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Improving Profit in Dairy Production by Benchmarking-Experiences from Southern Sweden

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Abstract: Biological and management factors influencing economic performance in dairy production were studied using information from farm book accounts, official Swedish milk recording, the dairy plant and from interviews with the dairy farmers. Sixty-eight dairy farms from the south of Sweden were included in this field investigation. Statistical analyses were made using correlation analysis and multiple regression analysis. There was a great variation in net return in milk production and feed costs were slightly more than one third of all costs (capital costs excluded). The use of beet pulp had a positive effect on net profit. Labour costs and variable costs were of the same magnitude. The feeding costs of dairy cows are focused by the advisory service but more attention should be paid to other factors, such as service to the dairy unit or management traits like herd replacement.

Key words: Milk production, management, milk economy

INTRODUCTION

The economic pressure on milk production in Sweden and throughout the world has increased, particularly during recent years. The gross margin from milk production in Southern Sweden has been decreasing since the beginning of the nineties[1]. The milk processing industry has difficulties in allowing the producer price to follow the inflation rate. The challenge for both the dairy farmer and the extension service is to combine good animal husbandry with a good economic output.

Traditional tools in Swedish extension services for economic management on dairy farms have been to use results from the accounts. This has the advantage that the farmer knows the economic results, especially for good tax planning. One disadvantage is that the result is based on historical data and there is little or no information about the biological traits involved. Another method has been to use results from the official Swedish milk records, sometimes in combination with monitoring the feeding in the herd[2]. This service concentrates on biological traits. Large dairy herds in Sweden have also joined the extension service operated by employers union. This organisation offers economic advise and accounting for different types of farms[3]. The service concentrates on economic factors and management, although the advisors have a great deal of experience in agricultural production and are also able to analyse biological aspects.

In the beginning of the nineties, a new advisory tool was constructed by advisors in the south of Sweden that combines both biological traits and economic traits in dairy production analysis. The tool consisted of a computer software program[4], which presented key figures for biological and economic factors in milk production. The software was developed in Microsoft Access 7.0 for PC and later the software was introduced to the rest of Sweden through the Swedish Association for Livestock Breeding and Production[5].

The software was one part of the concept. The other part was the participation of the dairy farmers in an extension course consisting of at least four different evening meetings during the winter. The purpose of the course was to make the farmers more aware of the economy of milk production and also to analyse and discuss the output from the computer results. One of the goals of the course was to make the dairy farmers think in terms of net income instead of high milk yield. Another goal was to point out the weakest links in their milk production system. The meetings were organised around different themes which the course leaders decided together with the farmers. The results from the data processing were also discussed at these meetings. The name of the course was 25-öringen which states a potential improved earning of 0.25 SEK (equals to 0.027 €) per kg milk. The whole course is an example of benchmarking in milk production.

The purpose of the following study was to match biological traits from the official Swedish milk recording with management traits included in the software to analyse which traits explained the profit of a dairy farm.

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The underlying hypothesis was that high milk production per cow and year was not the only factor explaining a good economic result in milk production.

MATERIAL AND METHODS

The study was based on field data. An analysis was made from results obtained from the dairy farms whose farmers joined the course and the extension program during the winter season of 1995/96. The course was organised by the Southern Sweden Extension Service. The data used originate from the computer results, farm accounts, official Swedish Milk Records, the dairy company and interviews with the farmers.

Altogether 68 dairy farms were studied, all from Southern Sweden.

Input to 25-öringen: The farmers were asked to send material from their accounts to a central computer, either on paper, a floppy disc or by E-mail. In order to be able to compare the data from the accounts, the individual number of accounts was minimised. The costs of the feedstuffs produced at the farm correspond to accounted production costs. Before entering these figures into the computer, a manual check was made to see if the data were realistic.

The data obtained from the official Swedish milk records were retrieved by modem or floppy disc. The important figures from the milk records were kg produced milk, fat content, the somatic cell count and the numbers of cows in the herd.

