

EFFICIENCY OF THE DANISH SYSTEM

*Applied in the veterinary
clinic*

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SUMMARY

The Danish System is a herd health management system for dairy herds. Veterinarians visit the farmer every week to score cows at risk. Veterinary clinic 't Leijdal was one of the first veterinary clinics that started to work with the Danish System. They are very satisfied with the Danish System and wanted to know if the farmers in the Danish System were receiving better results because of the Danish System. In this study five farmers using the Danish System since May 2010 were compared with five control farms working with a regular herd health management program. The differences between May 2009-April 2010 and May 2010-April 2011 within the two different groups were investigated as well as the differences between the two groups. There were no differences between the year before and the first year of working with the Danish System. The only significant difference between the Danish and control group were the veterinary costs. However, the interview with farmers using the Danish System showed they were very satisfied using the Danish System and their veterinarians.

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INTRODUCTION

Over the years, dairy farms have grown larger and farmers have had to work with the expectation of lower margins. Farmers have increased expectations of veterinarians and expect them to go beyond the treatment of sick animals. The most important reasons for this change in the farmer's expectations are the need for economic results and help with management factors. Also the attention given by the media to public health, welfare and the right way of using medicines, especially antibiotics influence the farmer's expectations of veterinarians (Cannas de Silva et al, 2006). The government and the dairy processors stimulate farmers to produce more consciously. For veterinarians it is important to earn more income from advising, because they receive less profit from selling medicines and treating sick animals.

All these factors come together in dairy herd health management. Within herd health management, veterinarians and farmers work together to ensure sick animals are detected and treated early. Herd problems can be detected in an early stage, which results in reduced costs and an increase in revenues from, for example, milk production and fertility (Brand, Noordhuizen & Schukken 1996).

In 2001, Vollebregt et al. wrote that a strategy in herd health management in the Netherlands was missing. It was not clear what was expected of the parties involved (Vollebregt, Noordhuizen & van der Wal 2001). Kremer et al (2001) proposed a strategy to deliver herd health management. The farm visit should be divided in three stages: animal inspection, farm management inspection and data inspection. According to the farmers and the veterinarians a protocol needs to be established. A yearly planning and reports from every farm visit should be made. These procedures together form a strategy towards herd health management (Kremer, Noordhuizen & Weeda 2001).

The Danish System is a herd health management system that was introduced in the Netherlands in 2010. The system is based on the very structured herd health management system developed in Denmark. It is focussing on the metabolic system of a cow. A herd is divided into five high-risk groups: animals 5-12 days postpartum, animals in top-lactation (50-90 days in lactation), pregnant cows, cows that are dried off, and calves and heifers. The veterinarian visits the farmer once a week. During the visit the vet performs gestation control and controls cows that were not seen during heat. The cows are then scored on Body Condition Score, uterus score, California Mastitis Test, ketone bodies, heels and use of the legs and manure, depending on which group they belong to. Animals with an abnormal score can be treated directly and a week later the treated animals can be scored again to evaluate the treatment. Diseased cows are also examined by the veterinarian. Before each visit the farmers receive a list of all cows in the different groups that need to be examined by e-mail. This is done to make it easier for the farmer to select the cows for control and to make sure none of the cows are forgotten.

The data from all these scores is collected together with data from the CRV and is processed in different computer programs. The result is a complete overview of the herd at herd level (Berger, Vink 2010). Once or twice a year the results are published in a report that can be discussed with the farmer. This report is used by the farmer, the veterinarian and possibly other involved advisers to set goals for next year.

In 2010 veterinary clinic 't Leijdal started to use the Danish System for dairy herd health management. The veterinarians that use the Danish System followed a two-day course how to apply the Danish system to the Dutch farms. In a second two-day course the veterinarians learned how to analyse the data they gathered.

Dairy farmers as well as veterinarians connected to veterinary clinic 't Leijdal, who use the Danish System, are very satisfied with this system. The question that rises from this discussion is: Is there an increase in efficiency using with the Danish System for both farmers and veterinarians?

The objective of this study was to investigate if farmers working with the Danish System herd health management program are getting better technical results than comparable farms in a regular herd health management program. The farmers in the Danish system were also interviewed to get an insight in their satisfaction level of working with the Danish System and their veterinarians.



