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Farmers' Decision Factors

- A Case Study

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Farmers´ Decisions Factors

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Credits: 15 hec

Level: Advanced E

Course title: Independent Project/Degree Project in Business Administration

Course code: EX0471

Location of publication: Uppsala

Year of publication: 2011

Name of Series: Degree Project

No: 648

ISSN 1401-4084

Online publication: <http://stud.epsilon.slu.se>

Key words: economics, factors, contingency, decision, AMS, dairy cow, dairy farmer



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Abstract

This study examined the factors influencing dairy farmers' decisions to invest in automated milking systems (AMS). The problem studied involves uncertainty, information and complexity for dairy farmers in specific decision contexts. The frame of reference in the thesis combines contingency theory and decision theory and is used in a qualitative analysis of a set interview with dairy farmers who have recently bought an AMS and salespersons from Delaval, one of the AMS suppliers.

The aim of this study is to develop an understanding of the decision making processes of dairy farmers, and in particular to identify which types of factors influence the outcome of an investment decision in the technological development of a farm.

The study uses Thompson's (1967) theory about the structure that organizations develop to handle the input of information. Thus, interest is focused on how a farm business structure handles information in the AMS decision, investigating the differences in information with Delaval's "feed first principle" system and Lely's "free cow traffic" system.

The results of the qualitative interviews with the dairy farmers who bought an AMS show that there are three important factors that influence the outcome: employees, suppliers and the owner. Results of the qualitative interviews with the salespersons show that the salespersons are aware of the factors that are important to the farmers.

Of the three main factors influencing the outcome of the decision, the role of employees was particularly evident. An employee milking cows is perceived to require more resources than an AMS. Having employees is costly, so the dairy farmer is interested in developing his operation into a more cost-efficient operation.

Lely's free-feed system does not have a specific order in which cows have to proceed, but with Delaval's feed first principle there are specific orders that must be followed. Thompson's theory suggests that this will lead to differences in how the organizations are structured, whereas in the case of Delaval, the dairy farmer must contend with more information than he does in the case of Lely.

The study concludes that farmers have different relations with the suppliers in the market, and that farmers believe in different milking systems. These factors influence the decisions made by farmers, which in turn effect change to the structure of organization. In the end, it comes down to a question of the system in which the farmer believes : either it will be necessary to handle more information in a more complex organization or handle less information in a less complex organization. Delaval's salespersons are well aware of the factors that influence the farmer's decision to invest in an AMS, but perhaps do not fully recognize why farmers choose the specific AMS system.

Sammanfattning

I denna studie har mjölkböndernas beslutsfaktorer undersökts när en investering har gjorts i en AMS-lösning. Problemet i studie handlar om osäkerhet, information och komplexitet för mjölkbönder när det ska fatta beslut. Teorin som används i studien är situationsteori och beslutsteorin. Metoden för denna studie är kvalitativa intervjuer med mjölkbönder och säljpersonal från Delaval. Studien använder en kvalitativ metod för att ta reda på vilka faktorer som påverkar mjölkböndernas beslut vid en investering i AMS.

Resultaten från de kvalitativa intervjuerna med mjölkbönderna och säljpersonalen redovisas i kapitel fem. Resultaten från de kvalitativa intervjuerna med mjölkbönderna som investerade i en AMS visar att det finns tre viktiga faktorer som påverkar investeringsbeslutet. Resultat från de kvalitativa intervjuerna med säljpersonal från Delaval visar att säljpersonalen är medvetna om de faktorer som påverkar mjölkböndernas beslut.

Syftet med denna studie är att få en förståelse för mjölkbönders beslutsprocess och i synnerhet att identifiera vilka typer av faktorer det som påverkar beslutet för en investering i en AMS. Teorierna som används är dels Thompsons teori om hur organisationer strukturerar sig. Organisationsstrukturen för lantbruk med AMS varierar och det går att lägga upp arbetet olika beroende på vilken AMS lösning lantbrukaren har.

Hur organisationer strukturerar sig handlar om hur mycket information som behandlas i verksamheten. I lantbrukarnas fall handlar det om det finns mer information som ska behandlas med Delavals eller Lelys system. Lely har ett system som bygger på fri kotrafik och Delaval har ett system som bygger på styrd kotrafik.

De faktorer som påverkar beslutet enligt resultatet är anställda, leverantörer och ägaren själv. En anställd som mjölkar kor jämfört med en AMS kräver mer resurser. En mjölkbonde försöker att rationalisera bort resurskrävande moment i mjölkproduktionen.

Systemet med fri kotrafik har inte en speciell ordning som korna måste gå. I systemet med styrd kotrafik finns det en bestämd ordning som följs. Från Thompsons teori varierar det i organisationerna hur dessa struktureras. Med ett AMS-system blir strukturen i organisationen att mer information kommer behandlas i organisationen.

Slutsatsen av studien är att mjölkbönder har olika förhållanden till företag på marknaden och mjölkbönderna tror på olika AMS-lösningar. De faktorer som påverkar investeringsbeslutet för en bonde är de faktorer som ändrar strukturen i organisationen. Antingen gäller det att behandla mer information i en mer komplex organisation eller att behandla mindre information i en mindre komplex organisation. Delavals säljare är väl medvetna om vilka faktorer som påverkar lantbrukarens beslut om att investeras i en AMS, dock inte varför mjölkbonden väljer en speciell AMS.

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1 Introduction

In Chapter One, the problem and aim of this study are presented. The studied problem involves the uncertainty, information and complexity that dairy farmers face in their decision-making process. There are also questions concerning how dairy farmers structure themselves in efforts to protect the farm organization from uncertainty.

1.1 Problem Background

Since time immemorial, farmers have been making choices about how and when they plan to do things – how to structure the work on the farm, how to organize the work, who is to do what etc. From a historical perspective, for example, dairy farmers produced their own heat for their residence and the heat often came from their animals. The farmers produced their own fuel for field work, producing the feed for the horses or oxen. These farmers' operations were not dependent on prices for fuel and electricity. Because of the self-produced input factors in their organizations, there was relatively little uncertainty about these factors.

Nowadays, many input factors for production are purchased from outside the organization. Farmers are more dependent on international market prices which the farmers can not influence. The development of the dairy farm organization has become more dependent on external actors on a world market. Another significant change is that the Swedish dairy herd size has become larger over time, and as dairy farms grow bigger, there is more information that must be handled. One effect of the bigger herd size is that there is less time spent on each individual cow (Rajkondaware et al, 2002), suggesting that farmers may need to make decisions with less detailed information. A study of farmer decision making shows that farmers often prefer to make decision intuitively, rather than through detailed analysis (Öhlmér, 2007).

Galbraith associates uncertainty in organizations with environmental dependencies and suggests that increased uncertainty increases the need for information. That means if uncertainty is low for an organization, its dependence on others is low. The surrounding environment is characterized in terms related amount of complexity and uncertainty (Thompson, 1967, 90). From this, it can be concluded that there is no one best way to organize (Galbraith, 1976, 2); the best way to organize depends on the nature of the environment to which the organization relates (Scott, 1992, 89).

Selznick describes the theory of how organizations structure themselves in an organic process. "The organic, emergent character of the formal organization considered as a cooperative system must be recognized. This means that the organization reaches decisions, takes actions, and makes adjustments"(Selznick, 1948). Selznick describes it as a closed system that knows what to do in certain system, and it is only the critical situations that affect the structure of the organization. Like a tree, it is affected by its environment in the various seasons of the year. The tree knows what to do when the temperature falls and the amount of daylight decreases. The tree has all the information needed to survive and knows what to do and when to do it. It is a closed system when it is as its best.

The modern dairy farm organization is not a closed system. The organization does not have all the information needed to act as optimally as possible, like the tree. The organization is affected by the uncertainty in the environment. However, through technical developments,

there are opportunities for dairy farmers to become less dependent on uncertain factors in their environment.

Examples of technical progress include the automation of heavy work, such as feeding and handle manure in the dairy barn. With less heavy work in the barn, fewer employees need to be used and they can handle more cows. There is also development in administrative work, such as computer solutions in both software and hardware. A combination of those software and hardware is found in the technical progress of the AMS, automatic milking system. An AMS can reduce the uncertainty through its consistent work, day in and day out, as compared with an employee.

It can be problematic for dairy farmers when trying rationally to organize and structure the organization, and at the same time make decisions that change conditions. This is because every decision the farmer makes takes the organization forward in an unknowable-future development of the farm. If the decision that is made takes place in a context of uncertainty, then the rationality of the choice can be questioned. After the decision is made, the dairy farmer must deal with more uncertainty, as compared with before. Therein lays the problem, if the farmer is to act and make decisions that protect the organization from the uncertainty.

1.2 Problem

One problem with decision making processes is the number of factors that can influence the decision, including factors in the decision context, such as technical complexity and uncertainty. Studies done of the decision-making process have identified a variety of factors that influence decision outcomes. The factors that can influence a decision vary from case to case. Factors such as risk attitudes, information and problem-solving strategies all can influence decision outcomes.

The decision situation of dairy farm organizations involves additional uncertainties in the biological processes on which they are based. For example, the decision situation for dairy farm organizations facing investment choices is characterized by particularly high uncertainty arising from the biological base of production, *e.g.* how will the cows' lactation react to a new milking system? Farm investment decisions are also often surrounded by technically complex factors and are information-intensive and prone to the risks of dynamic markets.

Meanwhile, many other factors can still influence the decision; such factors include employees or suppliers of technical equipment. All of the factors that can influence decision outcomes, such uncertainty, complexity and information handling, are potential issues that must be addressed by farmers. The problem is that there are so many factors that can influence the decision for an investment: What are the significant factors underlying dairy farmers' investment decisions? The literature in organization theory offers some leads, but it is commonly based on large organizations. With the small organization of dairy farm businesses, is the established theory applicable to the study object at hand?

1.3 Aim

The aim of this study is to develop an understanding of the decision making process of dairy farmers and in particular to identify which types of factors influence the outcome of investment decisions in a farm's technological development. As mentioned in the previous

section, there are many factors that can influence the decision for a dairy farmer. The aim here is to determine how a dairy farmer arrives at a decision to invest in a technology solution, where the decision to purchase an automatic milk system (AMS) will be used as a specific decision case. The goal is to identify the structural and managerial factors that influence the decision outcome.

There are different technical solutions from various suppliers on the market. It is of interest to consider the influence a company's salespersons have on farmers' decisions. Therefore, a second aim in the study is to determine the extent to which salespeople are aware of the factors involved in farmers' decision processes and how they utilize that awareness in the sales process. As salespersons may be a significant source of information about the AMS, it is particularly valuable to investigate the interaction between salespeople and the farms studied.

1.4 Delimitations

The study is limited to dairy farmers that have invested in an AMS solution. No farmers who considered but then decided not to invest, nor any that are still in the decision process, are included in the study. Only dairy farmers and salespersons have been interviewed. Additionally, only two AMS solutions have been compared in the study; Delaval's and Lely's.

2 A Theoretical Perspective

In this chapter, the two main theories that form the frame of reference for this thesis are presented: contingency theory and decision theory. The stakeholder view is used to present the involved actors and to introduce the factors that will be investigated.

2.1 Stakeholders

It is important to identify what factors that can influence the organization. The factors are the environment around the organization and internal factors such as goals. The stakeholder's effect on the organization can vary and therefore it is important to present these actors. It is the stakeholder model that is going to guide the work concerning the participants who are interesting for the dairy farmers. "Stakeholders are those individuals or groups who depend on an organization to fulfilling their own goals and on whom, in turn, the organization depends (Johanson et al, 2008, 132)" Some of the stakeholders that can be included in a stakeholder analysis are suppliers, customers etc. (Johanson et al, 2008, 154). The stakeholders that are important for this study are as follows.

- The employee
- Supplier (salespersons)
- The customer (dairy industry)
- Bank
- Government
- Environment
- The dairy farmer (owner)

2.2 Contingency Theory

According to authors' in organization theory, there is more than one way to organize an organization in different situations. One conclusion is that there is no one best way to organize (Galbraith, 1976, 2). The best way to organize depends on the nature of the environment to which the organization relates (Scott, 1992, 89). In the following chapter, a contingency theory is presented. The contingency theory by JD Thompson describes why organizations structure work the way they do.

2.2.1 Contingency Theory by Thompson

The structure of the organizations depends on the environment around it. That implies that the organizational structure changes according to different environments. Organizations change because the environment around them are uncertain and hard to predict according to the theory.

Thompson divides his theory of how to structure the organization into three different parts in order to categorize their structure. The three categories are as follows:

- Technical level: the part of the organization that carries the product function which transforms inputs into products.

- Managerial level: the part that is responsible for the design and control of the production system, for inputs and disposal of produced units and to secure the allocation of personnel.
- Institutional level: the part of the organization that relates to the organization's broader environment and determines the domain. Sets boundaries and secures the legitimacy for the organization.

Organizations strive to be rational and to be natural and open systems. It is in the leader's interest, that he who creates and operates the organization ensures that the work of the organization is as efficient and effective as possible. Yet, technical rationality assumes a closed system. Thompson argues that organizations will try to protect the technical level of the organization in order to isolate it against uncertainties in the external environment. It is at a technical level, the core technology in the organization, where it is expected that the rational system perspective will be applied with the greatest impact. In a rational system the objectives are clear and the organizations have a high degree of formal structure. At the other extreme, there is the institutional level and in the middle is the managerial level that must cooperate between a relatively open institution and a closed technical level. To do this effectively, a flexibility associated with less formal and more political activities is required. (Scott, 1992, 99).

