

Economic Assessment of Dairy Farm Production in Kosovo

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Abstract: The aim of this study is twofold: 1) provide an economic overview and 2) setup a framework for benchmarking economic performance of dairy cattle farming in Kosovo. Dairy cattle farming is the most important agricultural economic sector in Kosovo contributing about 10% to total GDP. As in many transitional economy countries, dairy foods are a dominant part of the diet and dairy farming and dairy-processing industry provide direct employment and support improvement of rural life conditions. To date, there are no data about economic performance of dairy farm production in Kosovo. Therefore, data from representative Kosovo dairy farms ($n \geq 100$) will be collected, recorded, and monitored on a continued basis, which will become the basis of a systematic benchmarking system. The study will utilize a number of key performance variables (> 60) with an economic impact on dairy farm income and costs. Focusing on a dynamic database and a spreadsheet model-based decision support system, analyses at the dairy farm level on production and benchmarking will be performed and conclusions for the future development of the dairy farm industry in Kosovo will be drawn in the light of competitiveness and efficiency. To date, we have collected key economic performance variables from 63 farms on a monthly basis for year 2013. Preliminary results indicate that the cost of rearing heifers calving at 24 months is €791.64; the average milk income per cow is €144.78/month, its feed costs €66.74/month, and therefore the average cow income over feed costs is €78.04/month. The average economic net margin of a cow after considering the income over feed cost and additional income and costs is €67.44/month per cow.

Keywords: Economic efficiency, Model-based, Input variables, Competitiveness.

Introduction

Developing an understanding of factors influencing profitability in dairy farm is critical because it provides dairy farm managers with the information required to select management strategies that would likely improve their herd's profitability (Gloy et al., 2002) and promote farm sustainability and resilience in the long-term. Also, better knowledge of critical economic variables in dairy farming would help extension educators, dairy farm advisers, and policy makers to promote practices and regulations that will assist farmers to remain profitable and economically sustainable throughout time (Gloy et al., 2002). Net margin in dairy farming is a key measure for determining how successful a dairy farm operation has performed historically and a critical indicator of the financial success a dairy farm could have in the future (Dhuyvetter, 2011). Net margin is the difference between all income and all expenses (Moran, 2009). Farmers without a good margin tend to produce more either by improving productivity or by increasing the number of cows. Increasing volume of milk produced helps to dilute farm fixed costs (Moran, 2009). One simple and important key performance indicator is the milk income over feed costs because it is easy to calcu-

late, it is highly sensitivity, fast responsive to management changes, and it is simple to monitor across time (Moran, 2009).

Cattle are the main sources of milk and meat production in Kosovo, including various breeds, crosses and categories. This industry is clearly segmented in small-scale farmers (about 95%), mainly producing for home consumption and commercial farmers (about 5%) producing solely for the market (Bytyqi et al. 2005). It is estimated that today there are over 83,000 livestock farms in Kosovo (Agriculture and Rural Development Plane, 2012). Native breeds and their crosses dominate small farming systems and they include a high level of land fragmentation. In these small farm systems, dairy products constitute a main source of food and a high share of production, which still serves subsistence purposes. The small livestock farms have poor hygienic and zoo-technical conditions. Large commercial dairy farms, on the other hand, use more productive breeds such as Holstein (Black and Red), Brown Swiss, Simmental Fleckvieh and Tyrol Gray (Bytyqi et al. 2009), have better zoo-technical conditions, and are more intensive production systems (Bytyqi et al. 2007).

It is estimated that over 50% of Kosovo dairy stock was lost during the 1998-99 war (Kodderitzsch and Veillerette, 1999). Losses included damage to dairy infrastructure, which has not yet returned to a desirable level. This situation led to shortages of dairy cows and dairy products, which had to be imported. Dairy production is an important segment of Kosovo's agriculture considered as an activity with considerable nutritional, social, and economical importance. Therefore, the Ministry of Agriculture Forestry and Rural Development of Kosovo (MAFRD) has implemented the milk as a policy priority, which consists of dairy farm's direct payment support and investment support in order to improve dairy production competitiveness and rely on local dairy production. Within this context the overall objective of the study was to understand the economics of dairy farming in Kosovo and setup a framework system for long-term benchmarking dairy cattle farming economic performance in Kosovo.