MATERIALS AND METHODS

This study compared the indicators of the farms working with the Danish System over two years and compares these indicators with the indicators of control farms. The indicators that were used in this study are milk yield, calving interval, removal of cows, somatic cell count, animal daily doses, and veterinary costs. Veterinary costs were subdivided in preventive and curative costs.

The five farmers that started to use the Danish system in May 2010 were involved in this research. For the purpose of this research they were named 'Danish farms'. For each 'Danish farm' a similar farmer was sought, in this research named 'Control farms'.

Selection of 'Control farms' was done by the following selection criteria:

- Participating PirDap
- The 'Control farms' had the same type of herd health management as the investigated farms the year before the Danish System was introduced. For example, one of the 'Danish farmers' was visited every two weeks by the veterinarian before they started to use the Danish System. The 'Control farmer' was also visited every two weeks during the two years that were investigated.
- Same breed
- Same grazing system
- The same 305-days milk yield, a difference of 10% was accepted.
- The same farm size. A variation of 25% was accepted, because there was only a small group of farmers available for selection.

The indicators of the period May 2009 to April 2010 were compared with the period May 2010 to April 2011. A calculation of the differences in indicators between the two years for the 'Danish farms' was made. The first period was named 2010 and the first year Danish System was named 2011 in the following chapters.

Secondly, the differences between the 'Danish farms' and the 'control farms' were calculated. In this calculation the differences in indicators between the two years of the 'Danish farms' were compared with the differences in indicators between the two years of the 'control farms'.

DESCRIPTION OF THE FARMS

All farms were located in the South of the Netherlands near Breda. They were all connected to veterinary clinic 't Leijdal and they were visited by five different veterinarians. The five 'Danish farms' were visited by the three veterinarians that had followed the Danish System courses. One of the 'control farms' was visited by a veterinarian that had followed the Danish system courses. The other four 'control farms' were visited by the two dairy veterinarians who had not followed the courses.

The five 'Danish farms' were very different from each other. The amount of cows ranged from 54 to 145 cows and 305-days milk yield also had a great variation between 7,582 kg and 9,784 kg of milk. There were also differences between housing systems; there were barns build in 1980 and new barns without sidewalls. The way of milking was different too; it

ranged from small milking parlors to automatic milking systems. The control farms were in a similar way also very different from each other.

The data was collected from three different sources; the CRV and PirDap, the clinic and the farmers.

CRV AND PIRDAP

Data used coming from CRV and PirDap includes:

- Overview of fertility for expected calving interval
- Yearly average for milk yield and number of cows during the two studied years
- Udder health overview for somatic cell count to calculate the average somatic cell count
- Sustainability monitor for the removal of cattle to calculate the percentage of cows removed

VETERINARY CLINIC 'LEIJDAL

In the veterinary clinic the following data are collected:

- Overview of preventive and curative costs during the two studied year, from the invoices that were sent to the farmers.
- Prescribed antibiotics and a mathematical model for calculating the animal daily doses

FARMERS

The farmers were interviewed in order to obtain the following information:

- Specification of antibiotics; which antibiotics were used for dairy cows and which for calves
- Their experience with the Danish system by completing the questionnaire

An example of the questionnaire is included in the annex¹. They were asked to grade the subjects: satisfaction in work, ease of work, satisfaction with the results achieved, supervision by the veterinarian and cooperation with the veterinarian over the period 2010 and 2011. In addition, they also had the possibility to write down the advantages and disadvantages of the Danish System, state which system gave the best results and give suggestions for improvements.

All data was entered in Microsoft Excel 2010. A calculation of the means and the differences was done using Excel. SPSS version 16 was used to calculate whether the differences were significant or not by using linear regression analysis.

RESULTS

Table 1 shows the means of indicators in 2010 and in 2011, the difference (Δ) and p-value of the difference. Only the data of the Danish group is compared in this table. It shows that there were no significant differences in indicators between the year before the Danish System and the first year working with the Danish System.

Even though there were no significant differences, milk yield, calving interval and animal daily dose were improved. And all veterinary costs were increased.