If the costs were assumed to come from different sources, for example, the cost of electricity came primarily from that required for milk and egg production, then the farmer and the advisor had to estimate the proportion of the electricity costs from the dairy enterprise. Economic key figures were calculated per kg milk.

Complementary input: In this investigation, inputs to 25-öringen were supplemented with data on biological traits of the dairy herd (calving interval, number of AI per service, age at calving and herd replacement rate). The farmers were interviewed by telephone with respect to herd health and if the dairy cows got beet pulp or raw feeds. The dairy farmer were also interviewed about their use of the extension service(e.g for feeding, individual mastitis, software) and also to check the figures from the farm accounts. Information about the total milk delivery and cell counts were collected from the dairy processor.

Statistical analysis: Statistical analyses were made using the SAS Statistical Programs[6]. The data were used to calculate mean values and standard deviations. In order to determine the most important factors affecting the net result, correlation analysis was used and from this a variance analysis was carried out to identify the factors influencing the net result.

RESULTS

Description of the herds: A description of biological traits and economic traits (SEK per kg milk) of the participating herds was made using the official Swedish Milk Records (Table 1 and 2). The relative importance of the different costs is shown in Fig. 1.

Correlation analysis: Correlation analysis were completed for all the variables measured. All variables were calculated per kg milk. In Table 3 the correlation between net profit and the variables found to be significant are presented. The variables found to have highly significant correlations with net profit were total costs, labour costs and variable capital costs.

Multiple Regression analysis: The influence of net return per kg milk (including income from slaughter and less favoured area support) and the income from only milk were analysed using the SAS procedure of multiple regression analysis and the backward function. The backward function includes only significant factors in the model[7].

Factors with significant influence on net return per kg milk were the cost of labour per kg milk, the cost of roughage per kg milk, the variable cost per kg milk and the total milk delivery to the dairy plant ($p<0.1$). The explanatory rate was 93%.

Factors with significant influence on the milk income were milk production per cow and year, milk thrown away and the replacement rate ($p<0.1$). The explanatory rate was 54%.

Table 1: Mean values and standard deviation of biological traits of the participating herds Comparison with the official Swedish milk recording

Parameters	Mean	SD	Official Swedish milk recording
Herd size	48.9	31.8	28.3
Age at calving, months	28.8	3.27	28.9
Calving interval, months	12.9	0.48	12.9
% of replacement	40.6	9.11	37.4
Kg ECM*	8728	833	8033
Cell count	223	71	209
Milk not delivered, kg milk	822	410	Not known

* Energy corrected milk[16]

Table 2: Economic traits. Value in SEK per kg milk (1 SEK = 0.11 ecu)

Parameters	Mean	SD	Minimum	Maximum
Net profit	-0.39	0.50	-1.43	0.54
Milk price	2.82	0.13	2.46	3.03
Total feed cost	1.52	0.19	1.13	2.05
Labour cost	1.15	0.32	0.52	1.82
Variable costs	0.39	0.06	0.28	0.52
Total costs	3.63	0.54	2.59	4.83

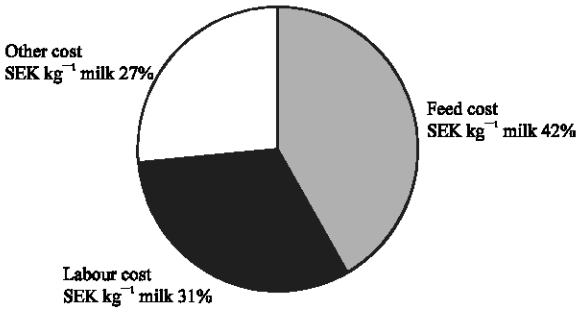

Fig. 1: Costs per kg milk, divided in feed cost, lobour cost and other costs. Other costs include costs of administration, maintenance of milking and feeding equipment, AI milk recording, veterinary costs and variable costs

Table 3: Coefficients of correlation between milk net and parameters with significant influence