Organizations are trying to shield their technical core from environmental changes in the surrounding environment. These strategies are planned by the organizations to buffer the technical core. But when the buffer is insufficient and uncertainty reaches the technical core, the uncertainties have an impact on the organization. This happens when organizations deal with more complex and uncertain information; organizations cannot buffer for uncertainty in those situations. Technology is the work that is being made in organization. One example of technology would be the physical elements in form of. for example, machines combined with the staff knowledge and experience, processed into a material and then becoming a commodity. There are three categorizations used to classify the structure of different organizations according to Thompson's theory. The categorization depends on the amount of information the organization must handle (Thompson, 1967).

- Pooled interdependence: is just with each element or process that contributes to the overall objective.
- Sequential interdependence: when tasks which entail other tasks must be performed. For example, x must be performed before y.
- Reciprocal interdependence: activities related to each other, both as input and output. The output becomes the input for the other.

When the interdependency becomes more complex, from pooled to sequential and from sequential to reciprocal, the need for communication within the organization becomes greater. The greater the dependence, the more resources must be devoted to the coordination of the activities within the organization. Pooled interdependence: can be handled by standardization, practices and rules. Sequence interdependence: planning and scheduling and timing of work process are essential. Reciprocal interdependence: common customizations and coordinate feedback, also mutual adjustment (Thompson, 1967).

2.3 Decision Theory

There are a number of theories that describe the process for a decision to be made, all under different conditions. In the classic theory of “economic man”, optimal choices are made with full information and clear goals. In the bounded rational model, there are also a number of factors that affect how and why a decision is made and the theory takes into account the uncertainty factor. One factor that comes up in this theory is uncertainty and the organizational goal. The theory of bounded rationality is explained in this section.

2.3.1 Bounded Rational Decision

Simon proposes a substitution of the classic "economic man" with a more reasonable approach known as "administrative man". The goal of the firm is not to maximize the profit, but rather merely to attain a certain level, or a certain level of sales; instead of maximizing objectives, firms only need to satisfy minimum levels (Simon, 1959). Within this satisfying context, Simon describes the decision-making individuals as pursuing their own interests. At the same time, the individual may not make the best choice, because individuals can only be aware of a few of all the possible options that are available. “The search processes and information-gathering processes constitute significant parts of decision-making” (Cyert et al, 1956). Individuals, however, are willing to settle for a good solution, compared to choosing an optimal solution based on the information they have gathered. Instead of continuing a search for the best solution, an individual will be satisfied with a solution that is good enough (Simon, 1955).

The organization simplifies the task that provides support and participation in decision-making at the level of individual. Organizations are made up of individuals who are involved in some kind of process or task in the creation of products or services. “The goal of an action is seldom unitary, but generally consists of a whole set of constraints that the action must satisfy” “More narrowly, the organizational goal may be used to refer particularly to the constraints that define the roles at the upper levels of the administrative hierarchy” (Simon, 1964). A fundamental approach is that organizations, in order to simplify employee decision-making, restrict the end of a process or activity in production. The organization divides up the production of different tasks and each task has a goal, and a beginning that then follows by the end of the task. Thus, the final stage of the previous activity is the first stage of the subsequent task. The organization only needs to look for a good move instead of the best move. Individuals only gather a small amount of information, if the person is certain that his choice cannot be made better by securing more information. The actual human quest for rationality can at best be an extremely crude and simplified approximation of the kind of implicit global rationality presented, for example, by models formed within game-theory (Simon, 1955). By dividing up the tasks in the organization, less information is required about all the processes than would be the case if they had all the information about all processes. These tasks are rising in the hierarchy and finally reaching the overall objective of the organization - typically to sell a product (Scott, 1992, 45).

Fundamental to Simon’s theory is the assumption that individuals do not have rational behavior. Simon develops it to the point that individuals donot make a decision with the full knowledge of all the information, which is a prerequisite for rational behavior. Therefore a decision is made with the individual lacking of knowledge of the situation. Simon chooses to call this behavior “bounded rational” as done does not have access to complete information in

the decision-making process. The motivation is the Survival of the organization and a balanced inducement between participants, and the contribution that the participants make to the organization: “Look for satisfactory choices instead of optimal ones” “Bounded rationality begins to emerge when we examine situations involving decision making under circumstances uncertainty and imperfect competition” (Simon, 1979). The individual does not check for all the alternatives of all the options, but chooses the alternative that is satisfying for the time being. The next term that Simon presents is just satisfaction. The individual is satisfied for the moment, with one decision made in a particular situation. The process of bounded rational decision-making is described in the bulleted list below (Jacobsen & Thorsvik, 2002, 375).

1. The employees have a target that is a bit unclear and varied.
2. The individual value some possible alternative solutions and some of the consequences of these options.
3. The individual values options sequentially, as he has the ability to deal with them.
4. The individual chooses the first satisfactory option that appears.

The decision of the organization has different goals and can be divided between different hierarchical levels. The two orientations on decisions relating to the organization, are named as follows, according to Simon (1979).

- Value: assumptions about the premises on which decisions are to be preferred or desirable
- Factual premises: assumptions about the world and on the way in which it carries out its activities

In higher positions in organizations, the decisions are made based on the value of what the organization should do, and the direction on which the organization should focus. Lower-level decisions about how the organization will achieve the best results on the basis of the conditions which have been given affect the higher hierarchical levels. Simon also mentions that there is a cognitive limitation of the human body and that this is what leads to the assumption of bounded rationality (Scott, 1992, 45-47).

2.4 Combining the Theories

According to an article, the authors Tarter & Hoy make a suggestion on how to combine the contingency theory and decision theory. Tarter & Hoy propose a theory of contingency of decision making, because the decisions are made under the influence of the environment's uncertainty and therefore the decisions can be made according to different decision theories (Tarter & Hoy, 1997).

As mentioned before, dairy farms are often smaller organizations compared to organizations in the literature presented in the articles and theories. If the main view is that dairy farms' structure and decision-making processes will be studied, then a thought should be devoted to the size of the organization. In bigger organizations, all activities can be divided, and limited to end and mean processes (Scott, 1992).

Different individuals have responsibilities for a process and until the person gives the “end” to another in the organization, and then that person has a “means”. In dairy organizations where

one dairy farmer is participating, that person as the decision-maker is responsible for every process and all activities. However, tasks can be divided into means-and-ends processes according to the theory (Scott, 1992). The farmer makes the decisions both in terms of value and on factual premises. It means that the farmer both makes decisions about when, how and what the dairy organization will do in the future. The dairy farmer also deals with the daily work with decisions on the basis of daily practice. The assumption about being *bounded rational* and that the *individual satisfies* also holds for a dairy farmer, and to farmers as individuals in an organization. The dairy farmer has lots of information to take into account in his daily work. According to the theories of Tarter & Hoy (1997), much of the information can lead to uncertainty for the organization, and the organizational structure in a specific way can process the information in order to reduce the uncertainty.

According to contingency theory, the best way to protect the organization against the influence of uncertainty from the surrounding environment is through protecting and buffering the technical core. When the technical core is entirely isolated from the surrounding environment, then the impact of the extraneous environment on the organization has no effect, and the organization has achieved total technical rationality. It means that all decisions that are made have a clear and plain outcome in the organization's technical core without extraneous environment factors influencing the organization. This theory is in itself impossible to achieve in full; there will always be factors that cannot be anticipated and there is always uncertainty surrounding a decision within the organization. The organization cannot shield itself from uncertainty and therefore decisions within the organization are lacking due to meager facts and knowledge. Decisions will be lacking with regard to satisfying the need of protecting the technical core. According to other theories, the decisions that are made can be made even if the decision is not satisfactory. Moreover, there are other relations that influence the organization. The objectives are unclear and a greater uncertainty influences the organization.

How this can be explained by taking agriculture organizations as an example can be described as followed. When the word "organization" is mentioned, thoughts go toward something big, with a large number of employees, perhaps not necessarily several departments with deputy directors and managers. However, an organization is more than one person. The farm organization consists of one or more persons on the farm.

This interpretation of the factors that play on how agriculture organizations act, is how great the uncertainty is and how great the decision-makers' objectives rule the organization. These two factors influence the structure of the organization. The problem with using Thompson's theory within the context of farm organizations is that it categorizes the structure within big organizations with different departments and units. If the focus lies on one person working on a dairy farm, with milk production, and that person has the responsibility for the entire production, issues and problems associated with communication, conflict and differences between people do not exist. A dairy farm, however, does have different "departments" with individual means and ends, such as milking, feeding, healthcare and breeding. While the same person may have responsibility for these different departments, it can be recognized that the means-and-ends processes involved may compete and even come into conflict. Therefore, Thompson's (1967) three structural categories may offer insight into the coordination of activities and decision outcomes in these small organizations as well.

3 Method

In Chapter Three, the methods employed in this study are presented and discussed, and compared with other methods. Interviews are used to get material for this study so the aim can be investigated. The study uses a qualitative method to sort out which factors influence the decision.

3.1 Interviews

Interviews were used to collect information from nine organizations and not a larger number of respondents. There are two types of methods that can be used when interviewing persons to get information. These two types are qualitative and quantitative interviews. The difference between qualitative and quantitative interviews is that in quantitative interviews, a larger sample population is polled on a limited number of questions. In qualitative interviews there is a small number of respondents and the question goes deeper into understanding the specific topic.

Interviews are used in this study because any another way of collecting information would not be appropriate. The reason why another method was not used is because the respondent's subjective opinion is important. The subjective opinion is the factor that is important to find out, as is what the respondent experiences.

The respondents were interviewed by telephone and the information was collected during the course of one week. Each interview lasted for approximately 30 to 50 minutes.

3.2 Qualitative Interviews

There are some arguments as to what the qualitative method is, and one of the arguments is that it should be subjective (Ryen, 2004, 93). By subjective there is a meaning of the respondents personal opinion of how things really are, set from their point of view. If the study had gathered information in an objective way, the interviews would not have been a good method. Accordingly to the theories, subjective information includes certain things, such as: how many trees or how many children there are. It is important that the interviews collect the subjective opinion of the respondent's thoughts in this study.

The difference between objective and subjective information in a case study with interviews is also very important to keep in mind (Andersson, 1985, 13). It is important because the respondents' answers should reflect how the people experience and feel about things in the surrounding environment. An interview provides important information about what the person in question thinks and feels. It does not give information as to what is really going on; the information is subjective (Bell, 2000, 137).

3.3 Choice of Methods

According to (Wallén, 1996) there are four types of studies that can be made into a subject for scientific research. The four types are *normative study*, *explanatory study*, *descriptive study*

and exploratory study. In this work, the exploratory study is used, because it can answer questions of why and how. Moreover, it obtains fundamental knowledge of the problem to be investigated. Another strength of the method is that it is possible to decide what is to be investigated. In this case, the factors that influence the decision for a dairy farmer are going to be investigated. In the exploratory study, it is also possible to decide that some alternatives should be excluded (Wallén, 1996).

The case study method is used in this study because questions of how and why must be answered. There is no universal method, but different methods provide different information (Andersson, 1985, 20). For example, there are other research methods such as experiment, survey and historical archival analysis. The case study method is chosen for this study in order to find factors that affect the decisions of a dairy farmer. Case studies focus on the process within the framework of this study and in these cases it is interesting to get detailed information about the processes of those complex contexts. Quantitative methods, where data is collected and analysed, would not be effective in this study because it is the individual's subjective opinion that is useful. When interpreting the interview, observations from the respondents help us to characterize the situation (Wallén, 1996, 73). The advantage of case studies is that real observations are made under real conditions. Another thing is that the study gives detailed information about the process. By studying the case, phenomena are certain to be found.

For case studies, there are five components that are important to keep in mind when using this kind of method (Yin, 1994, 20).

- The subject of the study,
- Its proposition if any,
- Its unit(s) of analysis,
- The logic linking the data to the proposition, and
- The criteria for interpreting the findings.

Subjects of study depend on the type of question a study seeks to answer; it must be sorted out as to what kind of questions are to be answered. The different questions can be who, what, where, how and why. This is important because of the type of question there is in the beginning of a study, which should decide the research strategy for the study. For the subjects of study as to how and why the most appropriate strategy to use is a case study. In this study, the method of case studies is used to find answers.

Study propositions are important for the study. "How" and "why" questions point out the strategy direction and it is clear what the study attempts to answer. However, the "how" and "why" questions do not give any significant clue as to what to study. Therefore it is beneficial to prepare a study proposition for the work so that the information collected is relevant and then sort out information that is not relevant. There are some areas that do not have propositions for the subject of study. In those cases, the strategy used is still a case study. The important thing to be aware of in exploratory research, as opposed to, a proposition is that there should be a purpose.

Unit of analysis is related to how the research question has been defined in this study. In this study, the essential question is about the factors that influence the decisions for a dairy farmer in an investment. In this study, the factors within the theory are the units of analysis.

Logic linking data to the proposition: In this case, the purpose is the more relevant focus . From the interview material collected from the dairy farmers and the salespersons comes the data material. The data materials are checked with the purpose of the study.

Criteria for interpreting the findings come from the theory used in this study. When trying to interpret how a dairy farmer makes a decision, the theory is applied to see if there is some pattern in the behavior.