Table 1. Differences in indicators between 2010 and 2011 of the farms working with the Danish system

	Mean		Δ	p
	2010	2011		
Milk yield (kg)	8661	8982,2	321,2	0,51
Calving interval (days)	421	410,8	-10,2	0,199
Removal of cows (%)	31,6	34,1	2,5	0,495
Somatic cell count (*1000 cells/mL)	208,9	215,9	6,9	0,874
Animal daily dose	6,234	5,658	-0,6	0,524
Veterinary costs per 100kg milk				
Total	€ 122,39	€ 135,60	€ 13,21	0,64
Preventive	€ 50,29	€ 60,92	€ 10,63	0,45
Curative	€ 72,10	€ 74,68	€ 2,58	0,87
Veterinary costs per cow				
Total	€ 102,72	€ 111,00	€ 8,28	0,64
Preventive	€ 41,70	€ 49,53	€ 7,83	0,36
Curative	€ 61,01	€ 61,46	€ 0,45	0,97

Table 2 shows the absolute differences between 2010 and 2011 for each farm. The numbers 1 to 5 represent the five farmers in the Danish group.

Table 2. Specified differences in indicators between 2010 and 2011 of the farms working with the Danish system

	Mean			p-value
	2010	2011	Δ	
Milk yield (kg)	8661	8982	321	0,51
1	9439	9784	345	
2	9095	9645	550	
3	7587	8028	441	
4	8275	8551	276	
5	8909	8903	-6	
Calving interval (days)	421	411	-10	0,199
1	387	384	-3	
2	413	408	-5	
3	460	433	-27	
4	430	419	-11	
5	415	410	-5	
Removal (%)	31,6	34,11	2,51	0,495
1	30,71	42,14	11,43	
2	31,72	36,11	4,39	
3	23,6	33,33	9,74	
4	35,19	33,33	-1,85	
5	36,79	25,64	-11,15	
Somatic cell count (*1000 cells/mL)	208,93	215,85	6,92	0,874
1	155,1	168,75	13,65	
2	150,56	134,57	-15,98	
3	250,83	237,23	-13,6	
4	271,4	335,5	64,1	
5	216,78	203,22	-13,56	
Animal daily dose	6,23	5,66	-0,58	0,524
1	6,81	6,44	-0,37	
2	5,23	5,67	0,44	
3	5,52	4,83	-0,69	
4	4,79	4,45	-0,34	
5	8,82	6,9	-1,92	

Almost all farmers showed improved results for milk yield, calving interval and animal daily dose. Farmer 3 decreased the calving interval at his farm with nearly 4 weeks. The somatic cell count at farm 4 increased a lot.

Table 3 shows the comparison of the Danish group with the control group. The data in the column 'Danish' represents the differences in indicators between the two years that were investigated; the column 'control' shows the difference in indicators between the two investigated years of the control farms.

Table 3. Differences in indicators of the Danish farmers compared with the differences in indicators of the control farms.

	Mean		Difference	p-value
	Danish	Control		
Milk yield (kg)	321,2	498,6	-177,4	0,657
Calving interval (days)	10,2	9,4	0,8	0,911
Removal of cows (%)	2,51	6,96	-4,45	0,52
Somatic cell count (*1000 cells/mL)	6,92	-20,41	27,33	0,365
Animal daily dose	-0,58	-1,08	-0,51	0,302
Veterinary costs per 100kg milk				
Total	€ 13,21	€ -3,42	€ 16,63	0,23
Preventive	€ 10,63	€ -4,67	€ 15,30	0,024*
Curative	€ 2,58	€ 1,24	€ 1,34	0,879
Veterinary costs per cow				
Total	€ 8,28	€ 2,84	€ 5,44	0,679
Preventive	€ 7,83	€ -2,64	€ 10,47	0,082
Curative	€ 0,45	€ 5,48	€ -5,03	0,541

* $p < 0,05$

The only significant difference was preventive costs per 100kg milk. On control farms the indicator milk yield, somatic cell count and animal daily dose improved more than on the Danish farms. The total veterinary costs per 100kg milk decreased.

Table 4 shows the outcome of the interview of the farmers. The minimum, maximum and mean of the grades given in 2010 and 2011 are given.

