

# **Unique Decision Making with Focus on Information Use**

**The case of converting to organic milk production**

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## Abstract

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This thesis deals with information use as part of the decision making process, when making unique decisions. The focus is set on the specific decision of converting to organic milk production. The thesis seeks to examine how decision making really is conducted in practice and not how it should be conducted. The study is assigned to the "analysis and choice" phase of the decision making process, in which the manager examines and plans one or several solution alternatives and makes a choice. After a literature review, three case studies were conducted, for which data was collected from interviews with milk producers. This information forms the basis for a model, which was tested quantitatively by solving simultaneous equation systems with the LISREL computer program. Data for the quantitative analysis was collected with a questionnaire, which was sent to both organic and conventional milk producers in Sweden. The results show that the reasons for converting to organic production differ substantially. Furthermore, different information sources are preferred in different situations. Most farmers wish to discuss a unique decision, such as converting, with someone in person before they decide. The value structure plays an important role in decision making, although the values differ substantially among producers. Those who converted in the early and middle 1990s mainly had an "ideology"-oriented value structure. However, in recent years converting farmers have had a more profitability-oriented value structure. In the quantitative analysis, seven simultaneous equation systems were analyzed and the estimated solution show several significant factors that seem to affect decision making. One conclusion is that future advisory services and tools should focus on the needs and demands of the farmers. Hence, it is important to focus on what is perceived as future threats and opportunities by the farmers. The threats and opportunities mentioned here are to a large extent the same as those matters, about which the farmers report that they lack information. These include uncertainty about future rules and regulations, impact of organic production on the soil, production results, starting time for organic delivery and economic matters.

*Key words:* farm management, learning, manager, farmer, decision maker, milk producer, milk production, LISREL, values, value structure.

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*To my parents:  
Monica and Jerker Lunneryd*

*If it wasn't for the last minute, then there wouldn't be much done...*

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# 1 Introduction

## 1.1 Background

Much research and teaching in farm management regards how farmers should make decisions and not in the actual decision making process. This is reported by March (1997), who concludes that “such research seeks techniques for improving the intelligence of actions”. Johnson (1987) argues that the concept of expected utility has been emphasized to the neglect of other aspects of optimization, such as problem definition, learning, analysis and other decision making rules. This lack of knowledge about how farmers make decisions may be one of the reasons that information, management services and tools are not being used by farmers to the expected extent (e.g., Batte, Jones & Schnitkey, 1990; Brunsson, 1985; Brytting, 1990; Davis, Bagozzi & Warshaw, 1989; Johannisson, 1992; Putler & Zilberman, 1988). (Johansson (1997) presents an additional explanation, though. He suggests that the managers in fact may not be interested in advisory service.)

It may also explain why farmers are not responding to policy regulations, production support or other institutional changes as expected, i.e., why they are not always adjusting production as anticipated by politicians and researchers, and why environmental policies and regulations very often have complex effects (Antle & McGuckin, 1993; Wossink, de Koeijer & Renkema, 1992). Knowledge about farmers’ collection and use of information seems to be especially lacking. These aspects are important and need to be studied in more detail.

Farmers need to make investments in production systems, which will be accepted by the society. It is therefore important to know how farmers collect and use the information that is available to them and how they adapt to the policy regulations that have and will be implemented. This knowledge would be valuable for the government, advisory services and for other organizations, companies, institutions and persons working with different types of farm and farm management assistance.

In previous research projects, the problem detection and problem definition parts of the decision making process have been studied (see Öhlmér, Brehmer & Olson (1997) and Öhlmér (1998), respectively). The findings suggest that more research related to data collection and information use is needed.

How is information collection included in the decision making process? What is the usefulness of knowing more about it? These and related questions are further examined in this thesis.

### *1.1.1 Theoretical background: a literature review*

The aim of this section is to more precisely define data and information collecting and their role in the decision making process and draw conclusions on what is known about the decision making process. This will make it possible to further

sharpen the problem to be examined in the thesis. It could also help to determine the importance of reaching the desired level of information.

Decision making is a central part in management, since the manager, almost whatever he (“he” is used synonymously with concepts like “he or she”, farmer, decision maker or reader, in the entire thesis) is doing, has to make decisions. However decision making is not necessarily equal to management, and consequently a manager does other things than making decisions. Eriksson & Wåhlin (1998) present management research as seven different schools. These are the classical, the individual oriented, the decision making oriented, the system oriented, the situation adapted, the activity oriented and the actor oriented schools. For obvious reasons, decision making is in the foreground in the decision making oriented schooling. Tasks involved in management, except decision making, include being a spokesman for the business and being a leader for the staff. Mintzberg (1973) in a famous study discusses this issue. He introduces the concept of “manager roles” and defines ten different roles for managers.

Since I regard the situation described above as a decision problem, I think that the decision making oriented school and decision making theories will help me to formulate, attack and hopefully also solve the problem in the present thesis. One always has to choose a focus, a way of attacking a problem, tools for solving the problem and a set of concepts with which to relate the results. This is one of my choices during the process of writing this thesis.

When reviewing literature about information collecting in the decision making process, an overview of the pre-existing literature is valuable. Many researchers think that decision making activities can be grouped into phases (Hogarth, 1987; Johnson, 1987; Mintzberg, Raisingham & Théorét, 1976; Simon, 1965). Several suggestions of a suitable division have been developed. Simon (1965) divides the process into three phases or functions: 1. intelligence, 2. design and 3. choice. Hogarth (1987) suggests a division of the decision making process into the following phases: 1. acquisition of information, 2. processing, 3. output, 4. action and 5. outcome.

Mintzberg, Raisingham & Théorét (1976) divide the decision making process in seven steps, namely: 1. problem identification, 2. searching for alternatives, 3. valuation of the alternatives, 4. choice according to formulated criteria, 5. authorization, 6. implementation and 7. follow-up. They mean that this division can be used within decision analysis, but that a general order of the different identified steps does not exist. Instead, the order seems to differ and depend on the situation and type of decision. Mintzberg, Raisingham & Théorét (1976) also claim that a specific order of the decision making steps could, in worst case, be misleading.

Kleindorfer, Kunreuther & Schoemaker (1993) divide the decision making process into six phases. These phases are: 1. formulation of objectives, 2. identification of alternatives, 3. prediction and inference (judgment), 4. evaluation, 5. choice and 6. legitimation and implementation. Each step is

carefully described and exemplified. Similarities and differences between individual and multi-person decision making are also pointed out and discussed.

In Öhlmér, Olson & Brehmer (1998), a conceptual model of the decision making process is divided into four phases. For each phase, a number of subprocesses are connected. The complete conceptual model is presented in table 1.

Table 1. *Conceptual model of the decision making process. Source: Öhlmér, Olson & Brehmer (1998)*

Phases	Subprocesses			
	<i>Searching and paying attention</i>	<i>Planning and forecasting consequences</i>	<i>Evaluating and choosing</i>	<i>Bearing responsibility</i>
Problem detection	Information scanning; paying attention	Forecasting consequences	Consequence evaluation; problem?	Checking the choice
Problem definition	Information search; finding options	Forecasting consequences	Consequence evaluation; choice of option to study	Checking the choice
Analysis and choice	Information search	Planning, forecasting consequences	Consequence evaluation; choice of option	Checking the choice
Implementation	Information search; clues to outcome	Forecasting consequences	Consequence evaluation; choice of corrective action(s)	Bearing responsibility for final outcome; feed forward info.

The four phases are: 1. problem detection, resulting in detection of a problem or not, 2. problem definition, resulting in choice of options for further development, 3. analysis and choice, resulting in choice of one or more options and 4. implementation, resulting in output consequences and responsibility bearing. Each of these phases consists of four subprocesses: 1. searching and paying attention, 2. planning and forecasting consequences, 3. evaluating and choosing and 4. bearing responsibility. The decision making process could be seen as a spiraling process where the different subprocesses return several times.

I choose to use the model in table 1 in the present thesis. I do this mainly due to four reasons. Firstly, it is a model that is quite recently published. Secondly, it is based on several other decision making models, thereby including many contributions from these. Thirdly, it has gained empirical support, qualitatively as well as quantitatively. Fourthly, compared to many other decision models, it is more detailed regarding information search, which is in focus in my thesis.

According to the model in table 1, information search appears in all phases of the decision making process, in the searching and paying attention subprocess. However, depending on the phase of the decision making process, the information gathered and the gathering itself appears differently.

The outcome of the “searching and paying attention” subprocess provides new knowledge about: (1) a problem, (2) causes of the problem and options to solve it, (3) consequences of options and eventually values of the consequences, and (4) forecasts of outcome. In the first phase, problem detection, the decision maker is scanning information, i.e., seeking in general terms, not searching for anything especially defined. However, in the second phase, problem definition, the decision maker is searching more specifically for alternative solutions to the problem. In the third phase, analysis and choice, the searching is further sharpened and the decision maker is searching information about one or more specific solution/s of the problem. In the fourth and final phase, implementation, the decision maker is searching for information about the outcome, i.e., clues to forecast the consequences of the decided and implemented action.

For the first two phases of the decision making model presented in table 1, submodels have been developed. These submodels include factors that are hypothesized to explain the problem detection and problem definition behavior. The models are developed as submodels in a larger project concerning the decision making process among Swedish farmers.

The problem detection submodel is described in Öhlmér, Brehmer & Olson (1997). The problem detection phase was modeled quantitatively in a recursive system of simultaneous equations using the LISREL computer program and data collected with a questionnaire sent to a sample of farmers. The statistical tests showed that the conceptualization of problem detection provides a reasonable explanation of this part of the decision making process.

The problem definition submodel is described in Öhlmér (1998) in a similar way as the problem detection phase. The statistical tests also showed that the conceptualization of problem definition provides a reasonable explanation of this part of the decision making process.

A problem is defined as a difference between a perceived and a desired situation. In order for the decision maker to actually detect a problem the consequences of the difference between the perceived and desired situation must also be evaluated as sufficiently serious. After having detected that a problem exists one has to define the detected problem in order to specify the problem and identify decision options. These options are evaluated globally and some are chosen for further analysis. In the analysis and choice phase, the decision maker is searching information in order to find factors affecting the problem, alternative actions, information needed to plan the actions and information about the consequences of the actions. Hence, it is both the consequences and the evaluation of the consequences that affect the decision maker. This is included in all phases of the model presented in table 1.

### *1.1.2 Problem formulation*

Recently, there have been important changes in factors affecting the Nordic farmers. Swedish and Finnish farmers have to adapt to the CAP (Common Agriculture Policy), which is also frequently changed. Furthermore, the WTO (World Trade Organization) agreement affects all Nordic countries. There is also a growing concern among consumers regarding animal welfare and environmental issues, to which the farmers must respond.

In order to meet the new requirements, the farmers may have to make investments or other changes that are costly to reverse. These are major and very important decisions, which largely affect the farm business. Such major decisions are not made often and can consequently be defined as unique decisions. To avoid changes that are unprofitable for the farmers and the society, it is important to understand how farmers collect and use the available information and how they adapt to the changes in the policy regulations.

To make the study manageable, I think it is preferable and even necessary to study a specific “case” decision, instead of unique decision making in general. By doing that I get a more well-defined study object. Thereafter, I intend to draw general conclusions regarding unique decision making. Though, I am taking into account that these conclusions may just be formulated as hypotheses regarding unique decision making in general.

One suitable decision to study in the present thesis would be “converting from conventional to organic production”. Converting to organic production is one way for the farmers to respond to new consumer requirements. For many it is an attempt to increase the profitability or adapt to other values.

In order to further sharpen this focus and make the study more manageable, the decision should be even more precise. Therefore it would be more suitable to study the decision making process of some specific conversion. One example is the decision of “converting from conventional to organic milk production”.

In Sweden, both the government and the dairy industry are interested in increasing organic milk production. The government has formulated a goal that 20 per cent of the arable land should be cultivated organically in year 2005. The demand for organic milk among the consumers has been rising consistently and consequently the needed number of organic milk producers is increasing. However, it has sometimes been difficult for the dairy industry to get enough milk producers to convert.

Despite that, converting to organic production is a decision that many milk producers have made recently, so there exists an empiric base to examine. It is also a decision that is still under consideration or forthcoming for several conventional producers. Therefore, the results of the present study could be expected to be valuable for many actors.

The process of making strategic decisions varies, among other things, with manager type, the nature of the problem and the knowledge situation. This study should give an insight into farmers' behavior, into a certain type of problem (converting or not) and into a relatively young type of dairy production (organic milk production).

Taken together, these factors support the choice of "deciding to convert to organic milk production" as a suitable decision to study in the present thesis.

This study would be a continuation of several studies on organic farmers' decision behavior (Michelsen, 1996; Østergaard & Lieblein, 1994; Schulze Pals, 1994, and others). These studies show that organic farmers attempt to *balance* conflicting goals and values to achieve a satisfactory level of income, security, leisure, etc., rather than trying to maximize any particular aim.

The farmers converting to organic agriculture require information on different topics, dependent on the changes in the production system. However, it is not only a question of delivering the correct data. It is also important to strengthen the farmers' ability to understand and relate this data to their individual situations and to convert the data to information.

Compared to conventional farming, most organic farms have a larger variety of crops and activities, and for this reason there is a greater need to manage the farm as a complex. In addition, the organic farmer is often more restricted in utilizing the local resources, which increases the farmer's need to balance the different parts of the production system. Thus, the farmers' ability to utilize the available data is related to the skills of interpretation and application, which can be described as the ability to "read" data from the outer world as relevant in a concrete situation (Nitsch, 1990).

In summary, the problem formulated in this thesis is that there is a lack of knowledge concerning information collection, information use and learning in the decision making process when making unique decisions. Since information is central in forming the basis for technological development and is important for the food requirements of the consumers and the controlling of food quality from the authorities, it is essential to know how farmers collect data, process data to information, use the information and learn from it. Knowledge about this would be a valuable clue in order to design the offered data and information to suit actual needs in a better way. How should information be offered and communicated to farmers in order to meet their need and demand? What information is needed? These and related questions can, at least to some extent, be answered in this study. There is now a cleavage between theory and practice. The specific unique decision that is studied is conversion to organic milk production.

## **1.2 Aim**

The aim of this thesis is to obtain a better understanding about information collection and use of information in the farmers' decision making process when

making unique decisions. Most emphasis is put on the specific unique decision of converting to organic milk production. This is a decision that is far reaching, but in principle reversible, and it may also be made in small steps. A farmer's experience from previous decisions of this kind is limited. The thesis seeks to explain how data is collected and transferred into information and how the information is used in the decision making process. This study will focus on the analysis and choice phase of the decision making process and relate it to previous research results regarding problem detection and problem definition (see table 1). The research questions are:

- What data do farmers acquire?
- How do farmers acquire data?
- How do farmers process data to information and use the information they get?
- Where and how in the decision making process does information collection occur?
- What factors associated with decision maker and the surrounding environment seem to affect the nature of the decision making process?

From the answers, conclusions are to be drawn about:

- How could information services, advisory systems and other management support systems help to improve farmers' information usage and thereby their decisions?
- How could advisory services be improved in order to fit the farmers' actual needs?
- How should efficient political measures for adaptation of the farming systems to, e.g., organic and sustainable production systems, be designed in order to have the expected effect?
- How could a mutual learning process between farmers, extension agents and researchers (i.e., from knowledge transfer to knowledge exchange) be facilitated?

Answers to these questions could be valuable information for the government, authorities, advisory services and for other organizations, companies, institutions and persons working with different types of farm and farm management assistance.

### **1.3 Demarcations**

Because of time and financial reasons, the step in the decision making process that is to be examined, is mainly the analysis and choice phase, described in table 1. This is also due to the fact that the problem detection and problem definition submodels already have been examined, (see Öhlmér, Brehmer & Olson, 1997, and Öhlmér, 1998). However, the obtained results will also be related to the former submodels. Searching and paying attention should be studied in one context, since the focus is to find out how farmers actually make decisions and not how they should make decisions.

The study is demarcated to the case decision of converting to organic milk production. The reasons for this are further discussed in the Problem formulation section, above.

## 2 Method

In table 2, a problem-structure continuum is presented, with respect to the problems that could occur for a manager. This presentation is used as a starting point for the method discussion in the thesis. Depending on the problem, different methods are suitable in order to solve the problem. As can be seen in table 2 the structure of problems varies along a conceptual continuum from well-structured to complex (Murdick, 1980). In well-structured problems the objective to be achieved is clearly defined, the variables and parameters are clearly identified, the procedure for solution is known and all required data are available. Complex problems are so ill-structured that they are not even defined. The problem solver must first define the problem amid a complex of symptoms and objectives. Data may be missing, inaccurate or unreliable. Each problem solver may define the problem - usually a cluster of related problems - differently. Finally, a specific procedure or algorithm for solving the problem is not known. Only a generalized method may be available as a guide. There may exist experts capable of solving complex problems within their area of expertise.

Öhlmér (1990) concludes that non-repetitive (i.e., unique) decisions require flexible access to:

- data
- methods to transform data into information
- knowledge (values, concepts, theories, models, etc.) to be able to use the information

and that non-repetitive decision problems often are semi-structured or complex. This is also the case for the problem formulated in this thesis.

In order to solve complex research problems, the first thing to do is to study and analyze the system in which the problem exists. Next, one has to step outside the system and ask what management's or society's problems are in order to make this system work according to the objectives. Then, the research is formulated that will provide the solutions to the problems.

If there is no known knowledge beforehand, the researcher has to start to develop concepts and generate theories. An explorative approach that uses creative processes is needed. When concepts and theories are developed, it is possible to formulate tentative hypotheses and test them qualitatively. The researcher may try to divide complex problems in several simpler, well-structured subproblems to be solved with the analytical approach. This is normally a process of many years and for complex problems we may never obtain the knowledge needed to reduce complex problems to well-structured subproblems (Öhlmér, 1990, after Nyström, 1990; see figure 1).



Table 2. *The problem-structure continuum. Source: Murdick (1980)*

<b>Problem structure</b>	<b>Methods for solving</b>	<b>Data</b>	<b>Anticipated nature of solution</b>	<b>Example</b>
1. Very well-structured	Known and specific	Known, available and accurate	Specific form of solution is known	Break-even analysis for a single product firm
2. Well-structured	Known, but alternative methods may be considered	Mostly known accurately, but some key data have a possible small error	Known, or alternatives known	Evaluation of capital equipment alternatives. Present value or discounted rate of return are alternative methods. Cost of capital and future operating costs are subject to error
3. Semi-structured	Methods for solving are known, but management judgment must use the technical solution only as an aid	Data known but quite imprecise or approximate	Not anticipated well	Plant layout for a multi-product firm using a variety of processes in production. Heuristic and trial-and-error approaches provide alternative solutions
4. Complex	Problem is limited in scope but difficult to formulate	Approximate, not complete, somewhat unreliable	Nature of the solution is only generally known	Development of a marketing program by a firm that has been losing market share for years because of poor marketing management
5. Very complex	Specific techniques or models not known. Only a general problem-solving approach is available	Approximate, incomplete, unreliable	Nature of the solution is not known	A firm is beset by a multitude of problems such as dwindling sources of raw materials, entrenched incompetent management, obsolete equipment, new aggressive competitors, shrinking credit and massive inventory problems

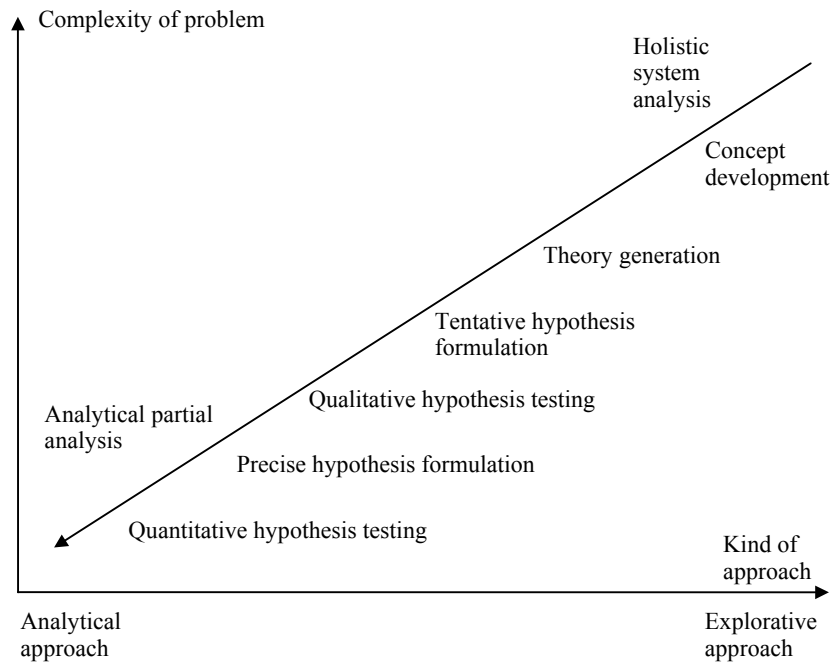


Figure 1. Development of knowledge in relation to complexity of problem and approach. Source: Öhlmér (1990), after Nyström (1990).

Following the discussion above, the first step to take in this thesis is to collect existing knowledge about information collection and usage, decision making and related fields. This will help to understand and obtain concepts to explain the data and information collecting and learning part of the decision making process. This, in turn, will help to collect relevant data in later stages of the study. In figure 1, the situation and step to take corresponds to concept development.

Based on the literature review, an introductory conceptual model of farmers' behavior in the analysis and choice phase of the decision making process is to be formulated, as a second step. To answer the research questions, more precise knowledge is needed about data, for which the farmers are searching, how they search for this data, how they relate the data to their current knowledge (i.e., convert data to information) and how they use the information in the decision making. This corresponds to the theory generation and tentative hypothesis formulation steps in figure 1.

As a third step, more precise concepts describing the behavior and the factors influencing behavior are needed. This could be achieved through, for instance, deep interview case studies of farmers making the decisions, or experiments with decision makers. Since the model describes a process over time, the case studies are most preferably longitudinal ones, because longitudinal studies make it possible to study the decision maker during a time period. Moreover, another advantage with longitudinal studies is that it is possible to make corrections if

some deficiency among the questions is detected, although a disadvantage with corrections is that we then lose the possibility to compare the results to earlier data. An alternative to a longitudinal study would be an experiment, such as a laboratory study with the aid of test persons. In this thesis, interviews are chosen because the empirical conditions are important and difficult to replicate in experiments (Woods, 1993).

Due to demarcations in time and resources, farmers who have made the decision and either converted or not converted to organic milk production are interviewed on one occasion in a retrospective study. (A longitudinal study would mean retrospective interviews of the same person repeatedly with a period of time between the interviews.) Questions are asked about what the farmers have done and then repeated why-questions are posed until the answers contain their highest goals or values. Questions are also asked about changes in their goals, values and life style. This procedure will reduce after-rationalization and give the best reconstruction of the farmer's memories.

The difference between the cases is to be maximized in order to cover the whole interval of the behavioral concepts and influencing factors. The outcome of this hypothesis-generating part of the study will be a conceptual model including relationships between the concepts, measurement variables, and their intervals and scales. This corresponds to qualitative hypothesis testing in figure 1. The interviews, interview technique, etc., are further described in the "Case studies" section, below.

The fourth step in this thesis, is to connect the introductory conceptual model to the results gained from the case studies and revise it to a "final" hypothetical model. This will be a hypothesis-generating part, which, in figure 1, corresponds to precise hypothesis formulation.

The fifth and final step is to quantitatively test the model developed in step four. For this part of the study, data is collected through a mail survey and the analysis is conducted through suitable statistical methods (see below). From the statistical examination, I intend to draw conclusions concerning the population. By doing this, generalized recommendations and advice regarding the research questions can be formulated. A quantitative analysis also makes it possible to test the significance levels of the independent variables obtained from the conceptual model. However, since the study is demarcated to the decision of converting to organic milk production, inference cannot be made to all unique decisions. Thereby the result can only be hypotheses about solving a more general problem. Below, a possible analysis method is presented, using simultaneous equation models (see, e.g., Greene, 1993; Gujarati, 1995; Sharma, 1996).

The vector  $\eta'$  ( $=\eta_1, \eta_2, \dots, \eta_m$ ) of endogenous variables represents farmer behavior and the vector  $\xi'$  ( $=\xi_1, \xi_2, \dots, \xi_n$ ) of exogenous variables represents the influencing factors. The endogenous variables are jointly dependent, and the variables and relationships form a simultaneous equation system. The farmer

behavior, as conceptualized in the endogenous variables, is formulated in the following system of linear structural relations:

$$\eta = B\eta + \Gamma\xi + \zeta \quad (1)$$

where  $B$  ( $m \times m$ ) and  $\Gamma$  ( $m \times n$ ) are coefficient matrices, and  $\zeta = (\zeta_1, \zeta_2, \dots, \zeta_m)$  is a random vector of residuals. The elements of  $B$  represent direct effects of endogenous variables on other endogenous variables. The elements of  $\Gamma$  represent direct effects of exogenous variables on endogenous variables. It is assumed that  $\zeta$  is uncorrelated with the exogenous variables. It is also assumed that  $I-B$  is non-singular, where  $I$  is the identity matrix. We get the matrix  $I-B$  when we move all  $\eta$ -variables to the left-hand side. None of the rows in this matrix should be a linear combination of another row, because then the rank of the matrix is reduced and it may not be possible to identify all parameters.

The latent endogenous and exogenous vectors are not observed. Instead, vectors  $y'$  ( $= y_1, y_2, \dots, y_p$ ) and  $x'$  ( $= x_1, x_2, \dots, x_q$ ) are observed such that:

$$y = \Lambda_y \eta + \varepsilon \quad (2)$$

$$x = \Lambda_x \xi + \delta \quad (3)$$

where  $\varepsilon$  and  $\delta$  are vectors of error terms. The equations represent the multivariate regressions of  $y$  on  $\eta$  and of  $x$  on  $\xi$ , respectively. The latent endogenous variables  $\eta$  are the concepts describing behavior, e.g., information search, and the observed variables  $y$  are the measurement variables, e.g., hours per week devoted to information search. The latent exogenous variables  $\xi$  are the concepts of influencing factors, e.g., farmer ability, and the observed variables  $x$  may be measurements of formal education. The errors  $\varepsilon$  and  $\delta$  are assumed to be uncorrelated between sets but may be correlated within sets.

The parameters are estimated with the aid of path analysis and the Maximum Likelihood estimator, using simultaneous equation modeling in the LISREL computer program. LISREL stands for LInear Structural RELationships and is actually a computer program for covariance structure analysis. It is a method suitable for solving structural equation systems with latent variables. Although there are several other computer programs dealing with this field, LISREL is the market leader (Diamantopoulos, 1994). Simultaneous equation modeling has been used in previous studies for estimating the submodels of problem detection (Öhlmér, Brehmer & Olson, 1997) and problem definition (Öhlmér, 1998). This method has also been used in several other similar studies with good results (see, e.g., Bagozzi, 1980; Rock et al., 1977; Warren, White & Fuller, 1974; Willock et al., 1999).

The LISREL modeling sequence follows an eight step procedure. These eight steps are:

- Model conceptualization
- Path diagram construction
- Model specification

- Model identification
- Parameter estimation
- Assessment of model fit
- Model identification, maybe resulting in a loop up to step one again
- Model cross-validation

The interested reader who wants further information about the LISREL method and its statistical features is recommended to study the manuals to the program (e.g., Jöreskog & Sörbom, 1989; 1993; 1996). In addition, the reader who is modestly interested in the details of the statistical features is recommended to read an article written by Diamantopoulos (1994). It provides a non-technical introduction into the basic concepts and issues of LISREL modeling, bearing the needs of a potential user in mind.

For an illustrative model of the path diagram part of the LISREL model, see Diamantopoulos (1994), p. 110. The eight necessary parameter matrices of a comprehensive LISREL model are presented and defined in the same article (p. 112). Simply put, the problem of estimation is that of finding values for these eight parameter matrices “that are consistent with the constraints imposed on the model (as described by the specification of the various fixed, free and constrained parameters) and ‘generate an estimated covariance matrix  $\Sigma$  that is as close as possible to sample covariance matrix  $S$ ’” (Diamantopoulos, 1994).

However, the LISREL method has been criticized due to some weaknesses. These weaknesses include:

- The LISREL method demands a conceptual model or hypothetical model or hypotheses in advance. Therefore it is not possible to develop a new model with the aid of LISREL. This in turn implicates that the connections between variables/concepts must be logical and realistic and also formulated in advance by the researcher.
- In the LISREL method it is difficult to handle dummy variables. It is possible but it demands a large number of degrees of freedom, which, in turn, consumes a great number of observations.
- The LISREL method has demands on the scales of the variables included in the model. The scales could be divided in nominal scale (categories which are not ranked, e.g. man, woman), ordinal scale (categories which are ranked, e.g., very bad, bad, neutral, good, very good), interval scale (distances between scale values are the same, definite zero point is missing, e.g., economic result of a firm) and quota scale (distances between scale values are the same, definite zero point is present, e.g., distance from population center). The scale categories are presented at an increasing level of attraction from a statistical point of view. When using the LISREL method, usually the interval and quota scales are preferred. However, it is also possible to use the ordinal scale.

In this study the model tested with the LISREL program is developed based on literature and case studies. I do not use dummy variables, with very few exceptions and these occasions are clearly marked in the text. (All measurement

variable definitions are found in Appendix C.) Finally, the scales of the variables are from quota scale, down to ordinal scale. No nominal scale variables are used.

Data for the analysis is collected with a questionnaire sent to a sample of farmers. The questions are formulated so the answer alternatives can be coded into a scale needed for covariance estimations. The answers on one question form one measurement variable. According to experiences from previous studies of the decision making process, around 200 observations are needed for the estimation. With a response rate of 60 per cent, around 350 questionnaires must be sent out. A more thorough presentation of the questionnaire and mail survey is found below.

## **3 Literature review - theoretical background**

### **3.1 Theoretical background**

The aim of this literature review is to summarize some of the current knowledge as described in the literature. The literature considers decision making, unique vs. repetitive decisions, information collecting and usage, learning and finally a review of literature about converting to organic milk production and the specific problems associated with that.

Johnson et al. (1961) conclude that there are many academic disciplines involved in studying managers and management. There are for instance economists, sociologists, psychologists, technical agricultural scientists, statisticians and political scientists involved, each having a different view and a different approach.

There is a broad range of literature about information usage and learning, with various approaches. For instance there is literature about what happens in the human brain physiologically when the individual is learning. There is also much literature about learning from a psychological point of view, as there is from a pedagogical perspective. However, much of the pedagogical literature has a focus on learning in relation to education and teaching, i.e., from the teacher's/educator's perspective.

In this study, I will regard learning as something that can and might occur, but not go into detail about how it occurs. This raises some suggestions of future research, which are presented in the final section of the thesis.

### **3.2 Decision making**

Some decision making literature was reviewed in the background section. There, I motivated my choice of using the model presented in table 1, as an instrument in this study. According to the demarcations, the analysis and choice phase is mainly examined, see table 3.

In the analysis and choice phase the decision maker collects information in order to be able to plan for and work up some of the solution alternatives, according to the model. In this phase the decision maker determines the consequences of each option and also evaluates the options, according to his values.

Two main theories about analysis and choice can be distinguished. These are utility theory and behavioral theory, of which both have been modified and developed into several variants. One example is the theory about naturalistic decision making, which originates from the behavioral theory (Klein et al., 1993).

Table 3. *Conceptual model of the decision making process, with focus on the analysis and choice phase. Source: Öhlmér, Olson & Brehmer (1998)*

Phases	Subprocesses			
	<i>Searching and paying attention</i>	<i>Planning and forecasting consequences</i>	<i>Evaluating and choosing</i>	<i>Bearing responsibility</i>
Problem detection				
Problem definition				
Analysis and choice	Information search	Planning, forecasting consequences	Consequence evaluation; choice of option	Checking the choice
Implementation				

If a farmer is thinking according to utility theory, he has a utility function for each of the consequences. Each function defines the utility of a single consequence, e.g., profit or own work. All utility functions are put together into a joint utility measure. The decision maker optimizes the utility. Uncertainty is present if the consequences are not known for sure. Uncertain alternatives are risky if their consequences change the well-being of the decision maker. The uncertainty affects the decision maker differently depending on the risk attitude.

If the utility theory should give rational decisions, consistent expectations and consistent preferences are demanded. They should also be mutually independent, i.e., what you want to occur must not affect what you think is going to occur. The concept of consistent expectations means that the subjective probabilities should follow the probability rules. The concept of consistent preferences means that the decision maker can present a consistent order for the preferences of the action alternatives. If the utility is to be maximized, it's required that all action alternatives, all consequences (and their probabilities) and the value of each consequence are known.

However, utility theory has been criticized. Time and information are treated as freely available resources. In practice, information search takes time and costs money. Empirical research shows that only a small number of alternatives and only a few consequences, which are related to only a few of the goals of the firm or decision maker, are taken into account and the judgments are relatively imprecise (Cyert & March, 1963).

An alternative to utility theory is behavioral theory, which can be summed into four basic concepts (Cyert & March, 1963): quasi resolution of conflicts, uncertainty avoidance, problemistic search, and organizational learning. Quasi resolution of conflicts means that decisions are made so that conflicts are neither solved nor confronted. Uncertainty avoidance indicates that the decision makers



try to change the surrounding world (or other prerequisites) in order to decrease uncertainty. Problemistic search means that the search after new alternatives or new information is motivated by a problem. Organizational learning implies that the managers/firms learn from their experiences.

If the farmer thinks according to behavioral theory, he has aspiration levels for each consequence dimension. The aspiration levels are then determined by the fact that the farmer wants to reach the same or higher output compared to earlier periods and that the farmer compares himself to firms, groups, persons, research results or information from advisors. For the uncertainty and risk that cannot be avoided, there is also a sort of aspiration level, i.e., a level that is not to be exceeded. That level is decided from the negative deviation that can be managed and by the risk attitude. The decision maker satisfies the aspiration levels in the choices included in decision making.

Another theory that deserves to be mentioned in this context is transaction cost theory. It arose from traditional micro economics, organizational theory and jurisprudence and could in principal be seen as a development of micro economic theory interlaced with organizational theory, where large consideration is taken into law. In transaction cost theory, the assumptions about completely rational human beings are relieved. Instead the concept “bounded rationality” is introduced (Williamson, 1975) which, after Simon (1968), is defined as “intentionally rational, but only limitedly so”. The reason for “bounded rationality” is, according to Simon (1968), the limited cognitive ability of humans, i.e., the way the human brain works. Humans do not have the ability to understand and mediate their entire complex surrounding world. Humans partly have a problem with surveying complex situations with many different possibilities and humans partly have a problem with communicating their actual knowledge.

Prospect theory (see Kahneman & Tversky, 1979), is another theory that is developed from utility theory. In short, it means that reality is reproduced in a more realistic manner and more “behavioral”. It explains how humans think and act in an uncertain situation. One important matter is that humans do not decide based solely on their self-interest and rational calculations. Values, feeling and rules of thumb are instead important for human decision making. A reference point is introduced. If outcome exceeds the reference point, this is defined as a profit and if the outcome becomes lower than the reference point, it is a loss. According to prospect theory, the utility function is steeper for a loss compared to a profit.

Daniel Kahneman received The Nobel Prize in year 2002 for his findings. The motivation to the Nobel Prize explains the contribution of the prospect theory. The motivation for his prize is: “for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty”.

Johnson et al. (1961) divide the decision making process into the following steps: 1. problem definition, 2. observation (both factual and in terms of value),

3. analysis, 4. decision, 5. action (alternatively, execution), and 6. responsibility bearing. These six functions are viewed as interrelated parts of a whole process which has continuity through time and is hardly divisible except for explanatory purposes. This can also be related to Mintzberg, Raisingham & Théorét (1976), who conclude that a general order of the different identified steps does not exist and instead the order seems to differ and depend on the situation and type of decision. Furthermore, Johnson et al. (1961) point out that their classification is just one among several alternatives.

What drives the manager to act, then? What motivates a decision maker to make decisions? Robbins (1992) defines motivation as “the willingness to do something and it is conditioned by this action’s ability to satisfy some need for the individual”. In other words, motivation is the “force” to satisfy an unsatisfied need. A need is, in turn, defined as “a physiological or psychological deficiency that makes certain outcomes appear attractive” (Robbins, 1992). The basic motivational process is presented in figure 2.

An unsatisfied need creates tension, which stimulates drives within the individual. These drives generate a search to find particular goals that, if attained, will satisfy the need and lead to the reduction of tension (Robbins, 1992). The drives correspond to the values of each individual, so values are closely related to motivation.

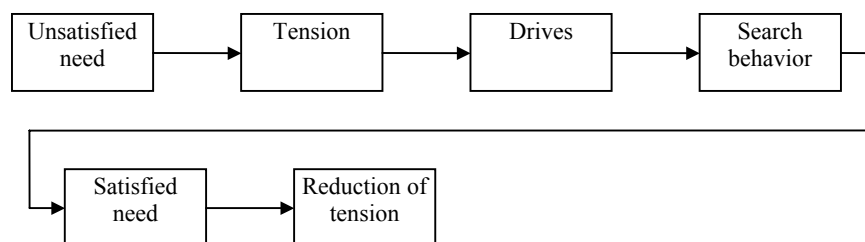


Figure 2. Basic motivational process. Source: Robbins (1992).

There are many theories regarding motivation. One of the more famous theories, formulated by Maslow in the 1950s, is “Hierarchy of needs theory”. It was hypothesized that within every human being there exists a hierarchy of five needs (see figure 3). These needs are:

- physiological - includes hunger, thirst, shelter, sex and other bodily needs
- safety - includes security and protection from physiological and emotional harm
- social - includes affection, a sense of belonging, acceptance and friendship
- esteem - includes internal factors such as self-respect, autonomy and achievement; and external factors such as status, recognition and attention
- self-actualization - the drive to become what one is capable of becoming; includes growth, achieving one’s potential and self-fulfillment

As each of these needs becomes substantially satisfied, the next need becomes dominant and the individual moves up the hierarchy. The needs were separated in lower (physiological, safety and social) and higher needs (esteem and self-

actualization), whereas lower order needs are predominantly satisfied externally (by such things as wages, union contracts and tenure) and higher order needs are satisfied internally. From the standpoint of motivation, Maslow's theory would say that although no need is ever fully gratified, a substantially satisfied need no longer motivates (Robbins, 1992).

However, recent research does not validate the theory, despite that it is logically appealing. For instance, little support is found for the prediction that need structures are organized along the dimensions proposed by Maslow, or the prediction that the substantial satisfaction of a given need leads to the activation of the next higher need (Robbins, 1992). Despite the fact that Maslow's hierarchy of needs has been widely criticized, it still plays quite a central role in explaining motivation. Maslow's hierarchy is to some extent used by managers as a guide toward motivating their employees.

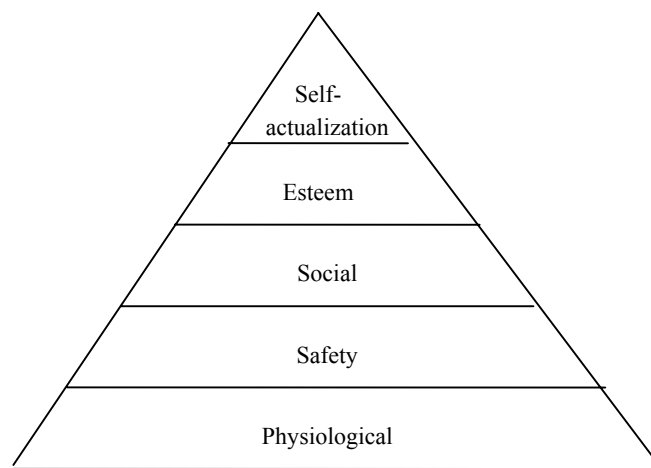


Figure 3. Maslow's hierarchy of needs. Source: Robbins (1992).

### 3.3 Unique vs. repetitive decisions

One division of decisions could be into unique and repetitive decisions, each further described in this section. Unique decisions are decisions that are made only once, concerning for instance a large investment. Öhlmér, Olson & Brehmer (1998) define unique decisions as "those decisions, which have not been faced before by the farmer/decision maker; usually unique decisions are strategic, but they could be operational". Repetitive decisions are decisions that are made several times, and consequently, following the definition above, *have* been faced previously by the decision maker, probably concerning a lesser matter.

The repetitive decisions often concern questions that by themselves do not have a major importance for the economic result of the firm. This does not imply that the repetitive decisions are unimportant, but that the single repetitive decision probably shouldn't risk the existence of the firm. It also does not make the repetitive decisions of less importance, compared to the unique decisions, since

the repetitive decisions are, according to their name and definition, made several times. Possible repetitive decisions could be which crop to grow on a particular field an actual year, how much hay and/or silage to give to a specific cow during the lactation or which tractor to use for a specific field work.

For repetitive decisions, the problem situation, alternatives and consequences are relatively well known since the decisions are repetitive, i.e., they are made recurrently. Only a few consequence dimensions are involved and these usually could be weighted to a common measure. The level of probable deviation from the expected value is most often acceptable. Since the same decision is made recurrently, it's more interesting to get as good a result as possible for the whole period, rather than in the single repetitive decision.

Highly repetitive decisions are often seen as well-structured problems. This means that methods for solving the problem are known, but that different methods may be considered. The data are also known more accurately, but some key data may have a small error. The anticipated nature of the solution, or at least some solution alternatives, are probably known by the decision maker. McShane and Von Glinow (2001) discuss the characteristics of these decisions, as they call "programmed decisions", further. They conclude that a programmed decision is "the process whereby decision makers follow standard operating procedures to select the preferred solution without the need to identify or evaluate alternative choices". Compare also to the problem-structure continuum, presented in table 2.

The unique decisions, on the other hand, most often concern large issues, which have substantial economic consequences. They are usually one-time decisions, which do not return, at least in the short run. The problem situation is most often new for the decision maker, which makes it difficult to find action alternatives, collect data, learn and evaluate the consequences. The long planning horizon also makes information more uncertain. The whole situation of the manager is affected, which makes it difficult to weight the many different consequences and the many different value dimensions together to a common measure of well-being. The level of probable deviation from the expected value is often very large and so is the level of the outcome. Since the decision is unique and made only once, the outcome of the single decision becomes very important. The manager must be sure that the business can manage a likely deviation from expected value.

Unique decisions in agriculture are often made under an investment process, such as buying additional land, investing in a new building, buying new machinery and adopting a new production technology. Farmers' machinery investments are studied for instance in Jacobsen (1996). The decisions are most often extremely important to farmers, since the effects are not seen in the short run (Ryhänen, 1995). They are usually long term decisions and concern permanent resources. Unique decisions are usually strategic, but they could also be operational (Öholmér, Olson & Brehmer, 1998). In addition, they are expensive and returns from investment will be gained over a long period of time. Thus, it is very difficult to predict the return on the investment (Ryhänen, 1995).

Using the classification of problem structure made by Murdick (1980) and presented in table 2, Öhlmér (1990) concludes that non-repetitive, i.e., unique, decision problems are often perceived as semi-structured or complex. This means that methods for solving the problem are known, but management judgment must use the technical solution only as an aid, or that the problem is limited in scope but difficult to formulate. The data are known but quite imprecise or approximate, or not complete and somewhat unreliable. The anticipated nature of the solution is not anticipated well or the nature of the solution is only generally known.

### **3.4 Information collecting and learning**

In order to understand the decision making process better, we need to know what information the decision maker needs, demands and uses and what information channels he uses. From this knowledge we can draw conclusions about how advisors and policy makers should design their information in order to make it available to the farmers. We also need to know how data collecting among farmers is conducted, how data is transformed into information and how the farmers learn from the information. Data are representations, mostly numerical, of facts and values. Information is data, which has been processed to a form that is meaningful for the user and is of real or perceived value for ongoing or planned actions or decisions. The difference between data/information collecting and learning is that the decision maker, when he is learning, saves the collected data and updates his mental models.

It is profitable to collect and process more data until the marginal value of the last piece of data/information equals its marginal cost. However, due to measurement problems it is difficult to use this rule in practice. The decision maker has collected enough information when additional information does not add anything further that is useful to him. This can be compared with theoretical saturation, which means that it is not meaningful to collect more data when nothing further is added to the existing knowledge with further information, data and answers. In scientific work, theoretical saturation means that you shouldn't continue to sample when: 1. no new or relevant data seem to emerge regarding a category, 2. the category development is dense, insofar as all of the paradigm elements are accounted for, along with variation and process, and 3. the relationships between categories are well established and validated (Strauss & Corbin, 1990).

It is also important to distinguish between need and demand for information. The need for information is the sum of information needed for goal formulation, control of goal fulfillment, decision making and other management tasks. The need for data is given by the need for information and the processing or interpreting models, because information is processed data or data that has some significance to the manager. For a demand of information to occur, the decision maker should: be aware of his/her need, be aware of the existence of possible information supply and understand the supplied information. The more aware of the need of information the decision maker is, e.g., by more developed mental models, the smaller is the cleavage between need and demand. Besides, the

benefits of additional information have to exceed the costs if a demand should occur. Hence, needed information is not always demanded.

Learning is related to information collecting, as was briefly discussed above. For the decision making models described above it is common that none of them involve learning as a step or stage in the decision making process except that Öhlmér, Olson & Brehmer (1998) conclude that learning occurs in all steps of the decision making process. However in the IMS study by Johnson et al. (1961), learning is included and studied.

Although learning is not the main focus in the present thesis, learning is closely related to information collecting and can occur as a result of it. The assimilation process is treated as a “black box” in the present study. The whole data collecting, processing and storing/assimilation is a better focus. This leaves what happens mentally at the time of assimilation of new information to the discipline of psychology. It is also to some extent a demarcation towards information technology regarding the design of the message. Though, these matters are also further discussed below as a suggestion for future research. However, taking these demarcations into account, I still think it is motivated to include some studies about learning in this literature review.

There are several definitions and models of learning. In the experiential learning theory (Kolb, 1984; Robbins, 1992), learning is defined as “the process whereby knowledge is created through the transformation of experience”. Robbins (1992) defines learning as “any relatively permanent change in behavior that occurs as a result of experience”. Another theory is the theory on social learning (Bandura, 1977), which emphasizes the reciprocal relation between people and their environment. Bandura (1977) defines learning as “a person’s assimilation of new information”. The assimilation of new information may result in a change in behavior, but all information may not have that result.

This conception of human behavior and acting neither casts people into the role of powerless objects controlled by environmental forces, nor free agents who can become whatever they choose. The two former learning theories provide a broad approach to analyzing and describing the farmers’ learning situation: on the one hand as creating knowledge through individual experiences (experiential learning) and on the other hand the learning process which takes place in larger social contexts (social learning).

The definition of learning as “assimilation of new information” is wider than the definition “any relatively permanent change in behavior that occurs as a result of experience”. Since the wider definition includes changes in cognitive factors, such as expectation and self-regulation, it is more applicable in studying unique decisions. Furthermore, unique decisions are decisions that most often have not been made before, so it is difficult to know which behavior is changed. Besides, it is difficult to have experience from something you haven’t done or decided upon before.

Therefore the definition in Bandura (1977), i.e., “a person’s assimilation of new information”, is more suitable when studying learning from unique decision making. This assimilated information may change behavior, but it may alternatively have only cognitive effects, such as a change in ability or risk perception. The processing and retrieval of information is illustrated in figure 4.

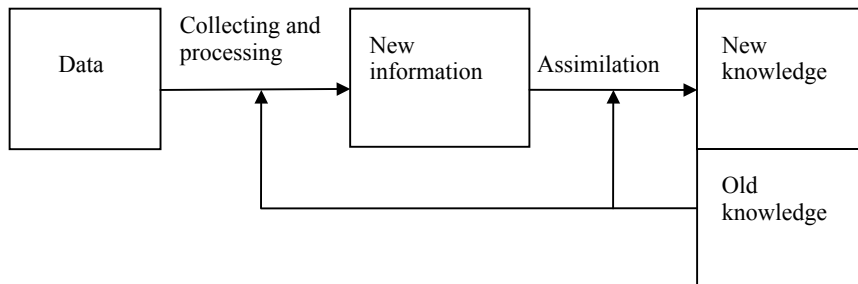


Figure 4. Learning as a person’s assimilation of new information. Source: Bandura (1977).

Humans observe data by comparing their observation with their expectation. It is a checking procedure. If there is a difference between observation and expectation, they pay attention to it. The observation has become information. They estimate the consequences of the difference, how certain the observation may be and evaluate if it means something for them and if they could use it. If so, they could assimilate it and memorize it, i.e., learn and gain new knowledge. A person can transform data that he understands into information, and he can assimilate the information that he can use to knowledge. The knowledge can be developed in loops where successively deeper knowledge is learned and tested/reflected in each loop. However, all data that is collected is not processed to information and all information is not assimilated. Hence, in figure 4, data and information is “lost” through different filters, such as repressing and rejection, during the assimilation process.

The model in figure 4 is also in line with the results obtained in Østergaard (1998). He refers to farmers’ learning as a transformation process in several stages. He concludes that the transformation process is an active and selective process and continues: “It never takes place per se, but is activated when the farmer is confronted with uncertainty or problematic situations in the daily work. The acquisition of knowledge depends on whether the information can be used to reduce the farmers’ uncertainty about a concrete situation. Through this transformation process, knowledge becomes an incorporated part of the farmers’ body of experience”.

Closely related to learning is knowledge, since when you learn you gain more knowledge. In the IMS study, Johnson et al. (1961) originally developed five knowledge situations, of which one is a learning situation. The five knowledge situations developed were:

- *Subjective certainty* - a situation in which a manager considers present knowledge adequate for either a positive or a negative decision.
- *Risk action* - a situation in which a manager regards present knowledge as adequate for making a decision and in which the cost of additional knowledge is exactly equal to its value. Risk actions may be either positive or negative.
- *Learning* - a situation in which a manager considers his present knowledge inadequate for action, in the sense that he is subjectively unwilling to decide and take the consequences for the errors which he might make and in which the costs of acquiring more knowledge are less than its value.
- *Inaction* - a situation in which a manager regards his present knowledge as inadequate for action and in which the cost of more knowledge exceeds its value. In this situation, no action is taken and no learning occurs.
- *Forced action* - a situation in which a manager's information is inadequate for him to be ready, willing and able to make a decision subject to the errors involved, but in which some outside force makes it necessary for him to act. Forced actions were regarded as either positive or negative.

Johnson et al. (1961) conclude that learning is included in the observation, analysis and decision parts of their classification of the decision making process and states that learning is a cumulative process. Hence, in appraising the value of the results of observing and analyzing, allowance must be made for the value of the "experience gained" as well as for the immediate value of the results.

One of the implications of the results of the IMS study was that yet another knowledge situation seemed to exist, namely involuntary learning, making it necessary to refer to the old learning situation as voluntary learning. Involuntary learning can be defined as a situation wherein the manager is subjectively unwilling to learn more since the costs of additional information equals or exceeds its value to him, but in which some outside force makes it necessary to learn, regardless of the volition of the manager (Johnson et al., 1961).

Although the IMS study was conducted in the 1960s, I have not found much farm management literature that includes learning as a part of the decision making process. This could indicate that the learning part of decision making is an interesting area of future research, worth examining further. The present study might help to identify some interesting future projects. This is further discussed in the section about future research, below.

A concept closely related to learning is perception. A person does not react on reality but on his perception of reality. Perception is a process by which a person receives, organizes and processes data inputs to his senses (Cooke & Slack, 1991). Another closely related definition is given in Ban & Hawkins (1988), who define perception as "the process by which we receive information or stimuli from our environment and transform it into psychological awareness". A similar definition is presented in McShane & Von Glinow (2001). They define perception as "the process of selecting, organizing and interpreting information in order to make sense of the world around us".



Different persons may look at the same thing but perceive it differently. None of us sees reality. We interpret what we see and call it reality. A number of factors operate to shape and sometimes distort perception (Robbins, 1992; McShane & Von Glinow, 2001). These factors can reside in the perceiver, in the object or target being perceived, or in the context of the situation in which the perception is made. Factors affecting perception concerning the individual perceiver, i.e., personal characteristics, include attitudes, personality, motives, interest, past experiences and expectations. Characteristics of the target being observed can also affect what is perceived, such as extremely tall, short, big, small, dark, light targets, etc. The context in which objects or events are seen is also important. The time, location, light, or any other situational factor can affect the attention.

The decision maker can learn from what he is able to perceive. According to Hogarth (1987) and McShane & Von Glinow (2001) the ability to perceive may be affected by:

- what we expect to see
- the time lag between action and outcome
- random variation
- type of action (or decision)
- treatment effect

It is easier to see and recognize what one expects to see than the unexpected. Learned concepts can be considered as cues for prediction (Hogarth, 1987). Moreover, in their information search, people tend to seek information that confirms rather than disconfirms their ideas. A long period of time between action and observation of the outcome makes it more difficult to learn something about the relationship between them, compared to a short period of time. Of course a random variation makes it more difficult to learn such a relationship and the bigger the random effect, the more difficult to learn.