In the context of a social science, is it not possible to go back if an experiment has carried out? It would then be possible to see what would have happened had it been done in a different way. (Wallén, 1996, 116).

3.4 Choice of Case Studies

There are six farmer respondents and end three salesperson respondents. The farmers have purchased the Delaval AMS and Lely AMS solutions. The salespersons are from Delaval.

The triangulation method is used to get results from an observation or from interviews. The point is to obtain observations and see if there is some deviation from the observation and see if the observations confirm the theory in this study. Triangulation entails checking the existence of certain phenomena from what people say through the gathering of information from different sources (Bell, 2000, 88). Three sources provide a basis for multidimensional variation.

3.5 Structure of Interview Questions

The stakeholders of a farmer must be described before the decision theory and contingency theory can be used. Such is necessary because factors from the environment are important to take in consideration. From the stakeholder model, there is a number of factors that influence the dairy farmer's actions. Such is the basis of the stakeholder questions and the factors that can influence the farmer in the decision process.

3.5.1 General Questions

General questions are asked in order to gain an understanding of the farm in question. General questions provide background information for the analysis and conclusion chapter.

- 1.1 How many years have you been a dairy farmer?
- 1.2 How many dairy cows do you have?
- 1.3 How many years have you had an AMS?
- 1.4 How many dairy cows did you have before AMS?
- 1.5 Which type of milk parlor did you have before AMS?
- 1.6 What is the yield of the dairy cows at present?
- 1.7 How much was the yield before the AMS?
- 1.8 Do you have any employees? How many?
- 1.9 Are there more employees now, compared to the period prior to the AMS?
- 1.10 To which dairy do you deliver?

3.5.2 The Employees

Employees are important stakeholders of the dairy farmer. The dairy herd size is expanding and therefore the need for labor is growing. It is important to have employees that have good animal skills with cows.

2 How much has the supply of labor effected the choice for AMS [1] [2] [3] [4] [5]?

2.1 How was the supply for skilled dairy labor?

2.2 Can machines replace human work and the know-how?

2.3 What are the advantages of having a dairy worker?

2.4 What are the disadvantages of having a dairy worker?

3.5.3 The Salespersons (Suppliers)

Suppliers to farmers are common in modern and developed farms. It is important to have reliable suppliers in the food production organization. Equipment suppliers for the production is important to have in order to prevent breakdowns.

3 How much did the supplier affect the choice of AMS [1] [2] [3] [4] [5]?

3.1 Why did you choose to invest in an AMS?

3.2 Did the supplier provide you with information concerning the AMS?

3.3 Was there any other AMS on the market?

3.4 Why were those not interesting?

3.5 Did the service affect the choice of AMS?

3.6 Was there any technical solution or component on the chosen AMS not found on the other AMS?

3.7 Did you believe that the AMS had potential for further development?

3.8 Did you believe that there would be better control over the dairy herd using an AMS as compared to a dairy worker who milked the dairy cows?

3.9 Did you believe that the quality of the milk would increase or decrease? 3.10 Did you believe that there would be more or less information to handle? Did you think that an AMS would releave a certain amount of work?

3.11 What are the advantages of an AMS?

3.12 What are the disadvantages of an AMS?

3.5.4 The Customer (Dairy)

The dairy as a stakeholder is the agent that handles all the milk deliveries from the farm. It is also the stakeholder who sets the milk price.

4 How much has the relationship with the dairy influence the choice for AMS [1] [2] [3] [4] [5]?

4.1 Did you think the quality demanded of the milk has increased?

4.2 Did you believe that the dairy would demand a higher quality of milk in the future?

4.3 Did you believe that the choice to invest in an AMS would increase or decrease their dependency on the dairy?

3.5.5 The Bank

Stakeholders in the credit sector, such as the bank, are important in investment phases. The farm organization is often dependent on credit in order to expand or to invest in development.

5 How much did the bank influence the decision for AMS [1] [2] [3] [4] [5]?

5.1 Were there any limitations on the loan from the bank to invest in an AMS?

5.2 Did the interest rate influence the choice to invest in an AMS?

5.3 Did you do or do you do anything to reduce the dependency on the bank?

3.5.6 The Government

Laws and regulations are governmental factors that influence the farm organization. There are a large number of rules and permits of which the farmers must keep track.

6 How much did the government influence the choice to invest in a AMS [1] [2] [3] [4] [5]?

6.1 Did you believe that the dependence on the government would increase or decrease with regard to AMS?

6.2 Has the information from the government increased or decreased with an AMS?

6.3 Did the investment subsidy influence the choice to invests in an AMS?

3.5.7 The Environment (Biological)

Environmental factors influence the farm organization in different ways. Biological factors beyond the farmer's complete control can make an impact on the milk production.

7 How much have the biological factors influenced the choice of AMS [1] [2] [3] [4] [5]?

7.1 Did you believe that animal health would be affected by AMS?

7.2 Did you believe that the choice of AMS would reduce the influence of biological factors?

7.3 Did you believe that the barn environment would be affected by an AMS?

7.4 Did the number of cows have any meaning for the choice of AMS?

3.5.8 The Dairy Farmers (Owners)

Goals and experience are two factors the owner controls. This is something that can make differences in the organization. An experienced farmer compared to an inexperienced one can make a difference in the organization.

8 How much have your experience and knowledge effected the choice of AMS [1] [2] [3] [4] [5]?

8.1 What was the goal within the organization?

8.2 How much knowledge was there within the organization?

8.3 Did you believe that the dependence on another stakeholder would increase or decrease with the choice to invest in an AMS?

4 Results of the Empirical Study

Results of the qualitative interviews with dairy farmers and salespersons are presented in Chapter Four. The interviews are divided into three sub-chapters and the chapters are presented as follows: Results of the interviews with the dairy farmers who bought a DeLaval AMS are presented first; after that come the results from the interviews with the dairy farmers who bought an AMS from Lely. Then come the salespersons results of the interviews and in these results, the order of the questions has been rearranged as compared to the order of the dairy farmers' question.

4.1 Dairy Farmers' Interview Results from those who Purchased DeLaval AMS

The answers to the question concerning the dairy farmers who invested in DeLaval's AMS can be found in the Appendix 1: Interviews Dairy Farmers - DeLaval. In this section, there is only a presentation of those factors that had an influence on the farmer's decision. Table 5.1 shows the results from the grading question presented from the dairy farmers who bought a DeLaval. The question about the suppliers is the factor that influenced the group most. The second question that influenced the dairy farmers most is question two, the question about the employee. The third question that influenced the dairy farmers most was question eight, the owner.

General questions: All three of the dairy farmers who bought a DeLaval AMS have substantial experience in dairy production, ranging from 19 to 30 years, and have been using a DeLaval AMS for one to two years, at the time of the interview. They had different milking systems before the investment in AMS, including traditional tie-stall and pipeline milking systems and free-stall systems. The milking systems they had before were all DeLaval solutions. Before the investment in AMS, the herd size ranged between 110 and 170 cows. After the investment, two of the farmers decreased the number of dairy cows and one maintained the same herd size, with herd sizes ranging between 65 and 140 cows. The milk yield varied from 8 200 kg ECM and 11 000 kg ECM before the investment in the AMS. After the investment, the milk yields were unchanged for the farmer's dairy herds.

Before the investment in the AMS the numbers of employees for two of the dairy farmers was unchanged, and for one of the two farmers was it unchanged because he had bought the neighbor's dairy farm. The farmer that bought the neighbor's farm has two different milking systems and therefore needs employees.

One of the three farmers says there is a big difference since he has cut down the labor force by one employee. The number of employees varied between and four on the dairy farms after the investment in the AMS from DeLaval. One of the dairy farms also had help from his partner on the farm.

Employee: In the Table 5.1 about the employee question, two of the farmers assessed the employees as a highly significant factor in the decision to purchase an AMS, rating it high upon the sale. The third farmer rated the employee factor as low, commenting that he had good employees with whom he was satisfied. All the farmers reported that it is hard to find and keep skilled dairy workers, noting in particular that it is hard to find people who are

willing to work at the different times during the day, early mornings and late nights, that are involved in non-AMS.

Therefore it is hard to even find someone who wants to stay in the organization as a dairy worker. The advantages of a dairy worker that the farmers describe included: an additional person creates time for the farmer to do other things on the farm; that there is someone at the farm even when the farmer is away. There is a physical person to talk to and discuss things.

On the other hand, the farmers also noted the disadvantage with a dairy worker, such human factors like illness, which can create more work for the dairy farmer and negatively affect the dairy herd. Additionally, a good dairy worker also costs a lot of money to employ.

When asked if machines can replace a skilled human worker answer was yes, but with a reservation that the machines cannot replace human intuition. The farmers explained that they felt that machines can replace the actual milking part of dairy production, and thus relieve the work load, but that a machine does not have an eye for the animals that a skilled dairy worker has.

Supplier: The suppliers were graded as the most influencing factor of all the questions that were given to the dairy farmers and that can be seen in Table 5.1. The supplier, Delaval, influenced the dairy farmers in different ways. In one case, salespersons provided the dairy farmer with just enough information about the AMS. In the two other cases one of the dairy farmers was a neighbor to the salesperson and was influenced by him. In the other case, the neighbor had been a test farm for Delaval's AMS and it had worked well for the neighbor.

On the question as to whether there were any other AMS labels on the market, the most commonly answer was Lely. The reason why Lely was not an interesting investment depended in two of the cases on the salespersons for Lely; they did not give a serious impression.

One factor mentioned that influenced the investment was the robot arm on the AMS. Delaval's AMS can milk cows manually if some part on the AMS is broken. Delaval's AMS have one extra line that cleans the teat and make pre stimuli. The AMS can milk cows with suffering from bacterial health problems in the udder..

One of the farmers mentions the service as a factor that made Lely uninteresting. The three dairy farmers who bought the Delaval's AMS mention the service as an important factor for the investment. The reason why service was important was the proximity to Delaval's service personal and the 24/7 service. Two of the farmers mention one factor each concerning technical components that come with Delaval's AMS. The two components consist of Delaval's feed first principle with guided cow traffic, and Delaval's cell counter OCC.

The dairy farmers believed the AMS would be further developed. One of the farmers thought that the control would be worse because he lacked the faith of the technical solution in the AMS. Two of the farmers believed that the control would be better with the AMS. They believed in better control resulting from an increase in information from the AMS and that an AMS would do a better job than a dairy worker. One of the farmers believed the milk quality would drop with the AMS and one believed it would be unchanged; no one believed the quality would rise.

The farmers believed the work load would be alleviated because the milking stages were taken over by the AMS. The farmers also believed that more information would result from the investment in the AMS.

Owner: The experience of the farmers affected the choice of the AMS substantially in two cases and not at all in one case. When the question about what goals the dairy farmers have, some answer that they want to have a profitable production and earn money. Some say that it is to have a good animal health and the dairy cows should produce as much milk as possible.

Two of the farmers did not think dependence on other stakeholders to their organization would rise if they invested in an AMS. One of them did however think the dependence would shift from less dependence on labor to more dependence on the suppliers. One of the dairy farmers has suffered from injuries of the hard work, and that one way he could continue with milk production was to invest in an AMS. Two of the dairy farmers mention time as a factor. One of them had made a calculation that the farm would save money if it invested in an AMS. Money would be saved because the cut in working hours.

One farmer says that one reason was to become independent of working hours. When questioned as to what advantages there are with an AMS, all the farmers mentioned the flexible time. There is no fixed time for work in the barn. The AMS always do the same routines over and over again, flexible work time, the AMS work all day but do not charge extra for overtime and night shifts. Better control of the milk quality, more information about the dairy cows and the interval for each of the cows can be set to each individual, for example a low producing cow can go to the AMS 2.2 times per day and a high producing cow can go 3.2 times a day.

On the other hand, disadvantages with an AMS is according to the dairy farmers include the risk of alarms, either alarms that comes in the middle of the night or when someone is not on the farm. One more comment reflects the feeling of never being completely finished.

Question	Respondent 1	Respondent 2	Respondent 3
2 Employee	More	Less	More
3 Supplier	More	More	Moderate
4 Customer	Less	Less	Less
5 Bank	Less	Less	More
6 Government	Less	Less	Less
7 Environment	Less	Less	Less
8 Owner	Less	More	More

Table 5.1 Qualitative assessment of decision factors by farmers purchasing Delaval AMS, grades as less, moderate and more significant

4.2 Dairy Farmers Interview Result from those who Purchased Lely AMS

The answers to the questions concerning the dairy farmers who invested Lelys AMS can be found in the Appendix 2: Interviews with Dairy Farmers - Lely. Only those factors that had an influence on the farmer’s decision to invest in an AMS are presented in this chapter.

General questions: The time during which the farmers who bought a Lely AMS produced milk varied from a couple of months to nine years. One of the dairy farmers had just bought the farm from his parents, but he had worked with milk production for eighteen years.

The number of dairy cows on the farms varied between seventy and one hundred and twenty cows after the investment in the AMS. Before the investment in AMS, the numbers of cows was between zero and one hundred and eighty cows. One farmer did not have dairy cows before the investment in AMS. The farmer had beef cattle prior to the investment.