Table 4. Experiences of the Danish system farmers

	2010			2011		
	Mean	Min	Max	Mean	Min	Max
Satisfaction in work	6,8	6	9	8,2	7	9
Ease of work	7,4	6	9	7,8	6	10
Satisfaction with the results achieved	6,2	5	8	7,4	6	8
Supervision by the veterinarian	7,4	7	9	8	7	9
Cooperation with the veterinarian	8,2	7	9	8,2	7	9

All farmers marked the experiences in 2011 better than in 2010. The most important improvement was satisfaction in work. All farmers were satisfied with the cooperation with their veterinarians; there was no difference between the two years.

DISCUSSION

USE OF CONTROL GROUPS

The design of this study consisted of two groups, the Danish farms and control farms. The differences over two years, between May 2009-April 2010 and May 2010-April 2011 were studied. The main question was raised by the veterinary clinic; they were interested to know if the Danish system farmers were achieving better technical results after they switched to the Danish system. It was hard to prove that a change in results between the two years was caused by the switch to the Danish system, because there were a lot of reasons that influenced the farm results. For example, every year the milk yield of cows increases due to genetic improvements (Funk 1993). Other factors like feeding costs and milk prices are also influencing factors from the management side of farmers (Evers et al. 2009). Especially the increase in feeding costs in 2010 might have influenced the data. There were only ten farms used in this study and there were a lot of differences in and between the two groups.

It was a difficult task to find good matching control farms. To obtain sufficient information from the farms, it was necessary that they were participating in PirDap and that they were in the same herd health management system as the farms they were compared with. Another requirement was that the number of cows and milk yield made the offer of the control farms small and they had to be willing to participate in the study. The farms that were closest to the Danish system farms were chosen, but they were still very different from the Danish farms. During the interview with one of the control farms it turned out that the farm switched from a conventional milking parlor to an automatic milking system in February 2010. This caused an increase of 1864kg on the yearly average of milk production between the two years. For this reason also a calculation was made of the difference between the control and Danish farm without this specific farm. However, the difference still was not significant.

The control group was used to partly take away some of these issues. The control farms that were chosen were equivalent to the farms in the Danish group. If the indicators of this group also improved, it was not possible to ascribe the improvements of the Danish group to the Danish system without any considerations. The main reason for the improvements was hard to trace. The results showed only one significant difference between the Danish and control group. It is still possible the Danish system was the cause of some improvements; however, there were no significant changes. Therefore, it cannot be proved in this study that improvements were due to the Danish System.

REMOVAL PERCENTAGE

Removal of cows was a hard subject. The number of cows removed did not influence any results. However, it would have been interesting to know how many cows were removed by involuntary reasons, before 100 days in lactation.

Voluntary removal of cows was influenced by a lot of reasons, not only depending on the cow. A period with a high milk price could negatively influence the removal of cows because, in this case, farmers tend to keep every cow as long as possible to deliver as much milk as possible. Another influencing factor is the end of the quota year. When a farmer has

already fulfilled his quota, he will be likely to remove cows which are not necessary on the farm anymore (Gosselink et al). The reverse situation applies as well, where a farmer needs to fulfil his quota, he will be likely to keep all the animals that are still producing milk, even though the milk yield is low. Another influencing factor is the price of slaughter cows (Van Arendonk, 1985). Farmers are more likely to remove cows if the price for slaughtering is good.

The sustainability monitor in PirDap shows the total lactation days during the whole lifespan at the time of removal. Not all farmers had data to tell exactly how many days the cows were in lactation at time of removal. If a farmer did not have this data, a calculation was made to determine the days in milk at time of removal. The lactation number and average calving interval was used in the calculation. These calculated days in milk are not very reliable.

PirDap does report reasons why a cow is removed from the herd. This data can be used to investigate the main reason of removal. A problem with this data is that not all farmers provided that information. Another problem with the reason of removal is to determine if the reason given by the farmer was the direct or indirect reason. An example; some cows were removed because they had fertility problems, however, it is possible that this cow also suffered a high somatic cell count. If after 120 days in milk the cow does not get pregnant, it will be removed with the cause of fertility problems although there were underlying problems with the same cow.

FERTILITY

The farmers in the Danish System group said they had better results according to the 5-12 days postpartum cows. If a cow does not start up well, it was seen early due to the weekly visits of the veterinarian. A diseased cow was seen early and treated accurately. A week later the same cow was checked and it could be cured or would be treated again. As a result, one can expect that it will be easier to get the cows pregnant again. This prediction cannot be seen in calving interval yet, probably because of the gestation length. Although in table 1 can be seen that the calving interval is already shortened.