The type of action (or decision) has importance. In some actions (or decisions) it is not possible to observe, i.e., perceive, the outcome(s) of the rejected alternative(s), while in other actions (or decisions) it is, e.g., through small scale attempts. For many unique decisions it is not possible to observe the rejected alternatives. It is, e.g., difficult to buy additional land or buy a new machine on a small scale, in order to be able to see the outcome. However, converting to organic milk production is, at least in theory, possible to do on a small scale. The treatment effect, finally, means that the chosen alternative is treated in order to improve the chances of success. The observed outcome is the result of both the original choice and the treatment (Hogarth, 1987).

Most judgments are the result of a number of comparisons with points of reference or cues. Originally, this was conceptualized by the psychologist Brunswik, in the “lens model” (see figure 5). The model contains two main parts; the actual outcome (or the “environment” side) and the person’s judgment (or the “person” side). Between them are a number of cues, or points of reference, “collected” in a lens. The person makes judgments about an uncertain event on the

basis of the different cues. Accuracy of judgment depends on the extent to which the relations on both sides of the lens are the same.

One part of learning is to improve the ability to predict consequences. That is conducted by improving the right side of the lens model, presented in figure 5, i.e., the mental model with the concepts  $x_i$  and the connections; the lines between  $x_i$  and  $y_s$ . Thereby the conformity with the left side in figure 5 is increased.

The lens model could be valuable when studying perception and decision making. Hogarth (1987) explains the lens model, and concludes that in the conceptualization of the process of comparing with the cues or points of view, Brunswik and his followers have been concerned with understanding the interrelations between two systems. One system is the real network of relations between cues in the environment and the event to be predicted. The second system is the network of relations between cues in the individual's mind and his or her predictions. The first system is the environment and the second is the model or representation of the environment in the person's mind that he or she uses for prediction. Accuracy of prediction therefore depends on the extent to which the model matches the environment, i.e., in terms of cues, relations between cues and between cues and the target event, as well as the relative importance of the cues (Hogarth, 1987).

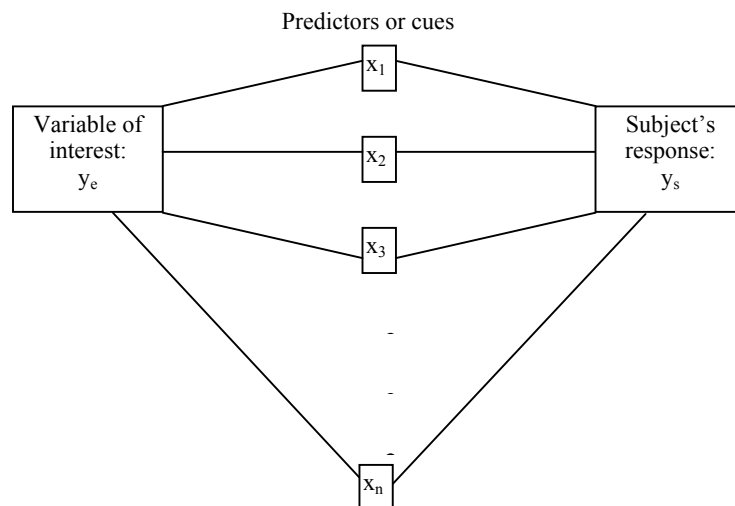


Figure 5. The lens model by Brunswik. Source: Kleindorfer, Kunreuther & Schoemaker (1993).

The importance of the lens model is to stress that: 1. judgment results from a series of operations on information that is related to other items of information or events, 2. such interrelations in the human brain have an analogue in nature, 3. judgment will be accurate to the extent that the individual's picture of reality and judgmental rules match those of reality, 4. Brunswik also stressed that judgment takes place in a probabilistic environment, i.e., the relations between cues in the environment and the target outcome cannot be represented by strict

functional rules; rather the rules are probabilistic, i.e., they are not exact in 100 per cent of cases, and 5. judgmental accuracy is a function of both individual characteristics and the structure of the task environment (Hogarth, 1987).

Above, I described and discussed the characteristics of repetitive and unique decisions. What could be learned from each decision type differs between the two decision types. From repetitive decisions the decision maker can learn facts and concepts, from the collected data, but also from the methods used in the repetitive decision. As an example, a farmer who is going to choose what crop to grow on a particular field could be used. The farmer probably knows from earlier years a lot about the soil and drainage of the specific field. He also knows facts about different crops and is able to match their suitability to the characteristics of the particular field. But the farmer also should know how to analyze the problem and how to choose among different alternatives, since he has done it several times before.

For a unique decision, however, the learning that could occur and become useful for future unique decisions comes mainly from the methods used. Since, according to its definition, the specific unique problem has probably not been faced before by the decision maker, he has probably not learned any useful facts from an earlier similar decision. However, methods used in earlier unique decisions could be valuable also in another unique decision. This could be exemplified with a farmer who is about to decide to buy additional land. He could probably be able to use at least fragments from an earlier unique decision such as, e.g., when he decided to set up a new building, in order to attack this new problem. What could be useful in this type of decision is such matters as the way of thinking and analyzing the problem, how to attack it further and where and how to search for more information.

In context of the increased scientific interest concerning practical management of a farm business, Söderberg (1997) investigates farmers' knowledge and learning, based on a literature review and four case studies. He concludes that much of the earlier research has focused on what/how farmers *should* learn and what kind of knowledge is important. Research of today is becoming more and more focused on what/how farmers *actually* learn and what kind of knowledge farmers consider to be important.

According to Söderberg (1997), the results show differences in the levels of farmers' actions, knowledge and learning. Some farmers are characterized by a high level of knowledge and learning, while others have a lower level. The learning seems to take place in a cyclic process, where the farmer reflects upon a concrete experience and thus forms an abstract way of thinking. The abstract conclusions are often tested through experiments and the results determine whether the conclusion is worth remembering. The knowledge is expressed through the farmers' actions. These findings are also recognized in Østergaard (1998), who concludes that "their knowledge in action is rarely verbalized, it is essentially expressed through practice and competence. This knowledge is kind of embodied knowledge, which is emerging out of the experiences gathered through

continuously making decisions and evaluating the outcome of actions in the farm management". Söderberg (1997) finds in his study that some farmers have an action based mainly on intuition, while other farmers' actions are based mainly on more formal knowledge and reflection.

According to Söderberg (1997), farmers' knowledge and learning have a cognitive as well as a contextual dimension. The interviewed farmers attach great importance to contextual and practical knowledge. Conceptions like "silent knowledge" and "instinctive feeling" agree with the farmers' descriptions of practical knowledge.

Söderberg (1997) concludes that there are some contradictions in farmers' learning. The farmer has to see details, as well as the whole. He must have a strong insight as well as a necessary distance to the action. The farmer has to have a certain trust in his knowledge to be able to act, but at the same time he has to be critical about his knowledge and impressions. The results of Söderberg (1997) also show the importance of attention, creative communication, interest and an adequate rhythm between active and passive work.

Factors influencing the outcome of learning are further described and discussed in Öhlmér & Lunneryd (1997).

### **3.5 Studies concerning the application area**

Farmers' decision making has been studied empirically by, e.g., Jacobsen (1994), Nyström (1996), Rustad & Romarheim (1994) and Sipiläinen (1994). Several studies have been conducted to survey the specific goals and values of farmers converting to organic farming. Some examples are from Norway by Østergaard (1998), Østergaard & Lieblein (1994), Vartdal (1993) and Vittersø (1997), from Sweden by Bergkvist & Fredriksson (1998), Ferguson (1995), Löf (1995) and Svensson (1991), from Denmark by Kaltoft (1997) and Michelsen (1996), from Germany by Freyer (1994), Rantzau, Freyer & Vogtmann (1990) and Schulze Pals (1994) and from USA by Blobaum (1983) and Wernick & Lockeretz (1977). In Switzerland, Schmid (1996) has studied the relation between organic farmers, advisors and researchers, and he has pointed at the possible support that the extension service could give to farmers in different phases of the conversion process.

Ferguson (1995) studies the selection of new technologies, of which one is converting to organic production, in case studies of three milk producing farms. He draws the conclusion that "the studied producers showed a selection process that was far more complex than a rational decision process, where technologies are selected because the expected returns maximize the expected costs". Psychological preferences, firm history and environmental conditions all contribute to the selection of a new technology. This is in line with the results in many of the cited studies in this literature review.

In order to analyze organic farmers' conversion process Østergaard (1998) conducted some comparative longitudinal case studies. He concluded that farmers' conversion to organic production can be described in five stages. These are: criticism of the current situation, search for new and better guiding ideas and models, the decision to convert, enthusiasm in the first part of the conversion and sobriety in the last part. The conversion could be described as a double phenomenon: a break with the past agricultural practice and a bridge towards establishing a new practice and a new life style.

Just as in many other studies, Østergaard (1998) found that the motivation for converting varies substantially. However, he found no clear trend in the change of motivations during recent years. Though, he has detected a tendency towards a more frequent view of converting as an exciting and stimulating challenge. This may at least partially be explained by the financial support that now is given to organic farming.

He continues with concluding that learning is an integral part of the conversion process. The farmers' development of practical skills and know-how, is characterized by intuition, experimentation, adaptation and information gathering (Østergaard, 1998). Learning is primarily based on solving problems in the day-to-day management and not that much towards gaining and producing knowledge, according to the results. This result was also found in Söderberg (1998), as reported above.

Bergkvist & Fredriksson (1998) studied factors of importance when facing the decision of converting to organic milk production. The study shows existing differences between organic and traditional milk producers and also differences within the group of organic producers.

The aim of the study reported in Bergkvist & Fredriksson (1998) was to determine which factors, risks, possibilities and values differ between traditional milk producers (fictitious converting decision) and organic milk producers (factual converting decision) when converting to organic milk production. The study also examines differences within the group of organic milk producers in their views of risks, possibilities and values. The aim was also to investigate how the organic milk producers searched for information before the decision and also to study how a milk producer in general wants to have new information presented. The study includes finding out sundry differences between the two main groups in, e.g., stage in life, education level and information situation.

The conclusions drawn from the results in Bergkvist & Fredriksson (1998) are that converting is still a choice of life style, which is in line with the results in Østergaard (1998), but that the economic factors are more important today than they used to be. If society wants to increase the acreage of organically cultivated arable land, the grants for converting should be increased even more, according to the authors. This conclusion is based on the result that the traditional farmers think that the risks with the decision of converting exceed the possibilities. The organic milk producers are mostly satisfied with existing information, but request

improved information about planting and animal keeping. The farmers primarily request a personal contact with advisors for presentation of new information, a fact that leads to the conclusion that still more resources should be invested in this area (Bergkvist & Fredriksson, 1998).

In a study conducted by Bergkvist, Lunneryd & Öhlmér (2001), milk producers' value structure is examined, using a simultaneous equation model. The producers are divided into two groups, based on the design of their decision making process. These groups are producers using intuitive (qualitative) vs. analytic (quantitative) decision processes. The results show that the value structure seems to differ between the groups, implying that the design of information and other advisory services should differ for different types of decision processes, in order to be efficient. Most information available today seems to be adapted for the needs of the analytical farmers (see, e.g., Öhlmér, Brehmer & Olson, 1997), while most farmers seems to be intuitive. These results are supported by the results in Bergkvist, Lunneryd & Öhlmér (2001).

According to Østergaard (1998) the question is not whether a decision or action is itself rational or not, but according to which values the decision or action is interpreted as rational. He ends with concluding that a discussion about how future agriculture should be is mainly a discussion about values and not primarily a discussion about rationality.

Since economic factors have been mentioned above, I will finally mention some recent Danish studies that examine the financial conditions for organic farming. Christensen & Frandsen (2001) present a broad economic perspective on organic farming. The consequences for the single farmer as well as the aggregated economic potential for the entire community are examined. The effects on different levels are aggregated and coordinated in order to draw conclusions on development potentials for organic farming in Denmark. They conclude that in order for organic production to expand, the products must be profitable in the long run and it must also be possible to export the products. Further discussion of potentials and future development for organic farming in general are presented in Jacobsen (2001) and Kledal (2000).

## 4 Description of organic milk production in Sweden

In this section, I present some background information regarding organic as well as conventional/traditional milk production in Sweden. Organic milk production is defined as “production according to the standards of the KRAV association”, (KRAV = Certification Body for Organic Farming, see below). The concepts “conventional” and “traditional” are used synonymously for milk production where fertilizers and/or chemical pesticides are used in the crop production.

Thereafter follows a short presentation of the development of organic milk production in Sweden, with focus on the Arla Foods geographical area in Sweden (Arla Foods is the largest dairy cooperative in Sweden, see map in figure 6). Finally, I present some of the specific rules associated with organic milk production that the organic milk producers must follow.

In April 17, 2000, Arla in Sweden and MD Foods in Denmark merged. The new company name became Arla Foods. However, in this thesis Arla and Arla Foods are used synonymously, since I describe situations both before and after the merger. Besides, the “Arla” name was used by the farmers who participated in the study. In addition, the merger and the new company name have no consequences for the issues studied in the present project and only farms situated in Sweden are included in the study.

The number of milk producing farms in Sweden is continuously decreasing, (see table 4). In 1934, there were nearly 155 000 milk producers and the number of farms were increasing. In 1950, it reached its maximum with nearly 268 000 milk-producing farms. Since then the number of milk producers has decreased substantially and today there are about 11 000 milk producing farms remaining.

The amount of milk delivered to Arla has increased during the 20th century, although the amount has been relatively stable since 1980 (see table 4). The number of cows has decreased steadily. In 1985 there were nearly 646 000 cows in Sweden (in farms with at least two hectares of land). In 1990 the corresponding figure was 555 000 cows and it has continued to decrease. In 2001 there were nearly 418 500 cows according to Swedish Dairy Association (2002).

From the figures above, it is obvious that the average size of the milk producing farm and the milk yield per cow has increased considerably during the 20th century and the trend does not show any signs of changing direction. This development is also seen in most other branches in agriculture in Sweden and many other countries at the moment.

Table 4. *Number of milk-producing farms and amount of milk produced 1934 - 2001 in Sweden. Source: Swedish Dairy Association (2002)*

Year:	Number of milk-producing farms:	Amount of milk (tons):
1934	154 533	2 498 378
1940	214 830	2 988 933
1950	267 793	3 912 727
1960	201 373	3 340 243
1970	84 716	2 752 122
1980	42 248	3 337 584
1990	24 786	3 432 479
1991	21 528	3 130 328
1992	19 839	3 133 061
1993	18 897	3 286 748
1994	18 048	3 356 961
1995	17 176	3 243 031
1996	15 913	3 258 281
1997	15 001	3 276 376
1998	14 174	3 277 514
1999	13 243	3 298 984
2000	12 168	3 296 747
2001	11 299	3 290 254

The average producer price for milk is presented in table 5. During the time period the producer price has not changed much; from 2.82 SEK (Swedish “kronor”) per kilogram in 1991 to 2.92 SEK per kilogram in 2001, in nominal prices. The figures are average prices in Sweden for all dairy cooperatives taken together. In addition, the producer costs have increased during the time period.

The price paid to each single farmer differs considerably. The prices do not include EU subsidiaries. As a general rule a farmer producing organic milk gets an additional payment of 0.50 SEK/kg (in addition to the price received by the conventional producers). EU subsidiaries, if any, are not included in the additional 0.50 SEK/kg.

From this perspective it is understandable that the farmers start thinking about other alternatives than continuing with conventional milk production. Obviously, many farmers have decided to cease milk production during the 20th century and the trend does not seem to change direction. However, there are also an increasing number of milk farm managers who have decided to convert to organic production. This trend does not seem to change, although the time period here is far shorter compared to the period of the overall decreasing number of milk farms.



Table 5. *Nominal producer price for milk in Sweden during 1991 - 2001. Source: Swedish Dairy Association (2002)*

Year:	Producer price for milk at 4.2% fat and 3.4% protein* (SEK/kg)
1991**	2.82
1992**	2.86
1993**	2.88
1994	2.88
1995	2.97
1996	3.05
1997	2.99
1998	2.97
1999	2.98
2000	2.98
2001	2.93

\* Prices are based on the decided base price for each dairy cooperative. The prices include final price adjustment, additional- and premium payments, additional fusion payment, additional quantity payment, environmental bonus, additional organic milk payment and quality price reduction.

\*\* Excluding quality price reduction

The development of the amount of organically produced milk weighed in is presented in table 6. The trend is an increasing production. According to Arla Foods AB Division Sverige (2001), their amount during 2001 was approximately 100 000 tons. The remaining 24 000 tons come from the other dairy cooperatives in Sweden.

Table 6. *Amount of organic milk weighed in during 1997 - 2001. Source: Swedish Dairy Association (2002)*

Year:	Amount of organic milk weighed in (tons):
1997	30 576*
1998	63 492
1999	77 683
2000	98 842
2001	123 814

\* During July - December

Although the time period is short, I present here a brief overview of the introduction and historical development of the production of organic milk in Sweden. Focus is set on the geographical area of Arla Foods in Sweden. As mentioned above Arla Foods is the largest dairy cooperative in Sweden and operates in the middle part of the country (see figure 6). Some milestones regarding the short historic development are:

- 1985: "KRAV" (= Certification Body for Organic Farming) was founded. KRAV is a key player in the organic market in Sweden. They develop organic standards, inspect to these standards and promote the KRAV-label, which is a

registered brand. Only the companies that have signed a contract with KRAV and is authorized by them may use the KRAV name and/or label on a product.

- 1989: the first organic subsidy was introduced by the government; 16 000 hectares arable land were converted to organic production (which corresponded to approximately 0.5 per cent of total arable land in Sweden).

- 1992: Arla signs contracts with the first 20 organic milk producers.

- 1995: a second subsidy was introduced by the government in order to stimulate more farmers to convert to organic production.

- 1996: approximately 200 milk producers are delivering organically produced milk to Arla.

- 1998: Arla recruits another approximately 100 organic producers. Approximately 20 per cent of the middle-fat milk sold in the city of Uppsala is organically produced.

- 1999: Arla formulates a goal of “at least ten per cent of milk for drinking shall be organic”. In their Environmental report 1998/99 they comment: “Sales of organic milk for drinking are increasing. In 1998 and the first half of 1999, 207 dairy farms were recruited for organic production”.

- 1999: Arla concludes that they “need to recruit another 500 farms”.

- 1999: Arla formulates a goal of “at least ten per cent of the milk weighed in shall be organically produced by 2002”, with an additional comment of “at least ten per cent of the milk that is used for the domestic market and market driven exports shall be organically produced by the end of 2002”.

- (April 17, 2000: Arla merges with Danish MD Foods and the new company name becomes Arla Foods.)

- 2000: Arla Foods has approximately 350 organic producers (May, 2000). A map showing how these are situated in Arla Foods area in Sweden is shown in figure 6.

- 2001: Government formulates a goal of “20 per cent of the arable land in Sweden shall be organically cultivated in 2005”.

- 2001/2002: the number of Swedish organic producers within Arla Foods is approximately 370 which corresponds to approximately five per cent of all producers in Arla Foods in Sweden (7500 producers in total). Of the total milk weighed in, the organic milk corresponds to approximately four per cent in the Arla Foods area in Sweden. This figure is also the percentage for Sweden as a whole. In total there were 11 299 milk producers in Sweden in 2001.

Figure 6 shows Arla Foods’ geographical area in Sweden with all the organic milk producers, as of 2000-05-05. They are well spread in the entire region.

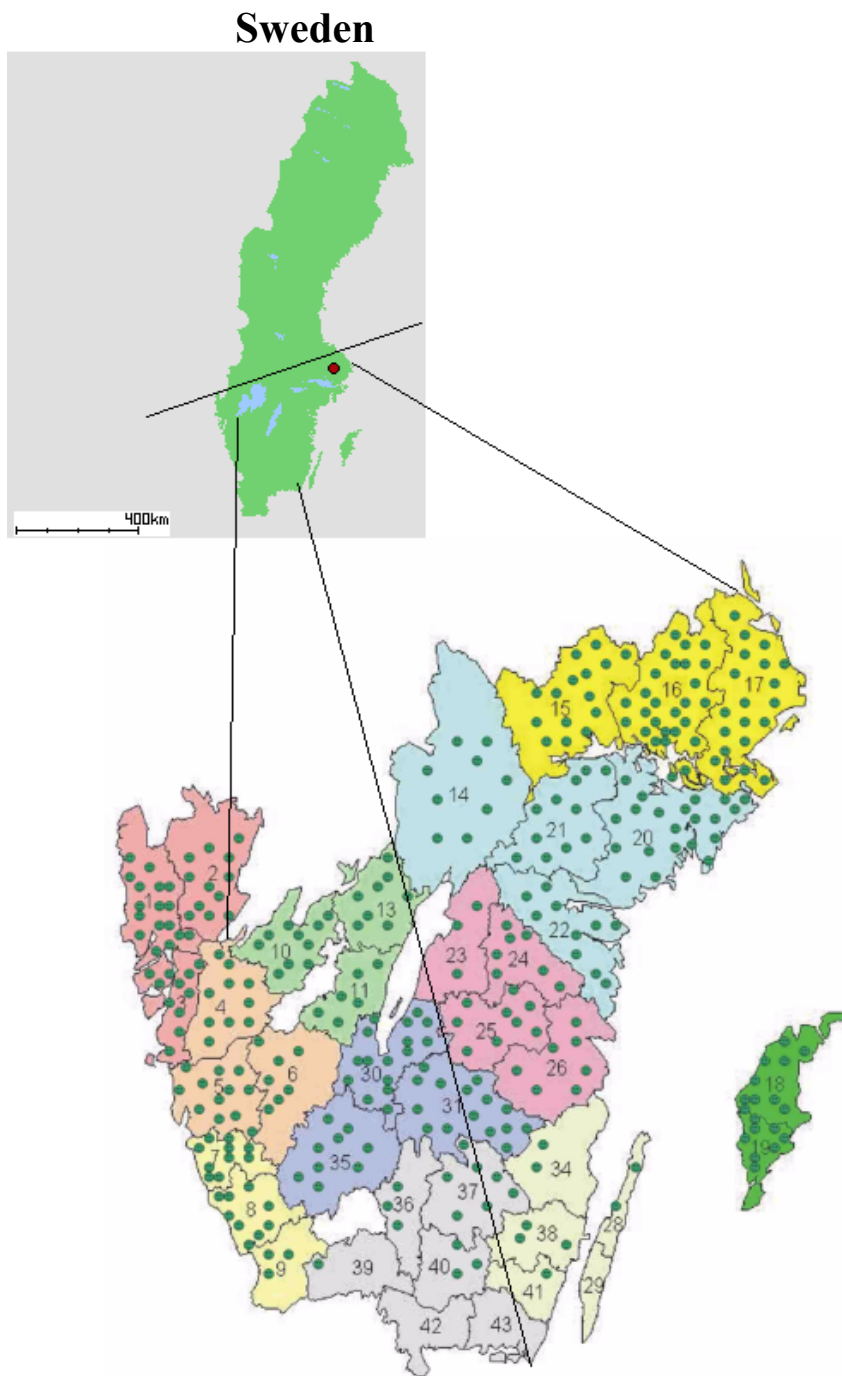


Figure 6. A map showing organic milk producers within Arla Foods geographical area in Sweden, 2000-05-05.

This is in itself a logistic issue and problem for Arla Foods, since the recruitment of new producers raises new demands on trucks and truck routes, dairy capacity in the surroundings, etc. Hence, it is a substantial decision for Arla Foods to recruit a new organic producer, since it results in a number of consequences. Arla Foods has not yet denied any farmer to convert to organic production, although the starting date for organic deliverance could be shifted a short period of time in order to gain an acceptable and suitable logistic solution.

The average organic milk farm today is larger than the average conventional/traditional one. It is obvious from the figures above that the production of organic milk has expanded considerably during the 1990s and that the subventions most likely have worked well in order to increase the organic production (compare to Bergkvist & Fredriksson, 1998).

The organic producers must follow some specific rules regarding organic milk production, of which some are presented here. It takes between one and three years for a farm to convert from conventional to organic. The required time is mainly due to the reorganization of the crop production. Once the farm has been brought into line with KRAV rules, it can be approved for KRAV production. Obtaining KRAV approval requires production to be inspected by the Certification Body for Organic Farming ("KRAV") to ensure that it is organic and that the farm complies with its rules.

Among KRAV's rules are the following (Arla, 1999; Arla Foods AB Division Sverige, 2001):

- At least half of the animal feed should originate from one's own farm.
- 95 per cent of the feed should be organically produced, i.e., without the use of fertilizers and chemical pesticides.
- Cows must be allowed to be outdoors for a longer period of the year, compared to what is required for conventional milk cows, if allowed by the weather situation.
- During the grazing period half of the animals' coarse feed (hay and silage) should come from pasture.
- Calves must be suckled from birth for a period of 3 - 4 days and then be fed on whole milk until they reach the age of ten weeks.
- The basic rule is that the animals should live their entire life on the same farm.

The dairy farm must also follow the requirements and guidelines that apply to conventional farms in Sweden. Often, these rules are more strict compared to rules in other European countries. For instance, antibiotics are not allowed on healthy animals, but only on unhealthy animals in order to cure ailments. The feed must not contain animal products and all cows must be pastured during the summer.

The converting decision that was made by the farmer must be set in relation to the societal situation at the time of the decision. In the beginning one can assume that it was more of a lifestyle decision, while it later on could have become more related to profitability, as was concluded by Bergkvist & Fredriksson (1998). These and other questions are examined in the remainder of the thesis.

## **5 Introductory conceptual model**

### **5.1 Introduction to the model**

Based on the literature review, above, I formulate an introductory conceptual model in the present section of the thesis. The introductory conceptual model is divided into three parts, each presented in a separate figure (figures 7, 8 and 9). This is due to layout reasons, which are further commented below.

### **5.2. An introductory conceptual model of the analysis and choice phase of the decision making process**

The introductory conceptual model presented in this section of the thesis corresponds to the theory generation and tentative hypothesis formulation parts of figure 1. Figure 7 shows the activities and figure 9 shows how the activities are supposed to be affected by different characteristics, such as of the farm and of the farmer. In figure 8, the information collecting and learning component is presented specifically. The introductory conceptual model is a result of the literature review and synthesis.

In figure 7, an introductory conceptual model of the analysis and choice phase of the decision making process is presented. The other phases are problem detection, problem definition and implementation, each presented in table 1. In the analysis and choice phase, data is collected and processed to information, i.e., data becomes meaningful for the decision maker, in order to plan and work up the options/solution alternatives. However, data and/or information may be stored in an external long term memory, such as on a piece of paper or in a computer, during data collecting and/or information handling. In this case the mental models could be updated, i.e., storing in internal long-term memory, although the details are kept in some external memory, such as on a piece of paper or in a computer. The details are then retrieved when the decision maker needs them. The information that is collected is supposed to affect the planning and forecasting of consequences of the alternatives that the decision maker discovers. The values are affected by data and information from many sources, including information sources that are not used specifically for the converting. This is marked with dotted lines in figure 7. In a similar way, the values are supposed to affect which information that the decision maker is collecting.

After information handling, the decision maker determines the consequences of each option and then evaluates the options according to his values. Possible values to be examined in the present study are, e.g., organic ideology, high profitability, time for being together with the family or spare time, ability to provide for the family on farm income and keeping the farm within the family.

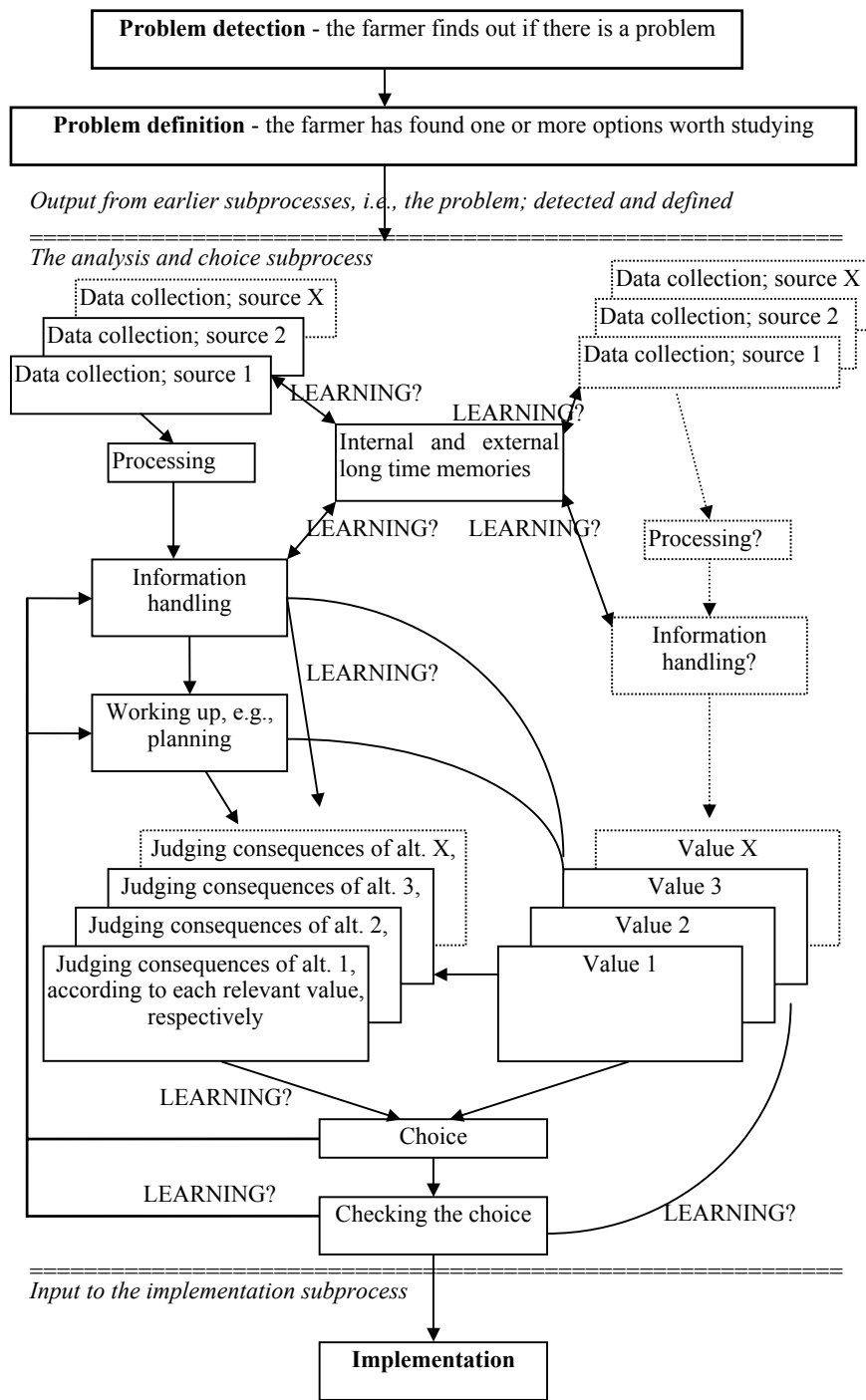


Figure 7. An introductory conceptual model of the analysis and choice phase of the decision making process.

The values are supposed to affect both the perception of the consequences of the options as such, as well as the choice that is made. One solution alternative/option has several consequences. The consequences of relevance are those with high value, such as the ability to pay bills in short and long run (e.g., liquidity and profitability), need of own work and risk level. Other options have other consequences in these dimensions. When the best (utility theory) or a satisfying (behavioral theory) alternative is found, that alternative is chosen. Checking the choice is the last part of the analysis and choice phase. When checking the choice, the evaluation could be changed due to the consequences of the chosen decision alternative. The process described in figure 7 might proceed in loops. Whenever new information is found, further data collection could start in order to plan and rework, which might be a continuous process. If the new information adds something, the plans/values/etc., may be reprocessed and perhaps revised.

Learning is supposed to occur in several places in the process. When the decision maker has collected information he can also store the information, i.e., assimilate it or learn. Learning could also occur when the decision maker finds out the consequences of each possible decision alternative, when checking his choice and maybe adjusting the plans for implementation of the chosen action. This may affect the values, information collecting and planning. In figure 8 the data collecting, processing and information storing, including learning, is illustrated.

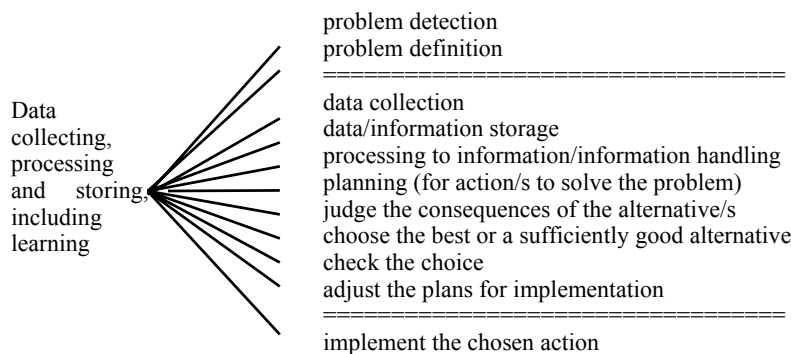


Figure 8. Data collecting, processing and storing, including learning possibilities with main focus on the analysis and choice phase of the decision making process.

A decision maker could learn a variety of things according to the presented model. One learning aspect includes being more attentive to changes in the business and/or surrounding environment, so a new problem might be detected at an early stage. It could also mean that the information search becomes more efficient and goal oriented.

Further on, learning could mean updated and better mental models for predicting consequences. If a decision maker has already made a unique decision, we could assume that he also has developed a better ability to analyze a similar forthcoming situation in this respect.

Learning could also affect values. For instance, additional knowledge about a production method could make the decision maker either appreciate some aspect of the method better or dislike it even more, thereby affecting the value structure. Hypothetically, using the example of converting to organic production, the farmer could have some thoughts about organic production in advance. He could disapprove of it due to the fact that he wants high economic profitability and has no ideological values. Producing according to nature, without chemical pesticides and fertilizers, might initially not be important at all to him. By collecting data and gathering information from different sources, he might find that it is good for the soil, thereby changing his values in a more ideological direction.

The evaluation methods could be further developed, i.e., a learning effect. Here, the aspiration levels and satisfying/weighing behavior could be affected and improved. The decision maker, when gaining more knowledge about a certain matter, may adjust his aspiration level or change the weight ratio between different consequence dimensions, thereby giving them a new importance in future decisions. The increased knowledge does not need to result in a change, though. It could just as well confirm that the former aspiration levels or weight ratios are still relevant and suitable for the decision maker.

Bearing responsibility, i.e., checking the result and receiving feedback, could also be changed due to a learning effect. After having gained additional knowledge, these functions may be developed further and refined.

Learning in the present thesis could represent increased ability in each of the aspects presented in figure 8. These include becoming more attendant on upcoming problems in the business, searching for possible and suitable solution alternatives in order to solve the problem, searching for relevant data, storing data and process it into information, using the information in a more efficient way in order to be able to conduct a better analysis of the problem, implying a better and more thorough and solid ground to make the choice.

The ways you could learn include different ways of collecting, storing and retrieving information. This could be conducted by own experience with, e.g., small-scale attempts, experiments and earlier decisions. It could also be a matter of gaining the experience from others. This experience could be gained by, e.g., reading articles in newspapers and magazines, listening to the radio, consulting advisors, observing others and talking to farmer colleagues. Former experiences and different kinds of education are an aid in this process.

As mentioned above, figures 7 and 8 show the decision making activities with focus on the analysis and choice phase. These activities might be affected by different factors. Examples of such factors are presented in figure 9. The total model is divided into three figures for layout reasons, since it is impossible to present everything on one page without each part being too small.

In figure 9, the factors are divided into four groups, named farm characteristics, farmer characteristics, environmental (institutional) characteristics and group



(social) characteristics. Characteristics in this figure mean “factors” not possible for the farmer to affect, at least not in the short run.

Farmer characteristics describes the farmer. Possible farmer characteristics are formal education, former professional experience, family situation and values.

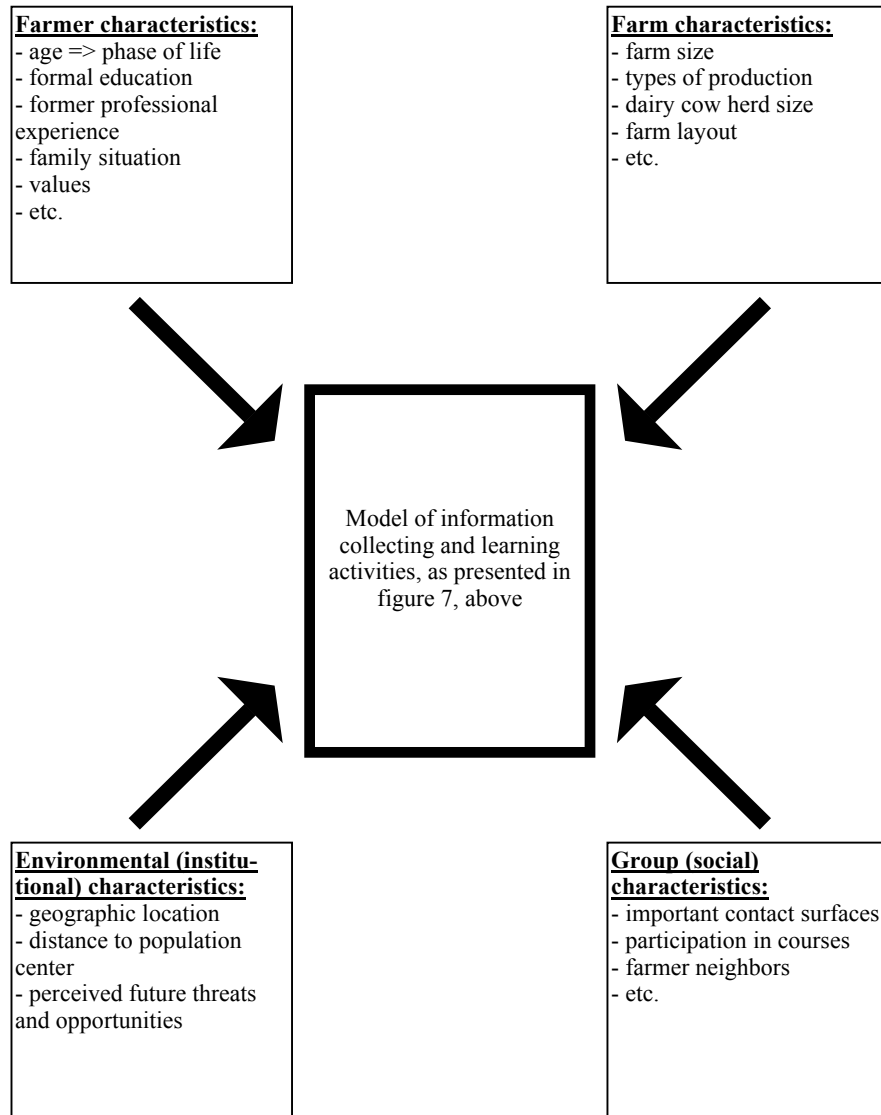
Farm characteristics concerns the farm as such, i.e., factors regarding the business. Possible farm characteristics could be farm size, types of production, dairy cow herd size and farm layout.

Environmental characteristics are factors regarding the world surrounding the farmer and farm. These characteristics include geographic location, distance to population center, i.e., market and information, perceived future threats and perceived future possibilities.

The fourth group in figure 9 contains group (social) characteristics, e.g., the availability of advisors, courses and farmer neighbors (see Bergkvist & Fredriksson, 1998).

For further information about the effect of characteristics on the decision of converting to organic milk production, see Bergkvist & Fredriksson (1998). There, a model is developed and tested with a logistic regression, describing differences in the search for information and between organic and conventional/traditional milk producers.

The model presented in figures 7, 8 and 9 is to be tested qualitatively in a number of case studies, which is the next part to be presented in the thesis.



*Figure 9.* The effect of characteristics of the farm, farmer, environment (institutional) and group (social), on information collecting and learning activities in the analysis and choice phase of the decision making process.

## 6 Case Studies

### 6.1 Introduction to the case studies

The case studies presented in this section corresponds to the qualitative hypothesis testing part of figure 1. The case studies aim at refining the conceptual model in figures 7, 8 and 9. The resulting model is then to be tested quantitatively. The end of this section contains a summary of the cases, where the main differences and similarities among the cases are presented.

### 6.2 Why use case studies in this thesis?

In order to examine a research question qualitatively, one could choose one or more of the three qualitative main method categories: document analysis, participating or non-participating observation, or interview.

The three main qualitative methods all include a wide spectrum of research methods within themselves. Coffey & Atkinson (1996) present a broad overview of the qualitative research methods at hand. Hammersley (1992) presents essays about different topics related to qualitative research methods, e.g., quality criteria, validity and presence of an objective reality outside the research object. For a detailed presentation of document analysis, see Scott (1990). Kvale (1997) gives a detailed presentation of the qualitative research interview.

In the present study at least two of the method categories, observation and interview, could be suitable from a theoretical perspective. Document analysis does not seem appropriate, though, simply because there are no documents about “information collection and learning when making unique decisions”.

From a theoretical point of view, it would be very interesting to observe a manager in the decision making process and see how he acts. It would be possible to see which information channels are used and the physical, social and environmental surroundings of the manager, at least to some extent. However, much of the decision making is conducted inside the manager’s head. The values of the manager are also not visible for an observer. Therefore, it would be impossible just to “observe” on the farm and see how the manager learns, since the effects are not necessarily seen in the short run, or even at all. The observation method would also demand a large amount of time and other resources.

One solution could be to use experiment as a research method. An experimental design could be to initially “measure” a person’s mental models in some specific field, such as view of incomes and costs in organic production, by asking questions. Then, more information could be served to the person followed by a new round of measurement, conducted as a new set of questions. A difference in the answers compared to the first set of questions could indicate learning. However, it would be difficult to make the experimental situation trustworthy and realistic in the sense that it could be difficult to make it look like real life

decisions. It is also difficult to cover all aspects of decision making in the experimental situation, as it of course would be in any research method.

The observation approach is therefore not perfectly matched to the research questions raised in the present study. It would also be very difficult to find managers who are willing to be observed during long periods of time.

Interviews seem to be the most suitable method to use in order to collect data to analyze qualitatively. The advantages of this method are that it is not too difficult to find interesting interviewees who are willing to participate and my own sufficient familiarity with the research method in order to conduct the interviews. Among the disadvantages is the risk of the interviewer effect, i.e., that the interviewee answers according to what he thinks he is supposed to answer and not necessarily according to the actual situation. Therefore, the following cases are based on interviews. The reason for choosing the three cases was that after these three interviews, the marginal value of additional interviews seemed to have decreased considerably because of theoretical saturation. After having conducted these three interviews I also thought that I had gained enough understanding of the problem of converting to organic milk production. Therefore, I thought that my own experience was good enough to develop a mail questionnaire.

### **6.3 About the cases**

As was mentioned above, three cases are included in the thesis. They all represent Swedish farmers and milk producers in the middle part of Sweden. Two of them (interviews 1 and 2) have converted from conventional/traditional to organic milk production. On the third farm (interview 3) they first decided to convert, but then regretted the decision and decided not to convert. I have therefore interviewed both organic and traditional/conventional milk producers. It means that all of the interviewed farmers have gone through the decision making process, although they have decided to act differently. In the quantitative part of the project (see below) the issue of target groups for examination is discussed further.

An aim of the case studies has been that they should cover as much of the differences between the farmers as possible. The differences regard both the characteristics of the decision makers and the conditions of the farms and their surroundings, all of which could be assumed to affect the decisions and the decision making processes. Some of the concept pairs which could be meaningful for the decision making process, and consequently are further examined in this thesis, are taken from Bergkvist & Fredriksson (1998). These include:

- converters - non-converters
- early converters - late converters
- important ideological factors - important profitability factors
- younger farmers - older farmers
- small business - big business
- short distance to most adjacent population center - long distance to most adjacent population center
- low level of formal education - high level of formal education

Of course the concepts in each respective pair could be combined, e.g., an early converter could be profit-oriented, young, have a small business, with a long distance to most adjacent population center and with a high level of education, etc., or any other combination. The choice of farmers to interview has been based on the criteria above, although I have received the names and addresses from Arla Foods. Therefore, one can argue that the choice of cases is biased in the sense that it is affected by Arla Foods. They may have chosen among those farmers that have a positive relation to them, in order to get positive comments and results in the study regarding how Arla Foods has acted. That may of course be the case, although I have not noticed any signs of this in my interviews. On the other hand, it should not necessarily be a big problem in this qualitative part of the study, since the aim of it is not to draw general conclusions regarding a population, such as milk producers, organic milk producers or farmers. In the present thesis, the aim of the case studies is to qualitatively test the results from the literature in order to develop a questionnaire. The choice of cases only within the Arla Foods geographical area probably does not affect the results of the study to any larger extent, since I want to study the decision making process as such and not the respondents' view of Arla Foods. Besides, in the interviews, the farmers expressed positive as well as negative comments about Arla Foods.

Permission to use an address register of milk producers was granted from Arla Foods. The milk producers were then chosen from the list and contacted by telephone and asked if they were willing to be interviewed. For time and financial reasons, all of the farms contacted were situated in a region of approximately 100 km distance to Uppsala, although with different distances to most adjacent population centers. This demarcation is not supposed to affect the result to any greater extent.

The three interviews were all conducted during spring and summer 1999. Two interviews were conducted after spring farming operations and one just after hay harvesting. This was due to the fact that those periods of the year should be less hectic for the farmer. Therefore the interviews infringe less on the operation of the farms. Hence the farmers were supposed to be more willing to accept participating in the project and also have patience to give complete and thorough answers during the interviews.

The interviews were conducted at a location chosen by the farmer. This meant at the homes of the farmers (interviews 2 and 3) and at a barracks near where the farmer was operating an excavator (interview 1). Besides the farmers, there were two interviewers present: a department colleague and myself. At the first interview there was also a second department colleague present, although the latter colleague was just observing and did not ask any questions. I have not found any discussion in the literature (Hammersley, 1992; Kvale, 1997) about the effect of the number of interviewers present. It can be assumed that the interviewee feels more uncertain the more interviewers there are present at the interview and that could of course have a strong negative effect. However, there are positive effects of being two interviewers as well (see below). In the present study I do not think that the

presence of two or three interviewers instead of just one has had any significant affect on the farmers' willingness to speak, or any other negative effect at all.

Since we were two persons interviewing, one of us could concentrate on the practicalities, such as operating the tape recorder and that we remembered to obtain all the necessary information. Instead, the other interviewer could concentrate on what the farmer said, raise additional questions and ask for clarification. During the interviews, these roles were changed repeatedly. One further very valuable advantage with having been two interviewers is the following analysis of the material. Despite the fact that the interviews are stored on a tape or some sheets of paper, or both, it is very valuable to have a colleague with whom I could discuss the interviews. These discussions are in themselves valuable pieces of analysis. In the citations of the interviewees in the sections below, I have not marked the names of the interviewers that asked each question. I do not think that the answers given by the farmers to any extent was affected by which of the interviewers asked the questions.

At the time of the interview, we informed the interviewee about the aim of the study, that all material was confidential and that the farmer was going to be kept anonymous in the continued process of the entire research project. Only the interviewers were going to be able to identify the farmers. Therefore the interviewees in this thesis have been given fictitious names and the geographical locations are not presented in any other way than that they are situated within a distance of approximately 100 km from Uppsala, as presented above.

Out on the two farms (interview 2 and 3) and in the barracks (interview 1), we offered the farmers to send a bill for their participation. Only one of them did so and the amount was negligible. After the interviews, each of the participants was given a small gift as an appreciation for their participation in the interview.

To the interviews, we brought an interview guide with prepared questions. This guide was also used, although additional questions were put in during the interviews, if necessary, depending on the answers given by the farmer. The ambition was to let the interviewee speak as much as possible without interruption from the interviewers. Therefore we let the farmer speak freely and also, where appropriate, stray from the original question. Instead, we came back to our questions when the milk producer finished one answer or by interjecting additional questions. Therefore the interviews can be regarded as semi-structured.

During all interviews we used a tape recorder. We did this in order to be able to concentrate on what the milk producer said and did, instead of concentrating on what to write. All of the interviewees accepted the use of this tape recorder, although they commented that it was "a little bit unpleasant with that machine" in the beginning. After a minute or so, they did not seem to notice it at all, though. The printing of the interviews has been conducted by a typewriting agency.

In order to present the raw material to the reader, citations are used frequently. By doing this the reader can get a clearer picture of the conclusions that are drawn.

However, to some extent the material has already been processed. First of all, the fact that the recorded interview has been written on a piece of paper is processing in itself. On one extreme one can argue that what is really the raw material is the situation at the time and place for the interview, i.e., what happened there and then. Naturally, this is difficult to duplicate in order to make it possible for the reader to draw his own conclusions. Therefore, we make print-outs.

The ambition has been to present the answers of the farmers as I received them from the typewriting agency. However, I have chosen to exclude certain items, such as swearing, coughing, hawking and disturbing moments, such as the telephone ringing and children interrupting. Also, some incomplete and/or incomprehensible sentences are excluded. The reason is that I assume that they in themselves do not add anything valuable to the interpretation of the answers in the interview. One further thing that is excluded is pausing, where appropriate.

One could argue that the exclusion of swearing, coughing, hawking, incomplete and incomprehensible sentences, pausing, etc., are in fact a processing of the material. In principal I agree with this, at least in many situations. However, in this study the aim of the interviews is to examine whether the results of the literature review seem reasonable, and based on that, develop a questionnaire for the quantitative part of the study. I cannot in that regard find that keeping the matters mentioned above will add anything to the study. This is also supported by Kvale (1997), who argues that unless the aim of the study is purely linguistic, there are no reasons for keeping such things as swearing, pauses and hawking.

The interviews were conducted by Swedish interviewers and the milk producers were all Swedish. Consequently the conversation was in Swedish during all interviews. Therefore the material has also been processed in the sense that it has been translated into English. In the choice of keeping the interviews in Swedish (i.e., more “raw” material, but not understandable for the non-Swedish reader) or translating it into English (i.e., more processed material, but understandable for the non-Swedish reader), I have chosen the latter alternative. The utility of more readers being able to study the material is considered to be greater than the loss in “rawness” attained by translating the interviews into English.

Except from what is described above, the citations are not processed to any extent. Below questions of the interviewers are marked **in bold** and citations of the interviewees are marked *in italic*.

In table 7, the three cases are presented according to the conceptual pairs presented above in this section. Table 7 is quite self-instructive, but some remarks deserve to be made here. Farmers AA and BB have both converted to organic milk production, while farmer CC first decided to do so, but then changed his mind and decided to remain as a traditional/conventional producer. This explains the “both” concept for farm C in table 7. He made these decisions recently and therefore he is marked as a “late” converter in the table.

Table 7. *Compilation of the three cases with respect to some characteristics*

Characteristic	Farm/er A/AA (Interview 1)	Farm/er B/BB (Interview 2)	Farm/er C/CC (Interview 3)
converter – nonconverter	converter	converter	“both”
early - late converter	middle	early	late
ideology - profitability important	middle	ideology important	profitability important
younger - older farmer	middle-aged	middle-aged	middle-aged (+)
small - big business	middle	small	middle (+)
short - long distance to most adjacent population center	longer	short	short
low - high level of formal education	middle	high + low	low

Their age is just about the same, although farmer CC is slightly older compared to farmers AA and BB, explaining the “+” sign on CC. The size of the business is approximately the same for farmers AA and CC with respect to amount of arable land, but farmer CC has more cows compared to AA, which explains the “+” sign for CC. Farm B is smaller than the other two, with respect both to crop production and milk production. Farms B and C are situated within ten kilometers from a population center. The corresponding figure for farm A is 30 kilometers. Finally, the husband on farm B has a low level and the wife has a high level of formal education, explaining the “high + low” in table 7.

The interviews are presented in chronological order following the names given to them in table 7. Each of the cases is introduced with a short description of the farmer and the farm. Thereafter, the interviews are commented and discussed, with a large amount of citations, which often are quite long. After these sections I compare the three cases and discuss similarities and differences between them. Finally, there are some additional remarks about learning and experiences based on the interviews.

## 6.4 Interview 1

Interview 1 was conducted with farmer AA at 3:30 p.m., Wednesday May 11, 1999, in a barracks near a building site. The interview lasted for approximately one and a half hours during a break in the operation of an excavator for building construction. This activity is a side income for the farmer, besides operating farm A. Present at the interview, besides the two interviewers and the interviewee, was also a third person who was a departmental colleague observing the process. This third person was however not participating in the interview itself, as was mentioned above.

Farm A is operated by a sister and brother (=farmer AA), and their husband and wife, respectively. The father and children of the managers are also involved in the farm operation to various extents. The farm business has been within the family since the beginning of the nineteenth century. The production on the farm consists mainly of organic milk production with a herd size of approximately 30 dairy



cows. Total acreage of arable land is approximately 130 hectares, of which own land corresponds to approximately 85 hectares. In the business, they also conduct contract work, which includes excavating for building construction and foundations. Since the brother and sister took over in 1990, they have reduced the usage of chemical pesticides and fertilizers in the crop production. They reduced the use of pesticides because they thought that it was unhealthy and that the costs of the pesticides were larger than their utility. Farmer AA's formal education consists of high school, machinery operator education and various courses within agriculture.