Among those farmers that produced milk using AMS, the durations in which they had been producing milk ranged from a couple of months to three years.. The farmer who just had the AMS for a couple of months is the farmer who bought the dairy farm from his parents. The type of milk systems in place prior to the investment in AMS ranged from nothing at all, as was the case of the dairy farmer who had beef cattle before the dairy cows, to such arrangements as a milk parlor with a free-stall system as in the case of the farmer who raised beef cattle prior to obtaining dairy cows.. The remaining farmer had a tie-stall system. The milk yield from the cows did not change when the farmers switched from their old systems to the AMS solution. The only farmer to have gone from zero in milk yield is the farmer who changed from beef cattle to dairy cows.

The questions of how many are employed now as compared to before the investment in AMS, is answered quite simply that there are no more employees after the investment. One of the farmers that had a tie-stall has reduced the labor force by two and a half employees.

Employee: Two of the farmers that invested in Lelys AMS graded the employee question in Table 5.2 as more significant. One of the three dairy farmers did, however, grade the question lowest,; this was the dairy farmer who ran the farm with his sister.

As to the matter regarding the availability and ease in finding skilled dairy workers, the situation appears to be very bleak indeed. It is hard to find anyone who wants to work with dairy cows. All the farmers who bought the AMS from Lely say that human labor can be replaced by machines.. However, all the farmers also indicate that this can only be done to a certain degree. The machines may replace the actual step of having to milk the cows, but the machines are no substitute for the human eye. Moreover, the machines do not possess the knowledge that human workers do.

The advantages of having human workers are that they can get a sense of the disposition of the cows in the barn, and present other benefits that machines simply cannot. On the other hand, the disadvantages of employing a dairy worker are those facing all human workers; they can become sick and, of course, they cost money. The problems that arise in communication with a human dairy worker is another common disadvantage.

Supplier: With regard to the question of how much the supplier's salespersons influenced the choice of AMS, two of the dairy farmers responded that it was a low consideration while the third indicated that it was quite high. The assessment can be seen in Table 5.2. One comment made by the farmer responding that it was a low consideration mentions that the salesperson from Lely had a low profile, as compared to Delaval's salespersons who were quite alert. Two of the dairy farmers said that they did not get much information from Lely; one of the farmers even had to call and press the salesperson for some information.

The other brand of interest on the market was Delaval. One farmer mentioned that there were other smaller brands but he did not find these interesting. All three dairy farmers said that the free cow traffic was the main reason to why they chose the AMS from Lely. Two of the farmers said that they felt that Delaval's salespersons did not listen to them when they told them about their request for free cow traffic. Delaval's salespersons were very eager to sell their feed first concept.

Two of the farmers also mentioned the cost difference between Lely and Delaval as an important factor; one farmer mentioned the investment cost and the other mentioned the service cost. Two of the farmers mentioned that the service from both Lely and Delaval were quite similar. There was a difference in two of the answers, and the difference contained of the number of neighbors that had Lelys AMS. One dairy farmer had approximately fifteen to seventeen neighbors with AMS from Lely in a radius of thirty kilometers so the service was good. In the other case, Lely was one man short so the service was not quite as good as Delaval's service in that area, but the farmer mentioned that he thought it would be better so he invested in Lelys AMS system.

Only one farmer mentions components of the AMS from Lely that did not occur in the concurrent AMS. These components were a stem wash for the liners and an automatic weight on the AMS that measures the dairy cows and speeds up the attachment for the liners.

All the farmers did believe in the further development in the chosen AMS; the comments made were that the technical equipment always develops. All three of the farmers who invested in the AMS from Lely say that they believed there would be better control over the dairy herd as compared to employing a dairy worker to milk the cows.

The reason why the farmers believed there would be better control with the AMS as compared to a dairy worker was because of the information that the AMS created. The three farmers believed there would be more information to process, because of the investment in an AMS. They also believed there would be less hard work because the AMS took away the monotonous work involved in milking. The aforementioned farmer who had a tie-up parlor in his barn opined that if there are more dairy workers, the routines are also more varied.

Only one of the farmers believed that the milk produced would be of a higher quality, and the reason was that the milk could be drawn from each teat. The other two farmers believed the quality of the milk would drop once they switched to milking the dairy cow with an AMS, because they heard the quality could drop. One reason for the farmer to make an investment in the AMS was to get rid of the overtime. However, it was commented that the main intention was to remove the monotonous task of milking.

One farmer commented that it was hard to find employees. The advantages of AMS are summarized by the farmers was that it allows for more time to do other things than milking dairy cows. The AMS gather more information about the individual dairy cow in the herd. Dairy farmers who bought the AMS from Lely mention that the disadvantage of the AMS is the feeling of never being finished with the work; it just goes on and on. Another factor that the farmers see as disadvantage was the risk of the alarm going off, if something happens in the middle of the night or when someone is not on the dairy farm. One farmer mentioned the initial cost of investment for the AMS is high, and if a farmer wants to expand the herd, the system must be built in large steps and therefore it costs a lot of money.

Environment: The biological factors did not influence the decision to invest in an AMS particularly much as can be seen in Table 5.2. Two of the farmers did not believe that the animal health would be affected as a result of the AMS; one farmer did, however, believe that the animal health would be somewhat improved. One of the farmers that invested in Lely AMS believed that the impact of biological factors would be reduced; one of the farmers who believed the opposite believed there would be better control over the dairy cows with an AMS.

All three farmers believed that the barn environment would be better if they invested in an AMS. The reason as to why the farmers believed that was that they believed that the dairy cows would be calmer. The farmers believed that when the dairy cows are not doing everything at the same time it made for a calmer barn environment. One reason as to why the cows do not do everything at the same time depends on the AMS, as only one cow can be milked at a time. The cow traffic in the barn was important for every dairy farmer who invested in Lely AMS as all of the farmers believed that free cow traffic was a reasonable solution. One farmer commented that it was better to allow free cow traffic where the cows act naturally rather than having them all line up.

Owner: Two of the dairy farmers graded their experience and knowledge as a high factor in deciding to invest in an AMS. The third farmer ranked his knowledge and experience as low,; this was the dairy farmer who had beef cattle prior to obtaining the dairy cows. When asked what goals there were in the organization the answers were quiet similar. Two of the farmers mentioned that they aimed for a high production yield on the dairy cows. One farmer mention he wanted good profitability and reasonable life and to develop a fine family farm.

The farmers know about dairy cows, and they are quite good in this particular field. One farmer says that he does not have any education and his knowledge of the business could be better. Some of the comments on the question of whether the farmers believed they would be more or less dependent on other stakeholders in the organization were that they felt they would be less dependent on the labor force and that it would be easier to find employees who want to work with dairy cows. Two of the farmers say that the dependency on the supplier would increase. One of the two farmers says that the business is more sensitive to breakdowns and late deliveries of feed.

Question	Respondent 4	Respondent 5	Respondent 6
2 Employee	More	Less	More
3 Supplier	Less	Less	More
4 Customer	Less	Less	Less
5 Bank	Less	Less	Less
6 Government	Less	Less	Less
7 Environment	Moderate	Less	Less
8 Owner	Less	More	More

Table 5.2 Quantitative assessment of decision factors by farmers purchasing Lely AMS, grades as less, moderate and more significant

4.3 Salesperson's Interview Results

The answers to the questions concerning the salespersons from Delaval can be found in Appendix 3: Interviews - Salespersons. In the results from the interviews with the salespersons from Delaval, we can find the thoughts about how the salespersons see the dairy farmers' point of view.

General questions: The salespersons at Delaval have been working in sales between three and eighteen years. Two of them have worked for seventeen and eighteen years while the third has worked three and a half years for Delaval. The number of customers the salespersons have is around two hundred and fifty, and five hundred, respectively. The number of AMS robots the salespersons have sold during their time at Delaval is between sixteen and fifty.

Owner: One of the questions regarding how much the salesperson thinks the dairy farmers' experience and knowledge has contributed to the decision to invest in a AMS finds that the results are quite moderate as can be seen in Table 5.3. All three sales persons say it is important also to find out what kind of experience and knowledge the dairy farmers have. That is in order for the level to be able to be set for the conversation and to find out what skills and knowledge the dairy farmer already have regarding milk production. The salesperson also believes it is important to find out what the dairy farmers' goals are within the organization. The comments indicated that it is interesting to hear what the dairy farmers want and think. All three of the salespersons believed that the dependence on other stakeholders in the farm organization would increase. For example, one of the salespersons believed the dependency on the bank would increase. The salespersons also believed that the dependency to the chosen supplier would increase with regard to servicing for the AMS.

Employee: The salespersons graded the employee factor as high, as can be seen in Table 5.3, the salespersons believed the supply of dairy workers affected the decision of the dairy farmers' to invest in an AMS. One salesperson mentioned that the rating is lower if the dairy farm is a family farm. All three salespersons believed it was hard to find skilled dairy workers for the dairy farmers; one opinion from a salesperson was that no one wants to work during the hours in which tradition-milking work takes place. The three sales persons believed that a machine can replace human work and get rid of monotonous work routines. No one believed that a machine could replace a dairy worker totally, because the machine needs supervision in order to function and the machine does not see everything in the dairy barn. The salespersons believed the advantage of having a dairy worker was that an individual sees everything in the dairy barn. One of the salespersons mentions that the labor cost for a dairy worker is a disadvantage and two of the salespersons believe that the human factor is a disadvantage.

Environment: One salesperson rated the biological factors high and two rate them a little lower when they get to the question of how much they believe biological factors influence the dairy farmers' choice to invest in an AMS. All three sales persons believed that biological factors would be affected by the choice to invest in an AMS. Two of the salespersons believed the barn environment could be made better with the choice of investing in an AMS. One salesperson mentions that the environment gets calmer because the cows are calmer when they do not need to do everything at the same time. The salesperson that did not think the barn environment would be better says that he had not thought about it. The three salespersons believe that cow traffic is significant for the dairy farmers choice when they choose an AMS. One salesperson says it is important to listen to the dairy farmers thoughts and the philosophy the farmer holds, and another salesperson says it is hard to speak about

Delaval's systems with the feed first principle with a dairy farmer that has already decided to have free cow traffic.

Supplier: The three salespersons rate their own influence on the dairy farmers as high when the farmers are going to invest in an AMS. All salespersons contact the farmer to book a meeting and inform him about Delaval's products. Personal contact is an important factor for the salespersons. One question is whether the sales thinks there is any difference in the service between the most common brands on the market and the answers are mixed. One salesperson says that he does not know anything about the competitor's service. Another comment is that the service the competition offers is the same and the prices for services are quite similar. The third says there is a big difference because Delaval has more service engineers in the district where he works, compared to Lely. The salespersons say that Lely is their biggest competitor on the AMS market, meanwhile he mentions GEA and SAC as two other competitors but they are not on the same level. The salesperson at Delaval says there are technical solutions within Delavals AMS that are not found in their competitors AMS. Only two of the salespersons mention the cell counter OCC and only one mentions the separate wash liner that makes a separate wash with a separate liner. Two of the salespersons mention management tools and one of them mentions the herd navigator as something that the competitors do not have.

The salespersons believe there is better control with an AMS as compared to a dairy worker. That is due to all the information which the AMS can provide the dairy farmer. All three sales persons believed the quality would increase if the dairy farmer invests in an AMS because of the technical solutions and the increase in information regarding the individual dairy cow. The salespersons believed that there is more information for the dairy farmers to process if they invest in an AMS. The salespersons believe that dairy farmers who invest in an AMS also get a relief in the work load. The salesperson sees the advantages of an AMS in eliminating monotonous work such as milking routines. All three salespersons mention that the working hours for the dairy farmers became better as they became more flexible. One comment made by a salesperson was that the dairy farmer gets better control over the herd due to receiving more information.

The disadvantages of the AMS, as the salespersons see it, is the alarm risk and one of them mentioned the feeling of never being finished when working with an AMS. One comment from a salesperson is that he does not see any drawbacks with an AMS. With regard to what the salesperson thinks the dairy farmers invest in when obtaining an AMS the answers were mixed. One of the answers was that the dairy farmers can do other things than milking dairy cows. The question of hard work was mentioned as a factor that where important. The salespersons believed the dairy farmers wanted to eliminate the hard work and the monotonous steps.

Question	Respondent 7	Respondent 8	Respondent 9
2 Owner	More	Moderate	Moderate
3 Employee	More	More	Moderate
4 Customer	Less	Less	More
5 Bank	More	Moderate	Less
6 Government	Moderate	Moderate	Less
7 Environment	Moderate	More	Moderate
8 Supplier	More	Moderate	More

Table 5.3 Quantitative assessment of decision factors by salespersons from Delaval, rated as less, moderately and more significant

5 Analysis and Discussion

In this chapter, the analysis for the study is carried out. The structure of the analysis begins with an analysis for all groups of respondents as a generic analysis that has an implication on the decision to invest in an AMS. After that comes the analysis for each brand, Delaval and Lely. The factors analysed include why the farmers chose the specific label. The factors that are analysed are what influenced the decision to invest in an AMS.

The aim of this study is to develop an understanding of the decision making process of dairy farmers, and in particular to identify which types of factors influence the outcome of investment decisions in a farm's technological development. The paper makes use of Thompson's theory, about which structure the organization assumes concerning Delaval's feed first principle and Lely's free cow traffic. It is about information and whether there is more information to process with Delaval's or Lely's system.

From the farmers' point of view, he can count on a deterioration of the milk quality, and the farmers comment that the relation to the dairy is also low. The three main factors that influence the decision are the employee, the supplier and the owner.