If cows start up better, a higher milk yield is expected. This is not seen yet in the results of milk yield.

PREVENTIVE AND CURATIVE COSTS

Both veterinarians and farmers expected an increase in preventive costs and a decrease in curative costs. However, the results did not show a significant difference in the costs between the two years.

In the results can be seen that there was only one significant difference between the Danish and control groups; the difference in preventive costs per 100 kilograms of milk yield. The difference in preventive costs between May 2009- April 2010 and May 2010-April 2011 was significantly higher in the Danish system group. The increase in veterinary costs was 20%, which is not a big rise in costs. This is not surprising as the veterinarians come almost every single week for a preventive visit, compared to the control group with only one visit every

four weeks. The costs of a Danish System subscription were higher than the costs of a subscription for a four-weekly visit. Another logical conclusion was that during a month a veterinarian spends more time on a Danish System farm than on a control farm for preventive actions. This explains why the preventive costs were increased.

The billing system of the veterinary clinic has to be pointed out as it might have influenced the curative costs in the Danish system. During every visit of the farms all cows in risk groups were examined, and treated if necessary. In the invoices, all treatments of cows in risk groups were called curative. That might have been a reason why the curative costs did not decrease.

Another point for discussion is the early detection of diseased cows, because the consequent way of examining and checking all cows at risk. If the diseased cows did not show any signs of discomfort, a farmer would not present these cows as diseased cows. It was questioned whether when these cows were treated it was a preventive or curative treatment. If these treatments were called preventive, the total preventive costs would have increased even more and the curative costs would have decreased.

DIFFERENCES BETWEEN FARMERS

The type of farmer was also an influencing factor in the results. The farmers interested in the Danish system were already in a herd health management program and they wanted to get advice from their veterinarian. One of the five Danish system farmers was already visited every two weeks by the veterinarian for pregnancy control and other support.

ACHIEVEMENT OF INDIVIDUAL GOALS

The farmers had different goals they wanted to achieve by working with the Danish system. Together with the veterinarian that assists the farmers the goals were discussed.

Farmer 1 wanted to improve the fertility of his herd, mainly the calving interval and insemination number. The results show that the calving interval was improved with three days. STO fertility shows also an improvement of insemination number from 1,99 to 1,88. Farmer 2 wanted to decrease the number of cows suffering a abomasum dislocation and also decrease of ketosis in postpartum cows. The billing of the veterinary clinic shows that between May 2009 and April 2010 five cows were treated for an abomasum dislocation. Between May 2010 and April 2011 they only had to fix one abomasum dislocation. During the two years two cows were treated for ketosis, so it seems there is no improvement here.

Farmer 3 had to improve all indicators, he had serious problems and the farmer did not have enough time to do everything as good as he should. Especially his fertility registration had to improve a lot. These were the main reasons to start with the Danish System. This farmer made a lot of improvements, looking at the indicators. The milk yield improved with 441 kg in 305 days average, the calving interval was decreased with 27 days, decreased somatic cell count and decreased in animal daily dose. However, the percentage of removal of cows increased. The specification of cows removed shows that between May 2009 and April 2010 14,2% of the cows have been removed before they were 100 days in milk. Between May

2010 and April 2011 14,8% have been removed before they were 100 days in milk. This difference is very little compared to the increase of removal percentage of 9,7%.

Farmer 4 had troubles with removal of cows, the percentage was too high. And most important, the son of farmer 4 decided quite late to take over the farm. He did not have much knowledge and experience in dairy farming. He wanted some help from the veterinarian and that is why they decided to start with the Danish System. In the results in table 2 can be seen that the percentage of removal decreased. The percentage of cows with less than 100 day in milk that were removed has increased from 9,5% to 11,1%.