**Why did you decide to convert to organic production?**

*"It was at some change of government, here, it was at an election, the non-Socialist parties lost the election and the Social democrats came back in 1994. At that point of time the non-Socialist parties had introduced something between organic and conventional farming. You got half the organic subsidy and you, well, they would introduce special rules for spraying and use of fertilizers, so it was perfect for us. It was so easily to convert to organic farming; we handled those parts so easy. We were just about to enter into this middle way, but then we had a new government and then this proposal disappeared and it was then, then we sat there, how - what do we do now, then?"*

**Why did you decide that the proposal was an alternative for you? You said that it would be perfect; what would be perfect for you?**

*"We used to spray at a maximum of half of the acreage with chemical pesticides, did not use much fertilizers and had animal husbandry which was adapted; no slatted floor; we had removed the slatted floor the year before."*

**So, you were already almost into that system?**

*"Yes, all we had to do was to make a, well such a thing where you fill the field crop sprayer; a bio bed. That was the only thing we would have had to do in order to fit into that system."*

When the proposal was not implemented after the change of government in 1994, the natural action for farm A was to convert to organic production according to the KRAV rules. The decision of converting to organic production was therefore not that great, due to the fact that they had already, for a couple of years, reduced the usage of fertilizers and, above all, chemical pesticides. During these years they had learned how the soil reacts on a reduction of these additives. The decision was formally made in 1995 and they were ready to start delivering organically produced milk in 1996. However, since Arla had an overly large concentration of organic milk producers in the area, they had to wait and actually started to deliver in May 1997. When they were considering to converting to organic production, they contacted The Rural Economy and Agricultural Societies (Hushållningssällskapet) for advice.

**Did you consult any advisors before the decision?**

*"Well, I think that The Rural Economy and Agricultural Societies (Hushållningssällskapet) has been good. Well, in a way it was they who made us*

*weigh the advantages larger than the disadvantages, because at that point we were faced with a difficult choice. At that point of time they had subsidies so he /an advisor/ came here for a couple of days; that was the reason that made us convert to organic, at that point of time anyway. Since then, well, no, we just go on. Well, I am sure that one is supposed to have advisory service but we think that it works fine without it anyway.”*

**Do you use any type of advisory service now when you have converted to organic milk production?**

*“Not more than that I can phone and ask for advice if there is anything I wonder about, but nothing that I use on an annual basis from someone, no. Then we cooperate a lot with the neighbors, sort of, what one of us knows you check up, so that you get to know anyway. We take it in turns to take courses like that you could say, so then we transfer it to each other instead. We play indoor bandy during winters on Tuesdays and then, well, it is half time of indoor bandy and half time of farmer talk. Well, it is LRF, Federation of Swedish Farmers (Lantbrukarnas riksförbund) that manages that. It is quite nice. It is somewhat like a study circle, because then most things are ventilated.”*

It seems like some contact still exists between farmer AA and The Rural Economy and Agricultural Societies (Hushållningssällskapet). With this contact, AA can receive answers to questions that arise. The main sources of new information, however, are from farming colleagues and neighbors. The Rural Economy and Agricultural Societies (Hushållningssällskapet) was contacted at the point of converting the production, while the contacts with farmer neighbors had been established for a long time. The Federation of Swedish Farmers, LRF (Lantbrukarnas riksförbund) is also mentioned, but mostly as an actor that creates contacts between farmer AA and farmer colleagues. This is very much in line with the findings made by Johansson (1997). He concludes that there may be several reasons for a manager to consult an advisor. The reasons cover everything from getting an encouraging pat on the back, to getting obvious recommendations and decision support based on facts.

**On the eve of the decision to convert, where did you search for information?**

*“I read everything I could get; that was what I did; I read and then I talked to him /an advisor/ at The Rural Economy and Agricultural Societies (Hushållningssällskapet). That was in principle what I did and then I talked to our neighbors who had been associated with KRAV for quite a while.”*

**At the farm X (=a neighbor farm that farmer AA named earlier during the interview)?**

*“Yes, they had a great influence on the reasons for our converting, yes, since they had been doing it for so long and we saw that it worked for them.”*

**What information source was the most important?**

*“I guess it was a mixture; yes it was, but that much is clear; if farm X had not been organic at that point of time, I am doubtful that we..., so we did or they have*

*changed so much there so we have been there digging for very many hours each year so you do know exactly how things work and it works fine, so that was why I did not see any more considerable danger with it either; if they could we could!"*

**And then they knew what they were talking about when they answered your questions; they had tried everything with their own hands?**

*"Yes, they had done it and they converted when there were no subsidies for organic production. In the beginning there were no subsidies for the organic production; the first years they existed there was nothing extra."*

**So they converted solely on their own?**

*"Yes, there was an acreage, a small acreage subsidy of some kind or some crop support in the beginning, but nothing for the milk or something like that or nothing for the livestock."*

**When did they convert, your neighbors on farm X?**

*"As early as it was possible; well yes, there were organic farms earlier, because they had been completely conventional before, but something like in the middle of the 1980s, I guess."*

The neighbors on farm X seem to have played a crucial role in farmer AA's decision of whether to convert or not, since farmer AA could follow the development on farm X and learn from their mistakes. Farmer AA is probably taking farmer X for a good model. In addition, he contacts his neighbor frequently and cooperates with him, e.g., when excavating for construction, so one can assume that they have a good relationship. This information source seems to have been the best one for farmer AA, since he has been able to follow the development on farm X and, due to their intense contact, has been able to ask questions about matters that seem unclear.

**Was there something that you were missing when you searched for answers to your questions about the converting process?**

*"I am sure there was, however that is nothing I can say today, but I am sure there was. Nothing has been worse than what could be expected in advance. I think that any of our fears could come true, nothing has been that bad, if there is anything that has been that bad."*

On the question about whether there was anything missing before the decision, farmer AA says that as far as he can remember, there was no particular information that was missing. Consequently he does not remember having had a lack of information. It is easy to assume that the foundation for the decision was enough, due to the fact that no significant changes of the operation of the farm were needed during the conversion. This fact can probably be related to the close contact with farm X, whereby farmer AA received many valuable answers on his unclear issues.

**Well, we have already been talking about advisory services and that you were satisfied with the assistance from The Rural Economy and Agricultural Societies (Hushållningssällskapet), which played an important role for the converting decision; but is there any area in which you think that the advisory services could be improved?**

*“Well, yes, that should be within the crop production or these matters with different varieties and such varieties that are suitable for organic production. That is an area where advisory services are poor. We are using conventional varieties just as they are, but we are using those with lower protein demands but a bit more..., there should be some varieties that would work better during organic circumstances I think, but if they conduct such research, I do not know.”*

AA thinks that advisory services regarding crop production could be improved. The reason for the poor service in this regard could be that research about new varieties adapted for organic production may have been lacking to some extent. The contacts with the advisor should probably continue, also after the initial step of converting, in order for the farmer to receive answers to his questions.

**Will you keep the organic production in the future?**

*“Yes, as far as it looks now, we will do that. You become involved in it, it becomes a..., it is nice not to need to take out the field crop sprayer. Besides, we have become involved in buying some manure and slurry from a neighbor farm and we buy poultry manure; you are allowed to use manure from free range hens so the nutritional need is not a problem anyway, it works pretty well.”*

AA says that they probably will continue with the organic farming and relates that to the positive feeling of not needing to use chemical pesticides. He also points out that they have learned how to compensate, at least partly, for the lack of nutrients that has occurred due to the conversion. One conclusion is that the entire conversion probably is seen as a continuous process. New knowledge is continuously added in order to keep up the learning process. The difference between conventional and organic production in this sense is that organic production to some extent still is unbroken ground, where knowledge regarding efficient production still is relatively unknown.

**Now, after having made this decision; what have you learned?**

*“Well, I do not know, but I have learned at least something I hope. /laughter/. It is not wrong to venture a bit; it is a kind of development, yes it is. Looking now back in hindsight, it was quite fun to convert to this; and it has not been worse, but better and also offers a carrot to the conventional farmers who always think “those thistle growers”. /laughter/. That is an incentive as well! We are no sort of green wave in that part, instead we try to produce quite intensively. It is just right now that we do not force the cows so intensively, but that is more at the moment, but we do try to manage the other production branches quite intensively. It should look good, I think; well, that feels good.”*

AA mentions that the decision to convert has not meant poorer results. Besides, it has been a personal challenge and fun to show to conventional colleagues and

others that it is possible to have organic production on a farm without having the farm look like a “thistle farm”.

To summarize the experiences of interviewing farmer AA, he mentions several things worth examining further in the quantitative part of the study. For instance, he talks about early and late adopters and which information sources that were regarded as important for the decision. Here, he especially mentions some colleague and neighbor farmer who was taken for a good model and advisor. He also mentioned that he read all he could about organic production before he decided to convert. An important general information source was study circles. He regarded them as important even though he did not attend them all himself. Instead, he received information by talking to fellow farmers who attended the study circles. Also, the indoor bandy sessions were important. The aim of these events was at least twofold. It was partly a way to get information, but maybe even more importantly, it was a social environment and a time to relax with colleagues and friends.

Farm A is operated by farmer AA and his family, together with his sister and her family. Their father is also somewhat involved in the farm. The decision seems to have been made in mutual agreement and all of them seem to think that the current production methods are good and according to their values.

Farmer AA also mentions values several times during the interview. He clearly states that they were no “green wavers”. Instead their production is quite intensive, although without the use of chemical pesticides and fertilizers. He also points out the importance of observing others, in this case farm X. He did this for at least two reasons. Firstly, it was an information source that provided valuable knowledge to farmer AA. Secondly, he studied a colleague whom he took for a good model, according to his values. If the colleague on farm X did something, such as in this case converting to organic production, it would probably be worth considering for farmer AA as well.

Farmer AA also stresses that they already had begun to change their former production to some extent. The former government introduced a system that was attractive to farm A and they began to adapt to that system. When the proposal was withdrawn, they decided to convert to organic production. Then, it did not mean such a dramatic change of methods as if they would have started from pure conventional farming.

The governmental subsidies were important according to farmer AA. This can also be related to the green wave statement, i.e., the reasons for the conversion are not only environmental considerations, but also profitability related.

An interesting comment regards the advisory services: “Well, I am sure that one is supposed to have advisory service but we think that it works fine without it anyway.” Farmer AA probably answers the questions in the way he thinks is expected from him by the interviewers. On the other hand, he actually contacts an advisor now and then, but not to any larger extent. Instead, his colleagues are

regarded as very important information sources (as well as providing a good social environment). He mentions several times during the interview that he learns from them by observing them, by cooperating with them and by talking to them in different situations, such as during study circle presentations, indoor bandy meetings and ordinary day-to-day meetings.

One thing that became very obvious during the interview was that when we started talking about decision making as such, it became difficult for farmer AA to answer our questions. It was obvious that he had not thought about it in this way. "It was just something that we did without thinking on how", or similar formulations, was a frequent answer on our questions regarding the decision making process. This may not be surprising, although an important point in the design of the questionnaire. Hence, it is extremely important to be clear and concise in the formulation of the questions regarding the nature of the decision making process.

## **6.5 Interview 2**

Farm B is operated by family BB. The interview was conducted on farm B on Friday May 21, 1999. It started at 10 a.m. and it lasted for approximately two hours. At the beginning of the interview both the husband and wife were present, besides the interviewers. After approximately one hour, the husband had to leave the interview in order to assist the veterinarian who just arrived at the farm.

When Mr. and Mrs. BB started renting the farm in 1980 the production did not give a sufficient profit, so BB had to work outside the farm. The former tenant had, due to his age, let the farm fall into disrepair. Therefore, investments were necessary in order to improve the standard of the farm and to make it possible to manage the farm as an independent holding. In 1981 the family decided to start building up their stock of cows and did so by purchasing six dairy cows. Mr. BB was interested and had experience in crop production and machinery, while Mrs. BB wanted to work with animal husbandry. A couple of years prior to the purchase of the dairy cows she had finished her Master of Science in Agriculture. Mr. BB has a nine-year compulsory school.

The stock of dairy cows has expanded from six cows in 1981 to 21 cows in 1999. Their milk quota is 138 tons and during 1998 the average production per cow and year was approximately 7000 kg. The acreage of cultivated land is 58 hectares, including rented land. The cultivated land is dominated by clay and mull soil. During the first year, 1981, they used herbicides (chemical pesticides against weeds). They both agreed that they did not want to continue with chemical pesticides, since it did not coincide with their values. Organic milk production, on the other hand, did coincide completely with Mrs. BB's values regarding farming and she used to be engaged in the environmental movement.

Recently they decided to cease with organic milk production, due to low profitability and the required high amount of own work in the milk production. This decision is further discussed at the end of the interview. However, the

interview started with a question about the importance of economic factors for the conversion decision.

**Did economic factors affect your decision to convert?**

*Mr. BB: "At least we did some calculations."*

*Mrs. BB: "No, we had already started with organic farming a long time ago and our animal husbandry was so similar to the organic. The only thing was that we finally made a calving box because we had discussed that we should do that for a long time and then we made a calving box. But, these things with milk to calves and such things; we had already done that for a long time. There was a lot; well, it was not that big a conversion with the animals for us."*

They make clear that the economic factors were not that important when they converted to organic production. Mr. BB says that "at least we did some calculations", while Mrs. BB tells us that they finally made a calving box. The calculations statement seems to indicate that profitability was considered, although the phrase "some calculations" indicates that they were not very important. The latter statement by Mrs. BB is translated into an economic consideration. However, it was not a reason for conversion, but as a result and necessary action after conversion. The calving box naturally costs money and requires labor. An additional question regarding economical considerations was added.

**Did you make an economic calculation to check the result?**

*Mrs. BB: "It was just a bonus; we did not buy that much feed either, so we had a proportionately large acreage compared to the number of animals, so we have always striven towards being self-supporting to a major extent regarding feed. Besides, the first year you were allowed to use 20 per cent conventionally grown feed, so that was no problem for us anyway. So the money was just an extra payment, so, well, it was not that much to calculate."*

Since they had, in principle, already managed their farm in an organic manner and according to the rules set up by KRAV, economic factors were not that meaningful. Instead they regarded the extra payment that resulted from the conversion as a bonus that came with a more pleasant way of living and working. It was thus not a very dramatic or extreme step to make the conversion decision, since they in principle already had produced more or less organically.

**How did you judge the risks with the decision to convert to organic milk production?**

*Mrs. BB: "Yes, I guess we were not that old as we are today /laughter/. I think that it was the same driving forces; we did not consider risks that much and besides we already had so much, we had not used the sprayer for a long time and we did not have to consider if it would be more or less weeds. It was sort of the same thing and it was a successive conversion in crop production and animal husbandry. In the way we managed our farm it was just like we received a better payment for our production. So there was not much, I cannot see that we had anything to loose. We had already taken a large step just because we did not like the other methods, so, it also became better for us economically by and by, even*

*though it was tough on some fields some years, but it became better overall. It became even better when these organic subsidies were introduced. These first subsidies, which were introduced in 1989, were quite small, but when we were allowed to sell our milk as organic, it was a financial contribution. We have always tried to keep a margin, but the effect has been positive and we have cut costs in that way. We have had both the stick and the carrot dangled before us so we have really tried to get the result into shape. It is the same thing with the crop production; there we really have had to learn. We have been forced to become more proficient and that has not been a disadvantage.”*

Mrs. BB mentions that their risk-taking was small with the conversion and that they already had learned to successively handle the crop production according to organic principles. They made a real effort to gather information about crop production and they have learned a lot regarding how to cultivate the land in the best way in order to get the highest yields. Planning in combination with practical experience has meant a good profitability in their farming. The financial subsidies came as an additional bonus, after the time when they already had decided to convert to organic production, so the subsidies were not the reason for their conversion.

**One of you said that you contacted advisors before the decision as well as afterwards, did you not?**

*Mrs. BB: “I attended a course in crop production recently, it was YY /an advisor/ from The Rural Economy and Agricultural Societies (Hushållningsällskapet) who gave it. It was a great course; a one-day course about crop production, about organic production, and then there was a course quite recently; it was just at the time of spring farming operations, so we could not attend it. An expert would talk about weeds and their control in organic farming. It was arranged by “Uppland farmers” (Upplandsodlarna) but it was too late, so I guess there were not many participators at all. Then, during winter, there are some higher courses in organic farming given at Ultuna (Swedish University of Agricultural Sciences in Uppsala). I have thought about trying to find time to attend one; there has been a lack of time, though. The Rural Economy and Agricultural Societies (Hushållningsällskapet) have organic monthly meetings and they are really great and then there is a lot of information available. Every year they arrange field trips and then we have these study circles now and then. What is missing is still the research, well, research is not at the cutting edge line and the big agricultural organizations are still behind and, well, there are single persons, single actors. The Rural Economy and Agricultural Societies (Hushållningsällskapet) used to be at the cutting edge, because they had YY /an advisor/. She visited us at an early stage and then we phoned and asked for some advice regarding our conversion in 1989. Then we had contacts with the Biodynamic Association (Biodynamiska föreningen); ZZ /an advisor/, well he was highly experienced; he had been doing this for many, many years; he had been an advisor for biodynamic farms. I guess it was in principle they who were available then. ZZ was very experienced.”*

*Mr. BB: “ZZ came out here several times.”*

*Mrs. BB: “And YY used the knowledge that existed then regarding the conventional farming, I guess you could say, and adapted it to organic farming.”*



**So, YY and ZZ were pioneers within this field?**

*Mrs. BB: "Yes, I guess you could say that, well, there were single persons then, and The Rural Economy and Agricultural Societies (Hushållningssällskapet) in Uppsala has been at the cutting edge, because they have always had some advisor; one or several, that has been able to offer advice regarding organic production."*

It is obvious that the single "pioneer persons" (YY and ZZ) who were present at the time of the conversion decision have had a large effect on the information gathering and knowledge development of the BB farmers. These persons have also inspired BB a lot. Mrs. BB mentions that it is more the single persons acting within the organizations that were important for information collection, rather than the organizations as such. However, the only exception, if any, would be The Rural Economy and Agricultural Societies (Hushållningssällskapet). This probably should be seen against the background that farm B converted early and already was associated with KRAV regarding crop production, before associating the milk production with Arla's organic venture. The organic knowledge sources that existed during the 1980s were generally single persons within or outside different organizations.

**What do you think about research in organic crop production?**

*Mrs. BB: "Concrete advice about soil compaction problems is needed and maybe some simple way to control whether it is time to conduct field work now or not. Such questions I think are not highlighted at all. And we know by experience that we can hardly spread any manure during spring here on the clayey soils, but that we have to spread it during the autumn; but some more precise measurements or methods to decide things; well, that is still missing. Yes, on the soil surface there is more and more information, but under the surface I think that we still lack information. It is just the worms that have increased in number."*

Mrs. BB announces that there is a lack of research in certain areas and stresses that it has been focused on what is happening on the soil surface and not the reasons for what can be seen at the surface. Soil compaction in organic farming and its consequences are too little examined, she thinks. One reason could be that farm B has some heavy clay soils which easily become compacted, thereby reducing yield. A more general problem for organic farmers, compared to conventional ones, is that they have to drive the heavy tractors more on the fields in order to reduce the amount of weeds and this frequent driving results in soil compaction.

After this question Mr. BB left the interview.

**Was it after you reported your interest to Arla that you were invited to an information meeting?**

*"But nowadays, what is important today is this Arla seminar which they have once a year. Arla's research fund regarding organic production; those results are presented yearly at Arla's seminars during the spring. Then, very many organic*

*milk-producing farmers attend and others as well; that has been, well I guess it has been for two or three years now, then it will be arranged again next year."*

She mentions Arla's seminar about organic production as a very important information source today. The seminars also make it possible to make and develop contacts with other organic milk farmers. Farmers BB were among the first ones to become associated with Arla's organic production, which meant that they had a particularly intense contact with the persons responsible for Arla's organic milk production.

**What information sources did you use before the conversion? Which ones were most important; was it advisors, your own experience, newspapers and magazines, radio, TV or anything else?**

*"The most important source concerning animal husbandry is feed and there you can almost use the conventional knowledge, the only thing you do not know so much about is the composition of the roughage and such stuff. But the advisors have tried to make the farmers produce good silage for a long time now. Well, I worked with an advisory service myself, when I was at the county agricultural board. Roughage production and how to do and there I could use all ordinary information about roughage. Roughage is definitely the central factor in organic production and especially if you produce a good roughage; that is sort of the foundation of a good economic result. You must become aware about the importance of having a sufficiently intensive rotation and that you see quite soon."*

Mrs. BB interprets the question as the most important factor in order to succeed with organic production and not as the most important information source. She focuses on information content rather than information channel. However, she mentions some areas where conventional knowledge and sources can be used. These areas are available both as one's own experiences and in the information provided by assorted agricultural organizations. Problems arose mainly in crop production where conventional agricultural knowledge was not enough. Instead biodynamic knowledge existed and it was presented mainly as private counseling.

**How do you want to have information designed? What do you prefer if you search for some information?**

*"Well, we absorb everything, I guess, but there was nothing that was adapted for organic production in the beginning. So, I think it is very positive with these Arla seminars; they are great. They have developed the questions for organic production and present research and test results for organic production and related items in a highly interesting way. Then I have written some articles in the magazine "Organic Farming" (Ekologiskt lantbruk) for those that do not have the possibility to visit the Arla seminars. That is also a way to spread knowledge; we are members and also get the magazine and it covers everything regarding organic production. They inform about courses and conferences, seminars and so on. We also subscribe to a magazine by "Kultura - biodynamic association" (Kultura-biodynamiska föreningen), but their magazine is not that farm oriented. Then we get technical and practical information sheets. Organic Farmers (Ekologiska lantbrukarna) distributes one of them. I wrote a couple of information*

*sheets, dealing with animals and animal husbandry, concerning parasites. I collected data by talking to veterinarians and tried to gather all available information and then adapted it to organic production so to speak; to the conditions of the organic farm; that is what you have been forced to do before there were specific organic tests."*

**Do you use a computer in the farm, e.g., do you search for information on the Internet?**

*"No, we do not have a computer, but it is only a matter of costs."*

**You may have access to the Internet elsewhere?**

*"Yes, we do, actually, but I am not that impressed with the Internet, I must say. I am used to searching for literature in the Ultuna library (the library at Swedish University of Agricultural Sciences), so if I am searching for something about agriculture I am impressed by the librarian, and then they have this database search system which I in that case find much better compared to the Internet, because I find it worthless to search for information on the Internet /laughter/. You could spend any amount of time and then you still do not succeed in getting deep enough if you want something. I think that if you really search for something, then it is efficient to, then you should really go to specialists because they have most information in their head and what they do not know they know the title of and that must be the most efficient way."*

It is obvious that Mrs. BB is very active and intense in her information collection. It is also obvious that she wants to transfer her own knowledge to fellow farmers and others interested and also feels a responsibility to do so. She does this by writing articles. She uses both written (e.g., several magazines) and oral (e.g., advisors and experts) sources, internal (e.g., her own experience) and external (e.g., magazines, advisors, experts) sources, and communicative (e.g., study circles, magazines) and non-communicative (e.g., her own experience) sources, of which she expresses a positive judgment. Several times during the interview she stresses the importance of her own experience and that it continuously gets larger and larger as you try new things and learn from these. On the other hand she does not find the Internet useful to any larger extent when searching for information.

**Is there something you have learned from the conversion decision, which is usable for future decisions?**

*"Yes, well, if I should give some advice to farmers who are about to quit /conventional production, i.e., convert to organic production/, then I would advise them to do calculations and think it through and get all the available information there is and nowadays there is also information in another way. I would not advise them to do so, but on the other hand, well, if they feel convinced that they really want to do it; yes, but do it then, I would say, although I might say take it one step at a time or something like that. And then have a good advisory service, because there are many advisory services."*

Mrs. BB interprets the question as what advice she would give to potential beginners. Probably this is knowledge she has gained and that she herself would adapt on own forthcoming decisions. The result of the learning process itself is for her to consult an advisor and to do the conversion process stepwise in order to avoid major mistakes. It is worth noticing that she mentions the importance of doing calculations. However, they did not seem to do so to a large extent themselves when they decided to convert, although Mr. BB mentioned “at least we did some calculations”. It is possible that the ideological reasons dominated in the beginning and that they during recent years have become more profitability oriented. It could also be that other values may have become more important, such as the importance of having good health, having spare time and time with the children, or something else. These values may in turn demand a more profitability-oriented management of the firm in order to be fulfilled. Hence, it does not necessarily mean that the ideological values have become less important and that the profitability-oriented values in themselves have become more important.

**Actually, you have made three major decisions; first you decided to start with farming, secondly you decided to convert from conventional to organic production and thirdly you have just decided to quit organic milk production.**

*“It is based on emotions but it is also realistic; it is not hard to see that today it is difficult to obtain a good profitability with 20 cows and neither of us is fond of being alone with the cows. I guess that we have thought about it for a while, but the thing that made us decide to quit was that we had to give our relief service employee notice to quit two years ago and it is boring to have a farm without a relief service employee, even though we do have a guy that we employ ourselves now and then. He is not able to come here that often, though, and we cannot afford to have him here so often either. And then this, well, the children get older and older and they have other needs. They like to get away a bit and we also feel that we have had enough, well, we have had piece and quiet with family life and always stayed at home almost, and now it is time for something new and it coincides with that we can not afford relief personnel. Besides, it is difficult to be profitable and none of us wants to go alone, while the other earns money elsewhere. It also feels wrong in some way to work greatly underpaid, it is a bit unsound in some way; a society that has such elements. Besides, we have the uncertainty regarding the tenancy situation.”*

**For how long have you been thinking about quitting milk production?**

*“Consciously we have not thought about it that long, but we have had that feeling for a while. And then, one day, you feel that: no, now is enough, sort of; it sort of comes to maturity. But, at the same time I think it is good that you do not go too far with it; because then it could be half-and-half. Of course you should have a proper basis for your decision. If you start to feel wrong or right in something, then I guess you should take care of it and somehow make some sort of plan that we have decided to do; sort of: now let us get a new job, here, or something like that, and then gradually quit. Besides we have planned for this by using artificial insemination with beef cattle; we started doing that last year. But we knew that if we had trouble, we still could have kept the organic milk production and start*

*once again if we by no means could find anything else, but now it seems like it will work.”*

The reason for the decision seems twofold. Firstly, they have gotten their business into good shape, although they still have poor profitability. Secondly, the past years' uncertainty regarding the tenancy has diminished their enthusiasm. She mentioned that she recommended a new-starter to make a profitability calculation before conversion. At their own conversion the economic factors seem to have been of less importance, though, and the ideology values were dominating. However, in the latter decision, i.e., to quit milk production, it seems like the economic values have received increased importance. If the foundation of the decision is the decreased profitability, the size of the farm, the amount of working hours necessary or simply a wish to do something new, is difficult to determine. Probably all aspects are involved and have contributed to the decision to quit milk production. The learning process in this case may consist of an increased understanding that the business has to be managed with profitability in order to be sustainable.

To summarize: farm B is operated by Mr. and Mrs. BB. He has a nine-year compulsory school and she has a M.Sc. in Agriculture. They converted their farm early and they sprayed only during their first year at the farm, in the beginning of the 1980s. The conversion was thereby not that dramatic, but rather a small adjustment in their operations. Mrs. BB used to be involved in the environmental movement. Recently they have decided to cease milk production.

It is obvious that Mrs. BB has a very intense information collection behavior. At the time of conversion she absorbed all information that she could get. She actively took part in seminars, consulted advisors and experts, participated in courses, read various magazines and searched for information in a university library. It is worth noticing that she also seems to feel a responsibility to inform her fellow farmers and colleagues. She does this by writing, e.g., various articles and technical and practical information sheets. When she is doing that, she contacts different kinds of experts, e.g., veterinarians. Most likely her formal education (M.Sc. in Agriculture) has contributed to this ability and behavior. Mrs. BB is very interested in animals and that contributes to her writing. She writes about various items, such as organic farming, organic milk production and seminar summaries, but also about more specific items, such as parasites.

Mr. and Mrs. BB stressed the importance of single persons who really believe in what they do. In BB's case they met two persons who really believed in organic farming. BB contacted their organizations more in order to consult these people, than to use the knowledge of the entire organization. The importance of these "pioneer persons" is heavily stressed in the interview.

She told us several times that she sought research about what happens in the ground and with the soil, not just on the soil surface, but also underneath. According to Mrs. BB the lack of information concerns crop production.

One's own experience, knowledge development and learning are stressed several times during the interview. She does this by herself, without any of the interviewers asking specifically about it. However, it becomes harder to dig deeper into these items. After having formulated such questions, there was a tendency during the interview to change focus and answer something else. This is probably due to the fact that decision making behavior, learning and related items are not discussed as theoretical objects, to a large extent. Rather, the effects of them are considered. It is, however, obvious that Mrs. BB was more familiar with theoretical aspects compared to farmer AA, probably due to her academic education.

One interesting thing regarding their decision making process when they decided to convert was that they did not seem to do any thorough calculations before conversion, although Mr. BB said: "at least we did some calculations". However, he did not seem to really think that they were of much value for them. Mrs. BB does not mention this at all and does not comment on the statement of her husband. On the other hand, when we asked what Mrs. BB (Mr. BB had left the interview by then) had learned from the decision, she answered that she would seriously advise the forthcoming converters to really do thorough calculations. It is interesting to see overall that the value structure seems to have changed during the period of organic milk production. In the beginning there seemed to be pure ideological reasons for converting. Now, on the other hand, when they actually have decided to quit organic milk production, they do it for financial reasons. However, there are several factors, of which some are profitability related (they could not afford to have an employee on weekends, they think it is too much work for too little money, etc.), that coincide. Besides, Mrs. BB says that they have reached a stage in life where they want to try something new and their children and Mrs. and Mr. BB themselves would like to travel and be outside the farm a little. Obviously, there has been a displacement of their value structure during the period, from pure ideological dominance to a mixture of ideological and profitability-related values.

Many factors that are mentioned by farmers BB are the same as the ones that came out of the interview with farmer AA. Consequently, these are not repeated here.

Once again it becomes obvious that it is of great importance to formulate the questions in the questionnaire with a high amount of precaution. In particular this regards the specific questions about the decision making and learning behavior, although farmers BB actually seem to have thought a little about how they made their decision.

### **6.6 Interview 3**

The third interview was conducted with farmer CC, Wednesday July 28, 1999 at 1 p.m. The interview lasted for approximately two hours at farm C. Present at the interview was, besides farmer CC, a companion who joined the final part of the interview. The farm is operated by the two companions and they have one

employee. Earlier, they used to operate their own respective farms, but in 1993 they merged their farms and built a new cowshed. The production on the farm consists of conventional milk with a herd size of approximately 100 dairy cows. Cultivated acreage arable land is approximately 150 hectares of which their own acreage corresponds to approximately 130 hectares. The farms are owned separately by the two farmers, but the operation is conducted together in a joint-stock company. The smallest of the farms has been in the family since the 17th century. The farmers have recently been in the process of deciding whether to convert to organic milk production or not. They decided to convert, but regretted the decision and have now decided not to convert.

**When did you consider to convert your production to organic production?**

*“It was, well, this winter, during late winter 1999.”*

**Who took the first step; you or Arla?**

*“Arla informed us about their need of more organic producers and that was the case.”*

**And then you could register your interest?**

*“Yes, exactly.”*

**What affected your decision to convert to organic production?**

*“Well, it is sort of, what will the customers demand, well, because it is worthless to have a product that maybe nobody wants to pay for in the future; what will the customer demand? Because then, if you calculate on the entire environmental side, for the entire agricultural production, you could almost ask...; well, there are so many pros and cons then, on both sides, which you are going to include, and then, eh..., well, I can not say, but I think it is really uncertain how big the environmental gains are; if you use a lot more diesel oil in order to reduce the amount of weeds. Well, it comes back to that you have to be a very skillful organic crop producer, as well and that you have to get payment for what you are doing. You simply cannot do something just according to some sort of ideal.”*

**Is that not interesting for you?**

*“Yes, not to just keep on working and working and not get any payment for it; you have to get a salary for what you are doing!”*

**And you do want some spare time as well?**

*“Yes, that is the way it is and then you have to be certain that if you convert and then do that, then there has to be an economic improvement, it must not be a change for the worse.”*

They have until quite recently been in a process in which they should decide whether to convert or not convert to organic milk production, but for the present they have decided to wait and see and not convert. It is worth noticing that they just six years ago merged their farms into one production unit and that they then built a new cowshed. They should thereby have a large amount of fixed costs, which have to be paid, irrespective of the type of farming. Naturally, that affects

the decision making, due to the supposed decrease in willingness to take risks. The reason for their consideration of conversion on the whole seems to be that they see a change of consumption pattern regarding milk products. The environmental benefits are marginal according to CC, if one considers the whole, since organic production demands more soil cultivation and consequently consumes more fuel, thereby releasing more exhaust fumes. The converting alternative seems to be more of a wish to improve profitability than increasing environmental benefits.

**How did you gather information before the decision? What sources did you use?**

*“Mm, the thoughts on organic production were there and we listened then, listened to all information then, well, they were there from KRAV and some organic producers were there and they talked a little about rules and there were some people from the county administrative board as well. There were also people from Arla present and there we understood that the cows are to be fed mainly by pasture. Yes, then there is ATL; “Advertising magazine for Agriculture” (Annonstidning för lantbruket), and then there is the newspaper of the Member Livestock Cooperatives (Husdjursföreningen). Then there is one magazine called Business of Agriculture (Lantbrukets affärer) that I have been looking in.”*

**Do you know if there are any courses regarding organic milk production that you could attend?**

*“No, I do not know that.”*

**Is that something you think would be useful and would you have time to take such a course?**

*“Yes.”*

**You have not really let go of the conversion idea; you said earlier that you will wait and see?**

*“Well, you should not say no definitely; we will not give up on this one; we could not say that. It could be that it has to mature for a while.”*

**You are on standby for a conversion?**

*“Yes, I think you should be that, but first we want to feel safe about this feedstuff part and look more into it. Well, it has been so overwhelming in agriculture during recent years, since the beginning of the 1990’s you could say, and if you then; well, we have been farmers since 1974 and then you are sort of, well, it is not just to jump into something new.”*

Facing the decision of whether to convert or not, the partners attended a meeting arranged by Arla, in which persons from the county administrative board and organic milk producers also participated. CC also reads farm magazines, such as ATL “Advertising magazine for Agriculture” (Annonstidning för lantbruket), “Livestock” (Husdjur) and “Business of Agriculture” (Lantbrukets Affärer). These magazines sometimes contain articles about organic farming. The frequency of articles regarding organic farming has increased in professional farm magazines during recent years, in accordance to more and more farmers getting involved in



that type of farming. CC tells us that he has not attended any course and also has not known if there are any courses. We can compare this statement to the inaction situation described in Johnson et al. (1961). However, if the marginal value exceeds the marginal costs of more information in the future, he might be interested to participate in a course. He also mentions that it would be interesting. I cannot exclude the risk of an interviewer effect regarding his opinion about the usefulness of courses in the future, though. CC expresses that the 1990s, with its turbulence in agriculture, has made them feel more uncertain whether a conversion is the right thing to do.

**Facing the decision of whether to convert or not, was there anything about which you missed information and would have needed more knowledge?**

*“It is mainly how rigid you have to be regarding rules; maybe there was not a demand to have that acreage of pasture; it may have been sufficient to feed with organically produced roughage. Then one disadvantage may be gone.”*

**Did you conduct any calculations regarding the conversion?**

*“We should have taken one small step further, perhaps, and have calculated more thoroughly before we decided, it is possible. But those were the main reasons. And then we have to rebuild here, where the young cattle are now. They are on slatted floor now, they must have a bedded area and must have a cubicle.”*

**The rules may be changed to become more severe?**

*“Well, the rules have changed too. If you are going to spend a lot of money, then it should also be on something permanent. Yes, when you want to be certain, when it is such an enormous decision as it actually is, you really want to get some sort of guarantee, otherwise it is nothing that you can start with because it is a decision that affects the entire business, yes it is a very big decision.”*

Here CC mentions one of the most important reasons for their decision of not converting; i.e., the lack of pasture for the cows. Their entire available acreage of arable land today would be needed for the production of roughage, if they keep today's herd size. Another important reason is the investment needed for building. He also questions how the rule and regulation system works today and what it will look like tomorrow, i.e., he questions if the rules and the political framework at the time of decision will be the same as those at the time of organic production. They may have learned to be suspicious from an earlier major decision and therefore want to wait and see this time. It is obvious that CC mainly is focused on economic aspects and he does not seem to have any organic ideology-oriented values that are emphasized.

**Now, after having made this decision to wait and see, what have you learned from this that could be useful for forthcoming major decisions?**

*“Well, yes, well, it is quite clear that we must examine more before we say that we will convert, if we would start considering it again, then we will examine and investigate the situation better and more, you could say.”*

**What do you mean?**

*“Well, yes and preferably talk to the one that succeeds with organic production, then, and how he/she does in order to gather experience.”*

**From those, who already are involved in organic production?**

*“Yes, exactly, and then this guy I knew went to this course; he seems to be bright but not fanatic, so I guess that I should try to meet with him. In order to learn, one should also listen to others who are just about to start. But you should not listen too much to those who are sort of pure ideology zealots, I think, because there could be some who are and that maybe, well, that do not have that big herd size and who are not heavily indebted or so, who think: “well, it does not matter”, well, that does not work under pressure and then, well, I do not know how to say.”*

When CC looks back on their decision making process, he seems to have been missing important information regarding certain matters. A natural question to raise is whether the outcome of the decision would have been the same if this information would have been available. CC also mentions the farmer he met on their way to a course regarding milk production, irrespective of organic or conventional method. He stresses the importance of objective and not ideologically colored information. It is also obvious that for farmer CC, direct contacts with fellow farmers who have actually tried something in practice are important and that he values these contacts as a very valuable information source.

To summarize, farmer CC operates his farm together with his neighbor, who also is a farmer. They own their farms separately, but operate them together. They quite recently decided to convert to organic production, but regretted the decision and then decided to wait and see. Farmer CC mentions that they did not dare to convert, based upon the information they had gathered. They particularly did not trust the rules and regulations associated with organic production and feared that these would not be the same at the times of the decision and for starting organic milk production. They have invested heavily during the past years, so they have a large share of fixed costs, which could explain their risk aversion to some extent. The interests on the loans have to be paid, no matter how they get their earnings.

Farm C is bigger compared to farm A and B. Farmer CC's value structure also seems to differ to some extent, since he clearly stresses profitability as a reason for conversion. He also expresses his suspicion towards “ideology fanatics” and their reasons for conversion. He suggests that many of them may not be that heavily in debt, thereby implying that it does not matter that much if the economic result is not so high. Farmer CC wants to get paid for the work he is doing and he does not add any ideological values to producing without chemical pesticides and fertilizers. He questions the environmental benefits with organic production overall, by asking about how high the benefits really are when the organic farmers have to use more diesel oil in order to reduce the amount of weeds in the fields.

Farmer CC uses seminars, magazines and fellow farmers as information sources. He also attends courses about different matters. On his way to one of these courses he met a fellow farmer who produced organic milk and that was a positive

experience for farmer CC. This was an information source that he respected and valued high and wanted to further develop contact with in the future. Fellow farmers are an information source that is stressed as very important several times during the interview. He finds it very important to talk to farmer colleagues who really have tried something in practice. By doing this, farmer CC thinks that he can obtain more objective and thereby more valuable and usable information for his own decisions. On the other hand, he does not seem to value advisors that high, or at least he does not mention that during the interview. The fact that he does not participate in courses about organic production at the moment indicates that he perceives that the marginal cost of doing it exceeds its marginal value.

The final part of this section discusses some similarities and differences among the cases. In addition, it forms the basis for the forthcoming quantitative section of the study.

### **6.7 Similarities and differences among the cases**

The interviewee's notations from above are kept also in this section; i.e., farmers AA, BB and CC on farms A, B and C, respectively. The concepts ideologically and ideological values are used synonymously for organic ideology and organic ideological values, respectively, in the text.

The reason for their conversion varies. It is clear that for BB the ideological values were dominating. This is more obvious for BB compared to the other two. CC on the other hand reasoned purely with profitability values and no organic ideological values at all. He even questioned the environmental benefits with organic farming and several times during the interview stressed the importance of profitability. There were also economic/financial reasons that made them regret their decision and instead wait and see and continue with conventional milk production. AA is situated somewhere in between BB and CC regarding profitability values vs. organic ideology values.

It is difficult to see the connection between the learning process and ideological/profitability values. Values are not changed so easily, but, e.g., farmer CC may change his belief about the profitability of organic production. There may be a difference in what is learned for different types of farmers. An ideologically focused farmer may focus more on which environmental benefits may result from the conversion, while a profitability-oriented farmer is focusing more on the financial results.

If we arrange the farmers in order of conversion, we see that farmer BB was first (pure organic ideology values), followed by AA (both organic ideology and economic profitability values) and lastly CC (pure economic profitability values). Though, according to these three cases we see that the ideological values dominated in the beginning of the period, but have gradually been transferred into economic profitability values. On the other hand, these are just three cases, which have not been chosen randomly and are not necessarily representative of all milk producers that converted at these periods of times. Therefore it is not possible to

draw any general conclusions regarding the population based on these cases. However, in earlier quantitative studies this result was found as well (see, e.g., Bergkvist & Fredriksson, 1998).

One interesting observation is that farmers BB, who converted on purely ideological grounds, have now decided to quit the organic milk production. However, they did not quit based on their ideological values, but rather on their profitability values. There may have been a change during their life, from pure ideology, to a substantial proportion of economic thinking. Farmer CC also says that “we have been farmers since 1974 and then you are sort of, well, it is not just to jump into something new”. During the latter stages of life, one may be more avert to risks and maybe cannot “afford” to follow one’s values if these values do not coincide with the financial requirements.

All of the interviewed farmers had tried organic farming on a small scale before the total conversion. Such small-scale experimenting seems to indicate both an amount of precaution, i.e., risk aversion, and a willingness to learn new things.

There are differences in the information collection facing the conversion decision for the three farms. There was also a difference in the amount of information that was gathered before the decision. All three had been contacted by Arla and attended Arla’s introductory meetings, even though BB had more intense contacts, due to the fact that they were among the first milk producers to convert. They also felt ideologically strongly for organic production. Thereby they were also almost like an experimental farm for Arla.

Farmers AA and CC seem to highly value persons who have tried things in practice and want direct contact with these persons, while BB seems to be more focused on courses, written material and direct contact with experts. The reason for this could be the academic education of Mrs. BB, that has created a familiarity with written sources and an ability to critically search for information by herself. She may also have ability to value different information sources in another way due to her education. On the other hand, one thing that connects farmer AA to BB is the emphasis on the importance of single persons, “pioneers” within the organizations involved in advisory services. CC does not mention this at all, but instead emphasizes the fellow farmers who have tried new things in practice.

All three farmers read several farm magazines today. When BB converted to organic production there were not many articles dealing with the conversion issue. During recent years, however, the amount of articles has increased enormously. This has made the farm magazines become more interesting as an information source for potential converters, under the condition that they enjoy written material.

A fact that is worth noticing is that Mrs. BB, despite her relatively high formal education (M.Sc. in Agriculture), does not want to use computers in her information search and processing. Instead she prefers to go to a librarian or directly to experts. However, she has tried computers, but came to the conclusion

that she is not fond of them. Computers were not used by AA or CC either to any larger extent, although their attitude towards computers did not seem to be that negative. Maybe the difference in this sense could be explained by experience. All interviewed farmers have used advisors and courses to a minor or major degree, but here as well are differences between BB on one hand and AA/CC on the other hand. Farmers AA and CC seem to view advisors and courses as something valuable in the introductory phase of the conversion, but they do not use them later on to any larger extent. Farmer BB, on the other hand, seems to view these as a source of continuous upgrading of her own knowledge in this area.

There are also differences in the use of information that has been collected among the interviewed farmers. For AA, new information does not seem to have the same kind of impact as it does for BB. One can perceive a slight suspicion towards, e.g., advisors, from AA. He said in the interview that: "Well, I am sure that one is supposed to have an advisory service but we think that it works fine without it anyway." The reason for this suspicion might depend on that he thinks that they reach their business goals without the assistance of advisors and without changing their production as recommended. The reason for BB's continuous upgrading might be that they operate their farm on other conditions and have other goals with their business. It could also be that Mrs. BB has the same education as most advisors and consequently is on a more "speaking term" with them. CC hardly mentions the advisory service as an information source at all.

The learning that is mentioned by the interviewed milk producers varies. Farmer AA says: "it is not wrong to venture a bit" and "and also to give a carrot to the conventional farmers who always think "those thistle growers". That is an incentive as well!". This could be interpreted like that AA sees it as a challenge and instructive to convert to organic production. He also seems driven by the force to really show the conventional producers that it actually is possible to succeed in the conversion.

Mrs. BB says that she would advise potential "converters" to really think it through thoroughly and collect all imaginable information. Unless you do not have special conditions that make it suitable to convert very quickly, she recommends the future "converter" to take it into several small steps and divide the conversion process in maybe three years, so that the entire business is not jeopardized. The conclusion is that BB thinks it is important to prepare thoroughly, by gathering a lot of relevant information concerning production factors as well as economic factors. BB also prefers taking small steps in the conversion process, in order not to risk the entire business. This implies that she thinks that producing organically is a difficult matter and that she thinks that one should not just start organic production without any knowledge about it. Instead it is a knowledge intensive production, which requires a lot of information before one can start producing successively.

Farmer CC says that they are pretty sure that they have to examine and investigate organic production further before they can think of converting again. He continues with saying that he would very much like to talk to those who have

succeeded in order to observe how they are doing and to learn from their experiences. Consequently both BB and CC think that a lot of information is required in order to be successful in the conversion process and in organic production. After having concluded that, they prefer different information sources, but it is no doubt that they both think that much information is required. It is also possible that they learn differently based upon their different preferences.

All of the three interviewees think that there is a lack of information today and also that it was the same during the time of the conversion decision. Farmers AA and BB would like to have more information about organic crop production and BB also refers to the lack of information on what is happening in the ground when they have to drive tractors more in the fields in order to reduce the amount of weeds. Farmer CC, on the other hand, does not specifically mention the crop production as an area of lacking information. Instead he wishes more information about the rules regarding production today and what could happen to these rules in the future. However, this is not mentioned by farmers AA or BB.

## **6.8 Final comments and learning points from the interviews**

### *6.8.1 Methodological experiences*

After having conducted the three interviews, one can conclude that the design with two interviewers was fortunate. This is an advantage, since two pairs of ears hear more than one pair, and even though there was a list with prepared questions, it is very easy to miss valuable comments in the answers, thereby missing the opportunity to add a complementary question. It is also easier to be two interviewers, so that one can concentrate on the technical facilities, while the other concentrates on the questions. After the interviews, it is extremely valuable to be two persons when conducting the analysis of the material. The disadvantages, such as that the interviewee could feel “alone” with two unfamiliar persons and also more uncertain facing two persons instead of one who ask questions, risk of a stronger interviewer effect, etc., have not dominated as far as it has been possible to judge from my point of view. The situation and atmosphere have been very relaxed in all cases. It is also likely that the fact that the interviews were conducted in the home arenas of the interviewees contributed to this positive atmosphere.

One question is whether the list of questions should be distributed in advance to the interviewees. An advantage with this is that it becomes possible to prepare oneself as an interviewee for the questions and that it gives an opportunity to think the answers through. A disadvantage could be that the interview might become deadlocked and that you might lose some spontaneity.

Another matter regards the spoken language vs. the written language. An interview transcript does not look at all as ordinary written text. Kvale (1997) discusses this problem, since there could almost be a conflict situation, in the sense that the interviewee sees himself as unable to speak his native tongue, thereby almost looking upon himself as “stupid”. Kvale (1997) stresses the importance of telling the interviewee the fact that written and spoken language

differ substantially. At all interviews the interviewees were offered a transcript of what had been said during the meeting. None of them declared that they wanted that, so therefore no transcripts were later distributed to the interviewed milk producers.

At the start of each respective interview, we promised total anonymity for the interviewee, in the sense that it would be impossible for everyone except the interviewers to identify the farmers that had participated in the study. The interviewees all reacted quite calmly to this and the statement was brushed aside jestingly with a comment like: “well, yes, I guess that will be fine” or “I am not worried”. Even though the interviewees in the present study did not seem to think that it did matter, there is still a point with addressing the question of anonymity. If you make clear to the interviewee that he will remain anonymous throughout the entire study, one can assume that the answers will be more open-hearted and maybe even more truthful, whether consciously or unconsciously.

### *6.8.2 Results of the interviews*

The interviews suggest a number of factors suitable to examine in the quantitative part of the study. They also support many of the factors gained from the literature review. The factors that are going to be examined further are found in the next section of the thesis. The design of the questions is found in the questionnaires, which are found in Appendix A.

One main finding in the interviews is that questions about how the decisions were made, i.e., questions about the design of the decision making process, seem difficult to answer. This is also the fact for the questions concerning learning behavior. The questions about learning were mainly interpreted by the interviewed farmers as learning facts and increasing skills, mostly in a practical sense. There were not many spontaneous comments about learning connected to “decision making conducted in a better way”. On the other hand, one answer regarding learning concerned the importance of collecting more information in the future. Farmer CC mentioned this spontaneously as one thing he has to do when facing a future conversion decision. He did not use to have enough information in order to make the decision (compare to the knowledge situations, presented in Johnson et al. (1961)).

It is obvious that the milk producers had not been thinking about decision making and learning from a general theoretical perspective, a fact that on the other hand is not surprising. It does, however, even further stress the importance of formulation of the questions in the questionnaire. Of course, questions in a questionnaire should always be clear and concise. However, it is even more important to be clear and concise when you ask questions about something that the respondents probably have not thought very much about, at least not from the viewpoint that is examined in the present thesis.

One final remark in this chapter concerns the value structure of the farmers. This seemed to differ quite greatly among the three interviewees in this study. The

values and their importance are worth examining further. The farmers that participated in the interviews had different motives for their actions, although they made the same decision, i.e., to convert. Though, one of them (farmer CC) regretted the decision and then decided to wait and see. Farmer BB was clearly organically ideological in her values when deciding to convert, while farmer CC was clearly profitability-oriented and not ideologically oriented at all. Farmer AA was somewhere in between. It is clear that the values of a person strongly regulate the activities in that person's life. It is also clear that although two farmers may have different value structures they may come to the same conclusion regarding a decision. Therefore questions about the importance of different values will be included in the questionnaire.



## **7 A conceptual model of the analysis and choice phase of the decision making process**

### **7.1 Introduction to a conceptual model of the analysis and choice phase of the decision making process**

In this section of the thesis a final conceptual model to be tested quantitatively is formulated. The model is a result of the literature review and the case studies. This section is a result and summary of the former concept generating sections, i.e., the literature review and the case studies. The model presented here is to be tested quantitatively in the following section of the thesis, since I cannot draw general conclusions in the present stage of the research process. This section forms the basis for a mail questionnaire.

### **7.2 A model to be tested quantitatively**

The case studies did not show anything in particular that contradict the conceptual model developed above (see figures 7, 8 and 9). However, they have added some interesting factors, worth including in the questionnaire.

One part of the model in figure 7 that will be difficult to ask about in particular, is whether there are separate information sources for developing the values of the farmer. This corresponds to the dotted boxes and lines in figure 7. It is probably impossible to tell which specific sources that have and perhaps have not contributed to the values of a person. Instead, all information sources probably contribute to the design of the value structure of a person and, conversely, the value structure of a person probably affects the choice of information sources and information content that the person gathers and uses. For instance, BB's profitability values and spare time values become more important over time, probably due to their own experiences, rather than external information sources.

One main result of the interviews is that questions about decision making behavior seem to be difficult to answer. It is obvious that the farmers do not think about exactly how they should conduct their decision making. Instead it seems to be something that "just happens" without active reflecting on what to do in a process, according to the interviewed farmers. They do not seem to think about *how* things were conducted, but about *that* they were conducted. It is easy to remember what information sources that were used, e.g., advisors, magazines, radio, TV, Internet and own experience. It is, however, difficult to remember why it was used and how the information was used, e.g., stored, retrieved or processed, in the continued decision making process. This makes it even more important to be extremely cautious in the formulation of the questions, especially regarding the decision making process and the activities associated with it.

The questions in the questionnaire should include the model presented in figures 7, 8 and 9. In addition, the additional factors that resulted from the qualitative part

of the study are to be included. The questions should cover the following main areas:

# Exogenous variables:

- farmer characteristics
- farm characteristics
- environmental (institutional) characteristics
- group (social) characteristics
- value structure of the decision maker

# Endogenous variables:

- information collection behavior
- other decision making activities, including information usage and learning

Farmer characteristics include: age, general formal education, specific formal education regarding organic milk production, specific formal education regarding management/small business management, professional experience from other fields than agriculture, the size and composition of the household, whether spouse is working outside the farm or not, number of persons responsible for management in the business and number of years as manager of the firm.