Level of significance	***	**	*
Total cost -0,91			
Variable cost	-0.91		
Labour cost	-0.81		
Veterinary cost	-0.56		
Variable costs	-0.55		
Total milk delivery	0.54		
Total feed cost	-0.51		
No. of cows	0.49		
AI cost	-0.44		
Cost of roughage	-0.41		
No of hectare		0.39	
Cost of administration		-0.35	
Milk yield, kg per cow according to delivery to dairy plant		0.33	
Cost of power		-0.33	
Use of beet pulp			0.25
Cost of base feed			-0.28
Labour time per cow			-0.28
Cost of maintenance			-0.26
Use of extension			-0.31
No. of cows			+0.28
kg ECM			+0.26
No. of A.I			-0.26

DISCUSSION

General description: The participating dairy farms in this investigation had a herd mean size of 48.9 cows compared with 33.1 cows which was the average in Sweden during the same period[7]. A comparison with the official Swedish milk recording showed that they also had a higher milk yield (8728 kg ECM) than the average dairy farm in Sweden (8033 kg ECM) during the same period[7]. Participation in the course was voluntary for the farmers and hence it is possible that the managers of larger dairy herds were more economically interested and therefore joined the course. However, there was a great variation in the biological traits of the participating herds.

Some herds in present investigation vary greatly in their milk yield between that given in the official Swedish Milk Records and that delivered to the dairy processor-milk not delivered in Table 1. There are several explanations of this; some milk can be consumed by the calves, milk with antibiotic residues or milk from sick cows is not delivered, or the retained milk yield has been overestimated because the farmer wants to have a high average yield. Feed costs were important but the other costs were not negligible (Fig. 1 and Table 2).

Correlation analysis: The correlation analyses show that there are several variables that significantly affect the net return per kg milk. Not surprisingly, there are highly negative significant correlations between total costs, variable costs and labour costs and net return per kg milk. In extension services, much of the focus is concentrated on feeding and feed costs but there are many other costs that can influence the net return, for example, veterinary costs, other costs, maintenance costs of the milking and feeding equipment, cost of power and the cost of AI The total feed costs make up a great share of the milk sales but, on the other hand, the other costs are, if taken together, also of importance. Management traits with positive correlations with milk net return per kg milk were herd size, farm size (hectare) and kg milk yield positive per cow. The use of beet pulp had also a per cow. The use of beet pulp had also a significant positive correlation with the net result. Negative significant management traits were labour time per cow, use of extension and number of AI (Table 3). The negative correlation between the use of extension and milk could be explained by dairy herds with problems making more frequent use of extension.

Multiple Regression analysis: The result from multiple regression analysis shows that both the cost of labour per kg milk and total milk delivery are of importance and hence this demonstrates the importance of scale in milk production. Focusing on only milk income demonstrates the effect of both high milk production and high delivery of the milk to the dairy plant. The significant influence of milk thrown away could explain differences between the official milk recording and the delivery to the dairy plant.

General remarks: On average, the dairy producers in this investigation have a zero result before the capital cost. Although some dairy herds show a positive result, the figures indicate that dairy herds in general must improve their result to be able to continue operation in the next few years.

Labour costs were negatively correlated with net profit per kg milk. Labour and variable capital costs had the highest ranking of the negative correlation coefficients significantly affecting net profit (Table 3).

The multiple regression analysis, clearly showed a scale effect in milk production. However, it might also be due to the fact that the farmers in this investigation had to declare their own working time and perhaps dairy farmers with small herds overestimate their working time or have difficulties to differentiate between working time and leisure time. Larger herds pay salaries for the workers, which makes it easy to calculate the labour cost.