It is costly to have employees and the dairy farmer tries to rationalize the organization to be more cost efficient. A free feed system does not have a specific order that cows have to proceed, but in feed first principle there is a certain order that must be followed. From Thompson's theory, the organization can be structured in different ways. In one of the cases, there is more information for the dairy farmer to process that there is in the other case.

5.1 Generic Analysis

Results from the interviews with the respondents who bought an AMS are analysed in this section. All the answers from the interviews with the farmers can be found in Appendix 1, Appendix 2 and Appendix 3. All the factors from the results in Chapter Five are not worth mentioning because they did not influence the decision according to the interviews.

As mentioned from the theories, the factors that influence the dairy farmer's decision are for example uncertainty, and how such uncertainty can be reduced. By that, the dependency on employees, for example, is reduced. What happens when a machine like an AMS replaces the human work in an organization like the dairy farmer's organization is that the uncertainty is reduced. Organizations that want to be (technically rational), shields the technical core to protect it from uncertainty from the environment (Thompson, 1967). The technical core in the organizations for the dairy farmers is the experience and knowledge of the employees. The technical core also consists of machines and technology. When the farmer replaces the employee milking activities with an AMS that milk the cows, the technical core becomes less influenced by uncertainty.

Factors that can influence the decision for the farmers are the employee, owner, supplier and environment. The employee factor was the factor that influenced the farmers' decision to invest in an AMS the most. The farmers said that it is hard to find dairy workers that want to work at these particular times necessary to milk cows. In Lely's case and in Delaval's AMS case, the farmers want to reduce the dependency on dairy workers and thus reduce the

uncertainty that can have an impact on the farm organization. Organizations want to protect their technical core. The technical core in this organization is the knowledge and experience of the individuals and the machine components structure. If the farmers' organizations have employees that do not stay for long, the technical core can go from personal knowledge that comes and goes, to machines that stay and make for a better milking operation. The AMS also detects inflammations earlier so measures can be taken to prevent big impacts on the milk yield.

The structure in the farm organizations before the investment in the AMS technology was sequential. A sequential structure means that x must be performed before y can be performed. In a loose house system with a milk parlor, the cows must be together before they can be milked for example.

When one investment in an AMS is made, the means-and-end processes are affected because some activities are taken away. The means-and-end processes are reduced because the milking activities in the parlor are no longer necessary. According to Simon, the processes are divided into ends and means processes in order to facilitate the decision process (Simon, 1964). If the structure becomes more complex, the ends and means processes become more undefined, because it is unclear where the process ends and therefore also where the process starts.

If the ends and means processes are unclear, the criteria from the theory in order to be bounded rational are not accomplished any longer. It is hard to analyse whether the ends and means processes have changed or if they are clear. In the big picture, the farmers' main objective is still to produce milk. Thus activities that lead to producing milk must be clear, if they are not clear the production would fail and decisions would not be made in a bounded rational way.

A farmer that invests in an AMS, either a Delavals or Lelys AMS solution, reduces the impact of uncertainty. According to the theory, organizations that reduce dependency reduce uncertainty. When the organization reduces dependency, it can predict the future better, and as a result it is less sensitive to unforeseen events.

The technical core in the farms' organizations consists, as mentioned earlier, of knowledge and machinery. One way for the farm organization to protect the technical core, is to replace some of the employees with a machine. Because employees tend to stay for just a short period, they do not gain any deeper knowledge of the specific farm. Comments from the farmers in Chapter Five regarding the question of what advantages there are with an AMS, reveal that their time was more flexible.

5.2 Brand Differentials

In Delaval's case there were three factors that did influence the decision for the farmers. The different factors from the interview result that influenced the dairy farmers were supplier, employee and the owner himself. The farmers that invested Lely's AMS solution were analysed by four factors that influenced the decision. The three factors that influenced the farmers' decision the most are employees, owner and supplier. There are results from the environmental factor that indicate that this played a small role, and the dairy farmers mention

the biological influence (Appendix 2). The different factors from the results are presented below.

Employee: The factor that the farmers rated with the highest influence when they invested in Lely's AMS solution were the employees. The reason is that it is hard to find a skilled dairy worker and keep them as employees. The supply of skilled dairy workers is very poor on the market and that makes the uncertainty high when it comes to finding a dairy worker that is skilled. One reason to invest in an AMS solution is therefore to be less dependent on the dairy worker and on the uncertainty that surrounds it. The dairy worker can be sick or have other personal issues that prevent him from working.

When the farmer invests in an AMS solution, the structure of work in the organization is changing. From a situation where the farmer has been dependent on specific work times and labor, to a situation where the farmer is less dependent on specific times and labor forces.

Farmers who bought a Delaval AMS mention that it is hard to find employee that want to stay and work with the milking duties. This presents the dairy farmer with a factor of uncertainty, and according to the theory concerning uncertainty, this comes from dependency (Galbraith, 1973). If the dependency on the employee is high, because that the employee is used for milking the cows, it would be reasonable for the farmer to invest in the AMS technology.

The uncertainty factor mentioned by the dairy farmers is the human factor; the employees can be sick and that impacts the whole organization. The problem of even finding an employee that is skilled enough is hard. The farmers say it is hard to find them. One solution for the organization is, according to the theory, to reduce the dependency on and at the same time reduce the uncertainty for the employee factor. When the farmer purchases an AMS, the uncertainty for labor becomes less. The uncertainty regarding the employee therefore also decreases.

Owner: The farmers who invested in Lely's AMS had less experience running their own dairy farms according to the interview results, as compared to the farmer who invested in Delaval's AMS solution. The owner also believed there would be less dependency on time for their own work, the farmers believed that the work time would be more flexible. The farmers believed that the dairy cows would act more natural with a free cow traffic system. The farmers believed in more work with heifers in steered cow traffic. If there are more technical components, there is a risk that something is going to fail sometime.

There is less work involved with free cow traffic because the cows move naturally in the barn, and there is no service on technical components that direct the cow traffic. According to the theory, the organizations act to reduce the uncertainty, in this case from technical break downs in the equipment, by a strategy of not investing in such systems, in the case of such farmers that invested in Lely and not Delaval. The farmers do not need to take into account the information on whether the cows have eaten or not from the computer system.

The three respondents that had bought an AMS from Delaval had a Delaval milking system before the investment. One reason as to why the respondent bought the Delavals AMS solution can be that he felt an uncertainty to in trying another brand on the market if it had so worked well with the present supplier.

What comes into account from the interview result as well, is the number of years the farmers have been their own. The farmers have produced milk between nineteen and thirty years. If the farmers who bought the Delavals AMS are satisfied with the supplier and it has worked well for all the years that they have produced milk, then they would not risk trying something that perhaps does not work so well compared with the present system.

The result from the interview question about the goals showed that the farmers wanted the organization to be profitable so they can keep being dairy farmers. There is a difference between individual goals that satisfy the individual desire to accomplish something personal, and organizational goals as such needed to have a profitable organization. In both cases it is the individual that makes the decision in the organization.

Supplier: Farmers that invested in Lely's AMS answered the interview question by saying that the supplier's salespersons did not affect the decision to purchase an AMS so much. The supplier's salespersons from Lely had quite a low profile in the selling process as compared to Delavals sales person. The farmers also mention that there was a difference in the price of the AMS and the price for servicing the AMS. One farmer mentioned Lely's cost for an AMS were lower than Delavals AMS solution.

The dependence on Delaval increases because the service to the AMS must be carried out in order to work correctly. Something that influences the farmer when they choose AMS, is the proximity to service personal from the supplier. Because of the proximity to the service personal, the uncertainty is also reduced if something happens that must be fixed. The structure of Delaval's AMS solution is computerised because there is more information to process for the system. The system keeps track of the cows when they are supposed to eat or be milked; the AMS system became more complex with Delaval's solution.

Environment: The environment had little influence over the farmers in choosing the AMS from Lely. The farmer believed there would be better control over the dairy cows, and that the uncertainty regarding what happens with the cows would be reduced. From the interviews, the result the farmers mention is that a dairy worker does not see things the way an AMS can see. An infection in the udder can be detected earlier with an AMS as compared to a dairy worker. The infection can be detected earlier because of the technical components that measure the number of cells in the milk.

After the investment in AMS from Delaval, the structure is still sequential because there is a procedure that must be done before others. Delaval's feed concept with guided cow traffic is a system of sequential procedures. Some activity x must be performed before y can be carried out.

The uncertainty has decreased and the complexities of the structure for the organization that choose Delaval's AMS solution have not decreased. It all comes down to how complex the structures are, and the complexity does not depend on the size of the organization. It depends on the environment in which the organization works.

In the case of Delaval's AMS solution, the structure is complex, but the structure in the organization is sequential and it has not changed. The structure became more complex with Delaval's AMS because there is more information to handle and the technical solution leads it in that direction. The sequential structure of the organization is handled by planning and scheduling, as well as timing the work process (Thompson, 1967).

The Lely farmers had already decided which type of AMS solution they wanted. From the interview results in Chapter Five, the farmers say it was free cow traffic that that they wanted. The farmers had chosen a system but not a supplier; the farmers believed the farm organization would perform better with a free cow traffic system. The free cow traffic system allows the cows to act more natural. The cows can eat when they want and be milked when they wanted. With this AMS system, the uncertainty of break downs of technical equipment is reduced. The dependency is therefore reduced for technical solutions that can affect the production.

With this free cow traffic follows another issue; the cows are individual in that act on their own. It can become uncertain as to whether the cow goes and eats all the amount of what it is allowed to eat, and it is uncertain as to whether the cow goes to the AMS to be milked as many times it is allowed to do.

The salespersons from Delaval had an opinion that corresponded quite well to what it was that influenced the farmers' decision as can be seen in Table 5.3 in Chapter Five. The question regarding employees was a factor of which the salespersons were well aware affecting the decision for the farmers. A factor that had a different impact on the selling process was the approach of the salespersons' selling style.

The selling style was something on which the farmers that bought Lely's AMS commented; the farmers said that Delaval's salespersons did not really listen to which kind of AMS system they prefer. Delaval salespersons had focused on selling their system with directed cow traffic and did not take to account that some farmers already have made a choice of which type of system, but not made a decision about the supplier of the system. Delaval's AMS solution can be installed with both type of systems, concerning the cow traffic.

Farmers that invested in Lely's AMS had already made a choice of which type of system they wanted. It was a system that reduced the information so the structure of the farm organization went from sequential to pooled.

The structure of the farm organization that goes from a milk parlor to an AMS with free cow traffic goes from sequential to a pooled structure. With the milk parlor system the procedure was activity x before activity y. When the farmer invested in the AMS system with free cow traffic, the procedure did not entail activity x before activity y anymore. The technical core of technical solutions does not require a specific order to function well. The cows can go and be milked whenever they want and go and eat whenever they want. There is less information in the free cow traffic system to process. The farmer does not need to care about whether the cows are going to eat or not.

A free cow traffic system goes from a complex structure to a less complex structure with a little bit more uncertainty regarding the cows. The reason as to why the farmer's organization goes from sequential to a pooled structure is that the amount of information is reduced. The information is reduced from the factors that influence the organization and the environment became less complex for the farmers concerning the factors that influence the organization.

Some dairy farmers invest in Lely's AMS solution when the salesperson from Lely affects the decision less then Delaval salespersons. According to the theory, different decisions are made because the farm organizations are striving toward different goals. There are two different

directions and the first goes to less complexity and more uncertainty. This direction is for the farmers that bought Lely's AMS solution. The system from Lely provides less information and fewer technical solutions for the dairy farmer to process. The uncertainty factor increases because of the cows; the cows are individuals that act on their own. The other direction goes to more complexity and less uncertainty, and this direction is for the farmers that invested in Delaval's AMS. There is more information to process and the cows are steered in the direction that the farmers want them to go.

Biological factors meant a little more to the farmers that bought Lely's AMS than the farmers that bought Delaval's AMS. Biological factors are not factors that can be controlled one hundred percent. That means the biological factors are surrounded by uncertainty. The Lely farmers choose more uncertainty and less information to process; as it has been analysed above, the farmers that invested in Lely's solution were striving toward a pooled structure.

5.3 Discussion

The interview questions can always be further developed to gain more information from the respondents. The method could have included a pre-interview in order to get a better grip of what answers the questions generated. The meaning would have been to ask the questions that had been good to ask. Small questions that enlighten the big picture even more than has been done so far.

All the questions that have been asked of the respondents have been enough to clarify the factors that influence the dairy farmer in making a decision to invest in an AMS technology, and to clarify why the farmers choose the different brands on the market. These questions that were asked about the factors, and the responses given were short with little information. Such questions would not provide any more useful facts to this work. The aim of the work was to examine the factors that influence the decisions of the farm organization, and not those factors that do not influence the decision.

Those who are early to adopt the technology can gain a lead compared to the other organizations that invest in technical solutions and can obtain a cost reduction and be more profitable. In production economics, this phenomenon is described in the supply and demand function. If there is equilibrium on the market and some of the actors invest in new technology, the organization can produce the same amount of a product for less input and therefore gain an advantage over the competitors on the market. The organizations that invest in the technology can be more profitable and therefore have a greater chance to survive the future.

One question can be raised as to what complexities face the organization and how they have been developed. At the beginning of the milk production, the complexity that faced the organization was not as complex as it is today. In the beginning, the cows were given fodder and then they produced milk. Later, the research started and the milk production improved. Today, more is known about what to do and what not to do in order for milk production to be successful. It would be easy to say that the knowledge of the production factors that we know them today, are the only factors that influence the structure of the organization. As well, the environment around the organization has become more complex.