At the farm of farmer 5 the veterinarians had too much work to do every visit. They started with a visit once every four weeks and later they visited the farm every two weeks. The farmer likes to do everything as good as he can. In 2010 he populated a new stable. The technical results were satisfying, but he had too many diseased cows and he wanted to improve udder health. Table 2 shows a decrease in somatic cell count. Other indicators did not improve. The farmer made an overview of cows he treated. The data showed treatments between January 2010 and October 2011. For this research only the data between January and April 2010 and data between January and April 2011 were used. It shows a decrease in mastitis treatments from 19,8% in 2010 to 8,5% in 2011. Probably this difference was also due to the new stable. Simultaneous with the decrease in mastitis treatment there was an increase in leg problems. The farmer changed the bedding of the cubicles from deep litter to rubber mats. Treatments of inflammation of the leg increased from 1,9% in 2010 to 3,4% in 2011 and treatments of thickened heels increased from zero cases in 2010 to 1,7% in 2011 in the same period.

SATISFACTION OF FARMERS

To get an insight in the farmers' views of working with the Danish system a short interview was made. Farmers were asked to give grades for five criteria. A great variation could be seen in the minimum and maximum scores. But the averages in 2011 are higher than in 2010. So it can be said that the farmers were more satisfied in April 2011 after working a year with the Danish system. The only criterion that did not change was cooperation with the veterinarian. That one remained high.

Another part of the interview were the advantages and disadvantages of the Danish system the farmers experienced. The most important advantage was that the farmers got the feeling that they were closer to the cows, especially the postpartum cows were better controlled. All farmers wrote this down as most important. Other things mentioned were a pleasant way of keeping up with all the work, good evaluation of diseased and treated animals, more pleasure in work and better technical results. Lievaart et al. described that access to routine screening of the herd and solutions to problems are the most important reasons to participate in a herd health management. This study showed that these were also important reason for the satisfaction of working with the Danish System.

The biggest improvements were seen in the postpartum cows. There were less cows suffering from ketosis and the postpartum cows were starting up better. Most farmers also had seen improvements in calving interval and the body condition score of the herd was much more uniform. Further, farmers experienced fewer cases of downers and chronic

endometritis. They also said that they did not need to call the veterinarian that often for an extra visit.

However, they also experienced disadvantages of working with the Danish system. Before every farm-visit the farmer received a list of cows that need to be examined so he can separate them. Too often these lists were not complete and then the farmers need to invest more time in administration. Also the higher veterinary costs were mentioned as a disadvantage. Lievaart et al. described in 2008 that the farmers thought the biggest disadvantages of a herd health management system were the costs and the time a visit takes. Farmers thought the hourly rate was too high for the system that still does not work properly. Farmer and veterinarian needed to make sure the visit are efficient; otherwise the hourly rate is too high. This can be achieved by making good working lists for the farmer so he can separate the cows that needed to be examined. A good advice would be to think of logical walking ways between the different groups. The veterinarian should take all medicines and materials with him that were needed almost every visit, so he does not need to go back to his car that often. Farmers admit that they do not have any problems paying for good treatments and veterinary actions.

Some farmers asked themselves if it was possible to do the scores of Danish system themselves. They think that it is easy to do after they have seen it a couple of times. These advantages and disadvantages made some farmers wonder, if there is not another way of achieving goals and why it is so expensive if it does not work well.

Derks et al. 2012 also describes that the main reasons for farmers to not participate in a herd health management system are the expected costs, low returns and that it is time consuming (Derks et al. 2012). This corresponds with the results in this study.

VETERINARIANS

Not only the differences between the investigated farms made it hard to compare them. There were also differences between veterinarians. The veterinarians used different treatments for diseased cows and severity of disease before starting a therapy, when they started to use the Danish system. During the study, six veterinarians worked with dairy cows in veterinary clinic 't Leijdal. Three of them worked with the Danish system farms; one of these three also advised a control farm. The other four control farms were advised by two other veterinarians. It could be that some differences between the two types of farms can be explained by the differences between the veterinarians.

One of the veterinarians working with the Danish system admits she looks more conscious at the dried off cows at every farm she advised. She also said that she is more focused on body condition score since working with the Danish system.

Veterinary clinic 't Leijdal has promoted the Danish system at diverse places; at their website but also in magazines meant for farmers and their sector. This way many farmers read a lot about the Danish system. The veterinarians said they saw that other farmers present postpartum cows earlier than before. This also influences the work at a farm not in the Danish system.