The feeding factor is overestimated: It was surprising that the total feed costs per kg milk or all the feed cost parameters did not have more influence in the correlation analysis. Olsson[8] investigated the effect of 25 factors on Swedish milk production profits and found 14 factors with influence: milk yield per cow and year, herd size, hectare land, total hours of labour per cow, the age of the farmer, the value of economic buildings per cow, residue value of the machinery, hectare yield of roughage and barley per hectare, share of milk income of the total income and support area. Among those factors with no significant influence on profit were kg roughage per cow and grain and concentrate per cow. In present investigation, the total feed costs per kg milk, cost of roughage per kg milk and cost of base feed per kg milk had a significantly negative correlation on net profit. Dairy herds using beet pulp had a significant positive correlation with net profit. In both investigations, milk yield had a significant effect, probably because it is important to achieve a high milk yield but the feeding strategy to achieve the high milk yield is of minor importance.

The influence of herd size: Several investigations have shown that a bigger herd size is one way to achieve a better profit in milk production[9-11]. Nörring concluded that the technological development during recent years has resulted in advanced technique with increased demands for skilled managers. Larger farms have an advantage because they are able to spend more time on education than smaller farms. They can spread the cost over a larger volume of production. However, Olsson[8], found that herd size had a negative significant influence on profit. This was explained by the fact that older farmers achieved a high milk production with a lower labour expenditure with respect to time. Thus, the high milk yield per cow meant that the cost per kg milk was spread over more kg milk.

The tool: The software described in our investigation can be described as being a type of Management Information System (MIS), namely a Managerial Accounting System (MAS). The difference between this system and a financial accounting system is that it pays more attention to the future than to the past[12]. One advantage of benchmarking is that it is an ongoing process and can easily be changed when the environment changes by including or excluding different parameters. One of the reasons to undertake benchmarking is to compare the performance of dairy production in an objective manner, another is to identify best practises. It is very important in benchmarking to identify the core issues, establish the baseline internal performance levels and information, analyse information and benchmark results and implement changes in existing processes[12].

A disadvantage with the computer software in this investigation is that it takes approximately 4 days of computer work to enter and calculate the input to the software, mainly from the farm accounts[13]. This point may be crucial for a farmer having a negative attitude towards computers. According to several investigations, negative emotional reactions towards computers influence, the degree to which they can effectively be utilised[14]. Another disadvantage is that the farmers must be objective with their own figures and not overestimate or underestimate them. According to our results, it is very important to monitor and control the dairy production in order to be able to survive after the next ten years. The problem cannot only be solved by increasing the herd size.

The computer software in this investigation is an example of software that utilises the ordinary record-keeping systems on the dairy farms. The problem with the official Milk Records is that it is data-rich but information-poor[13]. Lacroix *et al.*[15] point out that a in a herd of 40 cows, a monthly report from the official milk-recording can contain up to 3500 data.

CONCLUSIONS

- AIThere was a great variation in net return in milk production.
- AIThe feed costs were slightly more than one third of all costs (capital costs excluded).
- AIThe use of beet pulp had a positive effect on net profit.
- AILabour costs and variable costs were of the same magnitude.
- AIThe feeding costs of dairy cows are focused by the advisory service but more attention should be paid to other factors, such as service to the dairy unit or management traits like herd replacement
- AIHerd size above the Swedish average was favourable in net return per kg milk but there were a lot of other important factors which affected net return per kg.

Dairy farmers should pay more interest to ordinary business management and be very aware of all costs in dairy production, not just feed costs. It is important to have an extension service which is not just specialised in feeding problems but also in management and economics.

Appendix 1.

Variables in the investigation
Income from support "Less favoured areas"
Income from slaughter
Income from milk
Total feed cost
A.I cost
Veterinary cost
Herd turn over
Labour cost
Cost of power
Cost of insurance
Cost of administration
Cost of maintance
Cost of concentrate
Cost of top concentrate
Cost of other feedstuffs, e.g mineral feed
Cost of roughage
Total annual milk yield
Cell count
Herd size
Milk production per cow and year
Energy corrrected milk per cow and year
Calving interval
Numbe of A.I.
Age at first calving
Herd replacement
Milk production per cow and year delivered to dairy plant
Milk thrown away
Variable cost

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