If every dairy farmer tries to reduce the uncertainty and fulfill their organizations goals, and at the same time develop a better structure then the farmers try to move in to the origin of coordinates “every organization want to be a tree”. That is the most optimal structure to attain. If the farmers have a goal to make good profits on the farm, and then choose to invest in free cow traffic systems because they are less expensive to purchase compared to the feed first system, then it is cheaper and there is less equipment that can be broken, but if it requires more work from the employees it will be more expensive. If one of the goals were to make good profit and the investment does not lead to that end, then just where is the organization going?

Which dairy farmer has the correct judgment on what the right method is? What leads to less work and larger profits for the organization on their path to be independence? According to the theory, organizations that are less dependent on others and have clear goals, and have structures that can handle the information that comes from the environment, are more capable of making rational decisions. Uncertainty can be compared to risk and risk is something that organizations do not like. As mentioned, the uncertainty and dependency factors are linked together. Those factors that concern the economic man model are almost impossible to achieve in an organization,; it is therefore best that organizations be bounded rational.

The concept of being a tree, every action will take the organization to the origin of the coordinates. In a three dimensional diagram with x, y and the z axis, the axis can be labeled with goal, structure and uncertainty. The goal axis represents whether the decisions are made out of organizational goals or personal goals. If the organizational goals are followed the decision are made near the origin, if the decisions are made according to personal desire and not based on what benefits the organization, it is a step away from the origin.

From the theories of the economic man, all behavior is rational. That is to say near the origin and all the decisions are made in full knowledge of the outcome alternatives. Simon proposes that it is not like that in realty; the decisions cannot be made in full knowledge of every outcome of such a decision. Simon calls it ”bounded rational” and all the decisions are made in the hopes of a satisfactory result (Simon, 1964). Simon’s view strives further away from the origin because there is more uncertainty of what happens when full information is not available.

The phenomena can be described in three types of scenarios; in scenario one, the organization sells a part of the organization that does not fit in to the main organization. That part can be a department that has been developed under the organization time as an active organization. When the organization sells that part, the organization goes from uncertainty to less uncertainty. The structure is supposed to be less complex if the organization is reducing its contact with the environment, then the organization is moving into the origin.

Scenario two is the contrary; if an organization makes an investment in another organization that can fill a blank, or contribute to becoming a more unitary organization. Then it can reduce the uncertainty because the organization gets better control over the environment.

Scenario three, when the organization has invested in another organization, the goals in the two different organizations are different. Then it will take some time to implement a unitary goal throughout the organization. The organization will therefore move away from the origin, because the different organization will try to fulfill their goals.

Lely's system needs more time with the cows and requires that the workers have the appropriate skills, and Delaval's system needs more time with the computer and therefore the workers need good computer skills. When the dairy herd becomes, larger it becomes complicated to check all the cows in the barn. An effective way to control the cows is with a computerized system.

If the farmers have made their choice of what type of system they want, it is unwise to try selling a system that the farmers do not believe in. According to the interviews, the economic aspect did not have a sufficient influence on the decision. Some of the farmers were not economically rational, the rather choose and made their decision based upon the design and concept of the AMS system. When the investment cost is nearly equal there are other aspects than the economic view that affects the decision of the dairy farmer.

Other aspects than the economic view is to reduce the uncertainty. It has been presented in the analyses that the farmers reduce the uncertainty rather than be economically rational like the economic man. When the farmer reduces uncertainty for the organization, the farmer attains better control over the organization as compared to being economically rational.

6 Conclusions

The aim of this study is to develop an understanding of the decision making process of dairy farmers, and in particular to identify which types of factors influence the outcome of investment decisions in a farm's technological development. The last chapter of this study is the conclusion section. The empiric materials have been analyzed, and the conclusions of what factors influence the dairy farmer's decision are presented. The conclusions are presented as to why dairy farmers choose to invest in an AMS, and then the brand differences factors are presented.

An additional second aim in the study is to determine the extent to which salespeople are aware of the significant decision factors and how they are utilized in the sales process. The section on how the salespersons from Delaval is presented last. First are two generic conclusions of why farmers choose to invest in AMS.

Generic conclusion describes what the AMS investment has in common for all the dairy farmers. All farmers that invest in an AMS solution change the structure of the farm. The structure changes to handle more information in the processes on the farm. When information increases, and the process handle more information, then the structure becomes more complex.

The investment in AMS increases independence and reduces uncertainty. The outcome of the investment is reduced uncertainty. By more information and better control over the processes, an increased independence is achieved. The farmer becomes less dependent on the environment by purchasing an AMS.

One of the most important factors in reducing the uncertainty is the employee factor. Farmers do not have good control over the employee factor. Two reasons are that the supply of employees is poor and the employee is not accurate like an AMS. It is more reliable to have a robot that milks the cows instead of an employee that for example can be sick or quit the job. The employee cannot match the technical solutions the AMS have developed to measure indicators in the milk.

- The dairy farmers reduce the factor of uncertainty by changing the structure of the organization when they invest in an AMS. Dairy farmers act according to the theory when they invest in an AMS.
- Dairy farmers invest in AMS in order to have more flexible time and to reduce the uncertainty of the employee factor.

Brand conclusions elucidate the differences between Delaval and Lely's AMS solutions. When it comes to which brand the dairy farmers select are there some differences. The differences are about how the organizations structure the information processing.

Delaval and Lely have different AMS solutions where the cows can act more or less naturally depending on system. Delaval's AMS solution is built upon a guided system where the cow must pass a smart gate. The smart gate sorts the cow depending if it time to be milked or to eat. The cow cannot choose if it want to be milked or to eat. Delaval's AMS optimizes the cow's performance upon all the information it gathers from the system.

Lely's AMS solution is a freer system with a natural movement between the milk and feeding sections. In Lely's AMS solution, there is less information to handle because the cows act naturally; they eat when they want. Lely's AMS system is less complex because there is less information to handle, but the uncertainty factor is higher. The uncertainty factor is higher because the process cannot be controlled optimally. The system increases the farmers' own control in the organization.

Farmers purchase Delaval's knowledge when the investment is made in an AMS. Farmers who invested in Delaval's system had Delaval as supplier earlier. The farmers have a stronger bond to the Delaval company. It depends on the long and close relationship the farmers have with Delaval.

- The differences between brands pertain to the system of technical solutions, and the farmers' choice of different systems. Farmers choose different systems between:
 - Delaval's AMS: Increase information and change structure to be more complex
 - Lely's AMS: Reduce information and change structure to be less complex
- Suppliers are a factor that differs from the different brands. Lely's salespersons influence the farmers less as compared to Delaval. The Delaval farmers have a stronger bond with the Delaval company compared to farmers that invested in Lelys AMS.

Salesperson conclusion Delaval's salesperson was well aware of the factors that influenced the farmers' decision to invest in an AMS. Delaval's salesperson was not aware of the impact on the AMS system design.

The value of developing customer – supplier relations is important. Farmers that have a closer and deeper relationship with Delaval as suppliers were invested in their AMS. The farmers' had greater experience in dairy production as compared to the Lely farmers. An investment in Delaval's AMS increase dependency, but at the same time reduces uncertainty.

- The failure for Delaval's salesperson to sell AMS to these farmers that invested in Lely's AMS depends on the selling process.

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Appendix 1: Interviews dairy farmers Delaval

1 General question:

1.1 How many years have you been a dairy farmer

Respondent 1: 19 years

Respondent 2: 25 years

Respondent 3: 30 years

1.2 How many dairy cows do you have

Respondent 1: 170 dairy cows

Respondent 2: 140 dairy cows

Respondent 3: 110 dairy cows

1.3 How many years is it that you had a AMS

Respondent 1: It's the second year

Respondent 2: One year

Respondent 3: Two years

1.4 How many dairy cows did you have before AMS

Respondent 1: 120 dairy cows

Respondent 2: 140 dairy cows

Respondent 3: 65 dairy cows

1.5 Which type of milk parlor did you have before AMS

Respondent 1: DeLaval tandem 2x4

Respondent 2: Fishbone with fast exit

Respondent 3: Tied up barn

1.6 What's the yield for the dairy cows now

Respondent 1: 8 200 kg ECM

Respondent 2: 11 000kg ECM

Respondent 3: 9 000 to 9 800 kg ECM

1.7 how much was the yield before the AMS

Respondent 1: 10 000 to 8 000 kg ECM, the ensilage quality plays a huge part

Respondent 2: 11 000 kg ECM

Respondent 3: 9 000 to 9 800 kg ECM

1.8 Do you have any employee, how many

Respondent 1: One employee

Respondent 2: One point four employee

Respondent 3: One employee plus my partner

1.9 Are there more employees now, compared before the AMS

Respondent 1: It is equal

Respondent 2: It's a big difference, before was it two point four

Respondent 3: It is unchanged because we have bought the neighbors dairy cows

1.10 Which dairy do you deliver to

Respondent 1: Arla

Respondent 2: Milko

Respondent 3: Arla

2 Employee: How much have the supply for labor force effect the choice for AMS [1] [2]
[3] [4] [5]

Respondent 1: 5, not easy to find some one

Respondent 2: 2, I have good employee

Respondent 3: 4

2.1 How was the supply for skilled dairy labor

Respondent 1: It was poor, you must put up demand on the dairy worker, a dairy worker must be able to work on his own

Respondent 2: Not big, it is hard to find a skilled dairy worker that want to stay

Respondent 3: It is hard to find dairy worker that want to work with this

2.2 Can machines replace human work, and the knowledge

Respondent 1: Yes, but not all the way

Respondent 2: Yes, machines can replace routines but not the knowledge

Respondent 3: Yes the milking part, but machines can't keep one eye on the dairy cows and it can't fix broken things

2.3 What's the advantages with a dairy worker

Respondent 1: I can be free from work and I have more spare time

Respondent 2: A person to discuss things with, a physical person that you can speak with

Respondent 3: You can be gone from the farm and still there is some one that stake care of the animals

2.4 What's the disadvantages with a dairy worker

Respondent 1: There is always a disadvantage, the human factor

Respondent 2: A disadvantage is that a good dairy worker cost a lot of money, human factor that the can be sick

Respondent 3: They can be gone when they are supposed to be at work

3 Supplier: How much did the supplier effect the choice for AMS [1] [2] [3] [4] [5]

Respondent 1: 5, the service because my neighbor is the district chief

Respondent 2: 4

Respondent 3: 3

3.1 Why did you choose to invest in a AMS

Respondent 1: My partner is getting injuries from the hard work, the human factor, and to get rid of the monotonously work

Respondent 2: I calculated that it would be profitable and that the investment would pay back fast on reduced labor cost, the working hours would decrease from 45 to 27 hours per cow and year

Respondent 3: To be independent from the work time

3.2 Did the supplier provide you with information concerning the AMS

Respondent 1: I trust in my neighbor and there wasn't so much information

Respondent 2: Yes in he provided me with just enough information

Respondent 3: My neighbor has the same AMS, and they have been a test farm for DeLaval and it have worked well

3.3 Wad there any other AMS on the market

Respondent 1: We looked at Lely but the relation to my neighbor influenced me to invest in Delavals AMS

Respondent 2: Yes, But Lely was the only interesting label

Respondent 3: Lely

3.4 Why wasn't those interesting

Respondent 1: The service, and Delavals AMS have one linear that clean the teat and make a pre stimuli, and it can milk cows with difficult health from a bacterial view

Respondent 2: The sales persons from Lely wasn't trustworthy and I didn't get a serious impression from the organization

Respondent 3: Lelys sales person wasn't so good he blow it a little bit, but Delavals AMS can milk cows manually if some part on the AMS is broken

3.5 Did the service affect the choice of AMS

Respondent 1: Yes, the nearness to service is a safety, you can call 24/7 and that's outstanding, Delaval can connect to the AMS an fix problem without visiting the farm

Respondent 2: Yes it is did, the service personal lives near the dairy farm

Respondent 3: Yes a little, the neighbor hade a little concern but Delaval sorted out

3.6 Was there any technical solution or component on the chosen AMS, that didn't occur on the other AMS

Respondent 1: No

Respondent 2: Delavals feed first principle with smart gates, Lely only have free cow traffic and I don't believe in that

Respondent 3: cell counter OCC, conductivity that sees if it is blood in the milk because of the color

3.7 Did you believe that the AMS had potential to do further development

Respondent 1: Yes

Respondent 2: Yes

Respondent 3: Yes we were told that it would be possible

3.8 Did you believe that it would be better control over the dairy herd with a AMS compared with a dairy worker that milked the dairy cows

Respondent 1: No, I believed it would be worse, because when you milk the cows in the morning you can feel if some one is sick, I didn't believe the AMS would handle that so good

Respondent 2: Yes, the AMS can offer more information and that leads to better control over the dairy cows compared with a dairy worker

Respondent 3: Yes I believed it would be better control and more time for the cows

3.9 Did you believe that the quality on the milk would increase or decrease

Respondent 1: I thought that the quality would fall

Respondent 2: I believed it would be unchanged

Respondent 3: I had heard it could be problems with the quality on the milk in AMS stall