Farm characteristics include: size of the farm (acreage), farm layout, average milk cow stock size, change of milk cow stock size during the past ten years, number of years since the last change of milk cow stock size, planned changes for milk cow stock size, other commercial animal production at the farm, number of years as organic milk producer, the size of the change of production as a result of the conversion, share of farm income from milk production, level of debts and number of employees in the business besides the farmer himself.

Environmental (institutional) characteristics include: geographical location, distance to nearest population center, perceived greatest threats and perceived greatest possibilities for the farm in the future.

Group (social) characteristics include: cooperation with neighbors and fellow farmers, participation in study circles, most important contact surface and changing experiences with colleagues.

Value structure includes the importance of: organic ideology, work satisfaction, spare time/time with the family, reactions of the surrounding world, achieving high profitability, producing what the consumers demand, not using chemical pesticides and fertilizers, keeping the farm within the family, taking others for a good model, serving as a good model to others, being able to support the family on farm income and buy from/sell to the agricultural cooperative firms.

The information collection behavior includes: the importance of newspapers, farm magazines, radio, TV, the Internet, the family, employees, neighbors and colleagues, advisors, courses, the dairy and one's own experience, the time spent on data/information collection, most important data/information source for daily activities, most important source for the conversion decision, whether there were difficulties in finding some particular data/information at the time of decision and

whether there are difficulties in finding some particular data/information about organic milk production today.

Other decision making activities, including learning, include: problem detection (when and how) and problem definition. Further on there are questions about storage of collected data/information, processing of data to information, importance of the obtained information, use of information for alternative actions, valuation of the consequences, the choice, checking of the choice, adjustment of plans and implementation of the chosen action. The learning part includes a question of whether they think they have learned anything due to the decision, and if so; what they have learned (compare to figure 8), the most important effect on them as a manager from having made this decision and finally, facing other future major decisions in the business; what has been the most valuable experience gained from the conversion decision.

The questionnaire is developed in two versions, one for organic farmers and one for conventional farmers. The questionnaire is distributed also to conventional farmers, in order to reach those farmers that have thought about converting to organic milk production, but decided that it was not an alternative for them, at least not before the time of distribution of the questionnaire. Therefore, in order to separate those who really have considered converting from those who have not, the questionnaire developed for conventional farmers has questions about whether the farmer has thought about changing the overall production. Those who have not thought about changing their production at all could contribute to the study anyway, so they are asked to answer all of the “exogenous” questions, the value structure questions and the information collection behavior questions (see above). Their answers could be compared to the answers of the other farmers.

Among the conventional farmers that have thought about changing their overall production, I have to exclude those who have thought about changing their production, but where conversion to organic milk production has not been an alternative. Instead they may have considered to cease with milk production or to quit farming itself, or something else. These farmers are separated from those of the conventional farmers that really have thought about converting to organic milk production, through a question about what alternative ways of action they considered. These different groups of farmers are further presented and discussed in the next section of the thesis.

Despite the fact that I claim that this part of the study corresponds to the “precise hypothesis formulation” in figure 1, I have not formulated any hypotheses. Instead I have specified factors that I assume could affect the decision making process, based on the literature review and three case studies. I do not claim to have formulated formal hypotheses either, just that this specification corresponds to the mentioned part of figure 1. Consequently, the next section of the thesis is not in any formal meaning hypothesis-testing either, simply because there do not exist any formal hypotheses to test. Instead I “translate” this specification of factors in my study to correspond to the mentioned step in the general picture presented in figure 1. In a similar way I “translate” the descriptive

presentation and use of simultaneous equation modeling to correspond to the final phase in figure 1.

## **8 A model of the analysis and choice phase of the decision making process**

### **8.1 Introductory remarks - description of chapter content**

In this section, the “final” conceptual model is to be tested quantitatively. The chapter is divided into four sections. These sections include a detailed description of my data collection in the quantitative part of the study, a presentation of a drop-out analysis, a descriptive presentation of results from the mail survey and finally the simultaneous equation modeling, using the LISREL method.

The data collection is described thoroughly in order to give the reader a good view of this very important step in the research process. The way of conducting the data collection has a big impact on the results. It is not just a matter of asking whether I should have a qualitative or quantitative approach. Even when I have decided to make a qualitative and/or quantitative study the number of possible approaches is numerous. As regards the quantitative part, one could decide to make telephone interviews, send out mail questionnaires, conduct “participatory” interviews, experiments, etc.

Even after deciding to do a mail questionnaire, there are numerous factors that affect the result. For instance the design of the questionnaire affects the respondents and thereby their willingness and possibility to give valid and reliable answers. By design I mean all aspects from the content of the questions and their order of appearance in the questionnaire, to the paper quality, paper colors and text, fonts, etc. Another factor that plays a crucial role in this sense is the period of the year for the send out and number of and design of reminder send outs.

Yet another thing to have in mind is the design of the send out itself, with respect to prepaid return envelopes, missive/s, full vs. restricted content of the reminders, etc. One further issue is whether the respondents should get any kind of payment, monetary or non-monetary, for their participation in the project. All this should be taken into account when we study the response rate and the responses in the study. A thorough description of the data collection in the present study is found in the next section of this chapter.

I have presented results in the three latter sections of this chapter mainly by using diagrams and tables. In this sense (as well as in all of the text in this thesis) my intention has been to follow general recommendations given in, e.g., Day (1998) and Swales & Feak (1994). Finally, for a more thorough discussion of the simultaneous equation system approach, see the Method section, above.

### **8.2 Collection of data - a mail survey**

The literature review and case studies serve as a basis for the quantitative study, conducted by a questionnaire in a mail survey. The questionnaire has been developed in several steps and with the aid of different forums. The first forum

was a graduate course in questionnaire design, during spring term year 2000. In the course, the theoretical and practical aspects of constructing questionnaires were discussed. The structure of the questionnaire used in this study was also built up and the formulation of questions was discussed thoroughly in the course, both with the course professor and the fellow graduate students. The course mainly consisted of doctoral students from outside the agricultural sector. This is a situation that is very valuable and useful, in the sense that it forces the researcher behind the questionnaire to be very sharp and clear in formulating the questions. This minimizes the risk for misunderstandings and of being unclear. Several revisions of the questionnaire were conducted during the course.

Several department colleagues have shared their comments and views and suggested improvements. Many of these have also practical agricultural and even dairy experience, so support was provided both in factual content as well as regarding design of the questions and questionnaire from a theoretical perspective.

Arla Foods, the dairy cooperative, has also been given the opportunity to comment on the questionnaire before the send out. This also resulted in valuable suggestions for improvement.

The questionnaire was developed in two slightly different versions, i.e., one variant for organic milk producers and one for conventional producers. The content of the two did not differ much, though. The questionnaires are found in Appendix A. The main difference between the two variants involves the reformulation of some questions and the layout, respectively. Questions were reformulated to suit the situation of the organic and conventional milk producers. The order of appearance of some questions also differs in the two questionnaire variants. This was conducted in order to also include the view of, e.g., the information sources of farmers other than those who have converted or considered converting. These additional farmers are the conventional farmers that have not considered changing production at all. This category also includes those farmers who have considered changing production, but where converting to organic farming has not been a considered alternative. This is done due to the fact that the information variables are central.

However, two questions in the “organic questionnaire” were excluded in the “conventional questionnaire”. The first of these questions considered the number of years the milk production has been connected to “KRAV” (= Certification Body for Organic Farming). The second question that was excluded in the conventional questionnaire was pertained to how the conversion to organic milk production was conducted. By obvious reasons these two questions make no sense in a questionnaire to conventional milk producers, simply because they have not converted. Alternatively, which has the same consequence in this sense, they could actually have made a decision but chosen not to convert.

Correspondingly, one question in the conventional questionnaire was not included in the organic one. This question was about whether the conventional farmer had considered converting to organic milk production or not. This question

makes no sense in a questionnaire to organic milk producers, since they, by definition, already have converted their production. Besides the differences described above, the two questionnaires are identical.

The questionnaire is in total eight pages and was printed on “Colorit 110 crème yellow” paper with black print. It was cut in 840 \* 297 mm sheets, which were folded into A4 size, i.e., 210 \* 297 mm. Thereby the whole questionnaire was all in one piece. This design has several advantages, such as no risk of falling apart (such as for papers stapled together), better overview of the area in question and more conspicuous among all other material that inundates a farmer/business manager each day. A disadvantage is of course that it is far more costly than ordinary A4 sheets stapled together.

The questionnaire consists of a total of eight pages, of which one was a missive from the Swedish University of Agricultural Sciences and seven pages of questions. About half of the last page consisted of an open question in which the respondents could write anything they wanted, connected to organic milk production, milk production overall, or anything else. However, these latter comments are not included in the analysis.

The missive from Swedish University of Agricultural Sciences contained information about the present project and its aim, as an attempt to motivate the respondents to fill in the questionnaire and send it back. As a further motivation the responding farmers were offered a send out with the most important results of the study later on. This is regarded as a suitable reward for the farmer, since then the respondent can see the results of his participation in the study directly. Tax rules and financial and other restrictions also make direct payment or a gift such as money impossible to manage and distribute. Besides, as extra motivation for the milk producer, a missive from Arla Foods, in which they presented their view of the study, was attached to the questionnaire.

The questionnaires, sent to organic and conventional producers, respectively, including the missive from Swedish University of Agricultural Sciences and the missive from Arla Foods, are found in Appendix A. The language in Appendix A is Swedish, since the material is the original, sent to the Swedish milk producers.

The questionnaires were sent out in full scale for the first time July 10, 2000. The envelope contained the questionnaire, a missive from Arla Foods and a prepaid (stamped) return envelope. A first reminder, containing the same material as the first mailing, was sent out July 31, 2000, to those who had not responded. The third and final send out, which also contained complete and exactly the same material as in the former two, was distributed September 1, 2000, to those farmers that until then had not responded.

The addresses of the milk producers originated from Arla Foods and were taken from their member register. The respondents in this study belong to one of two main subgroups (organic and conventional milk producers), of which both can be divided into two subgroups, respectively.

Among the organic producers, there was one group who already was certified by KRAV and consequently these farmers were already producing milk organically. The other subgroup among the organic producers were producers who were on their way into being certified. Consequently, they were in a qualifying period before benefit may be claimed. These subgroups contained all of Arla Foods' members, so for the organic producers it is the population that is examined.

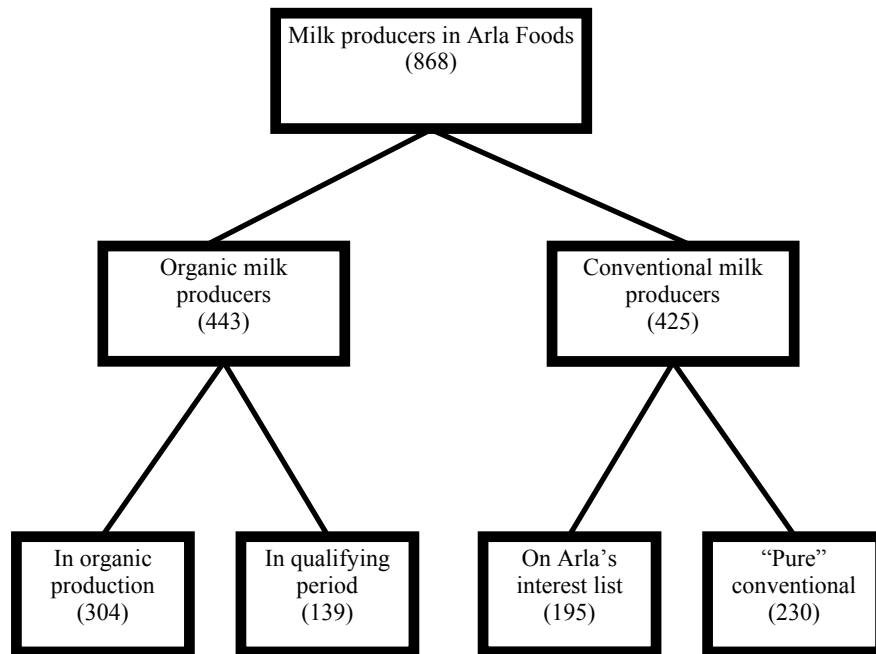
The conventional group also consisted of two subgroups. The reason for including conventional farmers as well, is that it is interesting to examine also those who actually have considered converting, but decided not to convert. These milk producers have gone through the decision making process as much as the organic producers have, although the conventional producers have chosen not to convert.

The first of the conventional subgroups is called the "interest list". This subgroup consists of milk producers who earlier had signed a particular interest list. The list was introduced by Arla in order to reach conventional milk producers who were interested in receiving information about organic milk production in the future. The list seemed very valuable for this study, since it could be assumed that farmers who wanted more information about organic production, also, at least to some extent, were interested in it and perhaps had considered converting for their own farms. Thereby I assumed that a larger proportion of them have gone through the decision making process. The "interest list" subgroup in this study contains all farmers on Arla Foods' list. The second of the conventional subgroups is a simple random sample of Arla Foods' milk producers.

In total 914 respondents received the send out initially. Due to their presence in more than one of the subgroups, some producers were excluded on one of the lists. It was always the presence on the "most" conventional list that was excluded, i.e., firstly on the "pure" conventional list, secondly on the "interest" list and thirdly on the "qualifying period before benefit may be claimed" list. Some of the members on the lists were schools, authorities, estate of a deceased person, foundations, etc. These were all excluded from the study, since the goal structure, decision making, etc., for these look fundamentally different compared to the situation of most regular, privately owned farms.

There were also some respondents who returned their questionnaires with a comment about that they had ceased with milk production. These farmers were also excluded from the study, since some of the questions regard the current situation. Taken together, these facts reduced the sample/population size in this study to 868. Of the total of 868 milk producers, 443 belonged to the organic main subgroup and 425 to the conventional main subgroup. The structure and sizes of the subgroups are presented in figure 10.





*Figure 10.* Structure and number of possible respondents in different milk producer subgroups included in the study.

By the end of October a total number of 497 questionnaires had been received. From these, 15 questionnaires were excluded, due to blank forms and/or comments about unwillingness to participate in the study. The overall number of usable answers is therefore 482. This corresponds to an overall response rate of 55.5 per cent. The response rates separated for the different subgroups are presented in figure 11.

On four of the returned questionnaires the respective respondent had removed the identification code or in another way made them impossible to read, which made it impossible to see who had answered. It was therefore only possible to see whether they belonged to the organic main subgroup or to the conventional main subgroup, due to the different design of the two questionnaire types. Therefore the response rates in the four parallel subgroups in figure 11 do not include these four respondents. However, they are included in the response rates of the main subgroups and in the forthcoming analysis.

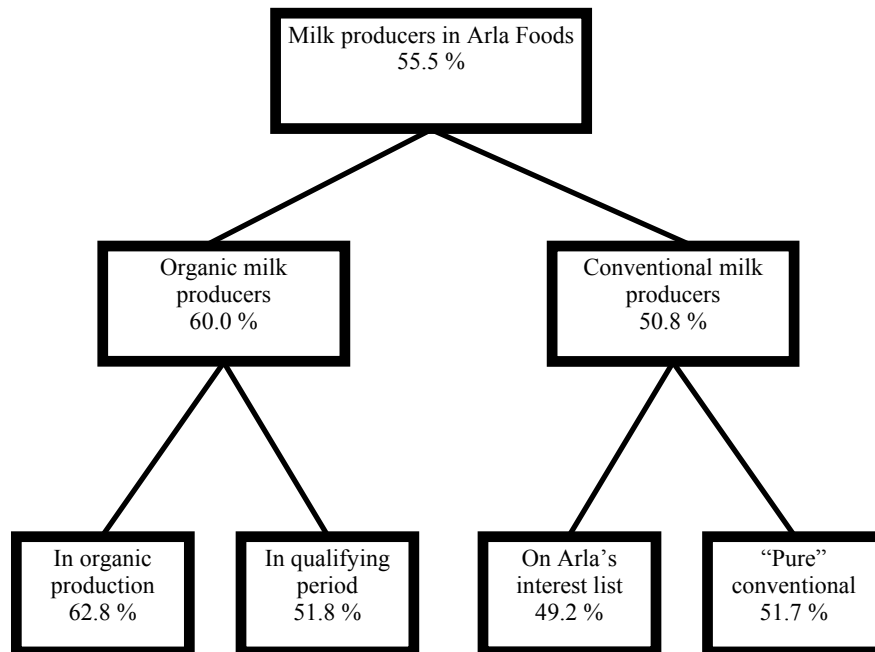


Figure 11. Response rates of usable answers, separated for different groups and subgroups.

The returned questionnaires were coded and registered in Excel, Version 5.0. In order to check for mistakes in data input, every questionnaire was controlled once again after it had been registered. After the complete registration of all questionnaires the minimum and maximum values, respectively, of all variables were calculated, also in order to find coding mistakes. All extreme values that pointed out far in the interval were studied specifically and compared with the corresponding questionnaire and if necessary corrected in accordance with the questionnaire.

Due to the overall response rate of 55.5 per cent, a drop-out analysis was conducted. This was conducted in order to examine if there seemed to be any systematic differences between the responding and non-responding milk producers. The design and performance of the drop-out analysis is further described in the next section.

As a last part in this section some strengths and weaknesses of the mail survey should be mentioned and discussed. It is also appropriate to discuss what could have been conducted in a better way.

One strength of the dataset is that it includes also some of those farmers that have gone through the decision making process but have decided *not* to convert to organic production. It is interesting to study these producers as well and to conclude if there are differences between them and the producers who have decided to convert. The differences include background variables, data sources

and working up methods, etc. Of course, there does not exist any register of those that have decided not to convert, so the only possible way is to ask respondents in the conventional group and separate a subgroup of farmers who have considered converting among them.

Another strength is that the response rate was 55.5 per cent. Although this is not by any means perfect or ideal, it is in fact higher compared to many published studies. There are also few studies that are reported with significantly higher response rates in the literature. For Swedish conditions regarding agricultural research and mail surveys, the obtained response rate in the present study is not substantially low. On the other hand, needless to say, the desire is to get as high a response rate as possible. The design of the questionnaire, the formulation of the missive, the inclusion of a separate missive from Arla Foods and the two reminder send outs, were all means in trying to obtain a high response rate.

A third strength is that the original dataset with 55.5 per cent response rate is supplemented with a drop-out analysis, in order to search for possible systematic errors. The drop-out analysis is presented further in the next section.

One weakness of the survey regards the time period of the data collection. Although the first send out was in the middle of July, i.e., the harvest period has not yet started, the summer is still an active period for farmers. This period in the middle of the summer is also a possible occasion for spare time and time with the family. Thereby one could assume that the motivation to answer questions and filling in questionnaires is not at its highest levels, to say it modestly. The second mailing (the first reminder) was conducted at the end of July and the third send out in the beginning of September. In the latter case it is the main season for harvesting, soil cultivation and winter seed sowing, so this is a time period of very high labor for farmers. Taking this into account, a response rate of 55.5 per cent is not bad.

An alternative time period would have been the following winter. However, time consideration made it necessary to start the mail survey in July, 2000.

Many respondents also commented that the amount of questionnaires that are heaped upon the single farmer is a never ending story. There are a lot of different actors that are interested in examining the farmers' views, situation, etc., and this affects the willingness to respond negatively. In order to motivate the respondents it is therefore important to make the questionnaire as attractive and easy to follow, answer and fill in, as possible. It is also important to clearly point out the aim of the study, to have attractive design (choice of paper, font, size, etc.), to have clear questions, not to have too many questions and maybe have a reward to offer to those who fill in and return the questionnaire.

Of course if time would have allowed, a test survey would also have been conducted. It would have been very valuable to have tested the questions and entire questionnaire on the same type of respondents (milk producers) as in the main survey. It would also have been valuable to examine how the answers could

be analyzed. By the same reason as the choice of time period for starting the survey, a test survey was unfortunately not possible to conduct. There were, however, a lot of other persons connected to the design of the questionnaire and their respective contributions have been very valuable.

On the other hand, a product of this kind will never be “finished”, “complete” or “perfect” and there will always be things that could have been conducted in another and better way. At some point of time one has to stop rearranging, developing and revising and instead use what one has and do the best with it. The design and accomplishment of the mail survey and the drop-out analysis, respectively, is an attempt to achieve satisfactory data collection for this study.

### **8.3 Drop-out analysis**

Due to the response rate (a total of 55.5 per cent usable answers) a drop-out analysis was conducted. A total of 60 respondents were chosen by simple random sampling, of which 30 belonged to each main subgroup, respectively. A total of 41 of these accepted to participate, of which 19 producers belonged to the organic subgroup and 22 to the conventional subgroup. The data collection in the drop-out analysis was conducted by telephone interviews during autumn 2000 and winter 2001. The milk producers were asked approximately 30 of the most important of the main questions from the questionnaire. The questions represent all groups of variables according to the conceptual model presented in figures 7, 8 and 9. The result of the drop-out analysis is presented in Appendix B, in tables B1 to B7. The presentation is conducted for the two main subgroups (conventional and organic producers) separately, in different columns. The tables show the mean values of each variable, respectively. The variable names are explained and given relevant units in table B8.

However, what is presented in the tables in Appendix B is only the mean values of the variables in each farmer group, respectively. This is not a sharp instrument when comparing two datasets. Hence, in addition a t-test is conducted. The t-test indicates whether two samples, such as “main dataset producers” and “drop-out analysis producers”, could be assumed to come from the same underlying population or not. It was conducted as two-tailed, assuming equal variance in the two samples. The variance is assumed to be equal, since respondents are milk producers, situated in the middle of Sweden, members in Arla Foods and the study was conducted under a limited time period (the telephone interviews for the drop-out analysis were conducted just a few months after the completion of the mail questionnaire). Further, no regional differences in response rate could be detected in the main dataset. Adding these reasons together, there does not seem to be any reason why equal variances could not be assumed. A study of the standard deviations for the two datasets supports this assumption.

The t-test often is a very suitable tool in order to examine whether two samples seem to come from the same underlying population. However, the conditions that must be satisfied perform a t-test the most powerful, are at least the following:

1. the observations must be independent,

2. the observations must be drawn from normally distributed populations,
3. in the case of analyses concerning two groups, the populations must have the same variance (or, in special cases, they must have a known ratio of variances),
4. the variance must have been measured in *at least* an interval scale, so that it is possible to *interpret* the results. (Siegel & Castellan, Jr., 1988).

The first three conditions should be more or less fulfilled in the present study. Some of the variables examined in the drop-out analysis in the present study do, however, not fulfill the interval scale requirement. Therefore a nonparametric test is conducted for these variables. In the present study the “Mann-Whitney test” (also called “two-sample rank test” or “two-sample Wilcoxon rank sum test”) is used. Assumptions for the Mann-Whitney test are independent random samples from two populations that have the same shape (hence the same variance) and a scale that is continuous or (at least) ordinal (possesses natural ordering) if discrete. The Mann-Whitney test is the nonparametric analogue of the two independent sample t-test (Pfaffenberger & Patterson, 1987).

The t-test and Mann-Whitney (nonparametric) test are used where each is appropriate, respectively. The variables are presented “chronologically” according to tables 8 - 14. If the variable is continuous or a dummy variable, a t-test is conducted, otherwise a Mann-Whitney test is conducted.

In the t-test/Mann-Whitney test of the variables very few considerable differences between the main dataset and the drop-out analysis were obtained on (at least) the five per cent level. Most of the variables have high or very high p-values, i.e., the samples seem to come from the same underlying population.

The Mann-Whitney test indicates that there could be a systematic difference in the “total information value of employees” variable. This is highly significant (on the 0.6 per cent level), i.e., among the organic producers there is a clear difference in view of the employees as an information source. It is hard to find any reasonable explanation for this and although the difference is significant I regard it as a coincidence.

The “learning variables” are also clearly different for the two groups of organic producers according to the t-test. There are more of the learning variables that are significantly different than there are learning variables, which are not. This result seems reasonable according to the mean values, presented in table B7 in Appendix B. The most probable explanation here is the different data collection techniques in the research process. A respondent could be expected to be more interested in answering that he has learned something, if a person is asking that question in an oral conversation and listens to the answer directly. This result is therefore to the largest extent explained by the interviewer effect.

For the conventional milk producers the values regarding “time with family/spare time”, “produce what the consumers demand” and “keep the farm within the family” are given significantly different importance at the five per cent level, according to the Mann-Whitney test. All these values are evaluated higher

by the drop-out analysis respondents, compared to the main dataset respondents. It is possible to argue that “time with family” and “keeping the farm within the family” are related to each other. In that sense the result is consistent. However, it is more difficult to see the obvious connection to the “produce what the consumers demand” value. One possible connection could be that they see this as a means to be able to “keep the farm within the family” and to be able to “get time to spend with the family or spare time”. It might also be explained by the interviewer effect, though. I do not consider the result to have any major effects on the conclusions.

Another significant difference is the total value given to farm magazines in the two conventional groups, according to the Mann-Whitney test. The difference is highly significant (on the 0.007 per cent level). Farm magazines are given clearly higher value by the main dataset farmers. No significant differences seem to exist for the other information sources. The farm magazine result is difficult to explain but is not supposed to have any major effect on the conclusions.

Information processing by “computer” also shows a highly significant difference between the two conventional groups (at the 0.1 per cent level). The corresponding mean values also show a very large difference, where as many as 43 per cent of the drop-out analysis respondents use computers, while only six per cent of the main dataset respondents do so. However, the result emanates from only seven observations in the drop-out analysis. Besides, it is likely that this could also be an interviewer effect, i.e., it is “appropriate” to say that you use computers when you talk to someone in person.

According to the t-test, several of the learning variables are significantly different in the two conventional groups. This is also indicated by the mean values and further commented above. The difference in these variables is most probably explained by the interviewer effect.

All other variables, which have not been commented here, for organic as well as conventional milk producers, are not significantly different in the two datasets. Almost all variables, thereby, show high p-values, indicating high probability that they come from the same underlying population.

The final and main conclusion of the drop-out analysis is therefore that I do not have reasons to believe that there are significant systematic differences between respondents in the main dataset and the drop-out analysis, respectively. I assume that the differences discussed above either are due to interviewer effect or coincidences. The response rate of 55.5 per cent in the main dataset and the drop-out analysis thereby should be sufficient in order to be able to draw general conclusions for the entire group of milk producers in this study.

#### **8.4 Descriptive results of the mail survey**

In this section the results from the quantitative part of the study are presented descriptively, separated for one variable at a time. Usually the respondents are divided into two groups and the results are presented for these groups separated.

The first group is: “have gone through the decision making process” (362 producers). These include all of the organic producers and those of the conventional/traditional ones who have considered converting, but of some reason have decided not to convert, at least not at the point of the mail survey. It is common for the farmers in this group that they have all considered converting, although they have made different choices. The second group is “those of the conventional/traditional producers who have not considered converting to organic production” (120 producers). This group includes both those farmers who have not considered changing their production at all and those who have considered changing their production, although converting to organic production has not been an alternative. Though, sometimes the presentation is complemented with other subgroups, such as “organic” (266 producers) and “conventional who have considered converting” (96 producers). For significant differences between groups, I have used the one per cent level (marked with \* in the tables) and five per cent level (marked with \*\* in the tables), where appropriate. The presentation starts with farmer characteristics.

#### *8.4.1 Farmer characteristics*

In this section, results about the farmer characteristics are presented. These include age, general formal education, specific formal education regarding organic milk production, specific formal education regarding management/small business management, professional experience from other fields than agriculture, the size and composition of the household, whether wife or husband is working outside the farm, number of persons responsible for management of the business and number of years as manager for the firm.

In figure 12, the age structure of the milk producers who have gone through the decision making process is shown. We can see that the age is well spread and it seems to be normally distributed. The mean age of the farmers was 45.9 years and the median age was 46 years.

For the conventional producers the mean age was 49,2 years and the median age was 50 years. The distribution is also more directed to the right, see figure 13. It is obvious that the farmers who either have converted or have considered doing it are the younger ones, compared to those who have not considered converting. The difference is significant at the one per cent level. This is, however, not surprising, since the latter group have reached a later stage in their life, thereby giving priority to other things than conducting major changes in the business. For many managers this willingness is decreasing with higher age, due to changed goals.

The formal general education of the farmers is presented in table 8. The different schools asked for in the questionnaire are (Swedish translation within brackets): elementary school (“folkskola”), nine-year (compulsory) school (“grundskola”), junior secondary school (“realskola”), (comprehensive) upper secondary school (“gymnasium”), folk high-school (“folkhögskola”) and university (“universitet”). Besides, there was a question about “other education”.

The latter education includes a variety of answers, where different courses and other education are mentioned. However, this category is not included in table 8.

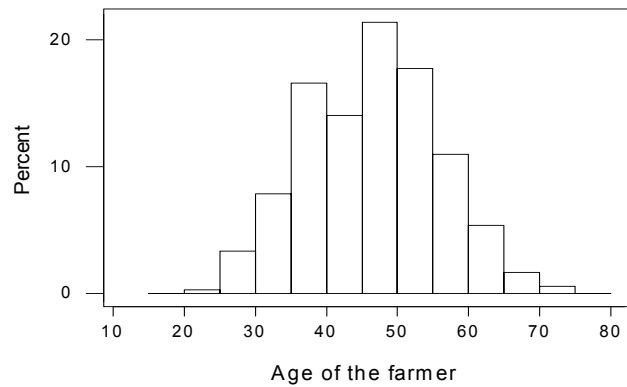


Figure 12. Age distribution of milk producers who have gone through the decision making process of whether to convert to organic production or not.

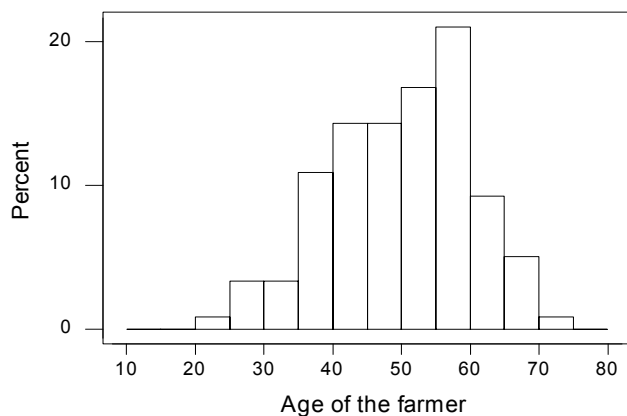


Figure 13. Age distribution of conventional milk producers who have not considered converting to organic production.

Until 1962 the elementary school education (the first row in table 8), used to be the basic level of education in Sweden. After having completed the elementary school one could choose to continue with the junior secondary school. However, this was not compulsory. In 1962 the system was changed and instead the nine-year (compulsory) school was introduced and it is still used today. However, the pupils that had started in the elementary school completed this, so for a number of years the two systems worked in parallel. These three schools are the basic ones.



After having completed the schools mentioned above, one could go on with (comprehensive) upper secondary school. This is not compulsory, although almost everyone does this today. After (comprehensive) upper secondary school one can go to folk high-school and/or finally take university courses or a degree.

Table 8. *Completed formal general education among the milk producers*

<b>Completed education</b>	<b>Converted/considered converting</b>	<b>Not considered converting</b>
elementary school education (former system)	30.0% *	46.2% *
nine-year (compulsory) school education	60.1% *	46.2% *
junior secondary school education (former system)	9.8%	7.6%
(comprehensive) upper secondary school education	66.2% **	53.8% **
folk high-school education	6.7% **	0.84% **
university education	16.8% **	9.2% **

It is obvious from the figures in table 8 that the milk producers who have converted or considered converting in general have a higher level of education compared to the farmers who have not considered it. The differences are significant for all educations, except junior secondary school education. The lower level in elementary school education is explained by the corresponding higher figure for the nine-year (compulsory) school education and the fact that the farmers who have converted or considered converting are younger. Thereby more of them have been educated in the new system.

Since everyone must go to school for a number of years in both the old and the current system, one could expect the sum of the first two rows in table 8 to be equal to one, since these are the compulsory schools. That is not the case here, though. However, if we also include the third row, i.e., junior secondary school, which used to be a continuation of the elementary school, the sum equals 99.9 per cent and 100.0 per cent, respectively. Those who have completed the junior secondary school most probably have not marked the elementary school in the questionnaire. Instead they have only marked their highest level of education.

For the more advanced levels of education, the difference between the groups also becomes obvious. Less than one per cent of the farmers who have not considered converting have been in folk high-school education, while almost seven per cent in the other group have. Almost twice as many of the farmers who have converted or considered converting have university education, compared to those who have not considered converting.

If the first group in table 8 is divided into organic vs. conventional farmers who have considered converting, there is no homogenous difference, i.e., the different types of education are over-represented in different groups. Though, the major

difference seems to be between the two groups presented in table 8. A preliminary conclusion could then be that the decision making process could be facilitated by higher levels of education. Maybe the farmers with lower levels of formal education to a lower extent have detected the possibility to convert. Another, but less likely, explanation could be that supplied and available information has been on a too advanced level.

The respondents were also asked questions about their specific education regarding organic milk production and management/small business management, respectively. Any producer could have none of, one of, or both of the education types. Among the organic farmers and farmers who had considered converting 28 per cent had some sort of organic milk production education and 37 per cent had some sort of management/small business management education. The corresponding figures for the farmers who had not considered converting are 4 per cent and 35 per cent, respectively. It is not surprising that farmers who are into a business or at least have considered entering it, have taken different kinds of courses dealing with those issues, to a higher extent compared to other farmers. Consequently, the difference in organic education is significant at the one per cent level. The management education does not seem to differ between the two groups, though. It indicates that there does not seem to be a difference in the degree of entrepreneurship among the groups. There are of course more aspects than completed courses, in order to be an entrepreneur, though.

One interesting thing, though, is the fact that within the group of organic and conventional farmers who have considered converting, there is a substantial difference between the two categories of farmers. Among the organic producers 31 per cent had some sort of organic milk production education and 31 per cent had some sort of management/small business management education. The corresponding figures for the conventional farmers who had considered converting are 21 per cent and 52 per cent, respectively. It seems that although 21 per cent of the latter have taken courses related to organic milk production, they have not been convinced. Besides, many of them have management education. The difference in the latter form of education between the subgroups is significant at the one per cent level. Maybe they do not see converting to organic production as a sufficiently attractive alternative, due to their higher level of management/small-business management education, i.e., from the perspective of an entrepreneur. It could also be that they are less open-minded towards changes in the business.

Former non-agricultural professional experience was divided into two categories: from management and from other professions than management. For the organic farmers and farmers who had considered converting, approximately 14 per cent had management experience and approximately 46 per cent had professional experience from other fields than management. The corresponding figures for the farmers who had not considered converting are 9 and 22 per cent, respectively. It is thereby obvious that the organic producers and the conventional producers who have considered converting are more experienced regarding professions outside agriculture, although only the non-management experience category is significant (at the one per cent level). Maybe these farmers have gained

valuable experience from their other professions. This experience might then have become a useful tool in the decision to convert. Perhaps they had a more efficient and sensitive problem detection process, in terms of observing a difference between the perceived current and desired situation, compared to other farmers. It might also be that it was easier to think about converting to organic milk production as an option. Besides, this category might be more open-minded towards changes in the business. They could also be less risk averse, which affect both choice of occupation and converting.

The family situation on the farms did not differ much among the different categories. In both categories approximately seven to eight per cent of the farmers lived alone on their farms. Twenty per cent of the organic farmers and farmers who had considered converting lived together with their spouse and the corresponding figure for the other farmers are 27 per cent. Approximately 55 to 58 per cent of the farmers lived together with their spouse and one or more children. The remaining farmers had another family situation, such as living together with parents, sister/s and brother/s.

There were also no large differences regarding the share of farmers whose spouse worked outside the farm. The figures varied from 48 per cent for those who had not considered converting to 56 per cent for the other main category, varying from 54 per cent for the organic producers to 62 per cent for the conventional producers who had considered converting. Although a small difference this is also a source of inspiration and data/information collecting.

Among the organic producers and conventional producers who had considered converting there were 70 per cent who reported that they were more than one in the business who made the management decisions. The corresponding figure for the other group is 65 per cent, which is approximately the same.

The final question about farmer characteristics considers the time as manager of the current firm. Among the organic farmers and conventional farmers who had considered converting, the result was 18 years at the time of the mail survey. There were no major differences between the two subcategories. The corresponding figure for the other main group was 21 years. This is a significant difference at the one per cent level. Besides, it is consistent with the age difference, i.e., they probably started as farmers at approximately the same age.

#### *8.4.2 Farm characteristics*

Farm characteristics include size of the farm (acreage), farm layout, average milk cow stock size, change of milk cow stock size during the past ten years, number of years since the last change of milk cow stock size, planned changes for milk cow stock size, other commercial animal production at the farm, number of years as organic milk producer, the size of the change of production as a result of the conversion, share of farm income from milk production, level of debts and number of employees in the business besides the farmer himself.

The acreage is presented in table 9. It is divided into several types: owned and rented arable land, woodland and other land, such as waste land, lakes and rocks. Both the mean and the median values are presented, in order to also present a value that is neutralized from extreme values.

In table 9, we see that the farms where the milk producer has not considered converting, are smaller, compared to the other farms, with respect to acreage. This is the fact for all types of acreage. Within the first group of farmers in table 9, the organic farms are bigger compared to the farms where the conventional farmers have considered converting, for all mean acreages except “other land”. Only the rented land is significantly different, though (at the one per cent level). To summarize, the biggest farms are the organic ones, followed by those where the manager has considered converting the production and the smallest farms in the dataset are those where the farmer has not considered converting at all.

Table 9. Mean and median acreage sizes

Acreage	Converted/considered converting		Not considered converting	
	Mean	Median	Mean	Median
owned arable land	48.1	30.0	38.7	27.5
rented arable land	40.7 **	28.0	30.9 **	22.0
total acreage	88.8 **	70.0	69.6 **	55.0
woodlands	74.6	40.0	54.2	21.0
other land	15.7	3.0	13.6	0.0

The farm layout for the different categories of milk producers does not differ very much. The respondents were asked to mark their perceived view of the farm layout on a scale between zero and ten. The mean values varies from 5.1 for the conventional farmers who have not considered converting to 5.4 for the other category. However, this difference is negligible.

The milk cow herd size of the different categories of farmers does not differ very much. Among the organic producers and producers who had considered converting the mean size was 43.9 cows (median value 36), with no major differences within the group. The corresponding figure for the farmers who had not considered converting was 42.0 cows (median value 36), i.e., about the same.

The mean value of the change of the herd size the past ten years is approximately the same for the two main categories: +9.8 and +9.1 cows, respectively, where the latter figure is for the farmers who have not considered converting. However, within the former category the change of the herd size varies from +8.8 cows for the organic producers to +12.6 cows for the conventional farmers who have considered converting. The answers include changes from -40 to +190 cows.

The time of the most recent change of herd size does not differ much between any of the farmer categories either. The mean time was between 7.4 and 8.3 years ago, where the latter figure regards farmers who have not considered converting.

The plans for the future, with respect to planned changes in herd size, do not differ very much between the two main farmer categories. Approximately 20 per cent of the farmers are planning changes in each of the two main categories, respectively. However, among the conventional farmers who have considered converting there are nearly 30 per cent who have planned to change their herd sizes. A clear majority of these are planning for an increase of the herd size. This is interesting, since they have also considered converting to organic production. It seems like they, to a higher extent than others, may have detected a problem in their firm and now are examining different options in order to solve it.

The farmers were asked whether they also had other commercial animal husbandry than milk cows. Approximately 33 per cent of the organic farmers and conventional farmers who have considered converting had that, while the corresponding figure for the other farmers is 43 per cent. Within the former category the figures differ from 30 per cent for the organic producers to 40 per cent of the conventional producers who have considered converting. Here it seems like the major difference is between organic vs. conventional farmers, no matter whether the latter have gone through the decision making process of converting or not. Though, the differences are not significant.

The organic producers were asked about the year of conversion. This question was excluded from the questionnaire to the conventional milk producers. In figure 14, the year for association with KRAV is presented (for an explanation and description of KRAV, see above). It is obvious that there were very few organic producers associated with KRAV, until year 1995, when the production expanded rapidly. Almost a quarter of the responding organic milk producers associated their production with KRAV in 1995. Thereafter the connection rate has decreased, but it has varied substantially between different years.

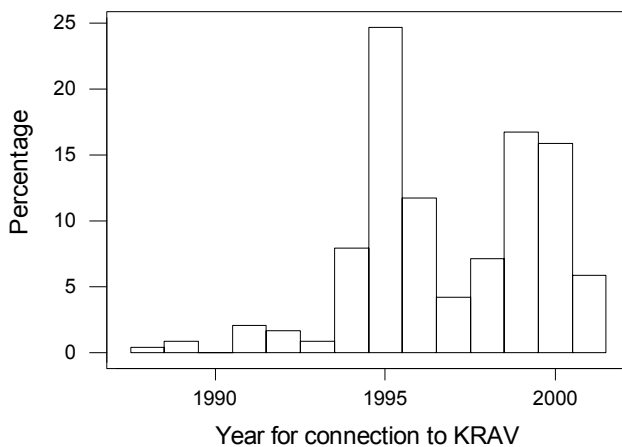


Figure 14. Year for connection to KRAV among the organic milk producers.

The respondents were asked to mark their perception of the total change for the milk production due to the conversion from conventional to organic production on a scale from one to ten. This meant real perceived circumstances for the organic producers and a perceived estimated change for the conventional producers. The organic producers received a mean value of 4.1 and the conventional farmers who had considered converting had a mean value of 5.6, which is significantly different at the one per cent level. It makes an overall mean for these groups of 4.6. The corresponding figure for the other farmers was 5.9. This is also a significant difference at the one per cent level. It could perhaps explain why the latter category have not been considering converting to organic production. They might think that it would be too great difference compared to their current situation. However, the question considered the total change for the milk production, e.g., yield, amount of labor time, economic profitability, etc. Besides, in the question I asked for the perceived deviation, no matter positive or negative. Therefore the answer of the question unfortunately becomes difficult to interpret. Ideally I would instead have used one question for each of the dimensions of the change.

The dependence on milk income, measured as the percentage of total income that originates from milk production, was almost identical for all farmer categories. It varied from 73.5 per cent for the organic producers to 75.1 per cent for the conventional producers who had considered converting.

The farmers were also asked about the perceived debt level in the business. There were three alternatives: “too high, must be reduced”, “acceptable, but must not increase” and “could be allowed to increase”. This is a subjective measure, since the personal preferences differ substantially among different managers. This is more interesting than to get an exact figure. It is the perception of the debt level that is affecting the farmer and an exact figure does not necessarily mean the same thing for two different managers.

Between the two main categories there were no differences. Just above ten per cent of the respondents in each respective main group considered their debt level as “too high, must be reduced”. Nearly half of the producers in each main group thought about it as “acceptable, but must not increase” and the remaining 40 per cent thought that their debt level could be allowed to increase.

The last question in this section regards the number of employees at the farm except the farmer himself. The median value for all categories was one employee and the mean value differs from 0.9 employees for the conventional producers, to 1.1 employees for the organic producers. Among the conventional farmers who had considered converting, approximately 40 per cent did not have an employee. Corresponding figure for the other farmer categories was just below 35 per cent.

#### *8.4.3 Environmental (institutional) characteristics*

Environmental characteristics include geographical location of the farm, distance to nearest population center, perceived largest threats and perceived greatest opportunities for the farm in the future.

The geographical area of Arla Foods was presented in figure 6. The distribution of the incoming answers is presented in table 10. Within a production area there are approximately the same production conditions, including climate, yields and times for field operations.

Table 10. *Percentage of milk producers from different production areas*

<b>Production area</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>	<b>Not considered converting</b>
the southern plains of southern Sweden	4% (5%, 2%)	6%
the middle plains of southern Sweden	10% (9%, 11%)	8%
the northern plains of southern Sweden	14% (13%, 18%)	12%
the plains of the middle part of Sweden	23% (26%, 15%)	18%
the woodlands of southern Sweden	43% (41%, 48%)	50%
the woodlands of the middle part of Sweden	6% (6%, 6%)	6%

In table 10 we can see that most farmers in all respective categories, come from the woodlands of southern Sweden. This is in accordance with the situation in the Arla Foods geographical area. About a quarter of the organic farmers live in the plains of the middle part of Sweden. The corresponding figures for the conventional producers are 15 per cent and 18 per cent, depending on whether they have considered converting or not. For the woodlands of southern Sweden it is the opposite relation. Elsewhere there are no obvious differences between the different farmer categories.

The next variable is “distance to nearest population center with a minimum of 5000 inhabitants”. There seem to be very small differences between the farmer categories with respect to this. The mean distance varies from 21 km for the organic farmers and the conventional farmers who have considered converting, to 23 km for the other main category, i.e., no obvious difference.

The biggest future threat for the business is presented in table 11 and the biggest future opportunity for the firm is presented in table 12. These questions were open and consequently no alternatives from which to choose were presented in advance. The answers of the farmers were grouped into categories, which in turn have been grouped into main categories, separated by blank lines in the tables. Of course the categorization could be done otherwise, depending on how many categories one wants to have. There were numerous other answers as well that did not fall into any of the categories in the tables. However, these answers appeared only at few occasions and consequently they are not included in the tables.

The threats could be arranged into three main categories. These are “rules and bureaucracy”, “economy and economy related aspects” and “personal situation with respect to labor demand and health”. From table 11 it is obvious that the overall perceived biggest future single threat regards economy. Thirty-six per cent and 40 per cent of the farmers in the two main subgroups, respectively, perceive this to be the biggest future threat for the business. If the other three economy-related threats in table 11 are added to the former, we get 56 to 59 per cent of the farmers who think that economy and economy-related aspects are the biggest future threat for the own business. There are no large differences between the two main subgroups, although there is a difference within the former group with respect to the “economy/profitability” and “large investments: rebuilding, additional land, etc.”, for which the relationship is interchanged.

Table 11. *Perceived biggest future threat for the business (by percentage of farmers)*

<b>Threat</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>	<b>Not considered converting</b>
rules, restrictions	16% (22%; 3%)	8%
bureaucracy, politicians	8% (6%; 14%)	9%
economy/profitability	36% (32%; 46%)	40%
large investments: rebuilding, additional land, etc.	14% (17%; 7%)	9%
decreasing consumer demand, smaller market	5% (7%; 3%)	5%
increased import	3% (3%; 3%)	2%
labor situation; amount of required own labor	3% (3%; 3%)	6%
own health	6% (4%; 10%)	7%
<b>Sum:</b>	<b>91% (94%; 89%)</b>	<b>86%</b>

About one quarter of the farmers in the first main group perceive rules, restrictions, bureaucracy and politicians as the biggest future threat. The corresponding figure for those who have not considered converting is 17 per cent. However, there is a difference within the former group. The organic producers perceive rules and restrictions as a future threat to a clearly higher extent (22 per cent), compared to the conventional producers who have considered converting (3 per cent). On the other hand, the opposite relation exists for bureaucracy and politicians. One can argue that this category is related to the economy category as well, since many rules, restrictions, etc., which are decided by politicians, have a crucial impact on the economic result of the firm. However, in order to make it possible to see the perceived threat of each of these categories separately, I have chosen to present them as two categories.

The third main category relates to the personal situation, with respect to amount of required labor and personal health. Approximately one tenth of the farmers perceive this as the biggest future threat for the farm. It is worth noticing that the



organic farmers perceive their personal health as a future threat to a clearly lower degree, compared to the conventional farmers. It may be that the organic farmers perceive the organic production as beneficial to their own personal health, thereby not fearing the future with respect to this issue.

In table 12, the future opportunities are presented in a similar way as were the threats in table 11. The same division in different farmer categories is used in table 12. The opportunities are divided into four categories, although some of them are closely related. The most frequent opportunities could be categorized into “less rigid rules”, “economy”, “way of competing” and “environmental and personal experiences”.

Table 12. *Perceived greatest future opportunity for the business (by percentage of farmers)*

<b>Opportunity</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>	<b>Not considered converting</b>
less rigid rules, less bureaucracy	1% (1%; 2%)	7%
economy	15% (14%; 18%)	23%
positive market development	35% (43%; 9%)	3%
compete by having high quality	4% (3%; 7%)	4%
small scale production	5% (4%; 7%)	7%
large scale production	4% (2%; 13%)	16%
efficiency increase	3% (3%; 5%)	4%
the suitability of the farm	2% (1%; 7%)	6%
environmental friendliness	9% (6%; 16%)	8%
own comfort and well-being, motivation, know-how	9% (10%; 8%)	2%
<b>Sum:</b>	<b>87% (87%; 92%)</b>	<b>80%</b>

In table 12 we see that less rigid rules are perceived as providing the greatest opportunity by very few farmers. On the other hand, the bureaucracy and rules were perceived as the biggest future threat by many farmers. This could indicate a situation in which the milk producers dislike the rules and bureaucracy, but they do not think that the situation will be less rigid and bureaucratic in the future. Maybe they think that the rules are something that they just will have to live with in the future.

Among the first main category of milk producers, economy is perceived as providing the greatest future opportunity by 15 per cent. Closely related to economy is market development. Taken together, these two opportunities correspond to half of the organic milk producers and conventional who have considered converting. However, within this main group there is a large difference. Fifty-seven per cent of the organic producers think that this is the major future opportunity, while the corresponding figure for the conventional ones

who have considered converting is 27 per cent. The difference could be explained by the fact that the organic farmers produce a “new” product compared to the conventional producers. Therefore the former farmers probably focus more on market and market related issues. There are also many articles in newspapers and magazines about the market of organic products.

Conventional producers, on the other hand, have a product, which has been on a more “stable” market, compared to organic milk. Therefore the market issue has maybe not become that obvious and important. Both categories of conventional farmers regard economy and market development as the most important opportunity to the same extent. Though, it seems like the organic producers are more market-oriented compared to the conventional milk producers.

In the next opportunity category in table 12, the relation is the opposite. This difference suggests that the conventional producers are more competition-oriented, compared to the organic producers.

However, the latter statement seems odd, due to the former result about market orientation. Since the competition category and the economy/market category are related, it could in fact be different ways of expressing the same thing. If these categories are added to each other, the difference between the main categories becomes much smaller. The conventional producers to a higher extent seem to express their way of attaining a good position on the market with a focus on the supply side of the market. The organic producers, on the other hand, to a higher extent seem to hope for a positive market development and focus on the demand side.

Environmental friendliness and personal comfort and well-being are in the last category in table 12. One thing worth noticing is that there are more of the conventional producers who perceive environmental friendliness as the greatest future opportunity, compared to the organic producers. It may be that the organic producers already perceive their production as environmentally friendly and that they thereby do not see that as a future opportunity anymore. This, in turn, may make them focus on other future opportunities.

#### *8.4.4 Group (social) characteristics*

Group (social) characteristics include cooperation with neighbors and fellow farmers, participation in study circles, most important contact surface and whether something is missing in order to increase the exchange of experiences.

Cooperation with neighbors is commonly occurring. Eighty-six per cent of those farmers who have gone through the decision making process cooperate with neighbors. The corresponding figure for the conventional farmers who have not considered converting is 92 per cent. Cooperation with colleagues includes various matters, such as machinery sharing, consultation and financial accounting. Therefore, it is not surprising that almost everyone cooperates with colleagues, at least in some aspect and to some extent.

Participation in study circles is commonly occurring. Nearly 90 per cent of the farmers do this, although not necessarily every year, irrespective of producer category. The conventional farmers who have considered converting were the ones who participated yearly to the highest extent. Nearly 50 per cent of them participated in study circles every year, compared to a yearly participation by approximately 35 per cent of the farmers in the other producer categories. Maybe some of these study circles have been about organic milk production. A content question was, however, not included in the questionnaire.

The most important contact surface, in order to gain professional experiences, includes the alternatives: family, employees, neighbors/colleagues, advisors and "other". The last, open, alternative has received several different answers. However, with the exception of "magazines", respondents gave very different alternatives. "Magazines" are perceived as the most important contact surface for gaining professional insights by approximately four per cent of the farmers. "Employees" are considered as the most important contact surface, by almost no of the farmers. This is further discussed in the "information collecting" section, below. The answer given by most farmers is neighbors/colleagues (approximately 40 per cent), followed by advisors (nearly 30 per cent), courses (approximately 15 per cent) and family (by approximately 8 per cent). There were no obvious differences between the different farmer categories.

The final question in this section considers whether the farmers were missing something in order to increase the exchange of experiences. Approximately 30 per cent of the farmers who had converted or considered converting thought so, while the corresponding figure for the other farmers was 20 per cent. The most frequently reported alternative was "experience groups" ("erfa-grupper") and "advisory/discussion meetings with experts present". There were also numerous other alternatives, reported by just a single or few farmers. There were no clear differences among the farmer groups with respect to what was missing.

#### *8.4.5 Values/value structure*

This section presents the value variables. The value variables are organic ideology, working satisfaction, having spare time/time with the family, reactions of the surrounding world, achieving high economic profitability, producing according to consumer demand, not using chemical pesticides and fertilizers, keeping the farm within the family, taking others for a good model, serving as a good model for others, being able to support the family on farm income and buying from/selling to the agricultural cooperative firms, which all are more or less related to each other.

