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ECONOMIC CALCULATIONS RELATED TO A MILK-HOUSE INVESTMENT

Brigitta ZSOTER

Abstract: *In my study I am intending to describe processes related to the replacement and procurement of a milking plant's milking equipment on a cattle farm by means of economic calculations. Investing into development is an indispensable step since it is in the company's interest to close up to the competitors. For this, I am aiming at choosing the suitable investment project considering the economic calculations. Nowadays, in the field of milk production it is difficult to achieve an economical operation because besides the expensive production, purchase prices are also low. The company can take some measures in order to increase its incomes. They can increase the amount of the product, or reduce the production costs. Both solutions are possible with the modernization of the equipments in the milk-house. The management have to decide over two offers. Using my calculations, I chose which offer meets the investors' expectations according to the economic indicators.*
Keywords*: cattle farm, milk-house, milk producion, investment, economic calculations, indicators.*

1. INTRODUCTION

Developments related to the milk-house have been planned by the company for the next year. After taking this measure, they intend to continue the investments in other fields. With the project, they can make their own production more economic, reducing the production costs. As a result, they will have a better position against their rivals in the market. First of all, it is the most important to know how big the profit is the company can gain from this investment. My task was to choose the most economic one of the investment offers (tenders) related to the investment in the milk-house, since the economic analysis of agricultural ventures is indispensable today (Nábrádi 2013).

As a starting point, I studied the position and importance of the dairy cattle industry. History of milk producing farms can be divided into three periods: old, medieval feudalism and the New Age. In the New Age several positive processes took place, for example increase in the number of dairy cows. It was typical to this period that its milk producing farms tried to create the optimum state from the factors in order to make production perfect. Here, it is necessary to mention cross-breeding cows

(high-yielding cows, eg. holstein frieze, jersey, red danish), favourable breeding conditions (eg. without tethering, regulation of the climatein the stable), adjusting the concentrate of the feed to the cows, and finally, modernization of equipments used for milking which trace the health state of the animals, also they pay attention to the storage and handling the produced milk (Merényi 1999).

By today, such cows have been produced which can make big amounts in good quality. 83,5% of the milk produced worldwide comes from cows. From this proportion we can conclude that the food industry uses it in large quantitites as primary commodity, or we can think of the proportion of the immediate use of raw milk, which is also high. Of course, it is possible to keep production at high level only when producers produce it cost-effectively, their incomes exceed their expenditure (Kis and Gál 2012). It can be accomplished if they choose species which utilize the feed well and equip their farms with devices of optimum performance that help production. In our situation, by means of a modern milking-machine more amount can be gained from the cows on a daily level, though the question is whether the income from the extra production covers the costs of modernization (Blaskó et al. 2011).

Milk production in the European Union was greatly influenced by the milk quota system introduced in 1984. It regulated the amount of the produced raw milk on country level. In 2003 the milk prices started to decrease at the same time with the liberization of the milk industry, so the direct income support got introduced. At the same timeraw milk quantities, export subsidies, internal subsidies and safeguard measures were defined. Each country is permitted to produce milk in the amount defined by the union. In case one of them exceeds the set quantity, she has to pay duty as a fine. The member states could divide the quantity set in the quota between milk-producers on the basis of their own decision. In general, exceeding the quota was not a threatening problem, but the Netherlands, Denmark and Cyprus were exceptions (Blaskó et al. 2011).

As a result of the reform introduced by the Joint Agrarian Policy, the milk quota system was terminated on 31 March, 2015. A market was created for milk-producers where it is the competition that controls the processes. Consequently, smaller ventures which are not so efficient regarding thrift can close. Milk production may concentrtae at large firms of solid capital.

The holstein-frieze appeared in Hungary due to the government program of 1972, also equipments, devices, milking-machines started to

be modernized. It clearly shows the development that while the milk production of one cow was 4.500 litresin the 80s, it had reached 5.500 litres by the 90s. 70% of the milk is produced by farms which have around 300 or more dairy cattles. Only 3% of the farmers belong here. In Hungary the milk production capacity per dairy cow was 7.501 litres as an average, and the total production reached the 1.890,2 million litres (Merényi 1999).

Both the quantity and the quality of milk are affected by the feed. The cattle is fed with fodder of different composition and concentrate during their life span. Larger farms generally use maize for silage, high protein crops, feed additives, and other additives. The amount the farm is not capable to produce for itself has to be purchased. It is the so-called procurement logistics process(Gál 2008a).It increases the production costs more, so it reduces the profit from the sale of milk more (Schmidt 2003).