ECONOMIC RESULTS

It would be interesting to look at changes in the economical results since working with the Danish system. It was assumed that working with the Danish system was more expensive because of the raise in veterinary costs. Important for the farmers are the revenues. If these are bigger than the raise in veterinary costs there was no problem. Of course it was possible to look at the revenues, but the farms cannot be compared anymore. Not only the indicators and veterinary costs were influencing factors, feeding costs, buildings, land and so on were needed to be taken in such calculation. Each farm was unique in that way and that was what makes it hard to compare them. It could be interesting to look at differences in revenues between the two years, but one should know what the most important influencing factor on the revenues is. It could be that the milk price or feeding prices were leading in decisions made by farmers and decrease in milk yield could be explained by these reasons and not by looking at the way of herd health management.

In this study it was not interesting to make calculations of economic results, because the indicators did not show improvements. Better economic results could have another origin than improvements because of herd health management.

For economic calculations it was probably better to look to differences in one farm and not between different farms, because that is what is most important for an individual farmer.

The Danish System BV has introduced Simherd. That is a program used in Denmark to make economical expectations. SimHerd simulates a model of a dairy herd. It has been developed and applied in the scientific field of Animal Health Economics at the Faculty of Agricultural Science of Aarhus University (<http://www.simherd.com/>). In the computer program a model of a farm can be made by putting data in it. The data comes from all the scores of the clinical examinations. This calculation program could be used to make a calculation of expected revenues. The difficulty is that for the most precisely expectations a lot of data needs to be imported in SimHerd.

IMPROVEMENTS

The study design was not ideal because it works with a real situation and not an experimental situation. The farms were not equal to each other and cannot be made the same. That was what made it hard to compare them and to take the right conclusions. To improve this study a whole new study design must be created. The farms need to be equal in the start situation. This means that the farms that participate in the research have to be made equal in housing, feeding, milking system etcetera. Both groups need to do everything the same for a certain time period, say a year. This includes feeding, milking, veterinarian visits and so on. After that year the groups and farms are made comparable. This takes a lot of time and money and will be hard to achieve. Although this might be the most ideal study design, it is very expensive and will not be performed easily.

Also the groups that are investigated are very small, only five farmers each that also differ a lot. It would be better if a study like this is done with larger groups.

It would be interesting to do this research again in a couple of years. There are more farmers working with the Danish System that can be investigated. It is quite possible that in two

years more differences can be seen, because the switching period is then over. Also the first reports are created and specific advice is already given to achieve new goals.



CONCLUSION

Overall conclusion is that the five farmers working with the Danish System achieved all or at least some of their goals. It was hard to say that the improvements were caused by the Danish System, but it shows why the farmers were satisfied working with the Danish System. Although farmers in the Danish group saw great advantages of working with the Danish system, the results above only show one significant difference in indicators. The only significant difference is seen in the difference between the Danish and control group for the factor preventive costs per 100kg milk. The small group that was studied could be influencing the significance of the results.

In the tables can be seen that most indicators are improved. Unfortunately the differences are not great enough to make a significant change and not all indicators of all farms are improved. There were lots of explanations to think of why the expected results cannot be shown. The most important reason might be that it is too early to expect good results. The period that is studied included the period of starting up of using the Danish system. In this period the veterinarians and farmers needed to get used to working with the system. The veterinarians needed to train themselves to score at the same way and to use the same treatment and with the farmers they had to find out what was the easiest and most efficient way of examining the herd.

The farmers were satisfied working with the Danish system, looking at the grades and advantages that were called. Also most farmers had achieved better results. However, some farmers were wondering if it was really the Danish system that caused the improvements. Also the frustrations about the working lists and increased preventive costs cannot be denied. The most important task of the veterinarians is to communicate about the disadvantages the farmers experienced. They need to convince farmer of their value in herd health management.

A recommendation is to repeat this research in a couple of years to investigate if the indicators of farms working with the Danish System are improved.

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INTERVIEW: EXPERIENCES OF THE FARMERS

Differences since working with the Danish system

Please answer the following questions by grading them from 1-10

	apr-10	apr-11
1. Satisfaction in work		
2. Ease of work		
3. Satisfaction with the results achieved		
4. Supervision by the veterinarian		
5. Cooperation with the veterinarian		

Advantages of the Danish system:

In which area the best results are achieved:

Improvements for the Danish system:

Space for other comments:

Thank you for your cooperation