The respondents marked a figure, with choices between zero and six, as a measure of the importance of each value. Of course, it is impossible to define the meaning of a "5" or any other figure. A "5" for one respondent could be the same thing as a "4" or a "6" or any other number for another respondent. Therefore the results can only be indications, taking into account the scale of the variables. This is also the reason why I have used diagrams instead of mean values in a table. In diagrams 21 to 32 the notation "dec. proc." is used for farmers who have gone

through the decision making process and “no dec. proc.” for those who have not. The former category is also divided into “organic” and “convent. cons. converting”, i.e., organic and conventional who have considered converting.

The organic ideology value is presented in figure 15. We see that among the conventional producers who have not considered converting, there are very few who think that organic farming is ideologically important to them. Among the farmers in the other main group, there are many who do think that it is ideologically important. The difference is significant at the one per cent level. However, the latter group is heterogeneous. Even within the organic group, there are many farmers who do not consider organic production as ideologically important to them. Obviously other values are dominating in their value structure. We can also see in figure 15 that the two conventional farmer categories seem to be quite similar, although the conventional farmers who have considered converting seem to be somewhat more ideologically-oriented compared to those who have not considered converting.

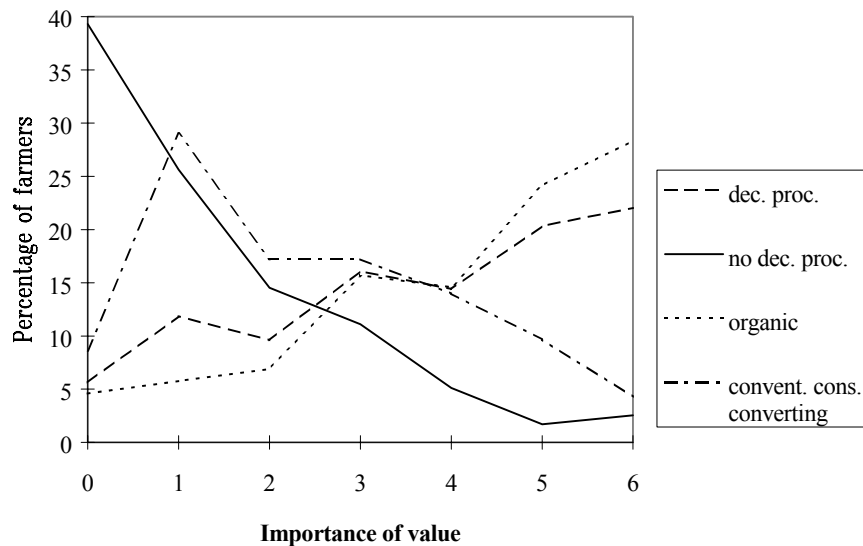


Figure 15. The importance of organic ideology.

In figure 16, the value “working satisfaction” is presented. The pattern is similar for the different farmer categories and a majority perceives working satisfaction as something important. The conventional farmers who have not considered converting seem to regard this value as slightly less important compared to other farmers, though. This difference is significant at the five per cent level. The conventional farmers who have considered converting seem to be more similar to the organic farmers than to their conventional colleagues. Though, the difference between the former category and their organic colleagues is significant at the five per cent level. Maybe this value is a driving force for them to examine other production methods than they have today. In the case of converting to organic

production, it could indicate that they do not like to use chemical pesticides and/or fertilizers. This issue is further discussed below.

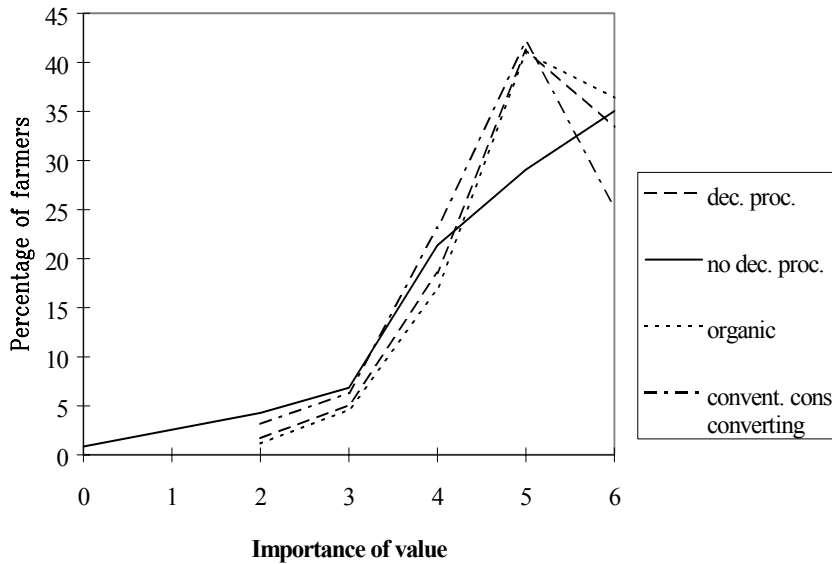


Figure 16. The importance of working satisfaction.

Figure 17 shows the “importance of having spare time/time with the family” value. The same pattern as for the previous value can be seen here, i.e., the conventional farmers who have not considered converting seem to value it lower. The difference is significant at the one per cent level. Figure 17 indicates that, with respect to this value, the conventional farmers who have considered converting are more similar to organic producers, than to their other conventional colleagues.

In figure 18, the value “importance of the reactions of the surrounding world” is presented. “The surrounding world” was exemplified by “family, colleagues, neighbors, consumers, etc.”, in the questionnaire. Although there seems to be a similar pattern for all farmer categories, we see slightly lower values for the conventional farmers who have not considered converting. Maybe these farmers to a higher extent walk their own way and do not care about the opinion, the environmental movement and other actors, who strongly argue for less usage of chemical pesticides, etc. However, the difference is not significant.

Figure 19 shows the importance of achieving high profitability. Those with the highest percentage on score “6” are the conventional farmers who have not considered converting. On the other hand, this category has the lowest percentage on score “5”, once again taking the scale into account, though.

In figure 19 we can also see that the conventional farmers who have considered converting seem to give high scores to the importance of achieving high

profitability. None in this category gives this value a score lower than “2” (once again taking into account the limited information in each figure). See also figure 27, below, for further discussion about profitability vs. ideology.

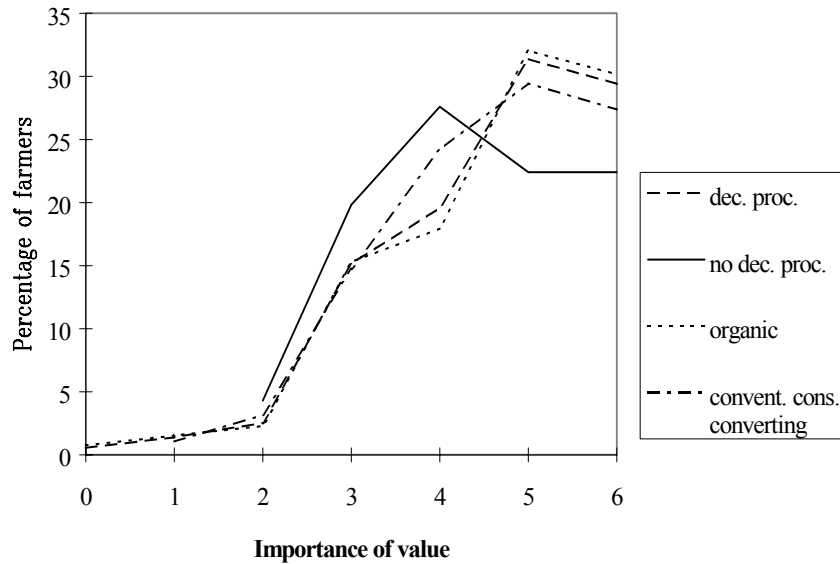


Figure 17. The importance of having spare time/time with the family.

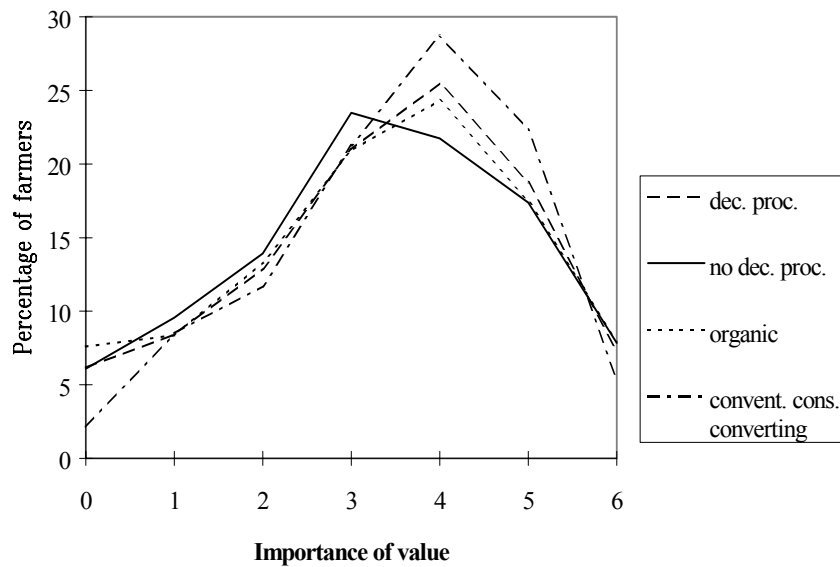


Figure 18. The importance of reactions of the surrounding world.

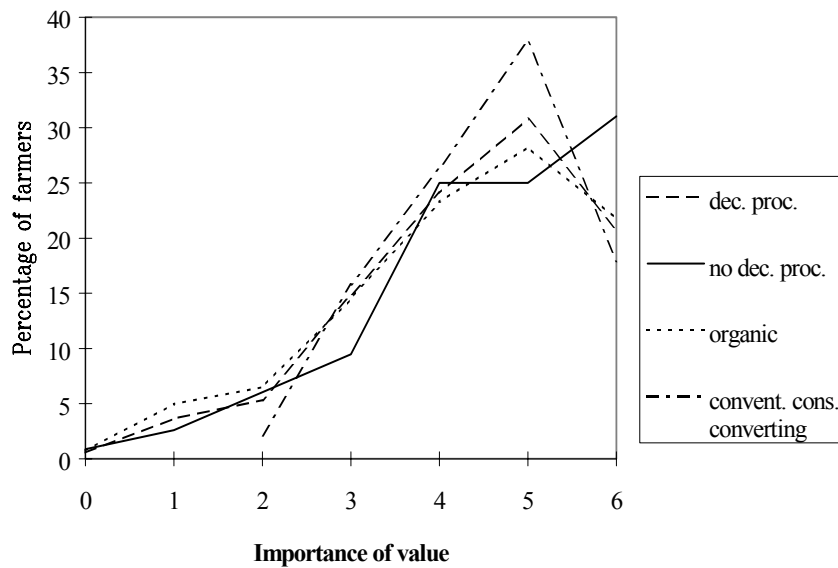


Figure 19. The importance of achieving high profitability.

Figure 20 shows the scores of the value “importance of producing according to consumer demand”. The results indicate that the conventional producers who have not considered converting are the ones that consider this to the lowest degree. The difference compared to the other main category is significant at the five per cent level. This is in line with the perceived greatest future opportunity discussed above.

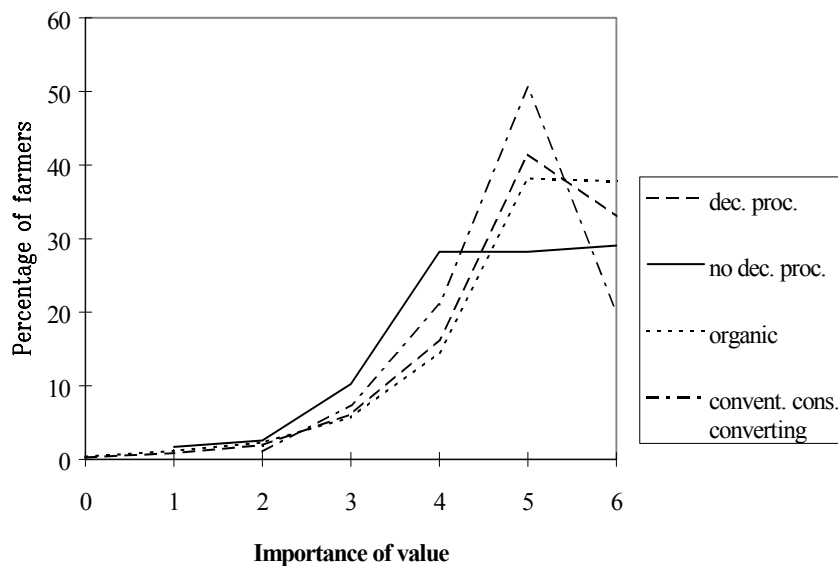


Figure 20. The importance of producing according to consumer demand.

The value “importance of not using chemical pesticides and fertilizers” is presented in figure 21. This is closely related to the ideology value, presented in figure 15. The answer pattern is also similar to that in figure 15. The difference between the two main categories is significant at the one per cent level.

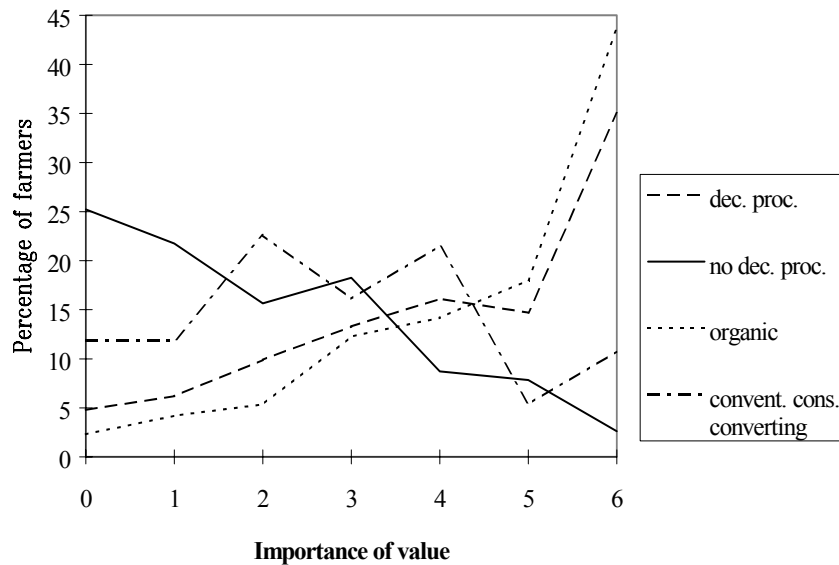


Figure 21. The importance of not using chemical pesticides and fertilizers.

Figure 22 shows the result of the “importance of keeping the farm within the family” value. We see that many farmers think that this is very important, although there are several who do not think that it is not important at all. However, the tendency is clear. Nearly half of the farmers have given this value a score of “5” or “6”, indicating that the value is of considerable importance. Below 15 per cent of the farmers have given the value a score of “0” or “1”, indicating no or very little importance. This is an indication of the complex situation for a farmer, in which many dimensions are included. It is not just a way of making ones living and achieving the maximum profitability. There are cultural, traditional and other dimensions involved in operating a farm, as well. These competing values affect the operating and have to be weighed into the management and decisions.

The importance of taking others as a good model seems to be normally distributed among the respondents, see figure 23. Consequently, not very many consider this to be neither very important nor of very low importance. Instead, most answers are concentrated somewhere in the middle of the importance scale.

The importance of serving as a good model for others is presented in figure 24. The pattern here is almost identical with the corresponding pattern for the former value and it seems more or less normally distributed. The internal relationships between the different farmer categories also seem to be quite similar.



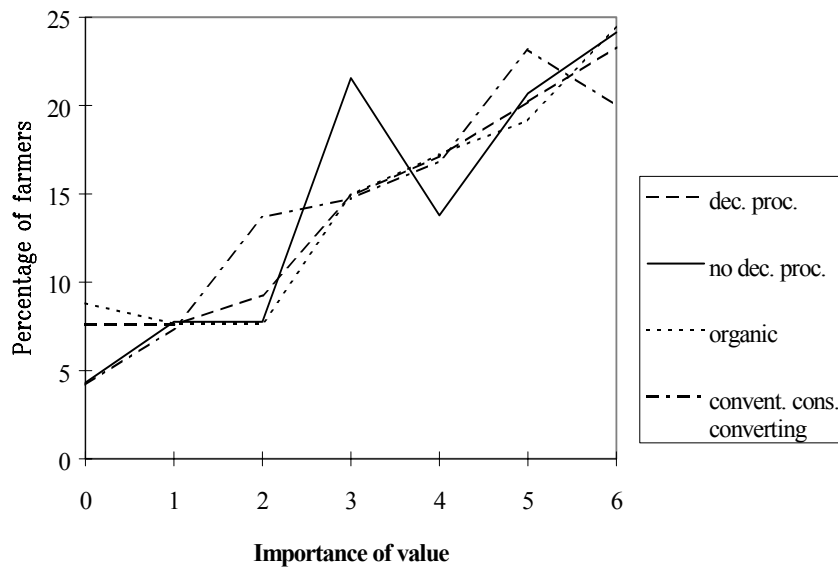


Figure 22. The importance of keeping the farm within the family.

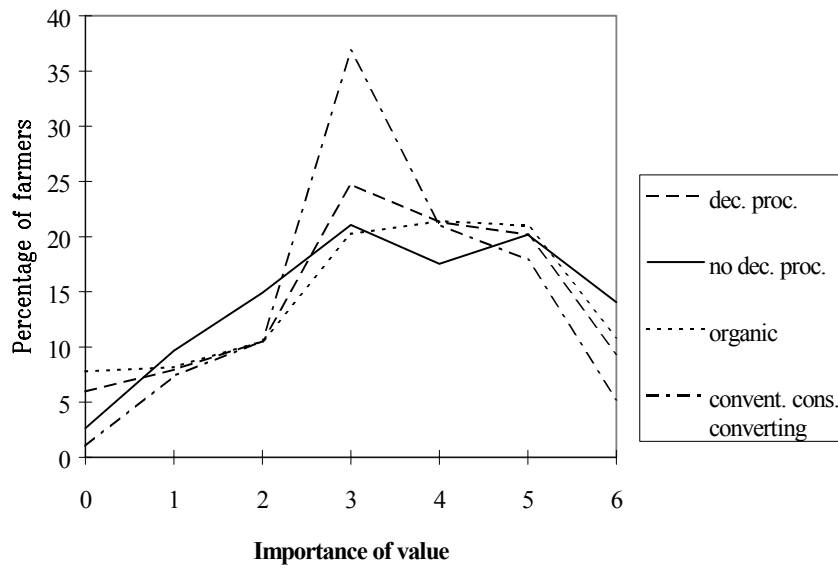


Figure 23. The importance of taking others for a good model.

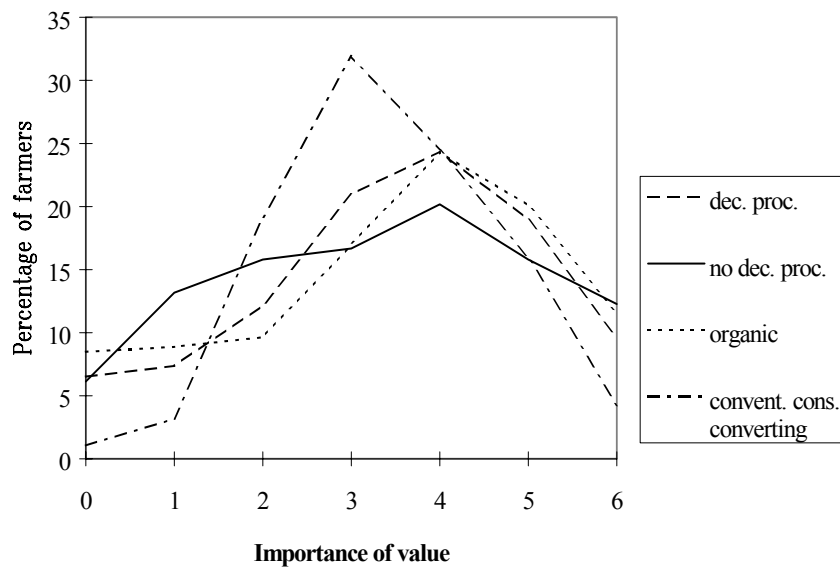


Figure 24. The importance of serving as a good model for others.

Another economy related value is “importance of being able to support the family on farm income”. This is regarded as very important by almost everybody, see figure 25. All farmer categories seem to have almost identical values with respect to the possibility to support the family. About 85 per cent have given this value a score of “4” or higher.

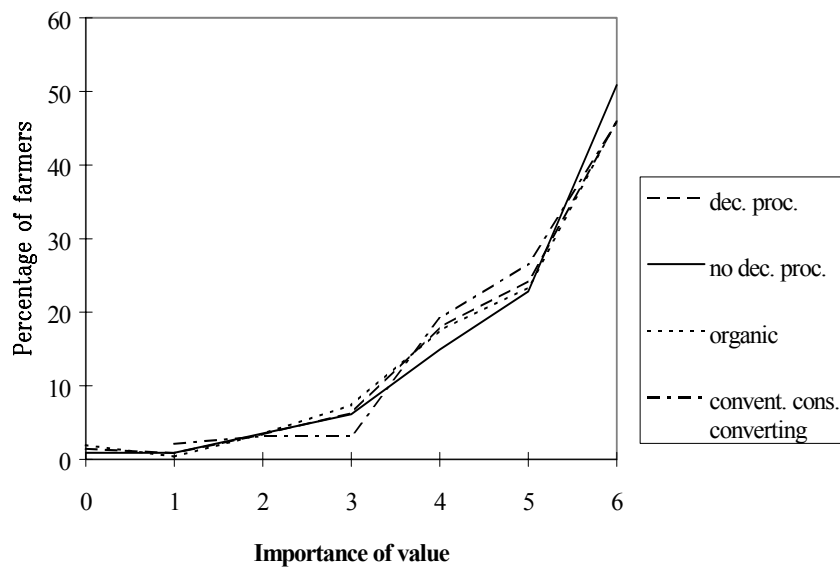


Figure 25. The importance of being able to support the family on farm income.

In figure 26 the last of the values, “the importance of buying from/selling to the agricultural cooperative firms”, is presented. We can see that few farmers in all categories have marked this value as very important or very unimportant. The curves are almost bell shaped, although slightly more concentrated towards the lower figures. The results indicate that the conventional farmers who have not considered converting are those who, to the highest extent, consider that buying from and selling to the agricultural cooperative firms is important. Among the organic farmers and conventional producers who have considered converting there are few who consider this to be very important.

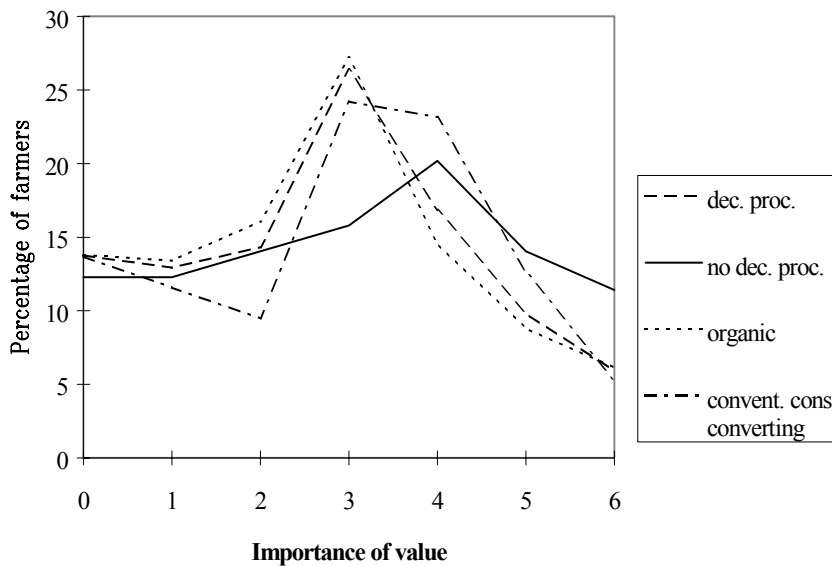


Figure 26. The importance of buying from/selling to the agricultural cooperative firms.

At the end of this section the importance of two values are compared for the organic producers. The values are “organic ideology” and “achieving high profitability”. The mean scores are separated based on the year of association with KRAV. The result is presented in figure 27. We can see three things in the diagram, taking into account the shortcomings of the variable scale.

Firstly, the “organic ideology” value seems to have decreasing importance with decreasing number of years in association with KRAV. Among the first farmers who converted to organic production, this value is very important. During the entire time period, though, the importance has continuously decreased and among the most recent converters the mean score was only half of what it was in the beginning of the period.

Secondly, the importance of “achieving high profitability” has gained slightly increased importance, or at least remained constant during the time period. Since

1995, when the organic market started to increase more seriously, the tendency is, however, increasing importance of achieving high profitability.

Thirdly, achieving high profitability nowadays seems to be more important compared to organic ideology. This relationship could indicate that those who want to convert due to their ideology already have done so to a large extent. Instead those who convert today probably have other values dominating, e.g., to achieve high profitability. This has implications for the content of the provided information, advisory services, etc., since these services should focus also on other aspects than environmental issues, such as the economic result of the milk production on the organic farm and other financial consequences of converting.

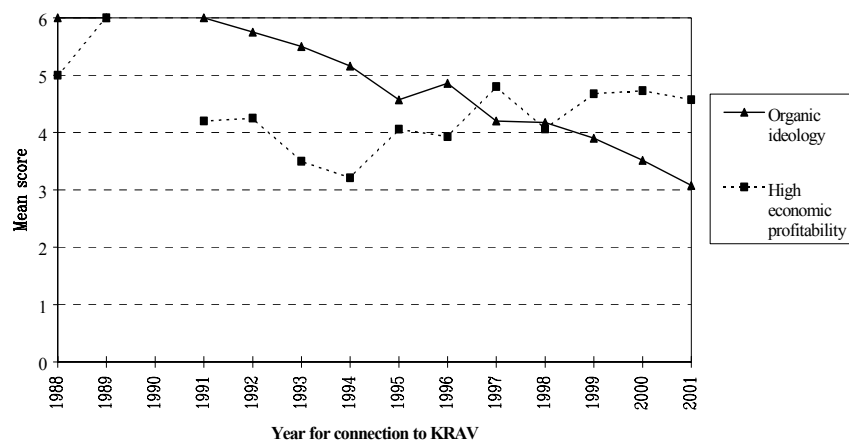


Figure 27. Importance of “organic ideology” vs. “high profitability” values, among organic producers at different years for association with KRAV.

#### 8.4.6 Information collecting

In this section results from the questions about information collecting behavior are presented. This regards the total importance of a number of information sources. These are newspapers, farm magazines, radio, TV, the Internet, the family, employees, neighbors and colleagues, advisors, courses, the dairy and own experience. Besides, the questions concern time spent on data/information collecting, most important data/information source for daily activities, most important source for the conversion decision (no matter what the result of the decision), whether there were difficulties in finding some particular data/information at the time of decision and whether there are difficulties in finding some particular data/information about organic milk production today.

The total importance of different data/information sources is presented in table 13. The respondents are divided into the same categories as was used above. The data/information sources are oral and written, internal and external, and communicative and non-communicative and are supposed to be the most frequently used among farmers today. The sources were given a score between

zero and six by the respondents, as a measure of the importance of each source, respectively. Consequently, the mean score should only be seen as an indication of the importance, due to the scale of the variable. See the discussion for the value variables, above.

The result is presented in tables instead of figures, since it is far more space consuming. Besides, compared to the values, it is not that interesting to see the number of farmers who have responded each single figure regarding the information sources. The impact on the decision making process of the perceived importance of a single information source should not be that considerate, compared to what the importance of a single value could be.

In table 13, we can see that the perceived total importance varies considerably between the different sources. However, the different farmer categories seem to have approximately the same opinion about the data/information sources although three information sources show significant differences for the farmer categories.

Table 13. *Total importance of different data/information sources; mean scores*

<b>Data/information source</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>	<b>Not considered converting</b>
newspapers	2.3 (2.2; 2.5)	2.5
farm magazines	4.4 (4.3 **; 4.7 **)	4.5
radio	2.1 (2.0; 2.3)	2.0
TV	2.2 (2.1; 2.2)	2.1
the Internet	1.6 (1.4 *; 2.0 *)	1.5
the family	3.5 (3.5; 3.3)	3.5
employees	2.0 (1.9; 2.2)	2.0
neighbors and colleagues	3.5 * (3.4; 3.7)	3.9 *
advisors	4.0 (4.0; 4.0)	4.1
courses	3.8 (3.8; 3.9)	3.6
the dairy	3.3 (3.4; 3.2)	3.2
own experience	4.7 (4.7; 4.6)	4.6

The most important data/information source is “own experience”. Naturally, the experience has been acquired during an entire lifetime and originates from a variety of other data/information sources. However, it is regarded as a data/information source in itself. The decision maker has learned facts, concepts, methods, values, abilities, etc., earlier in life and has stored them in the own mind. This information might not be found in any other source than own experience.

“Farm magazines” and “advisors” are also given high scores by the respondents. These are specific data sources, such that the milk producer could expect to find the demanded information for specific problems by using them. They might be directed towards agriculture or even sharper fields, such as organic farming, or even organic milk production. There is also more general information in farm magazines, and there are also magazines with a more general profile.

“Family”, “neighbors and colleagues”, “courses” and “the dairy” are given approximately the same score. Common for these sources is that they all, except “the dairy”, could be expected to have a “social” value with direct contacts with other persons. It is not necessarily only the answer of a specific question or information about a specific topic that is searched for when using these sources, but it is also a means to achieve social contacts.

The remaining sources in table 13 are considered to be less important. These sources are more general, in that they are broader with respect to information content. The exception would be “employees”, who, surprisingly, are given low scores. Although many farmers do not have employees, thereby responding a “zero”, there are not many of those who have employees that perceive them as an important information source.

To summarize; the data/information sources that achieve the highest scores for total importance (except experience, which is given the highest score of all sources), are the specific sources. These are often directed towards a specific topic or field and include “farm magazines” and “advisors”. As mentioned above, these can also include more general information. In the middle come some sources that also seem to have a social value, with direct contacts with other persons, such as “the family” and “neighbors and colleagues”. Lowest scores for total importance are given to general data/information sources, such as “newspapers”, “radio” and “TV”. “The Internet” is given the lowest score of all sources. Maybe there is no or little information about organic farming on the Internet. Computer usage pattern is also a matter that affect the perceived the importance of the Internet.

“Most important data source for daily activities” was dominated by five sources. “Farm magazines” was answered by approximately 30 per cent of all farmers, except by conventional farmers that have considered converting. The corresponding figure for the latter category was 23 per cent. “Farm magazines” was followed by “own experience”, except for the conventional farmers that had considered converting, who had the opposite order of this and the former source. The figures are approximately 25 and 30 per cent, respectively. Thereafter follows, in decreasing order, “advisors”, “the family” and “neighbors and colleagues”. The corresponding figures are approximately 15, 10 and 8 per cent, respectively. This order regards all farmer categories. The remaining sources are reported as most important for daily activities just by few farmers.

It is interesting to see that except for “own experience”, the second and third most important sources for daily activities are possible to use as channels for information distribution to milk producers. It is easy to write articles about various topics in farm magazines. Advisors can be trained in new topics and they can receive information, education and training about, e.g., new production techniques and methods, that government, farm organizations and cooperatives, or others want farmers to adopt or use. This indicates that these sources should be useful media in order to inform milk producers, with focus on daily activities.

The next question considered the most important data/information source for the decision or consideration to convert to organic milk production. By obvious reasons this question was not answered by the conventional farmers who had not considered converting to organic farming. Instead the two categories of farmers are organic and those of the conventional who have considered converting.

For the organic producers the most important data/information source for the decision to convert was, in decreasing order of appearance “advisors” (answered by approximately 24 per cent), “the dairy” (20 per cent), “the family” (14 per cent), “own experience” (13 per cent) and “courses” (13 per cent), followed by “neighbors and colleagues” (10 per cent). The remaining sources were answered by none or only a few of the respondents, respectively. It is interesting to note that “farm magazines” that were perceived as the most valuable source by most farmers regarding daily activities, receives a drastically lower score for the importance for the unique decision to convert to organic production.

For the conventional producers who have considered converting the source that was marked by most farmers as the most important for the consideration to convert was “advisors”. This was answered by approximately 45 per cent of these farmers, i.e., about twice as many as among the organic producers. The alternative answered by the second largest percentage (16 per cent) was “the dairy”, which to some extent also can be seen as advisory service. Taken together these sources correspond to nearly two thirds of the conventional milk producers who have considered converting. Thereafter follow “courses” (13 per cent) and “farm magazines” (11 per cent). The remaining alternatives are answered by none or only a few farmers.

The results have some interesting implications. Firstly, internal sources, e.g., own experience and the family, are not regarded as the most important source by many of the conventional producers. Among the organic producers these sources are considered as the most important ones to a much higher degree, though. It is not easy to find any obvious reason for this. One explanation could be that the organic farmers actually do value internal sources higher, compared to what the conventional farmers do. Maybe they to a higher extent do what feels right according to themselves or their family and do not listen that much to external, “expertise” and know-how sources. It could also be an after-rationalization, so that “now after having made the decision of converting, it feels like it was I myself, or I together with my family that made this decision”. Another explanation could be that the organic farmers have reached further with respect to converting to organic production, compared to the conventional producers. The former category therefore might have greater need to talk to other people about it. The conventional farmers on the other hand, have not changed their production in this sense. Consequently, they do not have such a demand of dialogues and discussions with other people. The latter explanation is focusing on learning and the decision making process, while the former is focusing on the personalities of the farmers.

Secondly, it is interesting to see that although “courses” received quite a high value according to the figures in table 13, they do not seem to have a large

importance for either daily activities or the decision/consideration to convert. It is an indication that courses might be valued high not only due to their value as a data/information source, but also to their value as something else, such as an occasion for social life, meeting others and discussing with colleagues.

Thirdly, although “advisors” and “the dairy” are considered to be the most important data/information source for the conversion consideration by such a substantial proportion of the conventional farmers, these sources have obviously not succeeded in making the conventional producers convert. This could depend on a number of reasons. For instance, the advisors could have advised them not to convert. The dairy maybe did not want these farmers to convert, perhaps due to low suitability of the existing truck routes and capacity in the nearby dairy. It could also be that the advisors have not succeeded in making these farmers convert, although they have tried. Perhaps the knowledge level of the advisors is not sufficient or maybe the advisors themselves do not like organic production. Obviously “advisors” and “the dairy”, for some reason, have, at least not yet, succeeded in convincing these conventional farmers convert to organic production, despite their perceived major importance as information source.

From these results it seems clear that when it regards the unique decision of converting to organic milk production, the most important data/information source is “advisors”, and to some extent the dairy, which also could be regarded as advisory service to some extent. The results indicate that it would be a good idea to make sure that the advisors have adequate and sound information that really is up to date, concerning organic milk production. Then it is important to ensure that they are also able to actually transfer this knowledge to the farmers. This is due to the fact that they seem to play a very important role in the consideration to convert according to the results.

The average time spent on data/information collection varies from 3.1 hours among the organic producers up to 4.1 hours among the conventional farmers who have considered converting. This difference is significantly different at the one per cent level. The other category of conventional farmers spends in average 3.2 hours per week. It seems like the conventional farmers who have considered converting are the most active farmers in this respect. Maybe it could be explained by the fact that they obviously have examined, and perhaps still are examining, one or more alternatives for future changes in production, of which one option was converting. This is time consuming.

Approximately 70 per cent of the organic producers and 60 per cent of the conventional producers reported no missing information at the time of the converting decision/consideration. This is a considerable proportion. On the other hand, consequently there were almost 40 per cent of the conventional producers who thought that there were difficulties in obtaining the needed information. This is actually worth considering for those responsible for recruitment of new organic producers. The information that was perceived as difficult to obtain at the time of converting consideration can be grouped into five categories. These are “rules, regulations and support now and in the future”, “crop production and



consequences for the ground”, “the result of the conversion; production result, etc.”, “starting time for organic delivery to Arla” and “economy and costs”. For all categories, the conventional farmers demanded information to a higher extent compared to what the organic farmers did.

There was also a question about whether it is difficult to obtain data/information related to organic milk production today. Approximately the same figures as for the former question about difficulties in getting data/information at the time of decision/consideration resulted. Also, the same knowledge areas were specified in this question. Therefore the presentation of the former question also can refer to the situation of today, or at least at the time of distribution of the questionnaire.

The results of this and the former questions regarding information collection should be interesting reading for those responsible for recruitment of new organic producers and other actors. Here concrete topics and issues have been presented, including topics and issues on which farmers, who actually have considered converting themselves, have reported as difficult to obtain data/information about. Besides, it is both at the time of conversion consideration and at the time of the distribution of the questionnaire. If we connect this issue to the perception of the importance of different information sources in different aspects, it could be a good indication and a useful help in order to design the supplied information and services to future converters and decide what issues to supply information about. Then, the content and channel of information and services could be better matched to the actual needs and demands of the farmers.

#### *8.4.7 Other decision making activities*

Other decision making activities include problem detection and problem definition. The analysis and choice phase include questions about storage of collected data/information, processing of data to information, importance of the obtained information, use of information for considering alternative actions, valuation of the consequences, the choice, checking of the choice and adjustment of plans. Also the implementation phase is included. The learning part includes a question of whether they think they have learned anything due to the decision, and if so; what they have learned (compare to figure 9; questions were asked about the eleven specified areas and an additional “other”, e.g., open, alternative), the most important effect on them as a manager from having made this decision and finally, facing other future major decisions in the business; what has been the most valuable experience gained from the conversion decision. By obvious reasons, the questions about the analysis and choice phase do not include those farmers who have not even considered converting to organic milk production.

The first of the decision making behavior variables concerns problem detection and, more specifically, if and when the farmer started thinking about changing the production overall. This does not necessarily mean converting to organic production. Among the conventional producers there were 44 per cent who had not considered changing their production at all. Consequently, more than half of the producers in this category of farmers had considered changing their production

(122 of 216 conventional producers). A clear majority of the latter farmers had done it during the latter part of the 1990s. This coincides with the time period when the organic milk production started expanding considerably. Several farmers have considered changing their production earlier as well, but then it was in 1990 or before that. Very few considered changing production during the first half of the 1990s.

The organic farmers also started thinking about changing their production to the largest extent during the middle part of the 1990s, although more spread than the conventional producers. The first ones started thinking about it in the middle of the 1970s, with single producers even before that.

The reasons for considering a change in the production at the farm, i.e., problem detection, is presented in table 14. Any single farmer could have more than one reason, such that the sums of the columns are not necessarily equal to 100 per cent.

Table 14. *Reasons for considering an overall change in production*

<b>Reason</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>	<b>Not considered converting</b>
wanted to try something new, but did not see a problem	53% * (56% **, 44% **)	23% *
had economic problems in the firm	9% (9%, 8%)	15%
had production problems in the firm	9% (6% *, 16% *)	19%
a forthcoming change of generations in the business	5% (6%, 2%)	12%
had personal problems	2% (0% *, 8% *)	0%
other reason	44% (46%, 36%)	45%

Fifty-three per cent of the farmers that have converted or considered converting considered changing their production overall, at least partly due to their willingness to try something new and not only due to some specific problem they had detected. The corresponding figure for those who had not considered converting to organic production was 23 per cent. The latter group to a significantly lower extent have considered changing their production overall due to the fact that they wanted to try something new, but did not see a problem.

The most frequently given answers in the “other reason” category were: “make more money”, “get more spare time”, “have always produced more or less organically” and “questioned conventional agriculture”. If we define “problem” as difference between current and desired situation, these alternatives are in fact examples of problems as well. Except the answers above, many others were reported. Though, those were just given by single or very few farmers. Few farmers thought about changing their production due to personal problems. This result can be seen in all categories except the conventional farmers who

considered converting. Almost a tenth of the farmers in the latter category reported this reason.

Next question in the questionnaire considered whether the farmers who had thought about changing their production overall, had also considered converting to organic milk production. Ninety-six of the conventional producers in the survey had considered converting to organic milk production, which corresponds to 44 per cent of all conventional producers.

To summarize, the conventional farmers can be grouped. Originally there were 216 conventional farmers in the survey. Of these, 94 farmers had not considered changing their production at all. The remaining 122 farmers consequently had considered doing that. Of the latter 122 farmers, 26 farmers had not considered changing to organic milk production, but instead one or more other alternatives. The remaining 96 farmers have considered converting to organic milk production, i.e., they have gone through a decision making process, as well as the organic farmers have, although they have made different choices. Consequently the remainder of this section includes only those farmers who have gone through the decision making process. This means the organic farmers and those of the conventional milk producers who have considered converting.

The reasons for considering conversion to organic milk production is presented in table 15. About three quarters of the farmers considered converting to organic milk production as an interesting alternative according to their values. This is also the case for the conventional producers, although the figure is slightly lower. The values could of course differ among the farmers as indicated above. Thereby different farmers may have substantially different reasons for considering converting, although all refer to their values and none of them necessarily may perceive that they have a problem in the business. It is interesting to see that the conventional producers also consider converting to be an interesting alternative according to their values. Thereby one could assume that it is possible for these farmers to convert in the future. If converting would not have been in accordance to their values, it would hardly be a realistic alternative for future action.

Table 15. *Reasons for considering conversion to organic milk production*

<b>Reason</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>
interesting alternative according to my values	74% (76%, 68%)
milk production profitability problems; had to act	10% (10%, 10%)
general business profitability problems; had to act	7% (8%, 3%)
converting would solve my production problems	4% (3%, 6%)
converting would solve my personal problems	1% (1%, 1%)
other reason	27% (27%, 28%)

Relatively few farmers report problems as a reason for considering organic production. Though, the most frequently reported problem as a reason for considering converting regards milk production profitability, which ten per cent of the farmers report as a reason. In the alternative “other reason”, the most common answers are “increase profitability without increasing the stock size”, “consumer demand”, “challenge” and “were already producing organically”. Numerous other reasons were reported by single or very few farmers.

The last question about problem definition regards whether the farmers considered more alternatives than converting to organic milk production. Table 16 presents the result of this question. Most farmers considered “continue with conventional milk production”, except converting. This was commonly occurring among the conventional producers, with a significant difference on the one per cent level compared to the organic producers. The second most common alternative was to quit milk production. Few farmers considered to quit farming overall, or to start an alternative production at the farm. The alternative “start alternative production” includes, e.g., “keeping beef cattle” and “work outside the farm”, according to the answers. There were numerous other alternatives as well, although only reported by single or very few farmers. “Other alternative”, finally, included, such options as to expand the cow herd size, lease out the farm and several more alternatives, although reported by just single farmers.

Table 16. *Considered alternatives to converting to organic milk production*

<b>Alternatives to organic milk production</b>	<b>Converted/considered converting (division in organic vs. conventional who have considered converting, within brackets)</b>
continue with conventional milk production	65% (58% *, 83% *)
quit milk production	18% (16%, 23%)
quit farming	6% (5%, 10%)
start alternative production	8% (7%, 9%)
other alternative	5% (5%, 7%)

Almost all of the remaining questions regard the analysis and choice phase of the decision making process according to the model presented in table 1, above. There are also some remarks about the implementation phase at the end. For the remaining questions, results are presented for the organic producers and conventional producers who have considered converting. By sake of linguistic simplicity the latter group is referred to as just “conventional” in the remainder of this section, unless other information is given.

The first question considers data storage. In table 17 we see that the organic producers have used data storage to a higher extent, compared to the conventional colleagues. Naturally a decision maker can use more than one storage, so the sums of the columns, respectively, do not need to be equal to 100 per cent.

The organic producers have used different data storages to a higher extent for all varieties except “by computer”, although the difference is significant only for

storage by memory. Instead the conventional producers are significantly over represented in the “no particular data storage” category. The reason for this may be that it should be easier to remember how you have done something if the result and implementation of the decision also mean a change of the current situation. The organic producers in most cases actually have changed their production, while the conventional producers after having gone through the decision making process, in this respect, have not changed it. Besides, some conventional producers might not have considered converting very seriously, which naturally could affect the level of effort spent in the decision making process. It is easier to remember something you have used to a great extent.

Table 17. *Usage of different data storages*

<b>Data storage</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
by memory	75% *	60% *
by pen and paper	31%	20%
by computer	5%	6%
written material that was saved	63%	59%
no particular data storage	10% **	19% **

Collected data is supposed to be processed to information according to the model presented in figure 7. In table 18 the usage of different data processing methods and tools are presented. The decision maker can use several data processing tools, so the sums of the columns, respectively, do not need to equal 100 per cent.

Table 18. *Usage of different data processing methods*

<b>Data processing</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
by own thinking	70%	62%
by discussion with the family	70% **	54% **
by discussion with neighbors and colleagues	43%	49%
by discussion with advisor/s	62%	56%
by using pen and paper, calculator, etc.	31%	33%
by using computer	7%	6%
did not process the collected data in any particular way	2%	4%
other processing	4%	4%

Almost all milk producers answered that they did process the collected data to information. It is obvious that organic producers are internally oriented with respect to processing of data to information. Seventy per cent of them conducted the data processing by own thinking and/or by discussion with their family (not excluding other methods as well, though). This result is in accordance with the result that the organic producers seem to value internal sources, such as “own experience” and “the family” very high. This can be compared with the section about most valuable data/information source for the decision/consideration to

convert, above. The organic farmers have reached further in their decision making, compared to their conventional colleagues. Therefore they may have a greater need to discuss their situation with other persons in their immediate surroundings, as was discussed above. Many of the organic farmers also discussed their options with an advisor, though.

Among the conventional farmers “own thinking” is dominating, followed by “discussion with advisor”, “discussion with the family” and “discussion with neighbors and colleagues”, where the three latter alternatives are used by approximately half of the producers. The internal focus is not that dominating for the conventional producers, although the internal methods are still important.

“Computer” and “other processing” were not used to a large extent among the respondents. The latter alternative includes examples such as “discussion with employees, colleagues and the board” and “discussion with consumers”. Though, these alternatives were answered by only single or few producers.

The collected information is used in the subsequent decision making. In table 19 the consideration given to the collected information is presented. The alternatives in table 19 follow a decreasing degree of consideration taken to the collected information and at the same time an increasing level of consideration given to own experience and intuition.

Table 19. *Consideration taken to the collected information in the subsequent decision making*

<b>Consideration taken to the information</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
studied the information in detail and considered exact calculations	5%	9%
studied the information, but just with respect to the direction; no exact levels in “kronor” (SEK)	29%	34%
used the information to some extent, but went just as much on own experience and intuition	54%	46%
looked quickly on the information, but went mostly on own experience and intuition	9%	9%
did not consider the information at all, but went solely on own experience and intuition	2%	0%

From the figures in table 19 it is obvious that the collected information is important, although not the sole factor that the decision maker is taking into account. Own experience and intuition seem very important. Just as there are few farmers who study the collected information in detail and consider exact calculations, there are also very few farmers who consider solely own experience and intuition. Instead most farmers prefer the mixture of collected information and own experience and intuition. It is obvious that experience and intuition are very

important for the farmers. This coincides with the high scores of "own experience" as information source, as was discussed above.

The collected information could be used for planning of alternative actions in the subsequent decision making. In table 20 the results about information use for planning of options are presented. Many of the organic producers saw several options, of which one was converting to organic production, and used the collected information for planning of these options. Few of the organic farmers report that they "did not plan in particular for the alternative/s". About half of the conventional producers saw several options and used the information for planning of those options. Obviously they were not yet convinced. On the other hand, about a third of the producers did not plan in particular for the alternative/s. The latter result could indicate that these farmers may not have considered converting and the other options very seriously. On the other hand there were 18 per cent of the organic farmers that reported that they did not plan in particular, but obviously they did convert anyway.

Table 20. *Use of the collected information in the subsequent decision making*

<b>Use of the collected information</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
saw several different options, of which converting was one, and used the information for planning of these options	42%	48%
saw just one option, i.e., converting, and used the information for planning of it	40%	22%
no, did not plan in particular for the alternative/s	18%	30%

After having identified one or several options, the consequences of each of these alternatives could be identified and evaluated according to the model of the decision making process presented in table 1. The result of the question about this is presented in table 21.

Table 21. *Evaluation of the consequences of the decision option/s*

<b>Evaluation</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
evaluated the consequences in detail	30%	18%
evaluated the consequences as a survey; got an overview	59%	77%
did not evaluate the consequences	10%	5%

Evaluation of the consequences of the alternatives is commonly occurring. However the degree of thoroughness does not always seem to be high. Instead most farmers seem to have evaluated the consequences in order to get an overview. Especially the conventional producers seem to have conducted the evaluation in order to get an overview about the consequences to a high extent.

Approximately three quarters of them did so. Only ten per cent or less answered that they did not evaluate the consequences of the options at all.

The answers to the question about the choice of option, i.e., to convert and not convert, is presented in table 22. The question contained four given alternatives and a fifth open alternative.

Table 22. *Choice of the option to convert/not convert to organic milk production*

<b>Method of choosing the alternative convert/not convert</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
judged the consequences of <i>all</i> alternatives and chose to convert/not convert, since this felt best <i>in total</i>	29%	37%
judged the consequences of alternatives until I found an option (i.e., convert/not convert) that corresponded to a <i>satisfactory level</i> for me	18%	20%
chose alternative (i.e., convert/not convert) solely according to my intuition	33%	9%
saw just one alternative (i.e., convert/not convert) and chose that	15%	9%
other alternative	5%	25%

From the figures in table 22 we can see that a third of the organic producers chose solely according to their intuition, which is the most commonly reported method in this farmer category. Almost as many made the choice by judging the consequences of all alternatives and choosing the alternative that felt best in total. The corresponding figure for the choice by judgment of the consequences of the alternatives until a satisfactory option was found, e.g., according to behavioral theory, is 18 per cent. We can once again conclude that intuition is important in the decision making process. This is also in accordance to the high importance of own experience as data/information source for the organic producers.

Almost 40 per cent of the conventional farmers have judged the consequences of all alternatives and chosen the alternative that felt best overall, i.e., in their case to remain conventional. They could alternatively have used the behavioral approach, but not found any satisfactory alternative to choose and therefore have judged all alternatives. For this category intuition seems less important in the decision making of whether to convert or not. Only nine per cent of these farmers made their choice solely based on intuition. On the other hand, a quarter of the conventional farmers did not choose any of the given answer alternatives. Instead they gave their own explanations of how they made their choice. Many different alternatives were presented, of which the most common ones are: “I am still in the process of converting”, “Arla does not admit new producers into organic production at the moment” and “the conditions of the farm were not appropriate for converting”, each with approximately seven per cent of the answers.



The next question considers checking the choice, i.e., to convert or not convert for each producer group, respectively. The result of this question is presented in table 23. The highest proportion of farmers checked the consequences of their choice in order to get an overview after the choice was made. Fewer farmers checked their choice thoroughly, especially among the conventional producers. Nine per cent of the latter farmer category also answered “other alternative”. All of these latter farmers reported that they were still in the process of deciding. Approximately a third of the farmers in each group, respectively, did not check the choice at all after it was made.

Table 23. *Checking the consequences of the choice of option to convert/not convert to organic milk production*

<b>Checking the choice to convert/not convert</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
checked the choice accurately, after it was made	23%	13%
checked the choice as a survey; got an overview, after it was made	44%	41%
did not check the choice after it was made	32%	37%
other alternative	1%	9%

After having checked the result, the decision maker could adjust the plans for implementation of the chosen option. In table 24 the result of this question is presented. Approximately a third of the organic farmers adjusted their plans for implementation due to their checking procedure. The corresponding share for the conventional producers is 43 per cent. The farmers in the latter category therefore seem more uncertain in their decision to remain conventional. Maybe a problem in the business, e.g., low profitability, is necessary to solve and therefore forces the farmer to be very sensitive to news, changing possibilities, etc. This is in accordance with the results presented above, where several conventional farmers reported that they still had not decided conclusively. Consequently, they were still considering converting. It could also be that they had gained valuable information from the converting consideration that they could try to utilize in their conventional milk production. It could also indicate that many conventional farmers have not excluded converting in the future, perhaps when some condition/s are changed to some extent.

Table 24. *Adjustment of the plans after decision to convert/remain conventional*

<b>Adjusted the plans</b>	<b>Organic producers</b>	<b>Conventional producers who have considered converting</b>
yes	32%	43%
no	68%	57%

When it comes to implementation of the chosen action it is only the organic producers that have been able to answer, for obvious reasons. Consequently, this question was excluded in the questionnaire for the conventional milk producers. In table 25 figures about implementation of the conversion decision are presented.

In table 25 we can see that almost half of the farmers made the conversion for the entire farm at one occasion, i.e., for both crop and milk production simultaneously. Thirty-five per cent of the farmers converted the milk production directly, implying that their crop production already had been converted to organic previously. Two per cent of the farmers reported “other alternative”, which in their case was specified to mean “already organic production”.