The breeding conditions of the cattle also has an impact on both the quantity and quality of production. It is necessary to consider air quality, lighting, the bedding for cows so as to make the production related processes go smoothly (Apáti et al. 2005). Eating-drinking and rumination are also included. Besides the cattle needs, it is necessary to pay attention to the proper conditions of work done there. Like feeding, manure removal, insemination and milking (Horn 1995).

If we want to get the main product of the dairy cattle, the milk, we have to follow the milking operations (Mikó et al. 2016). We can distinguish preparation, completion and additional work. It is the logistics of the milk producing process. During preparation the equipments, the animals (we have to pay attention to their state of health) and human factors have to be put into the proper hygienic state. During completion milk is recovered from the cow udder quarters. It is the product, the result of production management (Irimie et al 2014). Today, milking is done by machines. The additional work of milking is the treatment of udder quarters with disinfectants (Mikó and Baranyi 2015), which is applied to eliminiate the chance of bacterial infection (Tóth and Bak 2001). The investment is about equipments used for milking in a milk-house of tetherless breeding. This system still needs some live work since preparation and the additional work of the milking operations are done by humans.

Regarding milking equipments, there are some more modern ones, too. Like, for example, the milking robot. Nowadays, IT-systems make

people's life much easier, also help the management to make decisions (Hampel 2009). By means of the develpoment in IT, it is possible to achieve more efficient production, to manage a company (Scalera et al. 2012). It accomplishes all the steps of milking. Besides, it records the cattle, monitor their oestrus and observes their fodder needs. As a result, the labor committed so far becomes free to be employed in other work (Tóth and Bak 2001). We should not forget about quality management either. The basic interrelations of product management are valid for these processes as well. It is a task to produce quality food (Fabulya and Hampel 2016). We should not ignore food safety (Fabulya et al. 2015) and the logistics of food safety and quality (Gál 2008b).

There have been some renovation on the cattle farm in the last few years (renovation of the social building, modernization of the heating); they were investments which can reduce the later expenditures. An investment which is in compliance with regulations of environmental protection has also been implemented (modern manure storage). Now, the number of dairy cows on the farm is approximately 220. The milk produced daily is delivered by the purchaser in the evening of each day. Depending on the season the daily amount of milk is between 6.000 litres and 8.000 litres. Their primary income comes from the milk. The sale of bulls born on the farm is the secondary source of income. In a given year they can sell bulls as beef cattle even four times a year.

2. MATERIAL AND METHOD

The basic data necessary for the assessment of investment offers was collected both from the firm and the two tenderers. After cash flow calculations, I calculated the net present value, the discounted paybak time, internal rate of return, profitability index. Investments bring about an expenditure of large sum once therefore it is essential to prepare them economically with care (Nábrádi and Szőllősi 2007). The decision-making of the management has to be supported according to these indicators (Fenyves 2014). These indicators show whether it is worth to implement the investment or which one is worth to be accpted (Fenyves et al. 2014). On its basis, I ranked the tenders. I have to add that the subsidy of the milk price changes year after year, so the cash flow calculations had to be done separately for each year. It was not possible to regard the operational cash flow as annuity. Also, I had to consider the tax system (Lenghel and Miculescu 2016).

3. RESULTS OF MY OWN RESEARCH

There were two tenders for the construction. The first tender includes:

- The existing 2x12 / 24-stacked fish-hook suspendedstall structure will be upgraded.
- LVP-type system of vacuum generator with a frequency controller (the air tank over the milking shaft would be terminated, a direct connection to the milk receivers through a pipe of 11 mm in diameter).
- A single layer stainless steel bottom milk line system of 76 mm in diameter, with the necessary stainless steel profiles, Dutch vessels, stainless steel milk tube joints, also wih supporting brackets and consoles for fixing to the sides of the milking shaft.
- Milk receiver end unit: one piece of receiver of SR70 type with a milk pump FMP 110, the volume of the receiver is 70 litres, the performance of the milk pump is 13.200liter/ha kPa.
- Electropulsion system: 24 electropulsators integrated into the MP400 milking point controller, the number of pulses in the pulsator is 60/minute but it can be programmable with milking point controllers.
- Milking equipments: the existing 24 Harmony units would be upgraded, with parts replacement.
- The washing system: it would be realized with one Hygenius C 200 washing machine the features of which are: control with microprocessors, each parameter is programmable, it has a closed stainless steel washing water container of 160 litres, alarm functions, feeder of liquid detergent.
- Milking pipelines made of stainless material of 40 mm in diameter.
- MP400-type machines which remove teatcups, with MM27BC milk meters and comfort start function. They control the milk meters and the machines of removal.

It can be concluded from this list that most of the equipments will be replaced but the still usable ones will be upgraded, thus reducing the investment costs, which can be a positive aspect for the assessment of a project.