3.10 Did you believe that it would be more or less information to handle, did you think it would be a relief with a AMS

Respondent 1: I believed in a relief in the work load

Respondent 2: More information and from that I gain more control over the herd

Respondent 3: Yes, more information and I believed in a relief in work

3.11 What's the advantages with an AMS

Respondent 1: There is no fixed time, flexible time

Respondent 2: The AMS always do the routines same over and over again, flexible work time, the AMS work all day but don't charge for the over and night time. More information about the dairy cows and the interval for each of the cows can be set to individuals, for example a low producing cow can go to the AMS 2,2 times per day and a high producing cow can go 3,2 times a day

Respondent 3: I am not bound to any specific work time, you can go out and work in the afternoon. Better control on the milk quality

3.12 What's the disadvantages with an AMS

Respondent 1: Alarm that does indicate a stop on the AMS when you are gone

Respondent 2: You have always jour, and the feeling of that you never are completely finished

Respondent 3: Alarm that comes in the middle of the night and you must go out and fix it

4 Customer: How much has the relation to the dairy influence the choice for AMS [1] [2] [3] [4] [5]

Respondent 1: 1

Respondent 2: 1

Respondent 3: 1

4.1 Did you think the quality demand for the milk have increased

Respondent 1: Yes it have successive been better milk, Arla

Respondent 2: No, Milko

Respondent 3: Yes the dairy takes more samples on the milk now, Arla

4.2 Did you believe that the dairy would demand higher quality on the milk in the future

Respondent 1: Wouldn't be surprised

Respondent 2: No

Respondent 3: Yes it would surely be so

4.3 Did you believe that the choice to invest in an AMS would increase or decreases the dependency to the dairy

Respondent 1: No there was no thought about that

Respondent 2: One benefit is that the dairy company can collect the milk any time at the day

Respondent 3: No, because the dish for the milk tank must run before we can milk again

5 Bank: How much did the bank influence the decision for AMS [1] [2] [3] [4] [5]

Respondent 1: 1

Respondent 2: 1

Respondent 3: 5

5.1 Was there any limitations on the loan from the bank to invest in an AMS

Respondent 1: Yes, there were limitations, and the building went more expensive because we extend the heifer section and took the cost running

Respondent 2: Yes, and I am more dependent to the bank now because earlier loans on the farm

Respondent 3: Yes, it were hard to get a bottom loan and I didn't get loan for two AMS because a hade to little areal

5.2 Did the interest rate influence the choice to invest in a AMS

Respondent 1: Yes the interest rate was low when we took the loan

Respondent 2: No

Respondent 3: No

5.3 Did you do or do you do anything to reduce the dependency from the bank

Respondent 1: No, I am more dependent to the bank now then before because bigger loans

Respondent 2: No, we are in an investment phase and we have there for a tight collaboration with the bank

Respondent 3: No, it works fine with the bank we have a dialog

6 Government: How much did the government influence the choice to invest in a AMS
[1] [2] [3] [4] [5]

Respondent 1: 1

Respondent 2: 1

Respondent 3: 1

6.1 Did you believe that the dependence would increase or decreases to the government dependent on AMS or not

Respondent 1: No

Respondent 2: No

Respondent 3: No

6.2 Have the information from the government increased or decreased with a AMS

Respondent 1: No change

Respondent 2: No change

Respondent 3: No change

6.3 Did the investment subsidy influence the choice to invests n a AMS

Respondent 1: Yes to a certain degree

Respondent 2: No nothing to speak about

Respondent 3: Yes, but that part of subsidy is very little here in our region

7 Environment: How much have the biological factors influence the choice of AMS [1]
[2] [3] [4] [5]

Respondent 1: 1

Respondent 2: 1

Respondent 3: 2

7.1 Did you believe that the animal health would be affected dependent of AMS

Respondent 1: No

Respondent 2: No

Respondent 3: No

7.2 Did you believe that the choice of AMS would reduce the influence from biological factors

Respondent 1: No

Respondent 2: No

Respondent 3: Yes a little because the interval of milk time

7.3 Did you believe that the barn environment would be effected with an AMS

Respondent 1: Yes a thought it would be calmer in the barn when the cows can move and act freely, and that the feeding routines would make calmer

Respondent 2: Yes, a calmer climate because the individual cow can eat and drink when it want so

Respondent 3: No not generally but I believe in a calmer barn environment

7.4 Did the cow traffic had any meaning for the choice of AMS

Respondent 1: Yes, Delavals feed first principle and it was possible to get it in my dairy barn

Respondent 2: Yes, we did go for the feed first principle, to be able to adjust how many time a dairy cow would be milked per day should be hard with free cow traffic

Respondent 3: Yes, it was directed cow traffic I wanted

8 Owner: How much have your experience and knowledge effected the choice of AMS [1] [2] [3] [4] [5]

Respondent 1: 1

Respondent 2: 4

Respondent 3: 4

8.1 What was the goal with the organization

Respondent 1: It is a life style, produce so much milk as possible, and earn money

Respondent 2: Good animal health, profitable production

Respondent 3: We are old and have perhaps fifteen years left to run this dairy farm, we want that the dairy farm would develop further and that it would keep running

8.2 What was the knowledge in the organization

Respondent 1: High we have high education

Respondent 2: The dairy com side, we are good at milk

Respondent 3: The dairy cows, it thus ho lay down the ground

8.3 Did you believe that the dependence to another stakeholder would increase or decrees dependent on the choice to invest in a AMS

Respondent 1: No I had never thought about it

Respondent 2: No, but you can say that it have moved from dependency of labor force to other stakeholders, it s more work with the bank now than before

Respondent 3: Yes, the dependency to labor force was the main reason that we invested in a AMS

Appendix 2: Interviews dairy farmers Lely

1 General question:

1.1 How many years have you been a dairy farmer

Respondent 4: tree years

Respondent 5: nine years

Respondent 6: 2 months, been active dairy worker since 1992, 18 years

1.2 How many dairy cows do you have

Respondent 4: 120 dairy cows

Respondent 5: 70 dairy cows

Respondent 6: 112 dairy cows

1.3 How many years is it that you had a AMS

Respondent 4: Tree years

Respondent 5: One year

Respondent 6: Tree months

1.4 How many dairy cow did you have before AMS

Respondent 4: 0 dairy cows

Respondent 5: 100 dairy cows

Respondent 6: 180 dairy cows

1.5 Which type of milk parlor did you have before AMS

Respondent 4: Nothing

Respondent 5: SAC fishbone parlor

Respondent 6: Tied up barn

1.6 What's the yield for the dairy cows now

Respondent 4: 8 000 kg ECM

Respondent 5: 10 500 kg ECM

Respondent 6: 10 000 kg ECM

1.7 how much was the yield before the AMS

Respondent 4: No dairy cows before

Respondent 5: 10 500 kg ECM

Respondent 6: 10 000 kg ECM

1.8 Do you have any employee, how many

Respondent 4: One plus partner

Respondent 5: One plus sister

Respondent 6: Five

1.9 Are there more employee now, compared before the AMS

Respondent 4: No

Respondent 5: No before was it 1,8

Respondent 6: No there is less, 2,5 fewer

1.10 Which dairy do you deliver to

Respondent 4: Arla

Respondent 5: Milko

Respondent 6: Arla

2 Employee: How much have the supply for labor force effect the choice for AMS [1] [2] [3] [4] [5]

Respondent 4: 5

Respondent 5: 1

Respondent 6: 5

2.1 How was the supply for skilled dairy labor

Respondent 4: Not good, very bad

Respondent 5: Decreasing supply for labor force, in general bad

Respondent 6: Hard to find employees how want to work

2.2 Can machines replace human work, and knowledge

Respondent 4: Yes to a certain degree, machines can replace work but not the knowledge, there must always be someone in the dairy barn

Respondent 5: Yes, to a certain level, it can take away the moment of milking but all the rest is left

Respondent 6: Yes, the AMS can replace the human work, but the AMS can't replace a good eye for the animals, the AMs replace the human to 95 percent

2.3 What's the advantages with a dairy worker

Respondent 4: Can read the animals, machines can't read theme exactly

Respondent 5: You get better work time, you get help, more fun at work, and you can do other things self

Respondent 6: A human eye that sees everything in the barn, a dairy worker has other values than a AMS

2.4 What's the disadvantages with a dairy worker

Respondent 4: They can be sick, vacation, salary, the human factor

Respondent 5: Communication, cost money, if something is broken and the employee don't know how to fix it

Respondent 6: Sick, sick children, human factors, cost money for different times at the day

3 Supplier: How much did the supplier effect the choice for AMS [1] [2] [3] [4] [5]

Respondent 4: 2

Respondent 5: 2, Hade low profile

Respondent 6: 4, Lely was clear about what it should cost, Delaval where more on the bite but didn't say any specific cost for the whole project like Lely

3.1 Why did you choose to invest in a AMS

Respondent 4: Experience from milking dairy cows, knows that it is hard work and the body gets sick from it

Respondent 5: To get rid if early and late work times, and the employees was getting ill from milking

Respondent 6: The lack of employees was the biggest reason

3.2 Did the supplier provide you with information concerning the AMS

Respondent 4: Yes, and we where round and looked at other dairy farms also

Respondent 5: No, did send some brochures and posted an quotation

Respondent 6: No, I did call the supplier Lely and push for information, Delaval was better on that

3.3 Was there any other AMS on the market

Respondent 4: Delaval

Respondent 5: Delaval was the only interesting AMS, but there were other smaller labels

Respondent 6: Delaval

3.4 Why wasn't thus interesting

Respondent 4: More expensive to run, cheaper service, free cow traffic

Respondent 5: Not sure about the service from the smaller labels, Delaval didn't listen to us when we told them that we wanted free cow traffic

Respondent 6: The investment cost where to high for the Delaval AMS, Lely was 150 000 kr cheaper, I would have choose Delaval if the AMS were cheaper, Delaval didn't listen to my thoughts considering free cow traffic they only speak about the feed first solution

3.5 Did the service affect the choice of AMS

Respondent 4: No, it was equal

Respondent 5: Yes, but we know when we invested in the AMS that Lely was a man short

Respondent 6: The service is quite similar, but I have fifteen to seventeen neighbors that have AMS from Lely in a radius of 30 kilometers and Delaval only have tree

3.6 Was there any technical solution or component on the chosen AMS, that didn't occur on the other AMS

Respondent 4: No, but I thought that Lely had better control over the udder health

Respondent 5: Yes, steam wash for the liners "pura", the floor in the AMS can massage the weight on the cows and contributes to faster mounting of the liners, the AMS massage fat and protein values

Respondent 6: We choose Lely because of the free cow traffic, but on Delaval there is a robot arm that has the function of a human arm

3.7 Did you believe that the AMS had potential to do further development

Respondent 4: Yes

Respondent 5: Yes, the technical equipment always been developed

Respondent 6: Yes, it always develops

3.8 Did you believe that it would be better control over the dairy herd with a AMS compared with a dairy worker that milked the dairy cows

Respondent 4: Yes, much information from the computer that a dairy worker doesn't see

Respondent 5: Yes, we did know that a cow how started to get ill an infection the udder are detected faster with the AMS

Respondent 6: Yes, if you are by your own you have established routines but if there is more labor the routines are tending to vary more

3.9 Did you believe that the quality on the milk would increase or decrease

Respondent 4: I believed in an increase, because the milk can be separated if it's bad from each of the teat

Respondent 5: Unchanged, but I had heard the quality could drop with AMS

Respondent 6: I thought the quality would drop

3.10 Did you believe that it would be more or less information to handle, did you think it would be a relief with a AMS

Respondent 4: I believed in a relief for the work load, and more information from the computer, but totally less work time

Respondent 5: I knew that it would be more information to handle with a AMS

Respondent 6: Much more information from the computer, but in the end it leads to less hard work

3.11 What's the advantages with an AMS

Respondent 4: To get rid of the milking work, good control on the dairy herd, good individual control

Respondent 5: More freedom for us and the cows, fair work time, less milk leaking where the cows sleep because of more closely milking times

Respondent 6: The AMS work day and night, and it gives me more flexibility

3.12 What's the disadvantages with an AMS

Respondent 4: You always have your, someone always has to be prepared if it happens something, more work with heifers, and the alarms

Respondent 5: The investment cost for an AMS, a limited number of cows that you can have in one AMS, never finished with the routines, big steps when to build for more cows

Respondent 6: Break downs, feels like it is in the hands of the technique

4 Customer: How much has the relation to the dairy influence the choice for AMS [1] [2] [3] [4] [5]

Respondent 4: 1

Respondent 5: 1

Respondent 6: 1

4.1 Did you think the quality demand for the milk had increased

Respondent 4: No

Respondent 5: No, but I try to keep healthy cows to get high quality

Respondent 6: No, but the dairy have more information about to handle quality problems

4.2 Did you believe that the dairy would demand higher quality on the milk in the future

Respondent 4: No

Respondent 5: No

Respondent 6: Yes I believe they can

4.3 Did you believe that the choice to invest in a AMS would increase or decrease the dependency to the dairy

Respondent 4: No

Respondent 5: No

Respondent 6: No

5 Bank: How much did the bank influence the decision for AMS [1] [2] [3] [4] [5]

Respondent 4: 1

Respondent 5: 1

Respondent 6: 2, the bank must believe in the calculation and what you are supposed to do