Table 25. *Implementation of the decision to convert to organic milk production*

<b>Implementation of organic milk production</b>	<b>Organic producers</b>
stepwise; tested while I learned more	15%
direct conversion of the milk production	35%
direct conversion of the entire farm (milk and crop production together)	48%
other alternative	2%

The remaining questions concern learning. Sixty-five per cent of the organic farmers reported that they had learned something overall, due to the converting decision. The corresponding figure for the conventional producers was 71 per cent. The producers that had reported that they had learned something due to the decision to convert/not convert were asked to specify what they had learned. In figure 28 the answers to the specific learning questions are presented.

From the diagram in figure 28 we can see that the organic producers report specific learning to a higher extent compared to the conventional ones with two exceptions. This is somewhat surprising, since more of the conventional farmers reported that they had learned something overall, although the difference is small. One explanation could be that the organic producers have reached further in the decision making of converting to organic production. Hence, they have also had the opportunity to learn more and during a longer period of time. Though, the only significant difference between the groups regards evaluating the consequences, which is significant at the five per cent level.

Among the organic producers the most frequently reported ability they have learned about, due to the converting decision, is problem definition, in order to find solution alternatives to a problem. This is followed by implementation and to plan for options, i.e., to forecast consequences of the decision alternative/s.

The decision to convert does not seem to have had any obvious effect on the ability to store data. This is reported by both farmer categories. Checking the choice is not reported very frequently in this respect. The remaining abilities are reported to approximately the same extent, i.e., by 15 to 20 per cent of the organic farmers.

For the conventional farmers the percentage that have learned specifically in the decision making process in general seem to be somewhat lower, with two exceptions as mentioned above. Evaluating the consequences of the options is the ability that has been reported by the highest share of the conventional farmers with respect to learning.

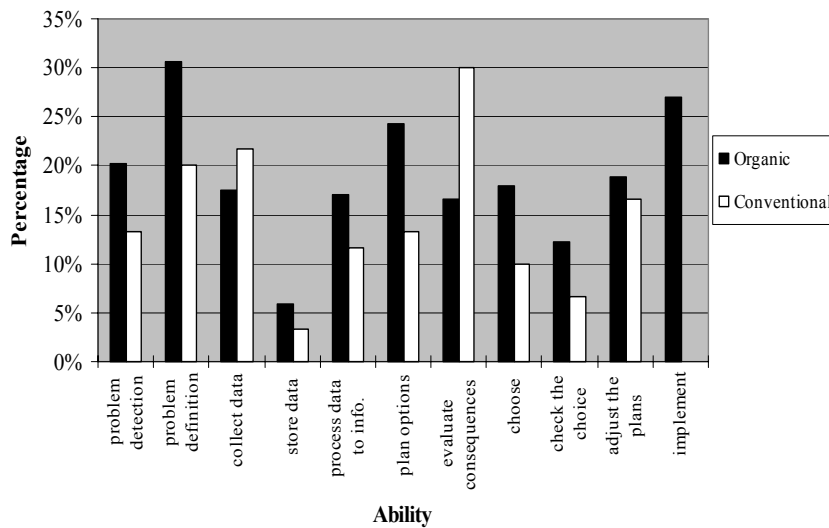


Figure 28. Learning in the decision making process.

There was also an open alternative on the question reported in figure 28. However, only eight and four per cent of the organic and conventional farmers, respectively, reported “other learning”.

The two remaining questions regard “the most important effect on the farmer as a manager from having made this decision” and, “facing other future major decisions in the business, that which has been the most valuable experience gained from the conversion decision”. Both questions are open, with no alternatives presented in advance to choose among. There were a large proportion of missing answers for these two questions, though. The low response rate may be explained by the fact that these topics are difficult to communicate and write about for the managers. On the other hand, especially the last of the questions is very difficult to answer, simply because it is a forecast of a future situation that you not yet know much about. Consequently, it does not just need to be due to the difficulties in communicating the topic.

What is learned in one situation or decision, that might be possible to use in another forthcoming situation, is also a topic of discussion among researchers. A “cognitive researcher” might try to examine whether the decision maker in fact has learned something specific, or if he just has done as before. He could then conclude that what the decision maker in fact has learned, could be used in forthcoming similar situations. A “contextual researcher”, on the other hand, might study the context or the situation as such and consider the decision as dependent upon, or started by the context. He might then assume that in a similar contextual situation, another decision of the same kind would be made in about the same way. Consequently, learning is not obvious for any of them.

The most commonly occurring answers (answered by at least ten per cent) on the former question are for the organic producers, in decreasing order of appearance: “increased self-confidence; stimulating”, “easier to try something new; courage” and “organic production technique and production according to consumer demand”. The corresponding answers among the conventional producers are: “easier to try something new; courage”, “surprised with the bureaucracy”, “more keen to collect information and gain new knowledge”, “have become a better leader of the business/manager” and “knowledge about organic farming”.

The answers given on the question about “facing other future major decisions in the business, that which has been the most valuable experience gained from the conversion decision”, are among the organic producers: “to dare to trust your own knowledge and intuition; self-confidence”, “the importance of long-run planning: creates possibilities to find alternative solutions, flexibility, etc.” and “more keen to collect information and gain new knowledge”. The corresponding answers from the conventional farmers are: “the importance of long run planning; creates possibilities to find alternative solutions, flexibility, etc.” and “more keen to collect information and gain new knowledge”.

#### *8.4.8 Summary of the descriptive presentation of the results*

The descriptive presentation was divided into seven parts, presenting the variables in each of the categories further described above. These were farmer characteristics, farm characteristics, environmental (institutional) characteristics, group (social) characteristics, values/value structure, information collecting and other decision making activities, including learning.

This section has presented some interesting results, which have implications for different actors, such as suppliers of advisory services and information. We can also conclude that there seem to be some differences among the different farmer categories. In the next section of the thesis simultaneous equation models are developed with the aid of the LISREL computer program. Then we can see how the variables are connected to each other and calculate significance levels.

### **8.5 “Analytical results” - a LISREL model**

The simultaneous equation method and the LISREL program were briefly described in the Method section. Detailed information about simultaneous equation models is found in, e.g., Greene (1993), Gujarati (1995) and Sharma (1996). Information about the LISREL program and its statistical characteristics, is found in, e.g., Jöreskog & Sörbom (1989, 1993, 1996). I also recommend an article by Diamantopoulos (1994), especially for the reader who is not very interested in all the statistical details associated with the LISREL method. The article provides a non-technical introduction into the basic concepts and issues of LISREL modeling, bearing the needs of a potential user in mind.

The eight necessary parameter matrices of a comprehensive LISREL model are presented and defined in the same article (p. 112). Simply put, the problem of estimation is that of finding values for these eight parameter matrices that are consistent with the constraints imposed on the model (as described by the specification of the various fixed, free and constrained parameters) and “generate an estimated covariance matrix  $\Sigma$  that is as close as possible to sample covariance matrix  $S$ ” (Diamantopoulos, 1994).

### 8.5.1 Results of the LISREL analysis

The analysis conducted in this section includes only those farmers who have either converted or considered converting, i.e., gone through the decision making process. This means that the conventional milk producers that have not considered converting are excluded in the LISREL analyses. Initially, the intention in this section was to present one LISREL model of the examined part of the decision making process of whether to convert to organic milk production or not. However, that was not possible, due to too few observations in relation to the number of parameters under investigation. Instead, the LISREL analysis has been divided into seven sections, each presenting a smaller part of the decision making process (see table 26). Measurement variable definitions are presented in Appendix C instead of at each path diagram, respectively. The correlation matrix from the underlying dataset used in the LISREL analyses can be obtained from the author upon request.

Table 26. LISREL models of parts of the decision making process regarding converting/not converting to organic milk production

LISREL model No. (presented in):	Illustrating phase/s/subprocess:	As a part of:
1 (figure 29)	Problem detection and problem definition phases	(Problem detection and problem definition phases)
2 (figure 30)	Searching and paying attention: Data collecting	Analysis and choice phase
3 (figure 31)	Searching and paying attention: Information handling	Analysis and choice phase
4 (figure 32)	Planning and forecasting consequences	Analysis and choice phase
5 (figure 33)	Evaluating and choosing	Analysis and choice phase
6 (figure 34)	Bearing responsibility	Analysis and choice phase
7 (figure 35)	Implementation phase	(Implementation phase)

Figures 29 to 35 each presents a path diagram of one part of the examined decision making process. In each of the path diagrams the rectangles symbolize measurement variables, while the ovals symbolize the latent variables (see above for further discussion of these concepts). An arrow between two variables symbolizes a significant relationship between those connected variables. A line connecting two measurement variables symbolizes error covariance. Unless other information is given in the figure each presented variable is significant at the five per cent level, i.e., it has a t-value of at least 1.96. The figures within each path diagram, are the corresponding correlations between the variables. Below each

path diagram the chi-square, degrees of freedom, P and RMSEA (Root Mean Square Error of Approximation) values are presented. These are overall model fit statistics, indicating whether the presented model seems to be appropriate in order to describe the relationships between the variables in the dataset or not, i.e., a measure of how well the theoretical model fits the dataset. For an illustrative model of the path diagram part of the LISREL model, see Diamantopoulos (1994), p. 110.

If the chi-square value is large compared to the degrees of freedom, it is an indication of a bad model fit. Chi-square measures the distance between the sample covariance matrix and the fitted covariance matrix. Consequently, a large chi-square value indicates a large distance between the two matrices, i.e. a bad model fit. The chi-square value at any number of degrees of freedom corresponds to a given P-value and consequently these are measures of the same thing. The P-value should be at least 0.05 for an indication of an acceptable overall model fit. RMSEA, finally, is a measure of “discrepancy per degree of freedom” (Jöreskog & Sörbom, 1993). An RMSEA value of approximately 0.05 or lower indicates a good model fit and an RMSEA value between approximately 0.05 and 0.08 or 0.09 indicates an acceptable overall model fit. However, an RMSEA value above 0.09 indicates unacceptable overall model fit. Besides the statistical measures mentioned above, many additional measures are automatically calculated by the program for each LISREL model. However, they are not presented here. Besides, many of these statistical measures are actually different modifications of the chi-square value.

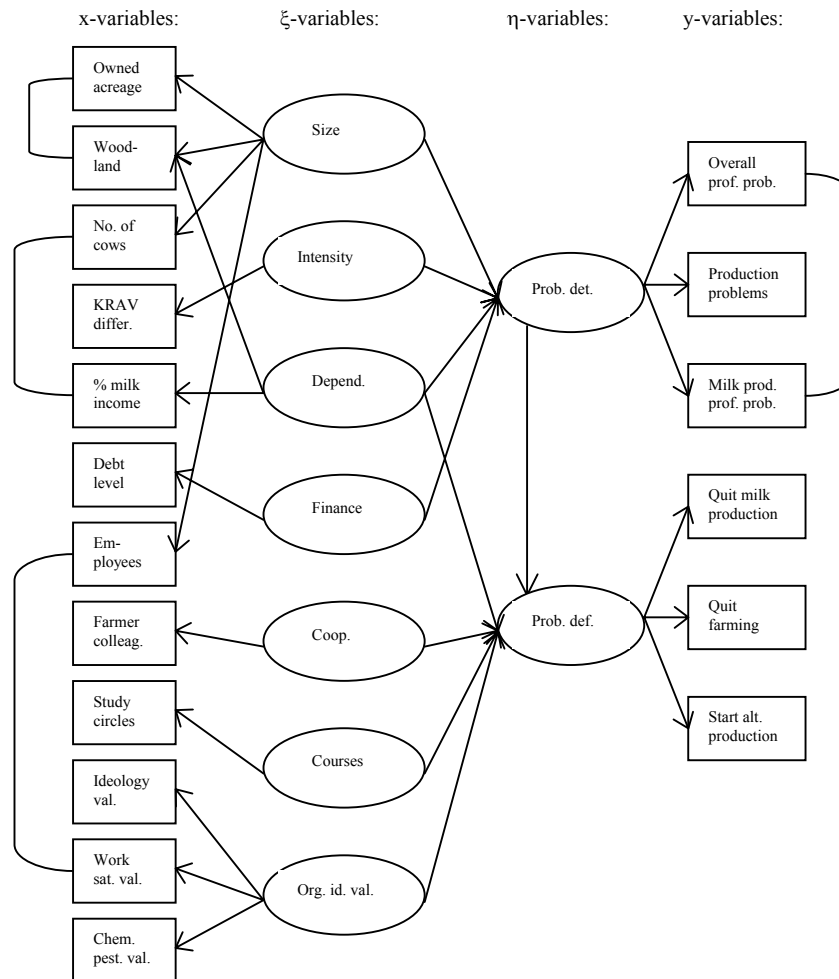
Acceptable overall model fit statistics do not themselves guarantee that the model cannot become even better, though. Consequently, the LISREL program also provides improvement suggestions, known as “Modification indices”, to the user. These suggestions are either as adding new paths between variables, or as adding error covariance between measurement variables. Besides the resulting decrease in chi-square, the new estimate is presented by the program. However, it is important to remember the theoretical and logical connections between the variables. Consequently, it is by no means certain that the modification indices produced by LISREL should be accepted. It is necessary to consider each single suggestion separately in order not to lose the theoretical connections.

The relationship between the variables could be expressed in equations. Also the structural equations are presented for each of the figures. These are estimated regression equations, which present the relation between the  $\eta$ -variable and the corresponding  $\xi$ -variables.

### *8.5.2 Problem detection and problem definition*

Figure 29 presents a LISREL model of the problem detection and problem definition phases. The overall model fit statistics, i.e., a chi-square value of 127.45 with 105 degrees of freedom, resulting in a P-value of 0.067 and an RMSEA value of 0.024, indicate an acceptable model fit.

From figure 29 we can see that the independent variables that seem to affect problem detection are all related to characteristics of the farm. None of the significant  $\xi$ -variables are related to characteristics in the farmer's person. They are also not related to the social environment, such as availability of courses, cooperation with farmer colleagues, etc. This is somewhat surprising.



Chi-square = 127.45, df = 105, P-value = 0.067, RMSEA=0.024

Structural Equations:				
Prob. det. =	0.34*Size	+ 0.22*Intensity	+ 0.24*Depend.	- 0.33*Finance
t-values:	3.93	2.93	2.80	-4.31
Error variance = 0.69	R <sup>2</sup> = 0.31			
Prob. def. =	0.44*Prob. det.	- 0.20*Depend.	+ 0.12*Coop.	+ 0.14*Courses
t-values:	4.24	-3.24	1.67(⊖)	2.10
	- 0.11*Org. id.			
t-value:	-1.64(⊖)			
Error variance: 0.73	R <sup>2</sup> = 0.27	(⊖) t<1.96		

Figure 29. A LISREL model of the problem detection and problem definition phases of the decision making process.

Consequently, Öhlmér, Brehmer & Olson (1997) report other variables with a significant effect on problem detection, as well. However, in their study the problem arose due to external changes: deregulation and EU membership. The problem in the present study might have been detected due to other non-external information, such as accounting, which may explain the difference of the results.

However, the size of the firm seems to have a positive effect on the problem detection, as defined in the model. According to the results in figure 29, the intensity of the production has also a positive effect on the problem detection. The more separated the production is from the KRAV rules, the larger is the effect. A similar result is found for dependence on milk income, i.e., the higher the dependence is, the higher is the effect on problem detection. The last variable that appeared significant in this sense was the financial situation as experienced by the farmer. The larger the perceived debt level in the firm is, the higher is the effect on the problem detection. Due to the coding of this variable it is indicated by a negative sign, though, see Appendix C. The result seems reasonable.

I asked for the farmers' perception of the debt level in the questionnaire. A fixed amount of money or a percentage may be perceived differently by different persons. Hence, one farmer could perceive a certain amount of debts as a problem, while another farmer does not. Of course, the debt level is one important factor for explaining profitability problems, if any.

The problem definition phase, on the other hand, shows a somewhat different pattern. Here the important independent variables seem to be related to characteristics in the farmer's person to a higher extent. Though, the profile of the firm with respect to dependence of milk income has a significant effect on problem definition according to the LISREL results. Here the relationship is negative, i.e., the more dependent on milk income the farmer is, the fewer alternatives seem to be at hand. This seems reasonable.

The remaining significant variables that seem to affect problem definition concern cooperating with fellow farmers, participating in courses, and organic ideology. Cooperation with fellow farmers, although not really significant at the five per cent level, has a positive effect on problem definition. Hence, one could expect this to be a source of alternatives in order to solve a detected problem. The same affect could be detected for participating in courses. Organic ideology, finally, has a negative effect on problem definition. The more organic ideology-oriented the farmer is, the smaller the "amount" of problem definition. Hence, one could expect these more "organic ideological" farmers to consider fewer solution alternatives due to the detected problem, compared to farmers with a value structure less oriented towards organic ideology.

Problem detection, i.e., the former  $\eta$ -variable, also has an effect on problem definition according to the results. Therefore the dependence of milk income in the firm affects problem definition directly (as was discussed above), as well as indirectly, via problem detection.



A weakness with the results in figure 29 is that the problem detection and problem definition latent variables are each measured by a set of dummy variables. This is generally not recommended according to the literature. Instead, I have tried to formulate ordinal variables from these, but without success. Consequently, these results should be interpreted with an amount of precaution, although the statistical measures indicate an acceptable situation. However, the results do seem reasonable in the sense that the signs of the variables seem intuitively and theoretically appropriate.

It is worth noticing that information variables, as measured by importance of different data sources and amount of time spent on information collecting per week, did not appear to be significant. This was the case for both problem detection and problem definition. This is somewhat surprising. I would have expected to find that a high amount of time spent on information collecting would have had a positive effect on problem detection as well as problem definition. Also a positive attitude towards external information sources was expected to have a positive effect on problem detection as well as problem definition. However, one possible explanation could be that it may have been regarded as an internally caused problem, such as low profitability, detected by studies of internal information and experiences. On the other hand, few farmers reported this as a reason for conversion. Another explanation could be the use of dummy variables as measures of the latent variables, which could mean a measurement problem.

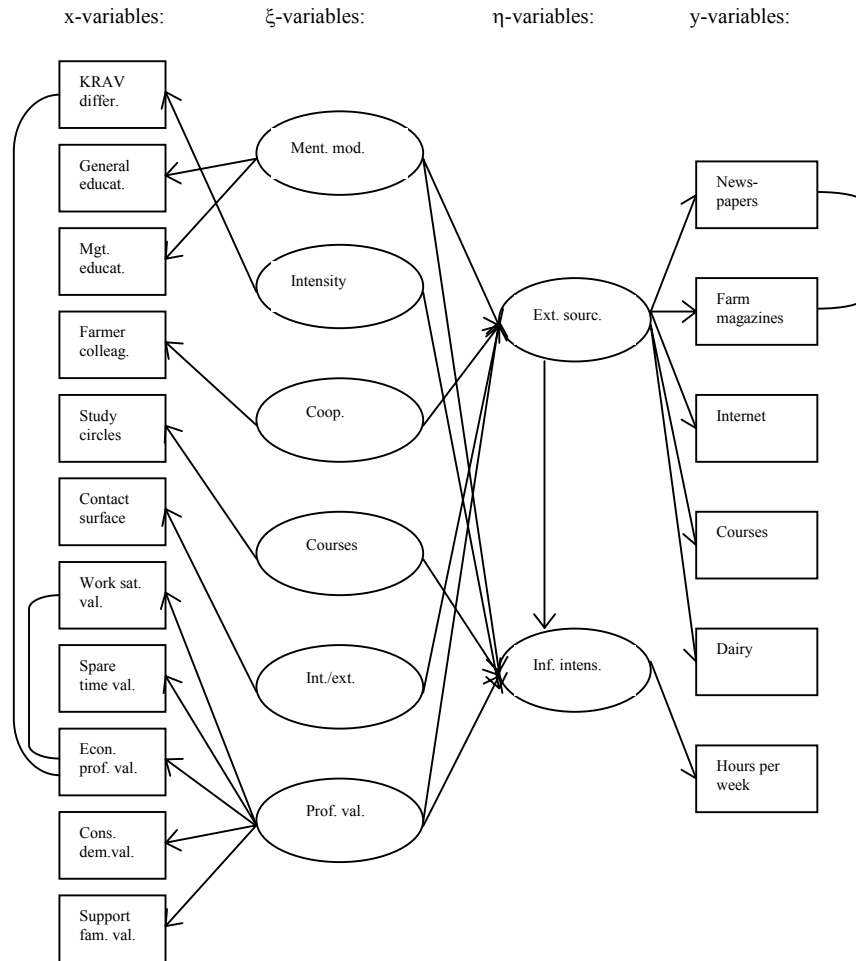
### *8.5.3 Analysis and choice: Searching and paying attention - Data collection*

Figure 30 presents a path diagram of the data collection part of the searching and paying attention subprocess in the analysis and choice phase. The intention was to present the entire subprocess in one path diagram. However this was not possible. As can be seen in figure 30 the chi-square value is high compared to the degrees of freedom and consequently the P-value is low (0.000). This in turn indicates that this probably is not a very good way to present the relations. However, despite many attempts I have not succeeded in formulating a better model. All individual variables are significant at the five per cent level, though.

We can see that the mental model of the farmer now seems to be important for both the importance of external information sources, as well as for the intensity in information search. The latter was measured as the time spent on information collection per week. The more developed the mental models are (as measured by the level of general education as well as amount of specific management education), the more the farmer seems to appreciate external information sources and the more time the farmer seems to spend on information collecting. In other words the farmers with more developed mental models are more active and externally oriented in their information searching behavior.

Other significant characteristics in the farmer's person and the social surroundings include cooperation with farming neighbors, availability and participating in courses and whether the farmer seems to be more internally or

externally oriented with respect to most important contact surface. These factors also influence the data collecting behavior according to the LISREL analysis. All these characteristics have a positive influence either on the importance of external sources, or on the intensity of the information search.



Chi-square = 187.74, df = 96, P-value = 0.000, RMSEA=0.051

Structural Equations:				
Ext. sources =	0.38*Ment. mod.	+ 0.25*Coop.	+ 0.19*Int./ext.	+ 0.53*Prof. Val.
t-values:	2.46	2.41	2.04	3.14
Error variance = 0.49	R <sup>2</sup> = 0.51			
Inf. intens. =	0.40*Inf. skrif.	+ 0.25*Ment. mod.	+ 0.17*Intensity	+ 0.24*Courses
t-values:	2.05	2.01	2.71	2.06
	- 0.28*Prof. val.			
t-value:	-2.15			
Error variance: 0.67	R <sup>2</sup> = 0.33			

Figure 30. A LISREL model of data collection in the searching and paying attention subprocess in the analysis and choice phase of the decision making process.

One firm characteristic showed to be significant and that was the intensity in the production. The farther production is from the KRAV rules, the higher the amount of time spent on information collection. In other words, those farmers who were or are producing close to the KRAV rules seem to spend less time on information collection compared to their colleagues with more high intensity production.

Also the view of external information sources seem to affect the time spent on information collecting in a positive way. The higher the importance of these external sources, the higher amount of time spent on information collecting. This seems reasonable, also since one might understand the question about time spent per week on information collecting, as external information collecting. Maybe the farmers do not consider using own experiences, asking the family or an employee as information collecting.

Profitability values, finally, play a significant role, according to the LISREL analysis. The higher the profitability importance value is, the higher is the importance of external information sources in the firm. In other words, those farmers who have a value structure oriented towards high profitability tend to value external information sources higher, compared to those farmers who have another value structure. This indicates some conclusions regarding choice of information source in relation to information content. If, e.g., a dairy wants to increase the number of organic milk producers, the information that focuses on profitability and related items should be presented in external sources such as farm magazines, through courses or by the dairy, etc.

The profitability values have a negative affection on time spent on information collecting, though. The more profitability oriented the farmer is, the less time he will spend on information collecting, according to the model. The reasons for this seem unclear. The expected result would have been the opposite.

#### *8.5.4 Analysis and choice: Searching and paying attention - Information handling*

The second half of the searching and paying attention subprocess focuses on information handling, i.e., data storage and/or processing of the collected data into information. As was mentioned above, the intention was to include it into the former path diagram. However, this was not possible to accomplish. Consequently, figure 31 contains the path diagram of this second half of the subprocess; i.e., data storage and processing. The P-value is close to 0.05.

In figure 31 we can see that the only significant  $\xi$ -variable for the data storage was specific education, measured as completed courses regarding organic milk production. The reasons for this seem a bit unclear. One explanation could be that those farmers that have this type of education actually received information during those courses and that it was this information that was stored. However, the  $R^2$ -value for the specific education variable is just 0.037, indicating that most of the variation in the variable is explained by the residual.

Data processing is explained by data storage, cooperation with farming neighbors and profitability values. All were positively correlated to data processing, i.e., the higher the value of any of these  $\xi$ -variables, the higher the value of data processing, according to the LISREL model. Cooperation with farmer neighbors is of course also a way of ventilating ideas and discussing problems, and is an excellent occasion for data processing.

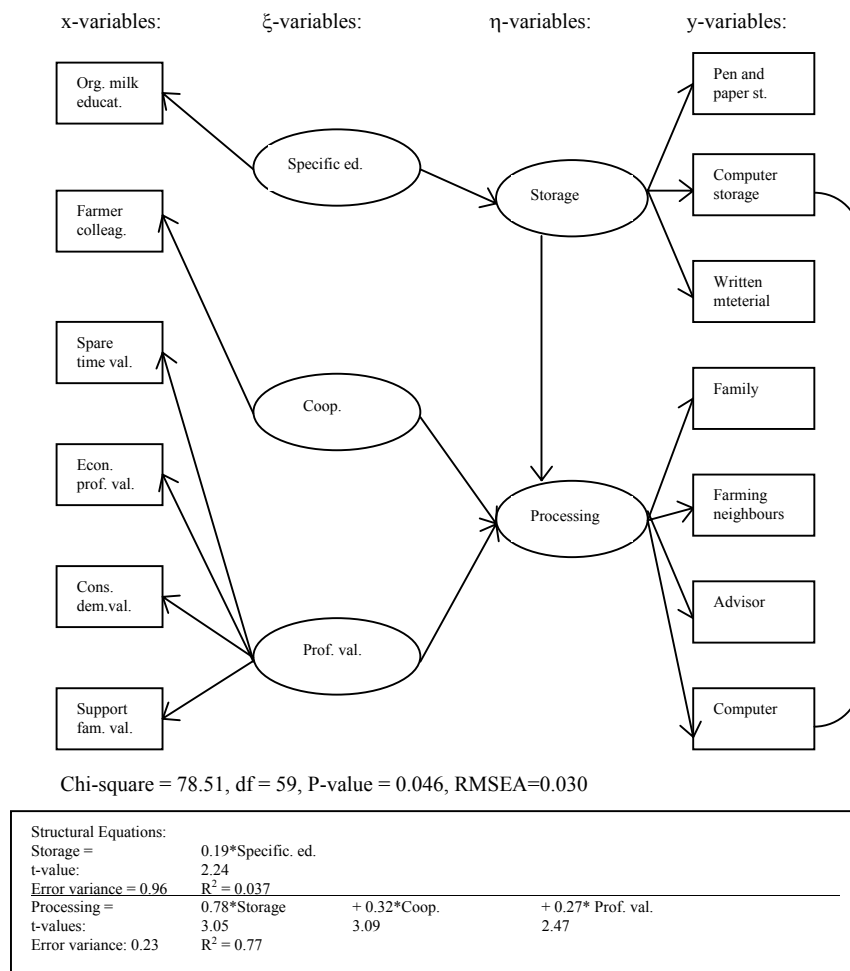


Figure 31. A LISREL model of data storage and processing in the searching and paying attention subprocess in the analysis and choice phase of the decision making process.

Also, the profitability values seem to have a significant influence on the data processing variable. The more profitability oriented value structure the farmer has, the more he seems to process collected data. If high profitability is important for the farmer he might be more concerned to really translate the data at hand into financial consequences. This often demands calculations or other types of processing. For instance, one issue could be what this or that new regulation means for me in amount of money.

Consequently there were a number of variables that turned out to be non significant. Among these we find the mental model of the manager, the importance of external/written data sources and time spent on data and information collecting. This is somewhat surprising, since one could expect these factors to have an important effect on data storage and processing. The reasons for this result are not clear, though.

#### *8.5.5 Analysis and choice: Planning and forecasting consequences*

In figure 32 we can see that the consideration taken of the received information, as opposed to intuition, is correlated to mental models, cooperation with fellow farmers and profitability oriented value structure. The higher developed the mental models of the farmer are, as measured by completed formal education, the more the collected information is taken into account. Due to the coding of the dependent variable this is indicated by a negative sign. Consequently, the less developed the mental models are, the more important become the intuitive aspects of forecasting the consequences of different action alternatives.

Cooperation with farmer colleagues is also an occasion for discussion and processing of information. Consequently, conducting this seems to have a positive effect on the consideration taken of the collected information. Due to the coding of the dependent variable, this is indicated by a negative sign. Farmers who do not cooperate with fellow farmers, to a larger extent seem to rely on own intuition when forecasting consequences. Maybe these latter farmers are more internally oriented overall, in the sense that they rely on own experiences and intuition in their management.

“High profitability”-oriented value structure of the farmer also seems to affect the consideration taken to the collected information in a positive way. This is indicated by a negative sign, due to the coding of the dependent variable. Farmers who do not consider achieving high profitability and related items as that important according to their value structure, to a larger extent seem to rely on their intuition when taking the collected information into account.

Planning for action alternatives is correlated with the account taken to the collected information, i.e., the former  $\eta$ -variable and problem definition. The more the farmer takes the collected information into account, the more action alternatives he seems to consider. (Due to the coding this is indicated by a negative sign.) The result seems reasonable. If a farmer has collected an amount of information and then really takes it into consideration, one could assume that he receives more and valuable influences and consequently have more alternative ways of acting, compared to if he to a higher extent trusts his own intuition. On the other hand, it might be that those farmers who actually have considered several action alternatives are the ones that are more intended to take the collected information into account instead of trusting their intuition. The path diagram in figure 32 does not include an arrow from “Planning” to “Cons. Info.”, though. Thereby the latter explanation does not gain immediate support by the model. On the other hand, problem definition is significantly correlated to planning for the

consequences. This seems reasonable, since the more solutions that you obtained, the more action alternatives you should forecast the consequences of.

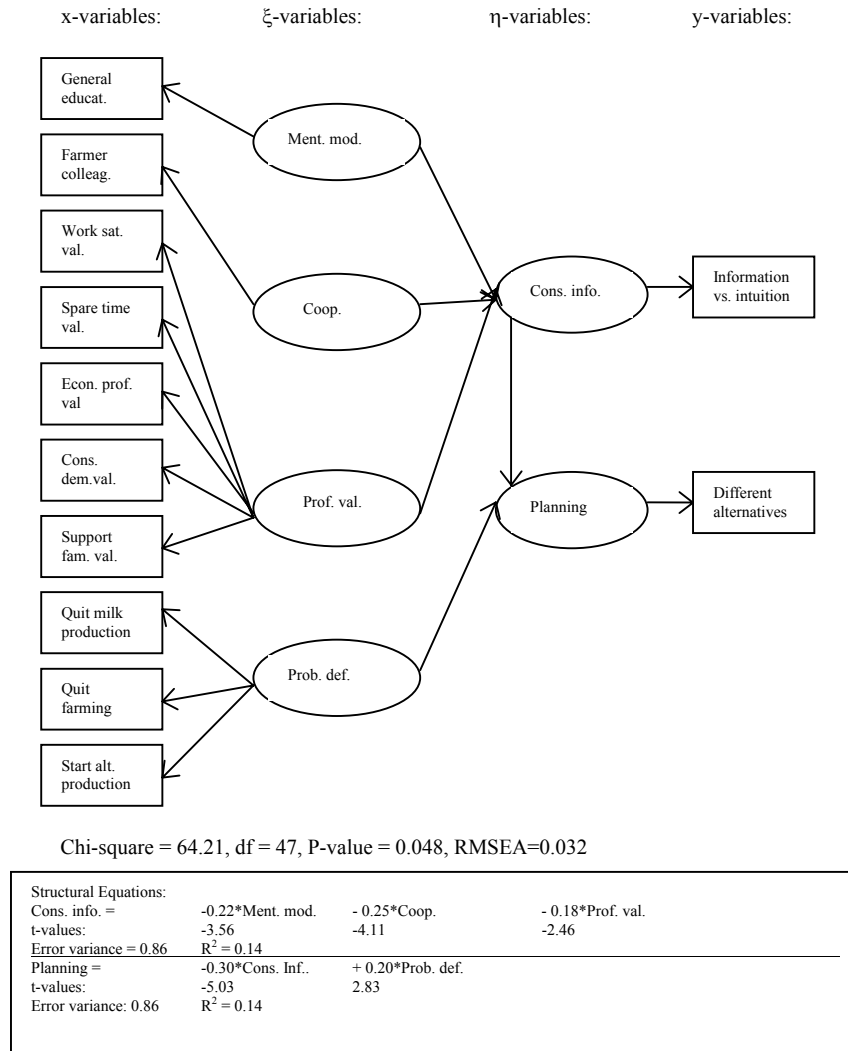


Figure 32. A LISREL model of the planning and forecasting consequences subprocess in the analysis and choice phase of the decision making process.

Finally, it is worth noticing that the P-value for the model in figure 32 is 0,048. Thereby it is very close to being significant at the five per cent level.

### 8.5.6 Analysis and choice: Evaluating and choosing

In figure 33 we see the path diagram of the evaluating and choosing subprocess in the analysis and choice phase. Although the RMSEA value is satisfactory, the P-value of the overall model fit is too low in order to indicate a good model fit. In addition, one of the t-values is a little too low in order for the variable to be

significant at the five per cent level. Consequently this should be kept in mind when interpreting the results.

Initially it is worth noticing that there does not seem to be any direct relation between the two  $\eta$ -variables, according to the LISREL analysis. However, consideration taken to the collected information and planning, i.e., forecasting of alternatives, both affect evaluating as well as choosing. These variables, which were the  $\eta$ -variables in the former path diagram, now occur as significant  $\xi$ -variables in the path diagram of the following subprocess.

Profitability-oriented value structure is correlated with the evaluation of action alternatives in a positive way. The more the farmer is oriented towards profitability values, the more careful he is in evaluating the consequences of the action alternatives under consideration. This seems reasonable, since the economic consequences of an action alternative could need rigorous evaluation. By the same reason it is reasonable that the consideration taken of the collected information shows a negative sign, i.e., the smaller the meaning of intuition (and the more consideration that was taken of the collected information), the more carefully the consequences were evaluated.

The positive sign on the correlation between planning and evaluating of consequences, indicates that the more alternatives that the farmer considered, the more carefully he evaluated the consequences of the alternatives. In this case we consequently can assume that a manager considering many alternatives is evaluating them in order to really find the best one. If there is only a single or very few alternatives left, the interest in evaluating it/them might not become that considerate, since there are not that many alternatives to choose among and it is actually not much of a choice. This result also seems reasonable.

Choice, on the other hand, is affected by data collection with respect to importance of written/external data sources, as measured by farm magazines, Internet and courses. The higher the value of external information sources, the more likely it is that the farmer has considered all available alternatives and really chosen the best of them. This result seems reasonable, since more information should make it easier to really examine all alternatives. This, in turn, also makes it easier for the manager to choose the alternative that he perceives as the best.

Although not significant at the five per cent level, the more active the processing of collected data, the less carefully the choice was made (indicated with a positive sign, though, due to the coding of the variable). With carefully I mean that all alternatives were judged and the best one was chosen, as opposed to a sufficient one, or if just one alternative was considered overall. This result does not seem logical and I would have expected the opposite relation.

However, a logical result appears regarding the "Cons. info." variable. The higher the importance of intuition, as opposed to considering the collected information, the less careful the choice was made, in the sense that all alternatives

were considered. Due to the coding of these variables, the relation is indicated by a positive sign (see Appendix C).

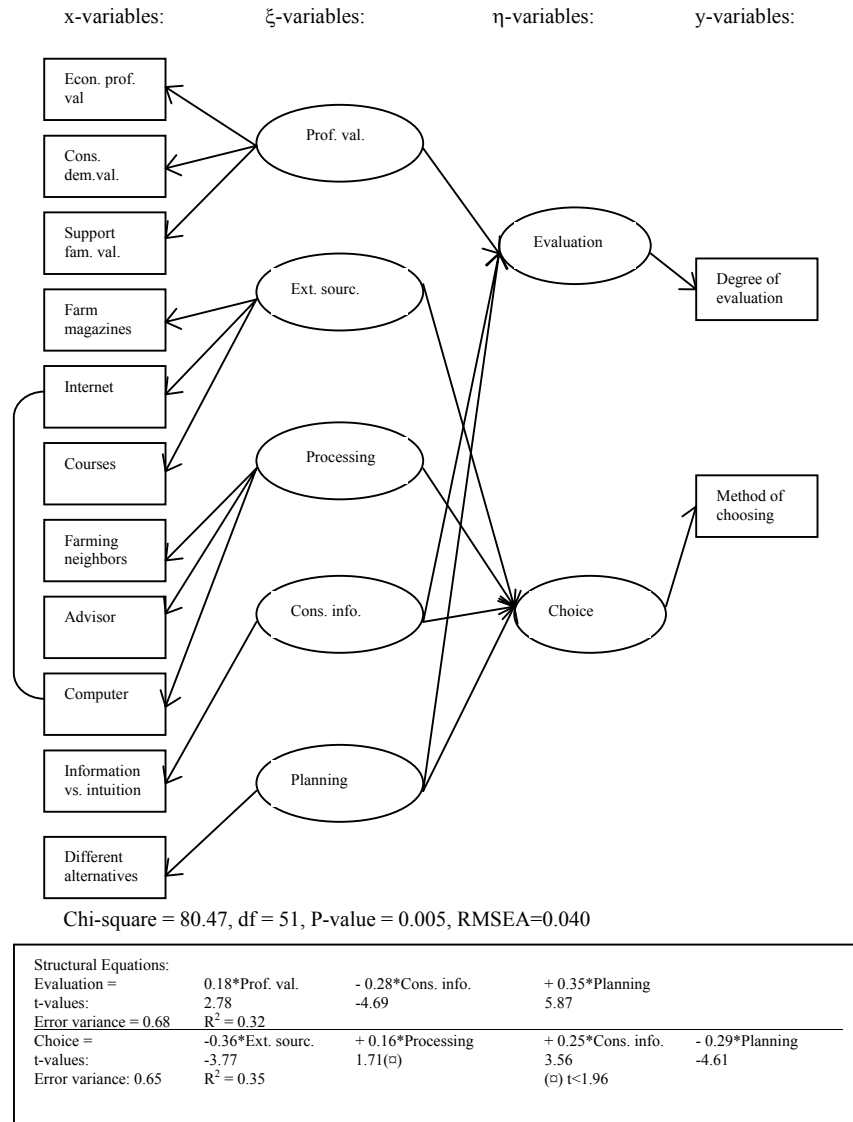


Figure 33. A LISREL model of the evaluating and choosing subprocess in the analysis and choice phase of the decision making process.

Planning, finally, is negatively correlated to choice. As the answers are formulated and coded this does not seem reasonable. The higher the number of alternatives that was planned for, the less carefully the choice was made, following the definition of “carefully” given above. I would have expected the opposite sign of the relation.



### *8.5.7 Analysis and choice: Bearing responsibility*

The path diagram of the last step in the analysis and choice phase is presented in figure 34. However, one thing to bear in mind when studying the path diagram is the remarkably high P-value and very low RMSEA value. One alternative is that the model actually is that good. Maybe the high P-value has resulted due to something else, though, such as the scales of the variables, etc. I have not found anything in the results that has made me suspicious, though.

According to the model in figure 34, control, i.e., checking the choice, is positively affected by course participation by the farmer (indicated by a negative sign due to the coding of the variable, though). Taking part in courses, study circles, etc, probably affect the farmer in the sense that he gets impressions from various sources. He could test his ideas and choices on fellow farmers, who could assist by giving valuable inputs.

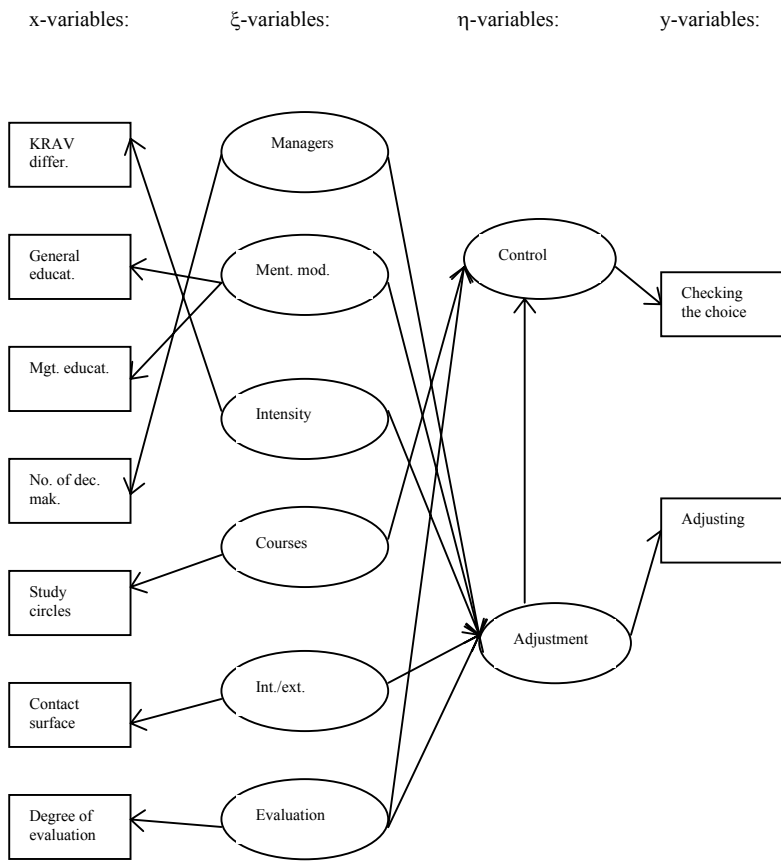
Another thing that seem to affect checking the choice is whether the farmer has evaluated the consequences of the action earlier in the process. The more thoroughly the consequences were evaluated, the lesser the choice was checked after it was made. A decision maker that makes a thorough investigation probably feels certain in his choice and may therefore not need that thorough follow-up.

Finally, the checking is affected by whether there is an adjustment of the plans. The correlation does not go the other way around, though. This should probably be a looping process, i.e., after having checked the choice, the farmer might find something less attractive with the initial choice. He therefore adjusts his plans and makes another check of the new choice. The procedure might continue until a satisfactory evaluation of the choice is made.

Adjustment of the plans of converting/not converting was affected by the number of decision makers in the firm according to the path diagram in figure 34. The result suggests that a farmer who is sole manager tend to adjust his plans to a higher extent, compared to a farmer who has management partners in the firm. One explanation could be that the information used in the decision is in fact already more analyzed earlier in the process if you have a colleague with whom to discuss the decision. If you are alone as manager you may have to adjust the plans to a higher extent. This might be seen as a compensation for the less frequent processing of the information that may occur.

Connected to this result is also the degree of internal/external orientation. It indicates that if a farmer is more internally oriented, as measured by the most important contact surface in order to get professional experience, he is more intended to adjust his plans for the chosen action. The explanation could be the same as for the situation of a sole decision maker, which was discussed above.

Mental models affect the adjustment in a positive way. Hence, higher developed mental models seem to stimulate the adjustment behavior. This result seems reasonable.



Chi-square = 7.71, df = 11, P-value = 0.739, RMSEA=0.000

Structural Equations:				
Control =	0.17*Adjustment	- 0.16*Courses	+ 0.57*Evaluation	
t-values:	3.21	3.09	10.09	
Error variance = 0.56	R <sup>2</sup> = 0.44			
Adjustment =	-0.24*Managers	+ 0.32*Ment. mod.	+ 0.11*Intensity	- 0.24*Int./ext.
t-values:	-3.92	3.41	1.82(⊖)	-3.84
t-value:	3.51			
Error variance: 0.74	R <sup>2</sup> = 0.26		(⊖) t<1.96	

Figure 34. A LISREL model of the bearing responsibility subprocess in the analysis and choice phase of the decision making process.

Intensity in the production also has a positive influence on adjustment of the plans according to the LISREL analysis, although just close to significant at the five per cent level. If the farmer produces with a high level of intensity it becomes more interesting and necessary to be certain that the decision that is made is really a good one. This may demand adjustment. Therefore the effect seems reasonable.

Finally, evaluation of the consequences earlier in the decision making process seems to affect the adjustment of chosen action in a negative way (though

indicated by a positive sign, due to the coding). If the alternatives really are evaluated once, there may be a lesser need of adjusting the plans.

### *8.5.8 Implementation*

The final phase of the decision making process, i.e., implementation, is presented in figure 35. The variables that turned out to be significant were, with two exceptions, “pure” independent  $\xi$ -variables, i.e., variables that have not appeared as  $\eta$ -variables in earlier models. Though, problem detection and problem definition also appear as significant variables. Problem detection is positively correlated to implementation, while problem definition is negatively correlated. The higher the value of problem detection, the higher the probability that the farmer have implemented the decision at one occasion, i.e., converted the entire production and farm at one occasion. It seems logical. If a farmer has problems of some kind, it might not be time to make a stepwise implementation in order to try and learn during the implementation process.

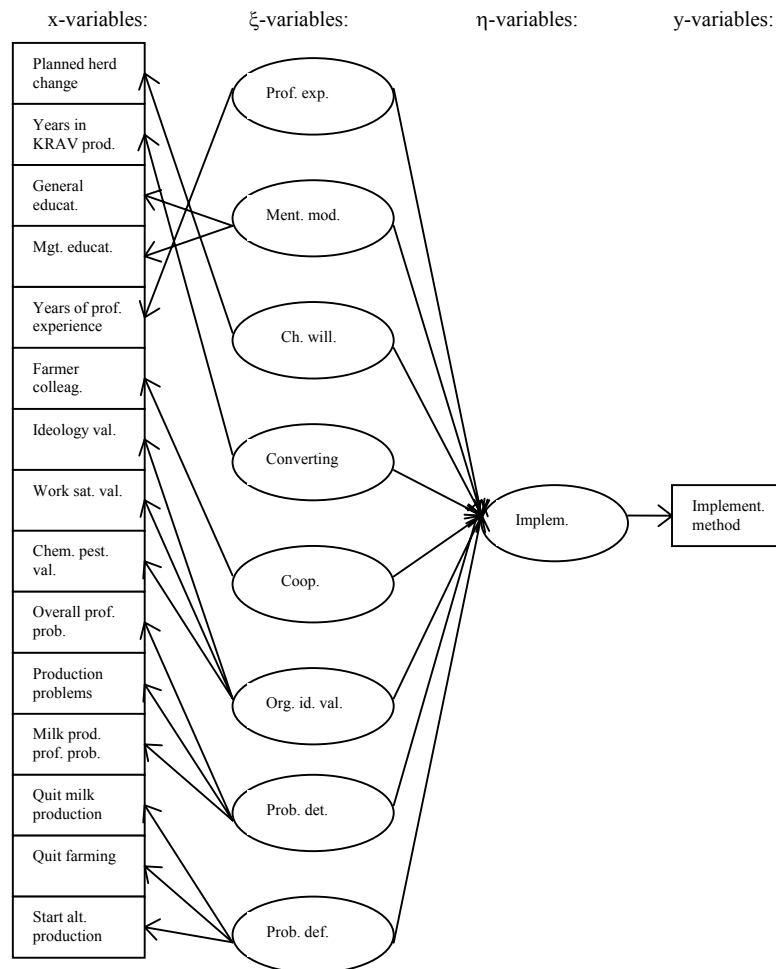
Problem definition is negatively associated with implementation. The more alternatives that are considered by the farmer, the more he is inclined to do stepwise implementation, according to the results. This could also be regarded as reasonable. By doing the implementation stepwise, the decision maker can learn, adjust and try again during the implementation process.

The other variables include professional experience, which is positively associated with implementation. With former professional experience, the farmer tends to conduct the entire implementation in one step.

The opposite relation is shown for mental models, i.e., with higher developed mental models the farmer tends to do a stepwise implementation to a higher extent. The mental models and professional experience variables could be expected to have the same sign, but that is obviously not the case here. The reason for this result seems unclear. Maybe higher developed mental models result in an ability to test new production methods and innovations. It may also be the case that higher developed mental model is positively correlated to higher risk aversion, resulting in more stepwise implementation.

The willingness to change the production, measured by when the herd size was changed last time, is also positively associated to implementation. This seems logical. If you are willing to conduct changes in the firm, you probably should not have problem with implementing a decision all on one occasion.

The number of years as the production has been associated with KRAV is also positively correlated to implementation. It seems like those farmers who converted early converted their production on one occasion, while those who have not been organic producers for that long period of time have conducted the implementation in small steps. This variable should measure the environment that was affecting the farmer at the time of the decision.



Chi-square = 91.14, df = 73, P-value = 0.074, RMSEA=0.026

Structural Equations:				
Implem. =	0.20*Prof. exp.	- 0.29*Ment. mod.	+ 0.18*Ch. will.	+ 0.25*Converting
t-values:	3.17	-2.87	2.74	3.71
	- 0.15*Coop.	- 0.24*Org. id. val.	+0.21*Prob. Det	- 0.24 Prob. def.
t-values:	-2.42	-2.99	2.61	-2.75
Error variance = 0.70	R <sup>2</sup> = 0.30			

Figure 35. A LISREL model of the implementation phase of the decision making process.

However, the KRAV connection time variable is tricky and one could ask whether there has been a linear change of the environment during the time period that is examined. It is hard to tell the answer. Therefore the model was rearranged and this time variable was excluded. The result was that none of the other variables changed, in either correlation value or sign. The overall model fit was changed only slightly, though still significant. Therefore we can conclude that at least the “year for association with KRAV” variable does not affect the other variables to any significant extent.

Cooperation with fellow farmers seems to stimulate to stepwise implementation. Maybe discussions with the colleagues raise issues and suggest things to test. The farmer may thereby be stimulated to conduct stepwise implementation.

Finally, an organic ideology-oriented value structure, seems to stimulate stepwise implementation as well. The reasons for this seem unclear and actually one could have expected the opposite relation, i.e., if you really are convinced that organic production is the right thing to have, maybe you should not need to do the implementation stepwise. On the other hand, we could assume that organic ideology is positively correlated to an intuitive approach (as opposed to profitability-oriented value structure, which was found to be positively correlated to an analytical approach, which can be seen in figure 32). The intuitive approach, in turn, logically should be positively correlated to stepwise implementation.

#### *8.5.9 Summary of the LISREL results*

Although the LISREL models more or less have some weaknesses in one way or another, related to structural as well as measurement problems, they still contribute to the study. The problems with the models include such aspects like models with a too low overall P-value, some variables with high or very high residuals, some very low  $R^2$ -values, use of dummy variables connected to the fact that it was not possible to construct tetrachoric correlation/covariance matrices in order to take these dummy variables into account in a better way, and the fact that it was not possible to construct asymptotic correlation/covariance matrices, in order to take non-normal distributions into account in a better way. Despite this, the models still indicate relations that are useful and important in the study.

It does not seem to be very interesting whether the correlation between two variables is 0.3 or 0.4. That is also the reason why these figures have not been presented in the figures. Instead they are presented in the structural equations with corresponding t-values. What, on the other hand, is interesting, is to know which variable correlations that actually are significant. That is indicated in the models. It is also interesting to know the sign of the correlation, i.e., positive or negative relation between the variables. This has also been presented in the models. These results should be regarded as trustworthy. However, as was argued above, the exact level of the correlation should most probably be regarded with precaution, because it is sometimes difficult to interpret the scales of the variables. Besides, if the correlation is 0,3 or 0,4 is not that relevant.

On the positive side is that I actually have succeeded in formulating a number of latent variables. This indicates that there seems to be a common cause of variation between the variables, i.e., there are factors behind the measurement variables that at least to some extent have been captured. Besides, most of the correlations have the expected and logical sign, also indicating realism in the modeling and the models.

Secondly, another positive factor is that for most models the overall chi-square/P-value and RMSEA value indicate an acceptable model fit. This is one

thing that supports the models, despite the weaknesses mentioned above. It also supports the possibility to draw general conclusions based on the results of the LISREL modeling. Besides, the single t-values for the variables are significant at the five per cent level, or in very few cases close to it. This is also a quality measure that supports the trustworthiness.

Thirdly, many of the expected variables also have proved to be significant in the LISREL models, i.e., they help to explain the decision making behavior when deciding to convert from conventional to organic milk production. With expected variables, I mean factors that were discovered in the literature review and case studies, reported above.

Fourthly, none of the LISREL models shows a situation where two latent variables seem to depend of each other, i.e., the paths are present in both directions between two latent (dependent) variables. This situation, i.e., reciprocal causation, could occur, though and it means a situation that should demand suspicion and precaution by the researcher. Studying the stability index is recommendable in those cases (Jöreskog & Sörbom, 1996).