The other tender included the following machines:

- Milkline P4C milking unit: 24 pieces of pulsation-pulsation stops per udder quarter, conductivity tests per udder quarter and alarm in case of an udder problem.
- Milkline meter of milk quantity.
- Milkline Mil4 lifting cell count sensor collector which includes the deflector which is capable of milk separation per udder quarter.
- Milprodynamic milking unit which is good for the cattle due to its construction, also it is excellent from technical aspect.

- XF collector, the MilklineMilpro 450 is a professional equipment which supports very high milk flow, better vacuum-stability and maximum peak load capacity in the milking unit.
- Installation materials, electric cables, vacuum pipes, fittings, and unit parts fitted into the milking shaft (pulsator, lifting cylinder, electric connections).

The idea of this tender is the entire replacement of the equipments in the milk house which clearly contributes to the increase in costs.

Prices of the two tenders are significantly different: the first one is 30.525.293 Fts (96.900 EUR), while the other is 40.008.810 Ft (127.000 EUR). It can be explained with the fact that the first tender would just upgrade the existing milking units and the fish-hood stalls (while the vacuum system, the milk receiver electro-pulsation system and the washing system would be new). The second tender would replace every single equipment, tool (milking equipments, milk quantity meter, cell count sensors, pulsators, milking equipment washing tray, milk receiver, vacuum system).

The investor expects 8% profit and 7 years of payback time from investing into the milk house equipments.

The reason for the investment is that the capacity of the present milking equipment is not able to hold the amount of milk coming from the cattle of high milk yield. On the hand, thrift can also improve due to the investment.

First, I examined the payback time (PB) of the economic indicators. Both values are under the payback time (7 years) estimated by the owners. The first tender has better payback time the value of which is 4,41. The other tender could show only 5,63 years of payback time.

Table 1: The results of the net present value calculation

Net present value	
NPV= -30.515.293+36.062.108,38 = 5.546.815,38 Fts	NPV= -40.008.810+ 36.697.595,32 = -3.311.214,68 Fts

Source: my own calculation

The second aspect was the net present value (NPV). It is one of the most important indicators which a decision can be based on. It is worth accepting the project if the NPV>0, so later it can increase the company's wealth. In case of this indicator it was the first tender again which proved to be better (Table 1). It would grow the company's value with the net present value of 5.546.815,38 Fts (17.600 EUR). However, the other tender is -3.311.214,68 Ft (-10.512 EUR), so it could not contribute to the growth, what is more it would reduce it.

Third, I examined the discounted payback time (DPB) (Table 2). It shows how many years of discounted cash flows it would take to recover the investment. For the company it is the most important thing to get the money

back as soon as possible. The first tender can be refunded in 5,63 years, while the second one only in 7,86 years.

Table 2: Results of the discounted payback time calculations

Discounted payback time	
DPP=5+(30.515.293-27.589.862,84) / 27.589.862,84-32.263.626,96 =5,63 év	DPP= 7+(40.008.810+36.697.595,32) / 40.567.297,29-36.697.595,32 =7,86 év

Source: my own calculations

The next indicator is the internal return rate. In normal conditions, it should have the same decision as the net present value indicator. The potential yield and the expected yield are compared. It is advisable to accept the investment if the potential yield is bigger than the expected. The first tender could show a better value (Table 3) with its yield of 13,09%, while the other could show only 5,54%. This latter one does not meet the level expected by the investors.

Table 3: Results of the internal return rate

Internal return rate	
IRR= 13,09%	IRR=5,54%

Source: my own calculation

Table 4: Results of profitability index calculation

Profitability index	
PI= 27589862,84/30515293 =1,18	PI= 36697595,32/40008810 = 0,92

Source: my own calculation

The last aspect was the profitability index (PI). It shows how many forints are brought about by investing 1 Ft. One of the tenders is acceptable, the other should be refused. The first tender shows the value of 1,18 Fts, which increases the company's wealth. The other results only 0,92 Ft, so we would lose 0,08 Ft on each invested 1 Ft.

4. SUMMARY

Considering the results, the first tender seemed to be acceptable from the given points of view. I recommended to accept it. Development is vital,

with its delay the economical production would be in danger and the company would fall behind its rivals. The new equipment would contribute to increase the company's capital. The existing production capacities could be utilized. The company could reduce its production costs since the amount of milk coming from one cow would increase.

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NOTES ON THE AUTHOR

BRIGITTA ZSOTER (Dr.habil. Ph.D.) economist, associate professor; University of Szeged, Faculty of Engineering Department of Economics and Rural Development, Mars ter 7. 6724 Szeged, Hungary; phone: +36 62 546 569; email: zsoterb@mk.u-szeged.hu.