5.1 Was there any limitations on the loan from the bank to invest in an AMS

Respondent 4: No

Respondent 5: No, good relation the bank

Respondent 6: Yes, to find a balance on the farms opportunities

5.2 Did the interest rate influence the choice to invest in a AMS

Respondent 4: No
Respondent 5: No, it was low
Respondent 6: No

5.3 Did you do or do you do anything to reduce the dependency from the bank

Respondent 4: Small loans and I have built much by my self
Respondent 5: So little loans as possible and I have had good numbers on the production
Respondent 6: No, perhaps in the long run try to reduce the loans to the bank

6 Government: How much did the government influence the choice to invest in a AMS
[1] [2] [3] [4] [5]

Respondent 4: 1
Respondent 5: 1
Respondent 6: 1

6.1 Did you believe that the dependence would increase or decreases to the government dependent on AMS or not

Respondent 4: No
Respondent 5: No
Respondent 6: No

6.2 Have the information from the government increased or decreased with a AMS

Respondent 4: Unchanged
Respondent 5: No deferens
Respondent 6: It is no Change

6.3 Did the investment subsidy influence the choice to invests n a AMS

Respondent 4: No
Respondent 5: No
Respondent 6: Yes

7 Environment: How much have the biological factors influence the choice of AMS [1]
[2] [3] [4] [5]

Respondent 4: 3
Respondent 5: 2
Respondent 6: 2

7.1 Did you believe that the animal health would be effected dependence of AMS

Respondent 4: Yes, a little I believed

Respondent 5: No

Respondent 6: No

7.2 Did you believe that the choice of AMS would reduce the influence from biological factors

Respondent 4: Yes I believed that

Respondent 5: No, but I believed in better control

Respondent 6: No

7.3 Did you believe that the barn environment would be effected with an AMS

Respondent 4: Yes, I believed that the dairy cows would be calmer

Respondent 5: Yes, calmer dairy cows

Respondent 6: Yes, a calmer barn, all the animals wouldn't do the same thing simultaneously

7.4 Did the cow traffic had any meaning for the choice of AMS

Respondent 4: Yes it had, why let the cows line up instead traffic when they can act natural

Respondent 5: Yes we wanted free cow traffic

Respondent 6: Yes we choose free cow traffic

8 Owner: How much have your experience and knowledge effected the choice of AMS [1] [2] [3] [4] [5]

Respondent 4: 2

Respondent 5: 4

Respondent 6: 4

8.1 What was the goal with the organization

Respondent 4: Good yield from the cows, good animal health, and good liquidity

Respondent 5: Reasonable life and develop a fine family farm, and a good profitability

Respondent 6: High production, and cut down a halftime labor

8.2 What was the knowledge in the organization

Respondent 4: It is good but can be better we don't have any education

Respondent 5: Good at dairy cows, less good at economy

Respondent 6: The focus is in the dairy cows, we have a good eye for dairy cows and we have many years experience from them

8.3 Did you believe that the dependence to another stakeholder would increase or decrease dependent on the choice to invest in a AMS

Respondent 4: Less dependent to labor force, but still dependent to the supplier

Respondent 5: Easier to find dairy workers because better work times, less energy waste with Lely and less water consuming

Respondent 6: I believed it could increase because it must always be a constant flow in the barn, is something is broken or if the feed don't reach the cows you lose production, everything have to work all the time

Appendix 3: Interviews salespersons

1 common question:

1.1 How long have you been working as a sales person at DeLaval

Respondent 7: 18 year

Respondent 8: 3 and a half year

Respondent 9: 17 year

1.2 How many customers do you have

Respondent 7: approximately 270 customers

Respondent 8: approximately 500 customers

Respondent 9: approximately 250 customers

1.3 How many AMS have you sold

Respondent 7: 40 to 50

Respondent 8: 16

Respondent 9: 20 to 30

2 Owner: How much do you think the dairy farmers experience and knowledge have contributed to the choice to invest in an AMS [1] [2] [3] [4] [5]

Respondent 7: 4

Respondent 8: 3

Respondent 9: 3

2.1 Are the goal for the dairy farmer's organization interesting to find out

Respondent 7: Yes, that's the most important thing, it is important to listen to the dairy farmer

Respondent 8: Yes, that is very interesting

Respondent 9: Yes it is interesting to find out what they think

2.2 Are the knowledge and experience interesting to find out for the dairy farmers organization

Respondent 7: Yes to some extent can it be

Respondent 8: Yes, just for to know which level you should talk to the dairy farmers when to speak with them about technical stuff

Respondent 9: Yes, how they see things, it can be important when to install the equipment according to the service

2.3 Do you believe the dependence to other stakeholders would increase or decrease for the dairy farmer's organization when to invest in a AMS

Respondent 7: Yes, the most of the dairy farmers will take loan on the bank and then the contact with the bank are important, more contact with DeLaval then before because service, meeting with the government (länsstyrelsen)

Respondent 8: Yes, dairy farmers chase costs in the organization, personal costs, perhaps little to the dairy it will decrease

Respondent 9: Yes, DeLaval has a little leap ahead compared other concurrent and there for the gain a little benefit

3 Employee: How much do you think the supply for dairy worker effects the choice to invest in a AMS [1] [2] [3] [4] [5]

Respondent 7: 4, lower if it is a family farm

Respondent 8: 4

Respondent 9: 3

3.1 How do you think the supply for skilled dairy worker looks

Respondent 7: Good dairy workers are there a lack of

Respondent 8: Very bad, few of them

Respondent 9: Hard to find skilled dairy workers, there isn't any one who want to work at thus traditional times

3.2 Can machines replace human work, and knowledge

Respondent 7: Yes, to a certain degree, but not all of the work, a good dairy worker see much of what's happen in the barn, machines doesn't see everything that's happen in the barn, machines replaces monotonously work for example milking

Respondent 8: A robot is a tool to get rid of monotonously work, but it can't handle to take care of the animal by its self

Respondent 9: Yes, the robot replaces human work but it doesn't have an eye for the animal, and there for cant you make an atomization there without dairy workers

3.3 What's the advantages with a dairy worker

Respondent 7: lugn och ro för djuren, de blir lugna

Respondent 8: The dairy worker have human contact with the dairy cows, and keeps an eye on what's happen with the animal

Respondent 9: A good eye for the dairy cows, can read the animals and see how they are

3.4 What's the disadvantages with a dairy worker

Respondent 7: A dairy worker that get angry fast isn't good, the human factor

Respondent 8: The small supply for skilled dairy workers on the market, the labor costs

Respondent 9: Lazy dairy worker is a disadvantage

4 Customer: How much do you think the relation to the dairy effect the choice to invest in a AMS [1] [2] [3] [4] [5]

Respondent 7: 2

Respondent 8: 2

Respondent 9: 4, the milk price and milk quality are important

4.1 Do you think the quality demand for the milk have raised

Respondent 7: Yes, bacterial, cells and spore, it has became lower acceptance for low quality milk

Respondent 8: No, not higher, Milko have been on the same level for a long time

Respondent 9: Yes, it has became higher demand on the quality for milk, it is a consumer product, grocery

4.2 Do you think the dairy could demand higher quality for the milk in the future

Respondent 7: Yes

Respondent 8: Yes I believe so

Respondent 9: Yes it can for sure rise

4.3 Do you think that the choice to invest in a AMS increase or decrees the dependent to the dairy

Respondent 7: Yes, with a AMS the dairy can collect the milk from the dairy farmer at any time

Respondent 8: Yes, to a certain degree, depended if it is free to collect at any time for the dairy

Respondent 9: No

5 Bank: How much do you think the bank influence the choice to invest in a AMS [1] [2] [3] [4] [5]

Respondent 7: 4

Respondent 8: 3

Respondent 9:1, if the farmer built a new barn the bank would see that the equipment is modern

5.1 Do you think there is any limitation on the bank loan for an investment in an AMS

Respondent 7: Yes, the bank know what a robot would and should cost

Respondent 8: Yes, it dos, and it is hard to finance more than 4 AMS

Respondent 9: Yes, the bank wants a calculation for the investment

5.2 Do you think the interest rate have any meaning for the investment in a AMS

Respondent 7: Yes

Respondent 8: No, dairy farmers who invests in AMS see it in the long run concerning the interest rate

Respondent 9: Yes, there have been more investments now than before, a certain level

5.3 How do you think the dairy farmers decrease the dependency to the bank

Respondent 7: Try to get so good economy in the organization as possible, pay off the loan

Respondent 8: Try to do so much work self, when the invest in new things, to cut down on the cost for workers

Respondent 9: Always contact several banks to get the best interest rate and other conditions

6 Government: How much do you think the government influence the choice to invest in a AMS [1] [2] [3] [4] [5]

Respondent 7: 3

Respondent 8: 3

Respondent 9: 1

6.1 Do you think the dependency increase or decreases to the government dependent on the AMS

Respondent 7: No, unchanged

Respondent 8: Unchanged

Respondent 9: Unchanged

6.2 Do you think there is more or less information to handle from the government dependent on the AMS

Respondent 7: Unchanged

Respondent 8: No, unchanged

Respondent 9: Yes

6.3 Do you think the investment subsidy influence the decision to invest in an AMS

Respondent 7: Yes

Respondent 8: Yes, to a certain level does the money influence, a AMS cost ca 1500` and a milking parlor costs 600` - 700` tkr

Respondent 9: Yes

7 Environment: How much do you think the biological factors influence the choice to invest in a AMS [1] [2] [3] [4] [5]

Respondent 7: 3

Respondent 8: 4

Respondent 9: 3, in free house barn the cows can move free

7.1 Do you think the choice of AMS can reduce the influence from biological factors

Respondent 7: Yes

Respondent 8: Yes, for Delavals AMS I think it can

Respondent 9: Yes, with a AMS you got all the information about milk quality, an more control over the heard

7.2 Do you think the barn environment can be better with an AMS

Respondent 7: Yes

Respondent 8: Yes, the dairy cows are calmer, you can decide you own pace, a calmer barn, you don't need to push around cows

Respondent 9: No, I haven't taught about it

7.3 Has the cow traffic any meaning for the choice of AMS

Respondent 7: Yes

Respondent 8: Yes, from Delavals side is it important. If a dairy farmer have been around and look at other dairy farms and then get stuck on free cow traffic, then the dairy farmer wouldn't listen to our proposal about Delavals feed first principals

Respondent 9: Yes, which philosophy the dairy farmers have is important to listen for

8 Supplier: How much do you think the sales person influence the choice of AMS [1] [2] [3] [4] [5]

Respondent 7: 4

Respondent 8: 3

Respondent 9: 4

8.1 How much information do you handle out to an interest dairy farmer about AMS

Respondent 7: I want to meet the dairy farmer personally. I can send brochures in advance

Respondent 8: I always contact the dairy farmer and make an appointment for a meeting, after the meeting can I send brochures if the dairy farmer don't want them in advance

Respondent 9: If I get a tip about a customer then I take contact with the dairy farmer personally and bring some brochures

8.2 Why do you think a dairy farmer choose to invest in a AMS

Respondent 7: To get a more freely life, don't be so dependent of time

Respondent 8: To make a relief for the work load, they are under economic pressure and invest to get a better economy, the family life is supposed to be better

Respondent 9: To get it a little bit more comfort, and less manual work

8.3 Do you know any other AMS on the market

Respondent 7: Lely, GEA (westfalia), SAC, but there are most of Lely

Respondent 8: Lely, SAC, GEA (westfalia)

Respondent 9: Lely is the brand that I know best

8.4 Is there any difference between the services for different brands on the market for AMS

Respondent 7: I don't have any answer on that because I don't know

Respondent 8: Yes it is a big difference, Lely in my district have only one service engineer and DeLaval have four service engineers

Respondent 9: No it is the same, I have heard that the price for service is the same also

8.5 Is there any technical solution or component on Delavals AMS compared to other brands on the market

Respondent 7: Yes, OCC a cell counter

Respondent 8: Separate wash cup and four other linear that milk the cow, management tools, cell counter OCC, the robot arm have the function of a human arm

Respondent 9: No, but heard navigator is a complement

8.6 Do you think there is better control on the dairy cow with an AMS compared with a dairy worker that milk the dairy cows

Respondent 7: Yes, it a lot of information in the computer

Respondent 8: Yes, there is many function to take samples and register how much the dairy cow are milking

Respondent 9: Yes I believe so, DeLaval have separate milking on every teat, and when one is empty it stops

8.7 Do you think the quality on the milk would increase or decrease with an AMS

Respondent 7: It will rise because the dairy farmers have a lot of information from measuring, the AMS can separate milk with low quality

Respondent 8: I will say that the quality increases

Respondent 9: I will think it increase because the technical equipment

8.8 Do you think there would be more or less information to handle, do you think there is a relief with an AMS

Respondent 7: More information to handle and it is a relief in work load

Respondent 8: More information to handle, and I think when it became a routine it will be a relief in work load

Respondent 9: It will be a relief in the work load

8.9 What's the advantage with an AMS

Respondent 7: To get rid of heavy physical work, and to be more flexible in work time scheduled

Respondent 8: The work time, no disadvantage for the human body, the work environment, all the information about the cows, can take care of the dairy cows better

Respondent 9: Now can the dairy farmers eat breakfast with the family and work later, it became better work time

8.10 What's the disadvantage with an AMS

Respondent 7: You are never free from the AMS

Respondent 8: Alarm risk, the size of the heard group and it leads to big steps when to expand

Respondent 9: I don't think there is any drawbacks, you have to be interested of computers and you have to know about computers