Consequently, the most important thing with the LISREL models is that they have indicated and confirmed what the decision making process can look like when making a decision like converting to organic milk production. They add information in the sense that we get a picture of how the variables are interrelated. This is with respect to what relations (correlations) that seem to be significant and what sign it is on this relation. Hereby we get a picture of what factors that could be expected to affect the decision making. We also see what different actions in the decision making process that are interrelated and also in what way they are interrelated.

To summarize this section, the models have confirmed that the model presented above to a large extent seems reasonable. Finally, after having discussed the quality of the LISREL models as such and the strengths and weaknesses of them, some important findings related to the decision making process deserve to be mentioned. For a further discussion of the results I refer to the models presented above and to the final section with discussion and conclusions, below.

Values seem to be intimately woven into the decision making process. However, to explain decision making behavior only by values or value structure seems to be too simple as a solution. That would not give much information about how decisions really are made. Rather the decision making process in that case just would be reduced to a "black box". The decision model I have used in this study does include values, in the sense that values are present and important in all phases of the decision making process. An inclusion of values as a part of the decision making models should probably be very fruitful in explaining the decision making behavior further. These results also give implications for future research, see below.

Information sources and search intensity was not significantly related to problem detection according to the LISREL model presented in figure 29. Instead, only firm characteristics affected the problem detection phase, according to the analysis. This is somewhat surprising. One possible explanation could naturally be a measurement problem, in either the independent or the dependent variables, or both. Another possible explanation could be that the problem has an internal cause, low profitability, which is easy to detect. On the other hand, this problem was not reported by many farmers.

Personal and socially oriented characteristics, on the other hand, seemed to play a more important role in the problem definition phase, in which the purpose is to find solution alternatives to the detected problem. Here the organic ideology-oriented values are significant.

Mental models play an important role in most of the analysis and choice phase according to the analyses. The more developed mental models, as measured by completed level of general education and specific management education, the more intense the information collecting seems to be, according to the LISREL analyses.

## 9 Discussion

### 9.1 Towards some recommendations

Much research reaches the conclusion that various types of decision support systems, advisory services and other management tools are not used by potential consumers to the expected extent (see, e.g., Batte, Jones & Schnitkey, 1990; Brunsson, 1985; Brytting, 1990; Davis, Bagozzi & Warshaw, 1989; Johannisson, 1992; Putler & Zilberman, 1988). One explanation could be that we do not know enough about how decision making is conducted in practice among managers. This, in turn, suggests a need of research with a behavioral approach, as opposed to much research with focus on how decision making ought to be made, in order to achieve something, such as maximum profitability.

Johansson (1997) also refers to the situation of lower use of advisory services than expected among small business managers, but presents an additional explanation to it. He suggests that many managers simply may not be interested in consulting advisory service. Johansson (1997) relates to the concepts of client identities: anticlient, consultmoderator and ideal client. The ideal client does demand consulting services, but according to Johansson (1997) this type “is presumably rare among small-firm managers”. The consultmoderator also may demand consulting services, although not a client-improving professional consultant as such, “but uses consultants and advisers in many different forms of which only part represents formal consultant services”. The anticlient, on the other hand normally fails to demand these services (Johansson, 1997). On the other hand, it is a qualitative study, so it is difficult to conclude on the situation for all small-business managers, solely based on that study.

In order to try to change the knowledge situation about how decision making really is conducted in practice to some extent, I have in this thesis examined how the unique decision of converting to organic milk production is made. Many decision making models are normative or prescriptive, i.e., they define how a decision should be made in order to reach maximum profitability or utility. Instead, the focus in this study has been to determine how decisions really are made. In order to make the study manageable, some demarcations have been made. Firstly, I have started from a given decision making (or problem solving) model that was found to be suitable. I chose this model since it was quite recent, it included several other decision making models and it has gained empirical support, qualitatively as well as quantitatively. However, I demarcated the study further, in the sense that I concentrated on information collection in one phase in the process, analysis and choice. However, I have examined the other phases of the model as well, although not that thoroughly.

Another demarcation that was made was the choice of using a “case” decision. Decisions are made constantly, regarding numerous matters. In order to make the study more controllable, I wanted to study a specific decision, from which I could



draw relevant conclusions. This choice reduces at least one dimension of the variability in the object under study, i.e., the decision making process.

The next problem was then to find a suitable decision to investigate. One grouping of decisions that is used in the literature is unique and repetitive decisions. Unique decisions, which are made only once or at least seldom, are usually of major importance for the decision maker, since the effects of the decision could drastically affect the conditions of the decision maker. Repetitive decisions, on the other hand, are made recurrently and often consider smaller matters. However, it is difficult, if not impossible, to find a single specific decision that is purely unique or purely repetitive for each and every decision maker.

I have in this study chosen to investigate the conversion from conventional to organic milk production as a case decision. Though, I am bearing in mind that this decision is “more unique” for some decision makers than it is for others. However, it should be a “more unique” decision, compared to, e.g., deciding which feedstuff to use for the cows or which tractor to use for specific field work.

This decision was also suitable from an empirical point of view. At the moment, there are numerous farmers who have considered converting, of whom quite a few have also decided to convert. Hence, it should be possible to find objects to study empirically. Besides, organic production is a quite recent production technique (although, this was naturally how all farmers had to produce before the introduction of fertilizers and chemical pesticides, so in that sense it is of course the original, “old”, way of farming!), since most farmers have used modern techniques in their production during recent years.

During recent years, the consumer demand of organically produced food has more or less continuously increased. In addition, the Swedish government has formulated a production goal of a higher share organically produced food, on two occasions in the past years. During the same time period, it has sometimes been difficult to recruit new organic producers. This makes it an even more suitable decision to study. The benefits could thus have both theoretical and empirical dimensions, such that we might get a better understanding about how decision making really is conducted in practice, while the dairy industry and others get valuable knowledge about the conditions related to milk production.

Consequently, I think that there is a need of more knowledge about how decision making really is conducted by farmers who are considering to convert their milk production to organic. Knowledge about this would be valuable for those who, for various reasons, want to influence more farmers to convert to organic production. If we broaden the focus, this knowledge would be valuable for anyone who has a need to understand how decision making really is conducted in practice by managers. Of course, the further we move from the original empirical base in this study, the more uncertain the conclusions will be. This is further discussed below.

In this study, I have started by acquiring an understanding of the existing knowledge in the area discussed above. This has been accomplished through a literature review. In order to synthesize the knowledge, I developed a conceptual model, which was empirically examined in three case studies. The aim of the case studies has also been to a large extent to develop questions for a questionnaire in a subsequent part of the study. The case studies were conducted through personal interviews with farmers from three different farms. Two of these farmers had converted and one had decided to do so, but then regretted the decision and consequently decided to continue with “traditional”, conventional production.

The interviews gave very valuable information, in many ways. Firstly, the interviews gave me an increased understanding of what milk production in general, and organic production in particular, is all about. It is one thing to study production rules, methods and results in books, reports and gross-margin calculations, but a totally different and very valuable thing to actually meet the manager or studied phenomenon, “eye to eye”. The increased understanding of the situation of the farmers has been very valuable for me in the entire study. Consequently, this has given many clues regarding variables to test in the quantitative part of the study. But that is just one benefit of the case studies. There are several more.

The interviews have also made it very clear that the decision making process as such is not a matter that managers are thinking of in their everyday life. The farmers have had considerable difficulties in formulating their answers to my questions regarding the “design” of their decision making process. It is obvious that formulating of questions is extremely important, which is always the case. However, the study object is also regarded as quite abstract by the farmer. It has been a stimulating challenge for me to try to get a picture of their thinking and decision making and my impression is that it is often regarded as a black box by the farmers. Whether I have succeeded in getting this picture or not is of course something one can discuss. This thesis is an attempt at getting at least one small step in that direction. As Nyström (1996) formulates it: “...to transfer some ounces of silent knowledge into articulated knowledge”. In summary, the role of the case studies can not be exaggerated.

After having conducted the three interviews, a mail questionnaire was distributed to a sample of milk producers, organic as well as conventional/traditional. The latter group was included in the study in order to try to reach also those who had considered converting, but for some reason had decided not to convert, at least at the time of the distribution of the questionnaire.

Through this quantitative part of the study, it becomes possible to draw general conclusions regarding the entire population. In order to search for systematic differences, I conducted a drop-out analysis. The result of this analysis was that there should not be many systematic differences and, consequently, that it should be possible to draw general conclusions.

The quantitative part of the study contains two main sections. The first is descriptive, and the questions/variables are presented one at a time, mainly in tables and figures. This gives valuable information regarding some of the research questions and forms a basis for some of the conclusions drawn in the study.

The second part is an attempt to formulate a model of the decision making process using simultaneous equation modeling. This was conducted using the LISREL computer program. The results of this part are presented as seven submodels of the decision making process. The intention was to bring these seven submodels into one model, although this proved to be impossible. The models should give an insight to which factors that seem to have a significant effect on decision making and also as to how the decision making process looks. This mainly forms the basis for one of the research questions and is an important ground for the conclusions drawn in the study. Due to the results of the drop-out analysis, it should be possible to draw general conclusions regarding a population.

The following part of this section of the thesis contains a discussion and conclusions based on the study. This originates from the research questions formulated in the Aim section, above. Thereafter follows suggestions of future research. The last part of the thesis contains some short concluding remarks, from which I try to look upon the thesis from a quality perspective. I present some strengths and weaknesses of the methods used in this thesis.

#### *9.1.1 Research question 1: What data do farmers acquire?*

The first research question regards the data, which farmers acquire. This includes at least two dimensions. These are data/information content and the distribution channel that is used to acquire the data. There was no direct question about the former in the questionnaire, since the answers would probably have been difficult to formulate by the farmer. Instead, I draw conclusions on this research question indirectly, by studying characteristics of the farmer and the surrounding environment. These include values, perceived threats and perceived opportunities. Besides, there were questions about perceived missing information.

The research question includes also another set of dimensions. The word “acquire” relates mostly to what the farmer actually demands. Another related concept is the need for data/information. The need could be greater compared to the demand, i.e., due to unawareness of some of the need or that the costs exceed the revenue of acquiring the additional piece of information. In this study, the questions are related to both the need and the demand of information. However, the supply of information is not studied in the present thesis. Instead, this is included in the section about future research.

One thing that has become very clear is that different values dominate for different farmers. This is by no means unique for farmers. Instead, all managers and humans overall have their own values and value structure. Returning to the organic farmers, there has been a change during the 1990s. The first producers who converted were very much “organic ideology” oriented, and did not perceive

“high profitability” as that important. However, during the 1990s the relationship has changed and among recent converters the opposite relation seems to exist. It seems like the “organic ideologically oriented” farmers already have converted and nowadays the milk farmers convert due to other values, such as “high profitability”. Naturally, this should have consequences for the content of the data they are interested in acquiring. A milk producer who is, e.g., very profitability oriented should consequently highly value data about production results, consequences for labor time requirements and subsidies. Another farmer, who might be more interested in producing without the usage of chemical pesticides and fertilizers and not valuing the profitability that high, should instead be more interested in data about consequences for, e.g., the soil, wildlife, ground water and sustainability. It is not a question of one or the other, but instead about to what degree the farmer is thinking according to “profitability” vs. “organic ideology”.

If we study the perception of most important future threats and opportunities we also obtain important hints about what data the farmer should be interested in achieving. The threats could be divided into three main categories as was discussed previously. These categories are: “rules and bureaucracy”, “economy and economy-related aspects” and “personal situation with respect to labor demand and health”. The “economy and economy related aspects” category was the dominating one, followed by the “rules and bureaucracy” category, according to the received answers. From this we can conclude that farmers greatly need data about economy and rules. Maybe one reason for the perceived greatest future threat could be lack of available data regarding these matters.

The greatest perceived future opportunities include such things as “less rigid rules”, “economy”, “way of competing” and “environmental and personal experiences”. We can see that these are to a large extent the same categories that also were regarded as the greatest perceived future threats towards milk production. Also for the opportunities economy and related matters is the dominating category. This further strengthens the conclusion that data about these matters should be highly valued, needed and demanded by the farmers.

One question in the questionnaire considers perceived missing data at the time of the converting decision/consideration. Between 30 and 40 per cent of the farmers perceived difficulties in getting data at the time of the decision/consideration. The data/information could be grouped in five main categories; “rules, regulations, and support now and in the future”, “crop production and consequences for the soil”, “the result of the conversion; production result, etc.”, “starting time for organic milk delivery to Arla” and “economy and costs”. These are about the same matters that appeared as largest perceived future threats and opportunities.

Another related question considers whether the farmer perceived difficulties in getting data/information today, at the time of the distribution of the questionnaire. As was discussed above, about the same share of respondents reported difficulties in finding data/information today, as at the time of decision/consideration. About

the same subject categories were mentioned as difficult to get data/information about today.

Taken together, these factors indicate that the farmers acquire information about economic matters, rules and institutional matters, consequences for the soil and personal consequences, such as health and amount of required labor time. These factors are also recognized from the case studies reported above. Numerous other matters were mentioned as well, although those mentioned here were the ones that seem to be of major importance.

The factors reported in the former section regards missing information in the decision or consideration of converting to organic milk production. In more general terms, regarding unique decision making, they could be translated into economic matters, rules and regulations and description of consequences of the choice. The consequences regard several dimensions, such as personal matters, the surroundings of the firm, and other consequences.

For other clues about which data farmers acquire, I refer to the case studies and the results from the survey. The next research question regards preferred ways or channels for achieving the acquired data.

#### *9.1.2 Research question 2: How do farmers acquire data?*

Different data/information sources are preferred for different types of decisions. This result is not surprising, but it has some implications. According to the results, the advisory service is very important for the unique decision of converting. Nearly half of the answering farmers report “advisors” and “the dairy” as the most important source for this decision. Thereafter follow “the family”, “own experience”, “courses” and “neighbors and colleagues”, in decreasing order of appearance. These channels correspond to nearly all of the answers in the quantitative part of the study. They are also recognized from the case studies.

Such a major decision as the one studied in this thesis, with considerate consequences for the farmer, probably requires a personal discussion with someone, such as an advisor or expert. It might feel secure and necessary to really have a discussion with someone in person, who can consider the situation at the farm, the actual financial situation, buildings at hand, etc. A common characteristic for these data/information channels is that you as a “user” of them could go back, ask for clarifications and have a dialogue, instead of consuming the data delivered in a “monologue”. An example of the latter is reading an article in a magazine.

One-way data/information sources, on the other hand, are not valued that high for the converting decision/consideration. Though, for daily activities, farm magazines were highly appreciated by the milk producers. This does not indicate that these magazines should not also be important for the unique decisions. Instead, magazines may be very important for the information scanning process, in which a manager becomes aware of a potential problem.

I think that the farmers interpret the question about the “most important source for the decision/consideration to convert” as the most important source for examining the consequences of the decision and how these consequences should be valued. I also think that many farmers do not consider the problem detection phase, as described in the theoretical model, as a part of the converting decision. Instead this phase is in many cases probably regarded as a “daily activity”, in which one could become aware of a problem in the firm.

It becomes obvious from the case studies as well as from the questionnaire results that single individuals, rather than the organizations they belong to, seem to be very important in the decision making of the farmers. Therefore single pioneer persons do seem very important in this respect. This has some implications for organizations. The importance of the single person and advisor, acting within the organization is considerable and should affect the farmers to a substantial extent. However, it is not only persons within organizations such as an advisory service that are stressed as important. Colleagues and fellow farmers are also stressed as very important information sources. These colleagues have an important practical experience that is valued very highly. This is in line with findings about intuitive vs. analytical approach, found in Öhlmér, Brehmer & Olson (1997). When thinking intuitively the manager regards the comprehensive picture. If the manager lacks experience from this entirety himself, he studies other actors who are regarded as models, such as colleagues or other models. In a sense the advisor could be said to represent explicit knowledge, while the fellow farmer may represent explicit, but also tacit knowledge.

### *9.1.3 Research question 3: How do farmers process data to information and use the information they get?*

According to the results from the mail questionnaire, the most commonly occurring data processing methods are “own thinking” and “discussion with the family”. These are typical “internal” methods and correspond mainly to intuitive behavior, as opposed to analytical behavior. Discussion with farmer colleagues is also important and conducted by approximately half of the responding farmers. However, discussing with an advisor is also important, although this might be considered as a somewhat more analytical behavior, compared to the former methods. Common for all these methods, though, is that they are without the use of any type of “technical tool”. Pen and paper, though, is used by approximately a third of the respondents. Computer usage is unusual in this sense. The results are recognized from the case studies as well.

After having acquired the information, the use of it in the forthcoming decision making process varies considerably among the responding farmers. Intuition is still considered as very important for the decision. About half of the responding milk producers value “experience and intuition” and “collected information” as equally important. Only five per cent of the farmers studied the information in detail and considered exact calculations, i.e. an analytical behavior. About 30 per cent of them studied the information, but more in terms of directions and approximate consequences. It seems like the purely analytical manager, who

objectively strives towards complete and accurate levels is not very common in practice, among the examined milk producers.

Younger farmers seem to have converted or considered converting to a higher extent compared to those who have not considered converting. Also, the producers who have converted or considered converting have a higher level of education. The educational level is increasing among younger people. Almost everyone has a (comprehensive) upper secondary school degree nowadays. Another explanation could simply be that the person's stage in their life explains this result. People who have reached a latter stage in their life are simply not prepared to change the entire production in their business. Younger farmers, on the other hand, may be prepared to do so to a higher extent, since they might want to build up something new. However, another explanation could be that the information and advisory services available today are on a level that does not correspond to the mental models of many of the farmers. Some of it may be too analytic and should be adapted more to the mental models and thinking processes of the potential users. The results obtained in this study could hopefully help in order to accomplish this.

Despite the fact that 21 per cent of the conventional farmers who have considered converting report that they have completed an education in organic milk production, they obviously did not convert. Maybe the design and content of that information material, courses and advisory services, need to be further examined in order to match the actual needs of the farmers. Management education is much more common among the conventional producers that did not convert although they considered converting, compared to the organic producers and the conventional who did not consider converting. Maybe they, due to their management knowledge, have considered converting as an unsatisfactory alternative.

It is also interesting to compare to the development of the value structure among the organic farmers during the 1990s. Focus seems to increase on profitability issues, more than other aspects such as use of chemical pesticides and their consequences for the environment. The future converters are probably more "business managers" than "farm managers" or "organic ideology managers". This should be a situation that most probably occurs for all types of farming and not just for converting to organic milk production. If so, advisory services should be adapted to that.

#### *9.1.4 Research question 4: Where and how in the decision making process does information collection occur?*

In the present study, I have mainly studied the analysis and choice phase of the decision making process, in which the decision maker studies the consequences of one or more options and values these consequences and finally decides how to act. However, in earlier parts information collecting also occurs in one way or another. The implementation of the chosen action, i.e., the final part of the decision making behavior, also requires information.

The problem detection behavior does not include a significant relation to any type of data/information collection variable according to the LISREL model presented previously. However, the importance of different information sources for daily activities could most probably be referred to the problem detection phase, as was further discussed above. The problem could be, e.g., organic production as an opportunity to improve sustainability or profitability. Alternatively, it could be a resolution to a profitability problem and then organic production and other resolutions would be considered in the next phase.

Problem definition is significantly related to two variables associated with information collection according to the LISREL model. These are cooperation with fellow farmers and attendance at courses.

In the analysis and choice phase it is obvious that information collection plays an important role. This is also a result in this study, according to the LISREL models. However, information collection behavior does not only seem to occur in the first subprocess of the model, but also in other subprocesses of this phase, as defined in the theoretical model presented in table 1. For instance, one LISREL model indicates that the perception of external data/information sources is significantly correlated to the choice of action alternative.

Implementation also requires information collection behavior according to the LISREL model presented above. The significant variable here is cooperation with farmer colleagues, which has also an information dimension.

Consequently, information collection behavior, in this study measured by several variables, plays an important role in decision making. Not only is it important for single activities in the process, but it also seems to be some sort of “glue” in the entire decision making. I come to this conclusion since different information collection variables are significant in almost all of the examined phases and subprocesses. Though, the nature of the information collection behavior seems to differ depending on the purpose. Different sources seem to be used at different occasions. This is an issue that would need further investigation and consequently it is recommended for future research.

#### *9.1.5 Research question 5: What factors associated with the decision maker and the surrounding environment seem to affect the nature of the decision making process?*

This question and also to a major extent the former one is answered mainly by the LISREL results. Since this question was quite thoroughly answered in the former section of the thesis, only some short remarks are made here. I comment on some interesting findings worth considering further.

The organic farmers and conventional farmers who have considered converting have a higher level of both general and specific education, more professional experiences from other matters than agriculture and have their spouse working outside the farm. In other words, they seem more extroverted, or turned outwards,



compared to conventional farmers who have not considered converting. One could thereby expect that the former category obtains more external influences and have a higher ability to detect a future opportunity, e.g., due to more developed mental models. That may have contributed to the conversion.

One factor that seems to be very important is the value structure of the farmer. This is very obvious, based on the cases as well as the questionnaire results. Different values dominate for different farmers. Besides, for the organic farmers there has been an obvious change during the 1990s. The first producers who converted were very much “organic ideology”-oriented and did not value “high profitability” that much. However, during the 1990s the relationship has changed and among recent converters we see the opposite relation. It seems like the “organic ideology”-oriented farmers already have converted and nowadays the milk farmers convert due to other values, such as “important with high profitability”.

This has obvious and important implications for anyone who, for some reason, wants to convince milk producing farmers to convert in the future. The results suggest that focus should be put on profitability. The milk producers that have not yet converted do not seem to be that interested in “ideological” matters, such as producing without fertilizers and chemical pesticides. They seem to think “business management” instead of “organic ideology”. Information, advisory service and management tools should be adapted to that situation.

Some scientists criticize decision making models as just theoretical constructions without connections to reality. Instead it is argued that decision making is value driven. However, in the model I have used in this thesis, values are included. I think that the models could help to explain how decision making is conducted and here values and value structure is one important ingredient. For instance, after having concluded what the consequences of a potential decision alternative are, these consequences have to be valued, based on the value structure of the decision maker. In other words, the values also play an important role in the theoretical model I have used. This is also in accordance with several other decision making models, such as Hogarth (1987). He presents the choice as following after judging the consequences and valuation of these consequences and there is a choice in every phase. In addition, values may direct information search rules, attention rules and rules when judging consequences.

Though, it would be interesting to study the role of values in the decision making process further. Different decision makers seem to make decisions in different ways, seemingly dependant upon the value structure among other things. I discuss this further below.

Another thing that can be seen from the results is that decision making seems to be conducted with a high amount of “intuition”. Although much information is collected actively and even externally, intuition and experience play a crucial role for many farmers. On the other hand, intuition and experience have, in turn, been developed and gained during the years by earlier information collection from, e.g.,

the external information sources presented above. One can discuss how intuition and experience should be treated and included in the decision making process in this sense. Maybe it is easiest to regard intuition as a “black box” or maybe it is not an overall problem. However, I still think it would be interesting to study the role of intuition in the decision making process.

## 9.2 Conclusions

In this section I present some conclusions based on the results obtained in the study. The conclusions follow the four questions formulated in the Aim section of the thesis. The first question considers how to improve and increase information usage among the farmers, hence hopefully making it possible for them to improve their decision making and thereby management of their firms.

- How could information services, advisory systems and other management support systems help to improve farmers’ information usage and thereby their decisions?

One could say that the information services, advisory systems and other management support systems should be designed in order to fit the actual needs and demands of the milk producers. At least two dimensions are worth considering further: information content and information channel, i.e., how the information should be distributed. The results from this study give some hints in this respect.

The content of the information services, management tools, etc., should focus on matters that correspond to the conditions and value structure of the farmer. These differ greatly between different farmers. For instance, a small farm is not similar to a big farm. A farmer with a university education and highly developed mental models may have other demands compared to farmers without that education. A farmer with lower developed mental models may have greater needs regarding problem and opportunity detection compared to other farmers. The list could be expanded substantially.

The problem is that it naturally is impossible to know which farmers possess specific personal conditions, mental models, value structure, etc. There are no registers of these aspects available. The implication here is not that the farmers should be divided into different categories, where each category should receive some sort of “properly designed” set of management tools. Instead the implication would be that it might be valuable to develop different, “parallel”, management instruments, tools and information services. These could be directed towards various typologies and offered in parallel. A similar suggestion is found in Nyström (1996). One such division regarding converting to organic production, based on the results from this study, could focus on organic ideology vs. profitability.

The other aspect regards the distribution channel. Depending on the type of the decision, the preferred distribution channel seems to differ. For repetitive decisions farm magazines are very highly valued. However, for a unique decision such as converting to organic milk production, other channels are preferred. (Farm

magazines were not valued as the most important information source by almost any of the responding farmers.) Instead, the farmers value different types of personal contacts. Advisors or the dairy is the most popular information channel to about half of all responding farmers. It is beyond the scope of this thesis to give detailed recommendations about how to design a proper advisory situation. Instead I refer to Johansson (1997) and Waldenström (2001). The former aims at understanding the advisory function and has been further referred to above. The latter study is about farmers and advisors in agricultural extension and about communication in advisory situations. The results of the present thesis points towards the importance of studies as the two mentioned here. Many farmers think that consulting an advisor is the most important information source, in the unique decision of converting to organic milk production, according to the results.

It is obvious that a personal contact, which makes it possible to discuss and ventilate ideas, is very important. However, I think that, for instance, farm magazine articles are very important as well, though then the purpose should be to make the farmer aware of potential problems and opportunities in the business. I base this on the result that farm magazines are highly appreciated for daily activities, according to the responding farmers. Information scanning should be an important aspect of this. Farm magazines should perhaps contain more articles about other farmers as good models, for whom converting has been successful. This is in accordance with the results obtained in this study as well as the adoption theory.

- How could advisory services be improved in order to fit the farmers' actual needs?

Naturally this question is related to the former one, i.e., demand vs. need of information. As was discussed above, the farmers may be unaware of some of their need, or that the cost of acquiring some further information could exceed its benefit. In order to become aware of the need, it is important to study the design of the decision making process. It is also important to adapt the costs of the management tools to the actual conditions of the potential users, so they can afford to demand them.

The need is also affected by the largest perceived future threats and opportunities, for milk production. If a farmer perceives rigid rules and bureaucracy as the greatest future threat for the milk production, he has a need for information on this issue. The greatest perceived threats and opportunities have been discussed further, above. The major issue to remember here is economic and profitability related matters, as formulated as the major future threat as well as opportunity by the responding farmers.

It is in this sense also important to know the farmer's reasons to consider converting to organic production. If a farmer considers converting due to the fact that he thinks it is an interesting alternative according to his organic ideology values, his information need might be substantially different from the need that is present for a farmer with a profitability problem.

Once again, the solution might be to have several parallel management tools and information services, with different focus. Naturally, there are no registers available regarding the reasons for considering converting. Therefore it is impossible to divide farmers into different categories in advance in this respect.

Is the available information material, insufficient and/or not properly designed and not distributed in a suitable way? Many farmers thought this was true at time of converting or consideration of converting. Besides, many farmers still think that there are difficulties in obtaining information regarding converting today (i.e., at the time of the mail survey). These farmers, which correspond to between 30 and 40 per cent of the responding farmers, obviously had and maybe still have a need that is unsatisfied regarding information. The categories that are mentioned in this respect to a large extent are the same as those mentioned as future threats and opportunities. They include “rules, regulations and support now and in the future”, “crop production and consequences for the soil”, “the result of the conversion; production result, etc.”, “starting time for organic delivery to Arla” and “economy and costs”. This information forms the basis for forecasting consequences. For all information categories, the conventional farmers report that they had or have an unsatisfied need to a greater extent than the organic producers.

- How should efficient political measures for adaptation of the farming systems to, e.g., organic and sustainable production systems, be designed in order to have the expected effect?

This question to a large extent could be answered by the answers to the former two questions. Better knowledge about the need and demand of the farmers should be important conditions in order to achieve this. In addition, some short further remarks should be presented.

According to the results, it is important to be aware of the knowledge levels and attitudes of the advisors themselves. If the dairy industry and authorities want more converters, they could work through advisors, according to the results of the responding farmers. The milk producers report advisors as the single most important information channel for the decision/consideration to convert. Also, one of the values was with regard to the importance of taking others for a good model. This is mainly intuitive information and was considered as an important value by many farmers. Besides, all the farmers interviewed in the case studies report that single persons have played an important role in the converting decision/consideration. Those persons do not necessarily need to be advisors, with high level of theoretical knowledge. Fellow farmers and neighbors, with high levels of practical knowledge, are also very important. Therefore pioneer persons have a crucial importance for future converters.

Single pioneer persons, rather than the organizations they belong to, seem to be very important in the decision making of the farmers. This has some implications for organizations. The importance of the single person acting within the organization is very high and probably affects the farmers to a substantial extent. Therefore it is important to maintain the knowledge level of these persons, stimulate their personal development, etc., so they want to stay within the

organization. However, this also indicates that farmers do not primarily identify an advisor with the organization, to which he belongs. If the organization replaces one advisor with another advisor with similar knowledge, the same situation will probably arise. Only if the person/advisor is difficult to replace, such as a real enthusiast, the single person becomes more important than the organization to which he belongs.

- How could a mutual learning process between farmers, extension agents and researchers (i.e., from knowledge transfer to knowledge exchange) be facilitated? This question could also be answered by the aid of the answers on the former questions. Though, some additional remarks should be made here. I think that it would be interesting for the future if farmers, extension agents and researchers together could discuss future research projects. I also think that the most interesting focus would be how management and decision making really is conducted in practice, and not how it should or ought to be conducted. I think that we still have a lot to learn about these matters. An increased knowledge about the actual needs of the consumers, i.e., the farmers in this respect, would make it easier for the extension agents to develop new, better designed management tools and for the researchers to suggest and conduct new relevant research projects. It should also be easier for the farmer organizations to support these projects financially, if they correspond directly to the needs and demand of the farmers.

Some suggestions of future research projects that could be interesting to conduct could also be detected from the results obtained in this study. These are found in the following section.

### **9.3 Future research**

One conclusion from the literature review conducted in this thesis is that further studies would be interesting in order to better understand the information collection and learning part of the decision making process. Here, I present some suggestions of what could be interesting future studies. Of course, there are many more.

Different data and information sources are appreciated differently depending on what sort of decision the farmer is about to make, according to the present study. Does the entire data and information collection behavior and usage of information differ between different decisions? If so, in what way does it differ? Does the information collection behavior also differ in different phases of the decision making process regarding a single decision? A refined study where this is studied in detail would be valuable.

Decision making seems to be conducted with a high amount of intuition. Although much “external” information is collected, intuition still is very important for many decision makers. Though, intuition, in turn, has been gained from earlier information collection from the sources presented above. How should intuition be included in the decision making model? Is it best to regard it as a “black box”?

What role does intuition play in decision making? How could suppliers of different types of management support tools adapt to the importance of intuition?

Information collection is closely related to learning. It would be interesting to study the role of learning in the decision making process in more detail. A joint project between economists and psychologists might be a valuable source of information in order to increase our understanding of the role of learning in the decision making process.

Decision making, knowledge situation, learning, etc., is difficult to talk and write about for the single manager and it is therefore difficult for researchers to study this in practice. Although I have made an attempt in the present thesis, the methods used are not in any way perfect. The farmers in the case studies had obvious difficulties in answering my questions regarding learning and decision making behavior. Also, in the questionnaire, the question regarding behavior and learning most probably were more difficult to answer than other questions.

Therefore, one should consider alternative methods, such as observed behavior and experiments when studying these matters. Ideally, at least in theory, one could follow a decision maker that is just about to make a decision. The researcher should observe the behavior and ask repeated what – why questions, i.e., a combination of observation and interview. Another approach would be participating observation, where the researcher actually takes an active part in the management and/or work in the business. However, these methods are more difficult to conduct in practice. Though, it is an interesting approach that I think would be very valuable. Advantages include that it would be a shorter period of time between the behavior of the decision maker and the data collection of the researcher. It should also be easier to talk about something you are doing at the moment compared to something that was conducted a long time ago.

However, it could also be interesting with another longitudinal study, in which the same farmers as those participating in this study were contacted again with a questionnaire. Differences in their answers could indicate a learning effect and this could give clues about the role of learning in the decision making process.

I have discussed the need and demand for information. What is actually the need for information? One cause of difference between need and demand is that the cost might be too high, compared to the benefit. Another cause could be unawareness of the need. If so, how could the managers become aware of the need? A study where the need for information and management tools is compared to the demand and supply could be an interesting future research project.

Focus in this thesis has been on the managers that need and demand information. However, it would be interesting to find out more information regarding the supply side, i.e., the different organizations that develop and supply information and different management tools. How do they adapt to the need and demand of the consumer side? How could the supply and demand side be matched in a more efficient way? This relates to one of the conclusions above. A project

that studies the interaction and communication between different actors would be valuable.

During this research project I have become more and more interested in the role of values for the decision making process. In this thesis I have mainly contrasted “ideology” and “profitability”, but there are many more values. Depending on these values a manager may have substantially different motives for some specific behavior. As I discussed above, this has implications for the content and distribution channel of information and different management tools. Nyström (1996) identifies three different manager types or decision styles and concludes that management support consequently should be designed in accordance to the different needs of these decision styles. A refined study regarding the roles of different values could give valuable clues regarding the preferred design and content of preferred management support. As was discussed above, there are no registers which indicate value structure of each manager. The implication could instead be that it might be motivated with several parallel sets of decision support products, each adapted to different value structures, in order to reach more managers.

Finally, returning to the present study, the already existing material in the quantitative part deserves to be analyzed further. A possible future study includes dividing the producers in different subgroups, based on certain characteristics. By this I could examine if the decision was made differently in different groups of farmers. Unfortunately, time reasons made it impossible to include such examinations in this thesis. Possible subgroups to use and examine include early – late converters, intuitive – analytic farmers, “ideology values” dominate – “profitability values” dominate. The list could be expanded with several more pairs. Maybe this could result in significant statistical models. Perhaps the models that I did not succeed in getting significant, presented above, could be developed in a positive direction, by doing this grouping. Then perhaps the variation in the material that I up to now have not succeeded in catching in a variable could be reduced substantially.

#### **9.4 Final comments**

What has been concluded above is based on the data collected in three case studies and a mail questionnaire, during the years 1999 and 2000. The main motive for conducting the three case studies, besides obtaining an increased understanding of the situation and decision making of milk producing farmers, was to achieve a basis for constructing a mail questionnaire. The main motive for conducting the mail survey was to be able to draw general conclusions. In order to be able to do so in a more certain way, I also conducted a drop-out analysis among those farmers that did not respond to the questionnaire. The drop-out analysis shows that there does not seem to be significant systematic differences (between those farmers who responded to the questionnaire and those who did not), with an important effect on the conclusions based on the study. Those differences that appeared were to the largest extent explained by the interviewer effect, which

might appear when you talk to someone, such a researcher or an interviewer, in person.

I can therefore draw conclusions based on the entire population of milk producing farmers in the Arla Foods region, at least regarding those that were connected at the time of the mail survey. The further away from these I go, in different dimensions, the weaker the general conclusions will be, though. One dimension regards time, i.e., I can with quite a substantial amount of certainty draw conclusions based on the situation of the farmers that were members in Arla Foods at the time of the mail survey. The further away from that point of time, the more uncertain the conclusions.

Another dimension is the decision itself made by the farmer, i.e., converting or considering converting to organic milk production. It should be regarded as a reversible unique decision. Can the conclusions be generalized to other reversible unique decisions or even unique decisions overall? Could the conclusions relate to all decisions, i.e., unique as well as repetitive decisions? We must be more careful the further away from the milk converting decision we go.

Still another dimension is farming vs. non-farming branches. In this thesis, I studied the decision making process of farmers, based on a theoretical model that also originally was developed based on farmers' decision making. The farm becomes a part of the life and existence of the farmer and the family and is intimately woven into the entire situation of the farmer. There are often social, historical and traditional aspects of managing the farm, besides a way of making ones living. The results and conclusions may therefore not be directly generalized to all business managers, irrespective of their branch of specialization. Consequently, the conclusions I present above, can just be hypotheses, if generalized to other branches, decisions and situations.

What is new in this thesis, then? One thing that I have not succeeded in finding in the literature is a study of Swedish milk producers' conversion to organic production, with a combined qualitative and quantitative approach. One exception to this is a Masters thesis conducted by Bergkvist & Fredriksson (1998). However, they do not use simultaneous equation systems and latent variables, and do not focus on the decision making process as such at that detailed level. Besides, they do not study the conventional producers that actually have considered converting. However, the results regarding those matters that are examined in both studies are to a major extent confirmed in the present study. For instance, both note the difference in value structure among early and recent converters.

I have not found any study that examines those farmers that seriously considered converting to organic milk production, but decided not to convert. These farmers are highly interesting to study, in order to find important clues for the future design of information services and other management tools. Overall, studies that also include those who have gone through the decision making process, but decided not to make a change, seem sparse in the literature.



If we broaden the geographic area to also include the areas surrounding Sweden, there are some studies about converting to organic milk production, though. One very interesting study was conducted by Østergaard (1998). The purpose of that study was to “gain knowledge about the mutual relationship between ecological farmers’ setting of goals and their fulfillment through decisions and actions in farm management”. He describes farmers’ conversion in five stages: “criticism of current agricultural thinking or their own management practices, search for new guiding ideas and models towards establishing new practices, decision to convert, enthusiasm in the first part of agronomic conversion and sobriety in the last part” (Østergaard, 1998).

There are some differences among our respective studies, though. Firstly, I have not studied the situation after the conversion decision and I have not gone into detail about the situation preceding the decision. Instead, I have focused on the decision itself. Secondly, Østergaard (1998) has another approach and presents a qualitative study, while I include also a quantitative study in my thesis.

Østergaard (1998) characterizes the relationship between farmer and advisor as a “creative and reflective dialogue”. This can be compared to Waldenström (2001), who studies the dialogue between farmer and advisor into detail. Johansson (1997) could also be related to this issue. His study is further discussed above. I have in the present thesis, on the other hand, not studied the relationship between farmer and extension agent of the same detailed level. Instead, “advisor” is treated as a source of information, just as many other sources, in the present study.

One interesting comparison regards the importance of information from advisors. The results obtained in Østergaard (1998) indicate that farmers attach little importance to information from ecological advisors, compared to the total range of their information acquisition. The results of Johansson (1997) also indicate this, although not specifically for organic advisors. The results obtained in the present study, on the other hand, indicate quite the opposite, although I have not asked about their share of the total information acquisition. However, I have asked about the importance of advisors as a total information source in the business. In addition, I have asked about the most important information source for daily activities and the most important information source for the conversion decision.

Advisors were assigned high importance as an overall information source in the present study, and very high importance for the decision or consideration to convert, by the responding farmers in the quantitative part of the study. However, for daily activities, few farmers perceived advisors as the most important information source, so in that sense the result presented in Østergaard (1998) are similar. That is not the case for the total importance and importance for the converting decision/consideration, though. By comparing with section 8.4.6, above, we can see that about half of all farmers perceive advisors as the most important information source for the conversion decision/consideration, if we include “the dairy” in that category as well. My results are supported by the results

obtained in Öhlmér, Brehmer & Olson (1997) and Bergkvist & Fredriksson (1998). However, once again, both Østergaard (1998) and Johansson (1997) have a qualitative approach, making it difficult to draw conclusions regarding a population. Still it is interesting that there is an obvious difference in our respective results regarding this issue.

In Öhlmér, Brehmer & Olson (1997), the researchers present the concepts of intuitive and analytical farmers, as a possible way of explaining farmers' low interest in information, management services and tools. They draw the conclusion that most farmers are intuitive, while most management support is designed for analytical farmers. I have not specifically studied or used the concepts intuitive and analytical. However, the results in the present study point towards the importance of intuition as a very important information source. Besides, the results indicate that detailed studies of the available information and consideration of exact calculations are not very common. Instead, about half of the farmers "used the information to some extent, but went just as much on experience and intuition" (see table 19). These results at least do not contradict the results presented in Öhlmér, Brehmer & Olson (1997). I have not studied the design of management tools, though.

Öhlmér (1998) use the same conceptual model as I have used (see table 1). The problem definition phase gains quantitative support, using simultaneous equation modeling in their article. This is in line with the findings in this thesis, which also implies significant support of the same conceptual model, although primarily to the analysis and choice phase.

To summarize, the conceptual model in Öhlmér, Olson & Brehmer (1998) seems reasonable according to the results obtained in the present thesis. I have obtained significant coefficients for most of the examined submodels, as part of the analysis and choice phase.

One interesting point in this sense regards the role of information. It appears that the role of information, in various types and measured in different ways, appears with significant effect, not only in searching and paying attention, but throughout almost the entire analysis and choice phase. This result I have not found in the literature. All of the subprocesses according to the conceptual model presented in table 1, should perhaps include a proportion of information collecting. I think that this is an interesting observation that is worth examining further.

Finally, I will comment on some matters that I think are satisfactory and some that are not so satisfactory in this thesis. First of all, I think that I have chosen a relevant problem to attack and study in the thesis. It is an issue that should be recognized by many actors today. This is primarily with respect to farmers, of whom many are considering converting to organic production, or some other major conversion, at the moment. The problem is also relevant with respect to other actors, such as the dairy industry, authorities and advisory services. Arla Foods has from time to time had difficulties in recruiting enough new organic milk producers. The government has formulated a new production goal of 20 per cent

organic production in year 2005. This will demand that more conventional milk producers convert and it might be a task for the authorities to try to convince these future converters. This will increase the need and demand of organic advisory service, which, in turn, will increase the demands on the supplying organizations to meet this increase. Therefore an increased knowledge about how farmers make their decisions seems valuable.

The next issue regards the methods chosen in the thesis, in order to solve the problem. There are no “perfect” and ideal methods, no matter what the problem. Each and every one has its shortcomings, in one way or another. The question here is whether the chosen methods are acceptable and good enough. Some matters deserve to be mentioned here. I have chosen a deductively oriented way of attacking the problem, i.e., I started with the existing theories. Thereafter I explored the empiric “reality” in order to see if the existing theories seemed reasonable. At first I did this qualitatively through three case studies, which in turn were the basis for developing a questionnaire for a mail survey in a quantitative part of the study. Hence, I have used a combination of qualitative and quantitative methods, which I think is a strength of the thesis. Though, there may be other opinions about that.

I presented the material from the quantitative part of the study in two parts, one descriptive and one analytic, where the latter one was conducted with the aid of simultaneous equation systems using latent variables, in the LISREL computer program. The issue here is: “Is this a reasonable approach?” I think it is. However, there are definitely shortcomings with doing as I have done.

Firstly, regarding the case studies, the issues dealt with were very difficult to talk about with the farmers. Besides, it is difficult to remember in detail how the decision making was conducted. It is obvious that this is not an everyday subject to talk about at the dinner table, to express it mildly. There is also an obvious risk of producing interviewer-affected answers. Therefore one has to ask oneself the question: “Do I really get the answers I am looking for?”.

Secondly, regarding the case studies, the choice and number of cases can be discussed. I chose three farmers, which were thoroughly described. One positive thing, is that I succeeded in finding farmers that were quite different with respect to many matters, such as production methods, farm size and value structure. They all contributed to my study. In order to present the material, I have chosen to describe the cases thoroughly. In addition, I have described the interview situation very carefully. I have also chosen to include long direct citations. These actions are all conducted in order to give the reader the best possible picture of the empiric material in order to find out if my interpretations seem reasonable.

One can always argue that the number of cases could be changed and increased. Why did I use three cases and not four or five or any other number? As I discussed above, after having conducted the three case studies presented above, I considered that I had received a sufficiently broad picture of the converting and converting decision. Consequently, I regarded the marginal utility of an additional case to be

considerably lower compared to what it had been earlier. Hence, I thought that I could start developing the questionnaire after three case studies. I am receptive to the opinion that more case studies should have been conducted, though.

Thirdly, regarding the mail survey, the same shortcoming as for the cases is present. Do I really get the answers I am interesting in getting through a questionnaire? There is a risk of getting “assumedly desired” answers with an influence of the interviewer effect, once again. Many of the issues studied in this thesis are difficult to talk and write about for the managers. This is also the motive for my suggestions of alternative research methods in the “Future research” section. However, a strength in this part of the study is that I have very thoroughly described the way in which I have worked. It is therefore easier for the reader to evaluate the results obtained in the study. Besides, alternative approaches, such as experiments, interviews or observation, also have their shortcomings. It is difficult to make an experimental situation look realistic and natural. In an interview it is also difficult to ensure that you really get the answers you are looking for. Observation, whether participatory or non-participatory, also has effect on the study object. A questionnaire also has its shortcomings, as has been discussed above. One advantage with it, though, is that the respondent can sit at home by himself when filling it in.

Most of the simultaneous equation models show significant or very close to significant overall model fit statistics and they have significant t-values for the single variables. Another strength is the high response rate of the mail survey, i.e., in total approximately 55.5 per cent, despite the size of the questionnaire (seven pages) and the time of year (in the middle of the summer). Yet another strength is the drop-out analysis, which was conducted due to the response rate. Though, the response rate is in itself substantially higher compared to many other published studies, where the latter many times are not complemented with a drop-out analysis. Taking these factors together, I can with a fairly high level of certainty draw conclusions based on the entire population of milk producing farmers within the Arla Foods area, who at the time of the mail survey had converted or considered converting.

These were just some of the strengths and weaknesses. Naturally there are many more, but I leave those for the reader to discover.

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Thank you, Roger Herbert, for transferring my so called English into English. You have done a magnificent job. The number of: "e.g.", "i.e.", "etc." and "respectively" has been reduced. Now they maybe have become fewer than a couple of thousand...each...! (Look, I did not use the word "respectively" in the last sentence!!!)

Another dear friend and former department colleague, who sadly is not with us anymore, is Lennart Bergkvist. Lennart, you never got the opportunity to experience neither your own nor my disputation. When I write this it is almost exactly one year since you left us and we are many who miss you. Thank you for your always so constructive, positive, smart and ingenious attitude. It was a pleasure to get to know you, Lennart!

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To Daniel "Danne Die Hard" Berlin, I just say that it's a great pleasure being your colleague, just across the corridor. Our frequent discussions show that there is still hope for this planet. At least WE have the right spirit, or...!?!

Karin Hakelius, you are also a breeze of fresh air! Your famous gesture showing your planning in advance (framförhållning) is highly amusing (a hand 0,0000004 mm in front of the nose). Your extremely quick answers are also famous. More than once you have "killed" my highly friendly "Have a nice weekend!", with a quick: "Fawn!" ("Fjäsk!")!

Bosse Hedin; to you I say: \_... . \_ . \_ . . \_ as an old telegraphist- and K3-colleague!

Marie-Louise Folkesson; it's always fun to talk to you, especially about the "disgusting Fridays and lovely Monday mornings"! You seem to regard that as a joke, though...

To “Vinprovarfestgänget” (alias “Dunkgänget”), i.e., Berit Klingspor, “Direktör’n” (Lena Pettersson), Christina Pettersson and Lars Lönnstedt: Well, there have been some cans of wine during the years now! Could you imagine the consequences of telling your fantastic colleagues about having a saddle of venison (rådjurssadel) in the fridge, Direktör’n?! Let’s go for another can soon, folks!

A friend from outside this department that I want to thank is Anna Nilsson. Especially during the last six months or so, we have had many (more or less desperate!) discussions about being a doctoral student. We have also had a lot of nice “Saturday and Sunday at the Department” lunches together. Well, maybe we should write a cookbook together, now after having finished our theses! We have had a number of interesting, combined, dishes during these months. I especially think about a classic like: “extremely dry waffles with old strawberry jam, drinkable yogurt and sweaty cheese sandwiches”. Speaking of your thesis subject; maybe we could call it “Dry Matter à la Department”!?!

One friend outside the department and SLU that always have been very supportive is Patrik Andersson. We have had many and long discussions and you have always encouraged me to go on and not give up. You have always, in your logic and objective way, found the reasons for continuing the job, despite the fact that I many times have been doubtful.

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From now on, I will hopefully be able to spend more time with our son Nils, who has just turned two years. I hope to learn more of the rapidly developing language of his. At the moment I guess the most frequently used words are: “meja” (=mera, more), “jamla” (=ramla, fall), “umla” (=humla, humblebee), “gooooool” (=gul, yellow), “ooet” (=huvudet, the head), “Lill-Lilla” (=Inga-Lill) and “momma” (=månen, the moon). I hope to be able to spend much more time with you from now on, son!

# Appendix A1. Questionnaire sent to organic milk producers

Uppsala 2000-06-22



## Bäste Mjolkproducent!

Jag som skickar detta brev till Dig heter Daniel Lunneryd och arbetar vid Sveriges lantbruksuniversitet i Uppsala. Jag genomför just nu en studie rörande omställning till ekologisk mjölkproduktion och främst om bli informationsbehov och informationshantering vid omställningen. Studien syftar till att öka kunskapen om hur omställningsarbetet går till, vilken information det finns behov av i detta sammanhang, om Du som mjölkproducent saknar information av något slag (t ex någon typ av rådgivning), hur rådgivning och informationsutbud i övrigt kan förbättras m m. Om dessa saker handlar alltså frågorna i enkäten.

I frågeformuläret erbjuds Du även att fritt ge Dina synpunkter på omställningen och omställningsprocessen, hot och möjligheter, samt ge övriga personliga kommentarer som Du finner viktiga. Som tack för att Du ställer upp skickar jag en sammanställning av de viktigaste resultaten.

Enkät skickas till samtliga ekomjölksproducenter, samt till ett antal konventionella producenter, inom Arla och adresserna är hämtade från Arlas medlemsregister. Alla uppgifter om enskilda producenters situation behandlas helt konfidentiellt och kommer givetvis inte att publiceras på sådant sätt att enskilda producenter kan identifieras.

Jag hoppas att enkäten är lättfattlig och att Du vill ta Dig tid att besvara den och skicka tillbaka den i det bifogade portofria svarskuvertet. Det är mycket betydelsefullt att Du deltar i studien, eftersom Dina och Dina kollegors erfarenheter därmed tas tillvara och främjar kunskapen om omställning till ekologisk mjölkproduktion. Jag tackar för Din medverkan på förhand och om Du har några frågor är Du välkommen att höra av Dig; telefon- och faxnummer, samt e-postadress enligt nedan.

Med vänlig hälsning

Daniel Lunneryd

Tel : 018 / 67 17 46

Fax: 018 / 67 35 02

E-post: [daniel.lunneryd@ekon.slu.se](mailto:daniel.lunneryd@ekon.slu.se)

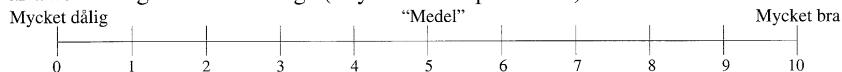
1

# ENKÄT OM OMSTÄLLNING TILL EKOLOGISK MJÖLKPRODUKTION

## 1. Gårds- och produktionsdata

a) Hur stor är Din fastighet? \_\_\_\_\_ ha ägd åker, \_\_\_\_\_ ha arrenderad åker, \_\_\_\_\_ ha skog, (ha=hektar) \_\_\_\_\_ ha övrigt, ange vad: \_\_\_\_\_.

b) Hur är arronderingen i Ditt företag? (Kryssmarkera på skalan.)



c) Hur stor är den genomsnittliga mjölkbesättningen i Ditt företag? \_\_\_\_\_ mjölkplatser.

d) Har besättningsstorleken förändrats de senaste tio åren?  Ja, ökat med: \_\_\_\_\_ platser.  
 Ja, minskat med: \_\_\_\_\_ platser.  
 Nej, den är oförändrad.

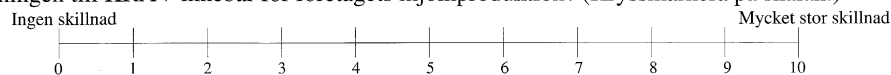
e) När skedde den senaste förändringen av besättningsstorleken? År: \_\_\_\_\_.

f) Planeras en förändring av besättningsstorleken?  Nej, ingen förändring är planerad.  
 Ja, en ökning till: \_\_\_\_\_ platser.  
 Ja, en minskning till: \_\_\_\_\_ platser.

g) Finns förutom mjölkproduktion annan kommersiell animalieproduktion i företaget?  Ja  Nej

h) Hur länge har mjölkproduktionen varit ansluten till KRAV? Sedan år: \_\_\_\_\_. (Ange årtalet.)

i) Hur stor skillnad (med avseende på arbetsinsats, avkastning, ekonomi, o s v) uppskattar Du att anslutningen till KRAV innebar för företagets mjölkproduktion? (Kryssmarkera på skalan.)



j) Hur stor del av företagets inkomster kommer från mjölkproduktionen? \_\_\_\_\_ procent.

k) Hur ser Du på Din skuldnivå?

För hög, måste minskas  Acceptabel, men kan ej öka  Kan tillåtas öka

l) Hur många heltidssysselsatta arbetar i företaget **förutom Dig själv**? \_\_\_\_\_ heltidssysselsatta.

## 2. Data om omgivningen

a) I vilken kommun ligger Ditt företag? \_\_\_\_\_.

b) Hur långt är det till närmaste tätort/större samhälle med minst 5000 invånare? \_\_\_\_\_ km.

c) Vad anser Du vara de största hoten mot Din ekologiska mjölkproduktion i framtiden?

\_\_\_\_\_ är det största hotet.

\_\_\_\_\_ är det näst största hotet.

d) Vad anser Du vara de största möjligheterna för Din ekologiska mjölkproduktion i framtiden?

\_\_\_\_\_ är den största möjligheten.

\_\_\_\_\_ är den näst största möjligheten.

### **3. Data om Dig som företagsledare**

a) Vilket år är Du född? År: 19\_\_\_\_\_.

b) Ange Din genomgångna formella skolutbildning. (Flera alternativ kan väljas.)

- Folkskola                       Grundskola                       Realskola  
 Gymnasium                       Folkhögskola                       Universitet/högskola

Annat; ange vad: \_\_\_\_\_.

c) Har Du genomgått någon formell utbildning om ekologisk mjölkproduktion?  Ja     Nej

d) Har Du genomgått någon formell utbildning om företagande/småföretagande?  Ja     Nej

e) Har Du yrkeserfarenhet från annat än lantbruket?  Ja, från företagsledning, under: \_\_\_\_\_ år

Ja, från annat än företagsledning, under: \_\_\_\_\_ år     Nej

f) Hur många personer består Ditt hushåll av?     Endast av mig själv (Fortsätt till fråga 3 h)

Av mig och min maka/make/sambo     Av mig och min maka/make/sambo, samt \_\_\_\_\_ barn

Av mig och mina \_\_\_\_\_ barn (Fortsätt till fråga 3 h)     Annat: \_\_\_\_\_.

g) Förvärvsarbetar din maka/make/sambo utanför lantbruket?                       Ja     Nej

h) Är Ni flera som fattar beslut i företagsledningsfrågor för företaget?                       Ja     Nej

i) Hur länge har Du varit företagsledare för Ditt företag?                      Sedan år: 19\_\_\_\_\_.

### **4. Data om sociala faktorer**

a) Samarbetar Du med grannar och/eller kollegor i något avseende?                       Ja     Nej

b) Deltar Du i studiecirklar och andra utbildningar?  Ja, varje år     Ja, men inte varje år     Nej

c) Vilken anser Du är den **viktigaste** kontaktytan för att få yrkesmässiga erfarenheter? (Ange **ett** alternativ.)     Familjen     Anställda     Grannar/kollegor     Rådgivare     Kurser

Annan, ange vem/vilken: \_\_\_\_\_.

d) Är det något Du saknar i syfte att öka erfarenhetsutbytet generellt sett?                       Ja     Nej

Om ja, ange vad: \_\_\_\_\_.



## 5. Värderingar

Markera ett siffervärde för respektive värderings betydelse. Siffran 0 anges om värderingen helt saknar betydelse.

VÄRDERING:	Saknar betydelse	Liten betydelse						Stor betydelse
		←	1	2	3	4	5	
a) "Att bedriva ekologiskt lantbruk är ideologiskt viktigt för mig."	0	1	2	3	4	5	6	
b) "Arbetsstillfredsställelse är viktigt för mig."	0	1	2	3	4	5	6	
c) "Att få tid tillsammans med familjen, alternativt egen fritid, är viktigt för mig."	0	1	2	3	4	5	6	
d) "Omgivningens (familjens, kollegors, grannars, konsumenters o s v) reaktioner på vad jag gör är viktiga för mig."	0	1	2	3	4	5	6	
e) "Hög ekonomisk lönsamhet är viktigt för mig."	0	1	2	3	4	5	6	
f) "Att producera något som konsumenten vill ha är viktigt för mig."	0	1	2	3	4	5	6	
g) "Att inte använda kemiska bekämpningsmedel och handelsgödsel är viktigt för mig."	0	1	2	3	4	5	6	
h) "Att behålla gården inom familjen/släkten är viktigt för mig."	0	1	2	3	4	5	6	
i) "Att ha goda förebilder för min verksamhet är viktigt för mig."	0	1	2	3	4	5	6	
j) "Att vara en förebild för andra är viktigt för mig."	0	1	2	3	4	5	6	
k) "Att kunna försörja familjen på inkomsterna från gården är viktigt för mig."	0	1	2	3	4	5	6	
l) "Att handla med, d v s sälja till och köpa av, de lantbrukskooperativa organisationerna är viktigt för mig."	0	1	2	3	4	5	6	

## 6. Beslutet att ställa om till ekologisk mjölkproduktion

a) När, ungefär, **började Du fundera** på att förändra produktionsinriktningen *överhuvudtaget* (d v s **innan** Du började fundera på just ekologisk mjölkproduktion)? År: 19\_\_\_\_.

b) Vad var det som fick Dig att börja fundera på att förändra produktionsinriktningen *överhuvudtaget* (d v s **innan** Du började fundera på just ekologisk mjölkproduktion)? (Flera alternativ kan väljas.)

- Jag ville prova på något nytt, men upplevde inte att jag hade något problem.
- Jag hade ekonomiska problem i företaget.
- Jag hade produktionsmässiga problem, t ex avkastning, sjukdomar, byggnader etc.
- Företaget stod inför ett generationsskifte.
- Jag hade personliga problem.
- Annat, ange vad: \_\_\_\_\_

c) Vad var det som fick Dig att börja fundera på att ställa om till *just ekologisk mjölkproduktion*? (Flera alternativ kan väljas.)

- Jag tyckte att det var ett intressant alternativ utifrån mina värderingar.  
 Jag hade problem med lönsamheten i mjölkproduktionen och var tvungen att göra något.  
 Jag hade problem med lönsamheten i hela företaget och var tvungen att göra något.  
 En omställning skulle lösa mina produktionsmässiga problem.  
 En omställning skulle lösa mina personliga problem.  
 Annat; ange vad: \_\_\_\_\_.

d) Övervägde Du fler alternativ än att ställa om till ekologisk mjölkproduktion vid beslutstillfället? (Flera alternativ kan väljas.)

- Ja, alternativet var att fortsätta med den konventionella mjölkproduktionen.  
 Ja, alternativet var att sluta med mjölkproduktionen helt och hållet.  
 Ja, alternativet var att sluta med lantbruket helt och hållet.  
 Ja, alternativet var att påbörja en annan produktionsgren; ange vad: \_\_\_\_\_.  
 Ja, annat; ange vad: \_\_\_\_\_.  
 Nej, jag såg det som det enda möjliga alternativet.

## **7. Information, informationsbehov och omställningsbeslutet**

a) Vilken betydelse har följande informationskällor totalt sett i företaget? (Markera en siffra för respektive källa.)

	Saknar betydelse	Liten betydelse					Stor betydelse
	0	1	2	3	4	5	6
- Dagstidningar:	0	1	2	3	4	5	6
- Facktidskrifter:	0	1	2	3	4	5	6
- Radioprogram:	0	1	2	3	4	5	6
- TV-program:	0	1	2	3	4	5	6
- Internet:	0	1	2	3	4	5	6
- Familjen:	0	1	2	3	4	5	6
- Anställda:	0	1	2	3	4	5	6
- Grannar och kollegor:	0	1	2	3	4	5	6
- Rådgivning:	0	1	2	3	4	5	6
- Kurser:	0	1	2	3	4	5	6
- Mejeriföreningen:	0	1	2	3	4	5	6
- Egen erfarenhet:	0	1	2	3	4	5	6

b) Ungefär hur många timmar totalt per vecka använder Du för informationssökning? \_\_\_\_\_ tim.

c) Vilken av informationskällorna i fråga 7a anser Du vara viktigast *för den dagliga driften*?

(Ange ett alternativ.) \_\_\_\_\_.

d) Vilken av informationskällorna i fråga 7a anser Du var viktigast *inför beslutet att övergå till ekologisk mjölkproduktion*? (Ange ett alternativ.)

\_\_\_\_\_.

e) Fanns det något som det var svårt att få information om inför omställningsbeslutet?  Ja  Nej

Om ja, ange vad: \_\_\_\_\_.

f) Saknar Du någon typ av information om ekologisk mjölkproduktion idag?  Ja  Nej  
Om ja, ange vad: \_\_\_\_\_

*De följande frågorna handlar om den fortsatta lagringen, bearbetningen och användningen av den insamlade informationen enligt beskrivningen ovan.*

g) Hur lagrade Du informationen från de i fråga 7a uppräknade källorna? (Flera alternativ kan väljas.)  
 Jag kom ihåg/lagrade i huvudet.  Jag skrev ned på papper.  Jag registrerade i dator.  
 Det var skriftlig information, som jag sparade.  Jag lagrade inte på något särskilt sätt.  
 Annat, ange vad: \_\_\_\_\_

h) Hur bearbetade Du informationen som Du samlat in? (Flera alternativ kan väljas.)  
 Jag bearbetade informationen i huvudet själv.  Jag diskuterade med familjen.  
 Jag diskuterade med grannar och/eller kollegor.  Jag diskuterade med rådgivare.  
 Jag använde papper och penna, samt t ex miniräknare.  Jag använde mig av dator.  
 Jag bearbetade inte den insamlade informationen på något särskilt sätt.  
 Annat; ange vad: \_\_\_\_\_

i) Hur stor hänsyn tog Du till den erhållna informationen i det fortsatta beslutsfattandet?  
 Jag studerade informationen i detalj och tog hänsyn till exakta beräkningar.  
 Jag studerade informationen, men endast med avseende på i vilken riktning det pekade, ej så exakt i kr och ören.  
 Jag använde mig av informationen till viss del, men jag gick lika mycket på min egen erfarenhet och intuition.  
 Jag tittade som hastigast på den insamlade informationen, men gick mest på min egen erfarenhet och intuition.  
 Jag tog inte hänsyn till den insamlade informationen alls, utan gick helt och hållet på min egen erfarenhet och intuition.  
 Annat; ange vad: \_\_\_\_\_

j) Använde Du informationen för planering av eventuella alternativa åtgärder, d v s förutom omställningen, som Du ansåg möjliga att genomföra (enligt fråga 6d, ovan)?  
 Ja, jag såg flera olika alternativa åtgärder, varav omställning till ekologisk mjölkproduktion var en, och använde informationen för planering av dessa.  
 Nej, jag såg bara en möjlig åtgärd, d v s omställning till ekologisk mjölkproduktion, och använde informationen för planering av den.  
 Nej, jag planerade inte särskilt för alternativet/alternativen.  
 På annat sätt; ange hur: \_\_\_\_\_

k) Värderade Du följderna av åtgärden/åtgärderna?  
 Ja, jag bedömde hur viktiga följderna var **noggrant**.  
 Ja, jag bedömde hur viktiga följderna var **översiktligt**.  
 Nej, jag bedömde inte hur viktiga följderna var.  
 På annat sätt; ange hur: \_\_\_\_\_

l) Hur bestämde Du Dig för att just ställa om till ekologisk mjölkproduktion?

- Jag bedömde följderna av **samtliga** tänkbara alternativa åtgärder och valde omställning till ekologisk mjölkproduktion, eftersom jag bedömde det som **bäst**, totalt sett.
- Jag bedömde följderna av tänkbara alternativa åtgärder, till dess att jag fann en åtgärd (d v s omställning till ekologisk mjölkproduktion) som motsvarade en **acceptabel nivå** för mig.
- Jag valde åtgärd (d v s omställning till ekologisk mjölkproduktion) efter vad som kändes **bäst rent intuitivt**.
- Jag såg bara en möjlig åtgärd, d v s omställning till ekologisk mjölkproduktion, och valde den.
- Annat, ange vad: \_\_\_\_\_.

m) Kontrollerade Du *följderna* av omställning till ekologisk mjölkproduktion, efter det att Du **bestämt** Dig för att ställa om (men innan du börjat **genomföra** själva omställningen)?

- Ja, jag kontrollerade följderna **noggrant**.
- Ja, jag kontrollerade följderna **översiktligt**.
- Nej, när jag väl bestämt mig kontrollerade jag inte ytterligare följderna av att ställa om.
- Annat; ange vad: \_\_\_\_\_.

n) *Justerade* Du Dina planer för omställningen till ekologisk mjölkproduktion (p g a ytterligare information som Du erhållit), efter det att Du bestämt Dig för hur Du skulle gå tillväga?

- Ja, jag justerade mina planer för omställningen till ekologisk mjölkproduktion.
- Nej, jag justerade inte mina planer för omställningen till ekologisk mjölkproduktion.

o) Hur genomfördes omställningen till ekologisk mjölkproduktion?

- Jag genomförde omställningen **stegvis** och provade mig fram, allteftersom jag lärde mig mera.
- Jag genomförde omställningen **på en gång** för hela **mjölkproduktionen**.
- Jag genomförde omställningen **på en gång** för hela **mjölkproduktionen och växtodlingen** samtidigt.
- På annat sätt; ange hur: \_\_\_\_\_.

## **8. Lärande**

a) Har Du lärt Dig något som Du kan ha direkt nytta av vid andra större beslut, efter att ha genomfört omställningen till ekologisk mjölkproduktion?  Ja  Nej

b) Om ja; vad har Du lärt Dig till följd av omställningsbeslutet? (Flera alternativ kan väljas.)

Jag har lärt mig att på ett bättre sätt:

- upptäcka problem** i företaget.
- finna lösningsalternativ** när ett problem har uppstått.
- samla in information**.
- lagra information**.
- hantera, tolka och använda** mig av insamlad information.
- planera olika åtgärder** för att lösa problemet.
- bedöma följderna** av olika åtgärder/alternativ.
- välja den/det bästa** av olika åtgärder/alternativ.
- kontrollera följderna av** den åtgärd/det alternativ jag valt.
- justera planerna** för genomförande av den åtgärd jag valt, allt eftersom jag får ny information.
- genomföra** beslutet som jag fattat.
- Annat; ange vad: \_\_\_\_\_.



## Appendix A2. Questionnaire sent to conventional milk producers

Uppsala 2000-06-22



### Bäste Mjolkproducent!

Jag som skickar detta brev till Dig heter Daniel Lunneryd och arbetar vid Sveriges lantbruksuniversitet i Uppsala. Jag genomför just nu en studie rörande bl a informationsbehov och informationsanvändning i mjölkproduktionen och vid en eventuell omställning till ekologisk produktion. Studien syftar bl a till att öka kunskapen om hur informationshanteringen går till, vilken information det finns behov av i detta sammanhang, om Du som mjölkproducent saknar information av något slag (t ex någon typ av rådgivning), hur rådgivning och informationsutbud i övrigt kan förbättras m m. Om dessa saker handlar alltså frågorna i enkäten.

I frågeformuläret erbjuds Du även att fritt ge Dina synpunkter på såväl konventionell som ekologisk mjölkproduktion, hot och möjligheter, samt ge övriga personliga kommentarer som Du finner viktiga. Som tack för att Du ställer upp skickar jag en sammanställning av de viktigaste resultaten.

**Enkät skickas till både konventionella och ekologiska mjölkproducenter** inom Arlas område och adresserna är hämtade från Arlas medlemsregister. Alla uppgifter om enskilda producenters situation behandlas helt konfidentiellt och kommer givetvis inte att publiceras på sådant sätt att enskilda producenter kan identifieras.

Jag hoppas att enkäten är lättfattlig och att Du vill ta Dig tid att besvara den och skicka tillbaka den i det bifogade portofria svarskuvertet. Det är mycket betydelsefullt att Du deltar i studien, eftersom Dina och Dina kollegors erfarenheter därmed tas tillvara och främjar kunskapen om mjölkproduktion. Jag tackar för Din medverkan på förhand och om Du har några frågor är Du välkommen att höra av Dig; telefon- och faxnummer, samt e-postadress enligt nedan.

Med vänlig hälsning

Daniel Lunneryd

*Tel : 018 / 67 17 46*

*Fax: 018 / 67 35 02*

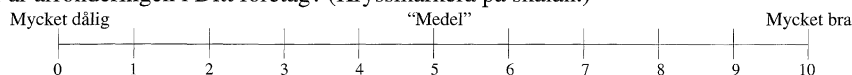
*E-post: daniel.lunneryd@ekon.slu.se*

# Enkät om behov och hantering av information rörande mjölkproduktionen

## 1. Gårds- och produktionsdata

a) Hur stor är Din fastighet? \_\_\_\_\_ ha ägd åker, \_\_\_\_\_ ha arrenderad åker, \_\_\_\_\_ ha skog, (ha=hektar) \_\_\_\_\_ ha övrigt, ange vad: \_\_\_\_\_.

b) Hur är arronderingen i Ditt företag? (Kryssmarkera på skalan.)



c) Hur stor är den genomsnittliga mjölkko-besättningen i Ditt företag? \_\_\_\_\_ mjölkkoplatser.

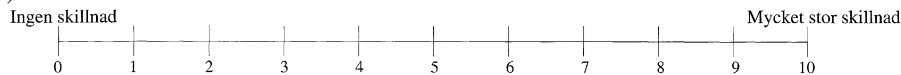
d) Har besättningsstorleken förändrats de senaste tio åren?  Ja, ökat med: \_\_\_\_\_ platser.  
 Ja, minskat med: \_\_\_\_\_ platser.  
 Nej, den är oförändrad.

e) När skedde den senaste förändringen av besättningsstorleken? År: \_\_\_\_\_.

f) Planeras en förändring av besättningsstorleken?  Nej, ingen förändring är planerad.  
 Ja, en ökning till: \_\_\_\_\_ platser.  
 Ja, en minskning till: \_\_\_\_\_ platser.

g) Finns förutom mjölkproduktion annan kommersiell animalieproduktion i företaget?  Ja  Nej

i) Hur stor skillnad (med avseende på arbetsinsats, avkastning, ekonomi, o s v) uppskattar Du att en anslutning till KRAV skulle innebära för företagets mjölkproduktion? (Kryssmarkera på skalan.)



j) Hur stor del av företagets inkomster kommer från mjölkproduktionen? \_\_\_\_\_ procent.

k) Hur ser Du på Din skuldnivå?

För hög, måste minskas  Acceptabel, men kan ej öka  Kan tillåtas öka

l) Hur många heltidssysselsatta arbetar i företaget **förutom Dig själv**? \_\_\_\_\_ heltidssysselsatta.

## 2. Data om omgivningen

a) I vilken kommun ligger Ditt företag? \_\_\_\_\_.

b) Hur långt är det till närmaste tätort/större samhälle med minst 5000 invånare? \_\_\_\_\_ km.

c) Vad anser Du vara de största hoten mot Din mjölkproduktion i framtiden?

\_\_\_\_\_ är det största hotet.

\_\_\_\_\_ är det näst största hotet.

d) Vad anser Du vara de största möjligheterna för Din mjölkproduktion i framtiden?

\_\_\_\_\_ är den största möjligheten.

\_\_\_\_\_ är den näst största möjligheten.

### **3. Data om Dig som företagsledare**

a) Vilket år är Du född? År: 19\_\_\_\_\_.

b) Ange Din genomgångna formella skolutbildning. (Flera alternativ kan väljas.)

Folkskola                       Grundskola                       Realskola  
 Gymnasium                       Folkhögskola                       Universitet/högskola

Annat; ange vad: \_\_\_\_\_.

c) Har Du genomgått någon formell utbildning om ekologisk mjölkproduktion?  Ja     Nej

d) Har Du genomgått någon formell utbildning om företagande/småföretagande?  Ja     Nej

e) Har Du yrkeserfarenhet från annat än lantbruket?  Ja, från företagsledning, under: \_\_\_\_\_ år  
 Ja, från annat än företagsledning, under: \_\_\_\_\_ år     Nej

f) Hur många personer består Ditt hushåll av?     Endast av mig själv (Fortsätt till fråga 3 h)  
 Av mig och min maka/make/sambo     Av mig och min maka/make/sambo, samt \_\_\_\_\_ barn  
 Av mig och mina \_\_\_\_\_ barn (Fortsätt till fråga 3 h)     Annat: \_\_\_\_\_

g) Förvärvsarbetar din maka/make/sambo utanför lantbruket?                       Ja     Nej

h) Är Ni flera som fattar beslut i företagsledningsfrågor för företaget?                       Ja     Nej

i) Hur länge har Du varit företagsledare för Ditt företag?                      Sedan år: 19\_\_\_\_\_.

### **4. Data om sociala faktorer**

a) Samarbetar Du med grannar och/eller kollegor i något avseende?                       Ja     Nej

b) Deltar Du i studiecirklar och andra utbildningar?  Ja, varje år     Ja, men inte varje år     Nej

c) Vilken anser Du är den **viktigaste** kontaktytan för att få yrkesmässiga erfarenheter? (Ange ett alternativ.)     Familjen     Anställda     Grannar/kollegor     Rådgivare     Kurser

Annan, ange vem/vilken: \_\_\_\_\_.

d) Är det något Du saknar i syfte att öka erfarenhetsutbytet generellt sett?                       Ja     Nej

Om ja, ange vad: \_\_\_\_\_.



## 5. Informationsanvändning

a) Vilken betydelse har följande informationskällor totalt sett i företaget? (Markera en siffra för respektive källa.)

	Saknar betydelse	Liten betydelse					Stor betydelse
	0	1	2	3	4	5	6
- Dagstidningar:	0	1	2	3	4	5	6
- Facktidsskrifter:	0	1	2	3	4	5	6
- Radioprogram:	0	1	2	3	4	5	6
- TV-program:	0	1	2	3	4	5	6
- Internet:	0	1	2	3	4	5	6
- Familjen:	0	1	2	3	4	5	6
- Anställda:	0	1	2	3	4	5	6
- Grannar och kollegor:	0	1	2	3	4	5	6
- Rådgivning:	0	1	2	3	4	5	6
- Kurser:	0	1	2	3	4	5	6
- Mejeriföreningen:	0	1	2	3	4	5	6
- Egen erfarenhet:	0	1	2	3	4	5	6

b) Ungefär hur många timmar totalt per vecka använder Du för informationssökning? \_\_\_\_\_ tim.

c) Vilken av informationskällorna i fråga <sup>5</sup> anser Du vara viktigast *för den dagliga driften*?  
(Ange ett alternativ.) \_\_\_\_\_

## 6. Värderingar

Markera ett siffrvärde för respektive värderings betydelse. Siffran 0 anges om värderingen helt saknar betydelse.

VÄRDERING:	Saknar betydelse	Liten betydelse					Stor betydelse
	0	1	2	3	4	5	6
a) "Att bedriva ekologiskt lantbruk är ideologiskt viktigt för mig."	0	1	2	3	4	5	6
b) "Arbetsstillfredsställelse är viktigt för mig."	0	1	2	3	4	5	6
c) "Att få tid tillsammans med familjen, alternativt egen fritid, är viktigt för mig."	0	1	2	3	4	5	6
d) "Omgivningens (familjens, kollegors, grannars, konsumenters o s v) reaktioner på vad jag gör är viktiga för mig."	0	1	2	3	4	5	6
e) "Hög ekonomisk lönsamhet är viktigt för mig."	0	1	2	3	4	5	6
f) "Att producera något som konsumenten vill ha är viktigt för mig."	0	1	2	3	4	5	6
g) "Att inte använda kemiska bekämpningsmedel och handelsgödsel är viktigt för mig."	0	1	2	3	4	5	6
h) "Att behålla gården inom familjen/släkten är viktigt för mig."	0	1	2	3	4	5	6

fortsättning: <b>VÄRDERING:</b>	Saknar betydelse	Liten betydelse						Stor betydelse
		←						→
i) "Att ha goda förebilder för min verksamhet är viktigt för mig."	0	1	2	3	4	5	6	
j) "Att vara en förebild för andra är viktigt för mig."	0	1	2	3	4	5	6	
k) "Att kunna försörja familjen på inkomsterna från gården är viktigt för mig."	0	1	2	3	4	5	6	
l) "Att handla med, d v s sälja till och köpa av, de lantbrukskooperativa organisationerna är viktigt för mig."	0	1	2	3	4	5	6	

### **7. Förändring av produktionsinriktningen?**

a) Har Du **funderat** på att förändra produktionsinriktningen i företaget *överhuvudtaget*?

- Ja; jag började fundera på det ungefär år: \_\_\_\_\_. (Fortsätt till fråga 7b, nedan.)  
 Nej, det har jag aldrig funderat på. (Om Du svarade Nej här behöver Du inte svara på fler frågor! Tack för Din medverkan!)

b) Om "**Ja**" på fråga 7a); vad var det som fick Dig att börja fundera på att förändra produktionsinriktningen i företaget *överhuvudtaget*? (Flera alternativ kan väljas.)

- Jag ville prova på något nytt, men upplevde inte att jag hade något problem.  
 Jag hade ekonomiska problem i företaget.  
 Jag hade produktionsmässiga problem, t ex m a p avkastning, sjukdomar, byggnader.  
 Företaget stod inför ett generationsskifte.  
 Jag hade personliga problem.  
 Annat, ange vad: \_\_\_\_\_

c) Har Du funderat på att ställa om till *ekologisk mjölkproduktion*?

- Ja; jag började fundera på det ungefär år: \_\_\_\_\_. (Fortsätt till fråga 7d, nedan.)  
 Nej. (Om Du svarade Nej här behöver Du inte svara på fler frågor! Tack för Din medverkan!)

d) Om "**Ja**" på fråga 7c); vad var det som fick Dig att börja fundera på att ställa om till *ekologisk mjölkproduktion*? (Flera alternativ kan väljas.)

- Jag tyckte att det var ett intressant alternativ utifrån mina värderingar.  
 Jag hade problem med lönsamheten i mjölkproduktionen och var tvungen att göra något.  
 Jag hade problem med lönsamheten i hela företaget och var tvungen att göra något.  
 En omställning skulle lösa mina produktionsmässiga problem.  
 En omställning skulle lösa mina personliga problem.  
 Annat; ange vad: \_\_\_\_\_

e) Övervägde Du fler alternativ än att ställa om till *ekologisk mjölkproduktion* då Du funderade på att förändra produktionsinriktningen? (Flera alternativ kan väljas.)

- Ja, alternativet var att fortsätta med den konventionella mjölkproduktionen.  
 Ja, alternativet var att sluta med mjölkproduktionen helt och hållet.  
 Ja, alternativet var att sluta med lantbruket helt och hållet.  
 Ja, alternativet var att påbörja en annan produktionsgren; ange vad: \_\_\_\_\_  
 Ja, annat; ange vad: \_\_\_\_\_  
 Nej, jag såg det som det enda möjliga alternativet.

f) Vilken av informationskällorna i fråga 5a, ovan, anser Du var viktigast *som stöd vid funderingen om att övergå till ekologisk mjölkproduktion*? (Ange ett alternativ.)

\_\_\_\_\_.

g) Fanns det något som det var svårt att få information om vid funderingen om att övergå till ekologisk mjölkproduktion?  Ja  Nej

Om ja, ange vad: \_\_\_\_\_.

h) Saknar Du någon typ av information om ekologisk mjölkproduktion idag?  Ja  Nej

Om ja, ange vad: \_\_\_\_\_.

\_\_\_\_\_.

*De följande frågorna handlar om hur Du gick till väga vid den fortsatta lagringen, bearbetningen och användningen av den insamlade informationen enligt beskrivningen ovan, då Du funderade på att ställa om till ekologisk mjölkproduktion.*

i) Hur lagrade Du informationen från de i fråga 5a uppräknade källorna? (Flera alternativ kan väljas.)

Jag kom ihåg/lagrade i huvudet.  Jag skrev ned på papper.  Jag registrerade i dator.

Det var skriftlig information, som jag sparade.  Jag lagrade inte på något särskilt sätt.

Annat, ange vad: \_\_\_\_\_.

j) Hur bearbetade Du informationen som Du samlat in? (Flera alternativ kan väljas.)

Jag bearbetade informationen i huvudet själv.  Jag diskuterade med familjen.

Jag diskuterade med grannar och/eller kollegor.  Jag diskuterade med rådgivare.

Jag använde papper och penna, samt t ex miniräknare.  Jag använde mig av dator.

Jag bearbetade inte den insamlade informationen på något särskilt sätt.

Annat; ange vad: \_\_\_\_\_.

k) Hur stor hänsyn tog Du till den erhållna informationen i det fortsatta beslutsfattandet?

Jag studerade informationen i detalj och tog hänsyn till exakta beräkningar.

Jag studerade informationen, men endast med avseende på i vilken riktning det pekade, ej så exakt i kr och ören.

Jag använde mig av informationen till viss del, men jag gick lika mycket på min egen erfarenhet och intuition.

Jag tittade som hastigast på den insamlade informationen, men gick mest på min egen erfarenhet och intuition.

Jag tog inte hänsyn till den insamlade informationen alls, utan gick helt och hållet på min egen erfarenhet och intuition.

Annat; ange vad: \_\_\_\_\_.

l) Använde Du informationen för planering av eventuella alternativa åtgärder, d v s förutom omställningen, som Du ansåg möjliga att genomföra (enligt fråga 7e, ovan)?

- Ja, jag såg flera olika alternativa åtgärder, varav omställning till ekologisk mjölkproduktion var en, och använde informationen för planering av dessa.
- Nej, jag såg bara en möjlig åtgärd, d v s omställning till ekologisk mjölkproduktion, (förutom att bibehålla dittillsvarande konventionella produktionsinriktning), och använde informationen för planering av den.
- Nej, jag planerade inte särskilt för alternativet/alternativen.
- På annat sätt; ange hur: \_\_\_\_\_.

m) Värderade Du följderna av åtgärden/åtgärderna?

- Ja, jag bedömde hur viktiga följderna var **noggrant**.
- Ja, jag bedömde hur viktiga följderna var **översiktligt**.
- Nej, jag bedömde inte hur viktiga följderna var.

På annat sätt; ange hur: \_\_\_\_\_.

n) Hur/varför bestämde Du Dig för att inte genomföra omställningen?

- Jag bedömde följderna av samliga tänkbara alternativa åtgärder och valde bibehållen konventionell mjölkproduktion, eftersom jag bedömde det som bäst, totalt sett.
- Jag bedömde följderna av tänkbara alternativa åtgärder, till dess att jag fann en åtgärd (d v s bibehållen konventionell mjölkproduktion) som motsvarade en acceptabel nivå för mig.
- Jag valde åtgärd (d v s bibehållen konventionell mjölkproduktion) efter vad som kändes bäst rent intuitivt.
- Jag såg bara en möjlig åtgärd, d v s bibehållen konventionell mjölkproduktion, och valde den.
- Annat, ange vad: \_\_\_\_\_.

o) Kontrollerade Du följderna av bibehållen konventionell mjölkproduktion, efter det att Du bestämt Dig för att inte ställa om?

- Ja, jag kontrollerade följderna **noggrant**.
- Ja, jag kontrollerade följderna **översiktligt**.
- Nej, när jag väl bestämt mig kontrollerade jag inte ytterligare följderna av att inte ställa om.
- Annat; ange vad: \_\_\_\_\_.

p) *Justerade* Du Dina planer för bibehållen konventionell mjölkproduktion (p g a ytterligare information som Du erhållit), efter det att Du bestämt Dig för hur Du skulle gå tillväga?

- Ja, jag justerade mina planer för bibehållen konventionell mjölkproduktion.
- Nej, jag justerade inte mina planer för bibehållen konventionell mjölkproduktion.

## **8. Lärande**

a) Har Du lärt Dig något som Du kan ha direkt nytta av vid andra större beslut, efter att ha undersökt en eventuell omställning till ekologisk mjölkproduktion?  Ja  Nej

b) Om ja; vad har Du lärt Dig till följd av att ha undersökt en eventuell omställning till ekologisk mjölkproduktion? (Flera alternativ kan väljas.)

Jag har lärt mig att på ett bättre sätt:

- upptäcka problem* i företaget.
- finna lösningsalternativ* när ett problem har uppstått.
- samla in information*.
- lagra information*.
- hantera, tolka och använda* mig av insamlad information.
- planera olika åtgärder* för att lösa problemet.
- bedöma följderna* av olika åtgärder/alternativ.
- välja den/det bästa* av olika åtgärder/alternativ.
- kontrollera följderna av* den åtgärd/det alternativ jag valt.
- justera planerna* för genomförande av den åtgärd jag valt, allt eftersom jag får ny information.
- genomföra* beslutet som jag fattat.
- Annat; ange vad: \_\_\_\_\_

c) Vad anser Du att den viktigaste effekten på Dig som företagsledare är av att ha undersökt en eventuell omställning till ekologisk mjölkproduktion? \_\_\_\_\_

\_\_\_\_\_

d) Inför kommande stora beslut i företaget; vad anser Du har varit den mest värdefulla erfarenheten Du fått till följd av att ha undersökt en eventuell omställning till ekologisk mjölkproduktion? \_\_\_\_\_

\_\_\_\_\_

## **9. Övrigt**

Ange här Dina egna synpunkter och kommentarer angående ekologisk och/eller konventionell mjölkproduktion och/eller annat som Du finner värt att påpeka i detta sammanhang.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Stort tack för Din medverkan!

## Appendix A3. Missive from Arla Foods

2000-06-28



### **Enkät om omställning till ekologisk mjölkproduktion**

Som Daniel Lunneryd skriver i sitt följebrev till enkäten pågår det ett arbete vid SLU med syfte att ta reda på vilka faktorer som ligger bakom beslutet att välja/inte välja att gå över till att producera ekomjölk.

Bifogad enkät är en viktig pusselbit för att utforma morgondagens rådgivning så att den passar behovet ute på våra mjölkgårdar. Arla Foods har därför ställt upp med adressetiketter till ett slumpmässigt urval av våra gårdar.

Jag hoppas att Du har tid att besvara enkäten i denna bråda skördetid.

Trevlig sommar!

Med vänlig hälsning

Arla Foods AB  
Division Medlemmar

A handwritten signature in cursive script that reads "Gun Olsson".

Gun Olsson  
ekomjölkansvarig

Arla Foods AB  
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Säte: Stockholm  
Vat nr: SE556579440001

## Appendix B. Drop-out analysis: mean values

Table B1. *Farmer characteristics*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
fodar	1953	1953	1953	1953
folksk	0.31	0.16	0.37	0.32
grundsk	0.59	0.74	0.53	0.5
realsk	0.11	0.05	0.07	0
gymn	0.64	0.63	0.62	0.55
folkhogs	0.08	0.11	0.02	0.05
univ	0.15	0.11	0.15	0.14

Table B2. *Farm characteristics*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
agdaker	55.1	32.1	44.1	38.7
arraker	48.2	50.8	33.0	41.0
haskog	88.8	53.3	69.4	76.6
haovr	29.6	18.9	32.3	17.6
koplats	42.9	35.2	44.0	41.7
planbes	2.6	1.1	3.9	12.4
kravar	1997	1997	-	-
skillnad	4.1	4.4	5.8	5
inkprocm	73.5	73.3	75.0	76.4

Table B3. *Group (social) characteristics*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
studcirk	1.4 (⊖)	1.2 (⊖)	1.5 (⊖)	1.3 (⊖)

(⊖) mean value does not have any practical meaning; a Mann-Whitney test does not indicate that there should exist any systematic difference between the main data set and the drop-out analysis dataset for the two groups of milk producers, respectively.

Table B4. *Environmental (institutional) characteristics*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
avst	21.8	19.7	21.8	18.6

Table B5. *Values*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
ideol	4.2	4.1	1.8	2.3
tidfarm	4.7	4.4	4.4	5.2
ekonlons	4.3	4.4	4.5	4.8
konsumen	5.0	5.1	4.7	5.4
gardfam	3.8	3.1	3.9	4.7
kooporg	2.7	3	3.0	3.5

Table B6. *Information collection*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
fackt	4.3	4.2	4.6	3.5
internet	1.4	1.4	1.8	1.5
familj	3.5	4.2	3.4	4.0
anst	1.9	0.65	2.1	1.4
grankoll	3.4	3.9	3.8	4.2
radgiv	4.0	3.8	4.1	4.4
kurser	3.8	3.5	3.8	3.8
mejforen	3.4	3.2	3.2	3.2
egenerf	4.7	4.4	4.6	4.4
tidinf	3.1	2.9	3.6	3.8



Table B7. *Decision making behavior*

<i>Variable</i>	<b>Organic</b>		<b>Conventional</b>	
	<i>Dataset</i>	<i>Drop-out</i>	<i>Dataset</i>	<i>Drop-out</i>
fundfora	1992	1991	869 (*)	999 (*)
opronytt	0.56	0.44	0.39	0.18
oekonpro	0.09	0.06	0.10	0.18
oprodpro	0.06	0	0.17	0.09
ogenskif	0.06	0.06	0.05	0
operspro	0.00	0	0.06	0.09
ekolfund	-	-	1411(*)	1271 (*)
eintvard	0.76	0.89	0.68	0.57
elonsmjo	0.10	0.06	0.1	0
elonsftg	0.08	0.06	0.03	0
eprodpro	0.03	0	0.06	0
eperspro	0.01	0	0.01	0
flkonv	0.58	0.37	0.83	0.71
flslutmj	0.16	0.21	0.23	0.14
flsluta	0.05	0.11	0.10	0
flborjpr	0.12	0	0.38	0.29
behuv	0.70	0.74	0.62	0.29
bedisfarm	0.69	0.64	0.54	0.71
begrakol	0.43	0.37	0.49	0.29
beradgiv	0.62	0.58	0.56	0.57
bepapper	0.31	0.37	0.33	0.29
bedator	0.07	0.05	0.06	0.43
beejsars	0.02	0	0.04	0
lartngt	0.65	0.94	0.71	0.57
lauppt	0.20	0.19	0.13	0.29
lalosalt	0.31	0.38	0.2	0.29
lasamin	0.18	0.19	0.22	0.29
lalaginf	0.06	0.25	0.03	0.29
lahant	0.17	0.25	0.12	0.57
laplaatg	0.24	0.31	0.13	0.43
labeledfol	0.17	0.31	0.3	0.43
lavalja	0.18	0.38	0.1	0.43
lakontr	0.12	0.31	0.07	0.29
lajust	0.19	0.38	0.17	0.43
lagenomf	0.27	0.62	-	-

(\*) mean of all values, i.e., including also those farmers who have answered that they have not thought about changing production in general, or thought specifically about converting to organic milk production. The figure thereby does not correspond to an actual year.

Table B8. Variable definitions

Variable:	Variable defined as:
fodar	year of birth
folksk	elementary school education (yes or no)
grundsk	nine-year (compulsory) school education (yes or no)
realsk	junior secondary school education (yes or no)
gymn	(comprehensive) upper secondary school education (yes or no)
folkhogs	folk high-school education (yes or no)
univ	university education (yes or no)
agdaker	owned acreage arable land, in hectares
arraker	rented acreage arable land, in hectares
haskog	woodlands, in hectares
haovr	other land, in hectares
koplats	number of cows
planbes	planned change of the herd size, in number of cows; -, 0, +
kravar	year when connected to KRAV (only organic producers)
skillnad	estimated total difference in the business when converting; 1-10
inkprocm	percentage of total income that comes from the milk production
studcirk	participation in study circles (yes or no)
avst	distance to most adjacent population center (>5000 inh.), in km
ideol	value: "Organic farming is ideologically important to me"; 0-6
tidfarm	value: "Time with family/spare time is important to me"; 0-6
ekonlons	value: "High economic profitability is important to me"; 0-6
konsumen	value: "To produce what the consumers demand is important to me"; 0-6
gardfam	value: "To keep the farm within the family is important to me"; 0-6
kooporg	value: "To buy from and sell to the agricultural co-operative firms is important to me"; 0-6
fackt	total importance of farm magazines; 0-6
internet	total importance of the Internet; 0-6
familj	total importance of the family; 0-6
anst	total importance of employees; 0-6
grankoll	total importance of neighbors and colleagues; 0-6
radgiv	total importance of advisors; 0-6
kurser	total importance of courses; 0-6
mejforen	total importance of the dairy; 0-6
egenerf	total importance of own experience; 0-6
tidinf	time spent per week on information collecting; hours
fundfora	year when started to think about changing the production overall
opronytt	wanted to try something new, but did not see a problem (yes or no)
oekonpro	had economic problems in the firm (yes or no)
oprodpro	had production problems in the firm (yes or no)
ogenskif	a forthcoming change of generations in the business (yes or no)
operspro	personal problems (yes or no)
ekolfund	year when started to think about converting the milk production (only conventional producers)
eintvard	interesting alternative according to my values (yes or no)
elonsmjo	milk production profitability problems; had to act (yes or no)
elonsftg	general business profitability problems; had to act (yes or no)
eprodpro	converting would solve my production problems (yes or no)
eperspro	converting would solve my personal problems (yes or no)
flkonv	alternative: continue with conventional milk production (yes or no)
flslutmj	alternative: quit milk production (yes or no)

fslsluta	alternative: quit farming (yes or no)
flborjpr	alternative: start alternative production (yes or no)
behuv	information processing by own thinking (yes or no)
bedisfarm	information processing by discussion with the family (yes or no)
begrakol	information processing by discussion with neighbors and colleagues (yes or no)
beradgiv	information processing by discussion with advisor (yes or no)
bepapper	information processing by using pen and paper, calculator, etc. (yes or no)
bedator	information processing by using computer (yes or no)
beejsars	did not process the collected data in any particular way (yes or no)
lartngt	learned something useful for other unique decision/s (yes or no)
lauppt	learned to detect problems in the business (yes or no)
lalosalt	learned to define solution alternatives (yes or no)
lasamin	learned to collect data (yes or no)
lalaginf	learned to store data (yes or no)
lahant	learned to handle, interpret and use collected data (i.e., process it to information) (yes or no)
laplaatg	learned to plan for alternative solutions to the problem (yes or no)
labedfol	learned to evaluate the consequences of the solution alternatives (yes or no)
lavalja	learned to choose the best of the different alternative/s (yes or no)
lakontr	learned to check the consequences of the choice (yes or no)
lajust	learned to adjust the plans for implementation of the chosen alternative (yes or no)
lagenomf	learned to implement the chosen decision (yes or no)

## Appendix C. Measurement variable definitions for significant variables in the LISREL analysis

Compare the measurement variable definitions below to the questions in the questionnaires presented in Appendix 1.

- (c) = continuous variable
- (o) = ordinal variable
- (d) = dummy variable

### Model 1. Problem detection and problem definition (see figure 29):

x-variables:

Farm characteristics:

- "Owned acreage" - hectares of owned acreage (c)
- "Woodland" - hectares of woodland (c)
- "No. of cows" - herd size; number of cows (c)
- "KRAV differ." - perceived difference in production compared to the KRAV rules, 1-10 (o)
- "% milk income" - percentage of farm income that originates from milk production (c)
- "Debt level" - perceived level of debts in the business; too high, acceptable, low (o)
- "Employees" - number of full-time employees except the manager/farmer himself (c)

Farmer characteristics:

-

Environmental characteristics:

-

Social characteristics:

- "Farmer colleg." - any type of cooperation with farmer colleagues; yes or no (d)
- "Study circles" - participation in study circles and other types of education; yes - annually, yes - but not annually, no (o)

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

- "Ideology val." - "Organic farm production is ideologically important to me"; 0 - 6 (o)
- "Work sat. val." - "Work satisfaction is important to me"; 0 - 6 (o)
- "Chem. pest. val." - "Not to use chemical pesticides and fertilizers is important to me"; 0 - 6 (o)

Decision making behavior:

-

y-variables:

Decision making behavior:

- “Overall prof. prob.” - “I had economic profitability problems in the business”; yes or no (d)
- “Production problems” - “I had production problems, e.g., yields, diseases, buildings”; yes or no (d)
- “Milk prod. prof. prob.” - “I had profitability problems in the milk production”; yes or no (d)
- “Quit milk production” - “The alternative was to quit milk production”; yes or no (d)
- “Quit farming” - “The alternative was to quit farming entirely”; yes or no (d)
- “Start alt. production” - “The alternative was to start an alternative production”; yes or no (d)

Model 2. Data collection in the searching and paying attention subprocess in the analysis and choice phase (see figure 30):

x-variables:

Farm characteristics:

- "KRAV differ." - perceived difference in production compared to the KRAV rules, 1-10 (o)

Farmer characteristics:

- "General educat." - education level graded 1, 2 or 3, depending on what schools that are completed; 1 for elementary school etc., 2 for high school etc., 3 for university education (o)
- "Mgt. educat." - completed formal education about management/entrepreneurship; yes or no (d)

Environmental characteristics:

-

Social characteristics:

- "Farmer colleg." - any type of cooperation with farmer colleagues; yes or no (d)
- "Study circles" - participation in study circles and other types of education; yes - annually, yes - but not annually, no (o)
- "Contact surface" - most important contact surface in order to get professional experiences: family, employees, neighbors/colleagues, advisors, courses (o)

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

- "Work sat. val." - "Working satisfaction is important to me"; 0 - 6 (o)
- "Spare time val." - "Getting spare time/time with my family is important to me"; 0 - 6 (o)
- "Econ. prof. val." - "High economic profitability is important to me"; 0 - 6 (o)
- "Cons. dem. val." - "Producing according to consumer demand is important to me"; 0 - 6 (o)
- "Support fam. val." - "Supporting the family on farm income is important to me"; 0 - 6 (o)

Decision making behavior:

-

y-variables:

Decision making behavior:

- "Newspapers" - "Importance of newspapers as information source"; 0 - 6 (o)
- "Farm magazines" - "Importance of farm magazines as information source"; 0 - 6 (o)

- "Internet"                      - "Importance of Internet as information source";  
0 - 6 (o)
- "Courses"                      - "Importance of courses as information source";  
0 - 6 (o)
- "Dairy"                         - "Importance of dairy as information source"; 0 - 6 (o)
- "Hours per week"             - Hours per week spent on information collecting (c)

Model 3. Data storage and processing in the searching and paying attention subprocess in the analysis and choice phase (see figure 31):

x-variables:

Farm characteristics:

-

Farmer characteristics:

- "Org. milk educat." - completed formal education about organic milk production; yes or no (d)

Environmental characteristics:

-

Social characteristics:

- "Farmer colleg." - any type of cooperation with farmer colleagues; yes or no (d)

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

- "Spare time val." - "Getting spare time/time with my family is important to me"; 0 - 6 (o)
- "Econ. prof. val." - "High economic profitability is important to me"; 0 - 6 (o)
- "Cons. dem. val." - "Producing according to consumer demand is important to me"; 0 - 6 (o)
- "Support fam. val." - "Supporting the family on farm income is important to me"; 0 - 6 (o)

Decision making behavior:

-

y-variables:

Decision making behavior:

- "Pen and paper st." - "Use of pen and paper for data storage"; yes or no (d)
- "Computer storage" - "Use of computer for data storage"; yes or no (d)
- "Written material" - "Use of written material as data storage"; yes or no (d)
  
- "Family" - "Use of family for data processing"; yes or no (d)
- "Farming neighbors" - "Use of farming neighbors for data processing"; yes or no (d)
- "Advisor" - "Use of advisory service for data processing"; yes or no (d)
- "Computer" - "Use of computer for data processing"; yes or no (d)



Model 4. The planning and forecasting consequences subprocess in the analysis and choice phase (see figure 32):

x-variables:

Farm characteristics:

-

Farmer characteristics:

- "General educat." - education level graded 1, 2 or 3, depending on what schools that are completed; 1 for elementary school etc., 2 for high school etc., 3 for university education (o)

Environmental characteristics:

-

Social characteristics:

- "Farmer colleag." - any type of cooperation with farmer colleagues; yes or no (d)

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

- "Work sat. val." - "Working satisfaction is important to me"; 0 - 6 (o)
- "Spare time val." - "Getting spare time/time with my family is important to me"; 0 - 6 (o)
- "Econ. prof. val." - "High economic profitability is important to me"; 0 - 6 (o)
- "Cons. dem. val." - "Producing according to consumer demand is important to me"; 0 - 6 (o)
- "Support fam. val." - "Supporting the family on farm income is important to me"; 0 - 6 (o)

Decision making behavior:

- "Quit milk production" - "The alternative was to quit milk production"; yes or no (d)
- "Quit farming" - "The alternative was to quit farming entirely"; yes or no (d)
- "Start alt. production" - "The alternative was to start an alternative production"; yes or no (d)

y-variables:

Decision making behavior:

- "Information vs. intuition" - degree of consideration taken to the collected information, as opposed to consideration taken to own experience and intuition; 5 - 1 (o)
- "Different alternatives" - solution alternatives planned for; several alternatives, one alternative, no specific planning was conducted (o)

Model 5. The evaluating and choosing subprocess in the analysis and choice phase (see figure 33):

x-variables:

Farm characteristics:

-

Farmer characteristics:

-

Environmental characteristics:

-

Social characteristics:

-

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

- "Econ. prof. val." - "High economic profitability is important to me"; 0 - 6 (o)
- "Cons. dem. val." - "Producing according to consumer demand is important to me"; 0 - 6 (o)
- "Support fam. val." - "Supporting the family on farm income is important to me"; 0 - 6 (o)

Decision making behavior:

- "Farm magazines" - "Importance of farm magazines as information source"; 0 - 6 (o)
- "Internet" - "Importance of Internet as information source"; 0 - 6 (o)
- "Courses" - "Importance of courses as information source"; 0 - 6 (o)
- "Farming neighbors" - "Use of farming neighbors for data processing"; yes or no (d)
- "Advisor" - "Use of advisory service for data processing"; yes or no (d)
- "Computer" - "Use of computer for data processing"; yes or no (d)
- "Information vs. intuition" - degree of consideration taken to the collected information, as opposed to consideration taken to own experience and intuition; 5 - 1 (o)
- "Different alternatives" - solution alternatives planned for; several alternatives, one alternative, no specific planning was conducted (o)

y-variables:

Decision making behavior:

- "Degree of evaluation" - degree of evaluation of the consequences; thoroughly, roughly, not at all (o)

- “Method of choosing” - method of choosing; the best alternative, a satisfactory alternative, an intuitive choice, considered just one alternative and chose that (i.e., with no competing alternatives) (o)

Model 6. The bearing responsibility subprocess in the analysis and choice phase (see figure 34):

x-variables:

Farm characteristics:

- "KRAV differ." - perceived difference in production compared to the KRAV rules, 1-10 (o)

Farmer characteristics:

- "General educat." - education level graded 1, 2 or 3, depending on what schools that are completed; 1 for elementary school etc., 2 for high school etc., 3 for university education (o)
- "Mgt. educat." - completed formal education about management/entrepreneurship; yes or no (d)
- "No. of dec. mak." - whether the milk producer is single manager, or if there are more than one who make management decisions in the firm (d)

Environmental characteristics:

-

Social characteristics:

- "Study circles" - participation in study circles and other types of education; yes - annually, yes - but not annually, no (o)
- "Contact surface" - most important contact surface in order to get professional experiences; family-employees-neighbors/colleagues-advisors-courses (o)

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

-

Decision making behavior:

- "Degree of evaluation" - degree of evaluation of the consequences; thoroughly, roughly, not at all (o)

y-variables:

Decision making behavior:

- "Checking the choice" - whether the farmer checked his choice before implementation; yes-thoroughly, yes-roughly, no (o)
- "Adjusting" - whether or not the farmer adjusted his plans for converting; yes or no (d)

Model 7. The implementation phase (see figure 35):

x-variables:

Farm characteristics:

- “Planned herd change” - planned change of herd size (c)

Farmer characteristics:

- “General educat.” - education level graded 1, 2 or 3, depending on what schools that are completed; 1 for elementary school etc., 2 for high school etc., 3 for university education (o)
- “Mgt. educat.” - completed formal education about management/entrepreneurship; yes or no (d)
- “Years of prof. experience” - number of years of professional experience from other occupations than agriculture (c)

Environmental characteristics:

- “Years in KRAV prod.” - number of years as the farm has been connected to KRAV; as a measure of exposition to different trends in society at the time of converting (c)

Social characteristics:

- “Farmer colleag.” - any type of cooperation with farmer colleagues; yes or no (d)

Values: (the farmer was asked to mark the importance of each of a number of values, respectively)

- “Ideology val.” - “Organic farm production is ideologically important to me”; 0 - 6 (o)
- “Work sat. val.” - “Work satisfaction is important to me”; 0 - 6 (o)
- “Chem. pest. val.” - “Not to use chemical pesticides and fertilizers is important to me”; 0 - 6 (o)

Decision making behavior:

- “Overall prof. prob.” - “I had economic profitability problems in the business”; yes or no (d)
- “Production problems” - “I had production problems, e.g., yields, diseases, buildings”; yes or no (d)
- “Milk prod. prof. prob.” - “I had profitability problems in the milk production”; yes or no (d)
- “Quit milk production” - “The alternative was to quit milk production”; yes or no (d)
- “Quit farming” - “The alternative was to quit farming entirely”; yes or no (d)
- “Start alt. production” - “The alternative was to start an alternative production”; yes or no (d)

y-variable:

Decision making behavior:

- "Implement. method" - degree of testing in the implementation phase:  
stepwise implementation, the entire milk production at  
one occasion, the entire farm at one occasion (o)