Material and methods

General conditions: Kosovo's climate is typical semi-continental with annual averages of 631 mm of rainfall and 11° C temperature (Kosovo Hydrometeorology Institute, 2009). Dairy cattle are normally kept indoors from mid-November to the end of April (winter season) when feed is provided indoors, mostly hay.

Dairy sector in Kosovo: According to MAFRD there are around 151,000 milking cows hosted in 83,000 dairy farm operations in Kosovo. The predominant size of dairy cattle farms is 1-5 heads which comprise most cows in milk production (76%), 24% is comprised by farms that have over 5 heads of milking cows and only 5.3% is from farms over 10 cows (Agriculture and Rural Development Plane 2007-2013, 2012). Farms with ≥ 5 heads of milking cows are the main milk suppliers of the processing industry that represent approximately 92% of the production.

Information on data recording: Data were collected from 63 randomly selected farms from 6 regions in Kosovo: Prishtina, Prizren, Mitrovica, Ferizaj, Gjakova Gjilani. Studied farms were monitored for a period of 12 months (January to December, 2013). Incomplete records and outliers were excluded from the analyses.

Economic variables: Several key economic performance indicators were recorded within the areas of: (1) raising cost for young stock, (2) milk revenue and feed costs, (3) revenues from animals sold, (4) other income sources, (5) reproduction costs, (6) animal health costs, (7) depreciation costs, (8) credit interest cost, and (9) other costs. Based on these variables, (10) farm income over feed costs and net margins were calculated.

Analyses: We are implementing a Spreadsheet-based decision support tool that contains a dynamic database in which we record and analyze all the information. Continued data recording and time-sensitivity permanent analyses regarding Kosovo dairy farm economic performance is expected. Analyses will be performed across time and throughout geographic regions. The decision support tool is self-contained software that selects, filters, and performs queries on recorded data within an Excel® Spreadsheet with Visual Basic embedded commands. Results presented in this paper that describe the overall income, costs, income over feed costs, and net margin of randomly selected farms are preliminary and are punctual for the first year of data collection (2013). Continued data study is planned together with temporal and regional benchmarking analyses.

Results

Young stock costs

Rearing costs of Kosovo dairy young stock is presented in Table 1. As expected, the most expensive period of raising young stock is before weaning (≤ 3 months of age; €73.80/month per calf) due to large and dominant costs of milk feed (€67.10/month per calf), which represents 91% of the total costs during this period of time. As calves grow older, concentrate feed becomes the largest cost, although it never surpasses 44% the total costs in any growing period presented in Table 1. Cost of milk feed remains still important during the period 4 to 12 months and is close to the cost of concentrate (€7.67 vs. €9.91) representing still about 30% of total costs. Overall, feed costs (milk in early life and concentrates, silage, and forage later in life) dictate the big majority of costs of raising young stocks in Kosovo as they represent 96% of the total costs. Health costs (3.4%) and other costs (0.7%) are insignificant in comparison. No farm in the sample reported using milk replacer as an alternative to milk feed (Table 1).

Total cost per month of rearing young stock during the first 3 months is 2.87 times greater than during the following 8 months, 2.42 times greater than during months 13 to 24, and 2.09 greater than after 24 months (Table 1). The average cost of raising a young stock is €41.26/month per calf. Nonetheless, as seen in Table 1, there is a large variability on this monthly cost from period to period. A heifer that calves at 24 months of age will incur in a total cost of €791.64. This total cost will decrease by €30.42 for every month shorter to first parturition and will increase by €35.17 for every month greater to parturition. E.g., a heifer that calves at 660 days of age will have a rearing cost of €730.08, whereas a heifer that calves at 780 days of age will have a rearing cost of €861.94.

Table 1. Rearing costs (average \pm standard deviation; €/month per calf) of dairy young stock in Kosovo dairy farms for year 2013 (n=63).

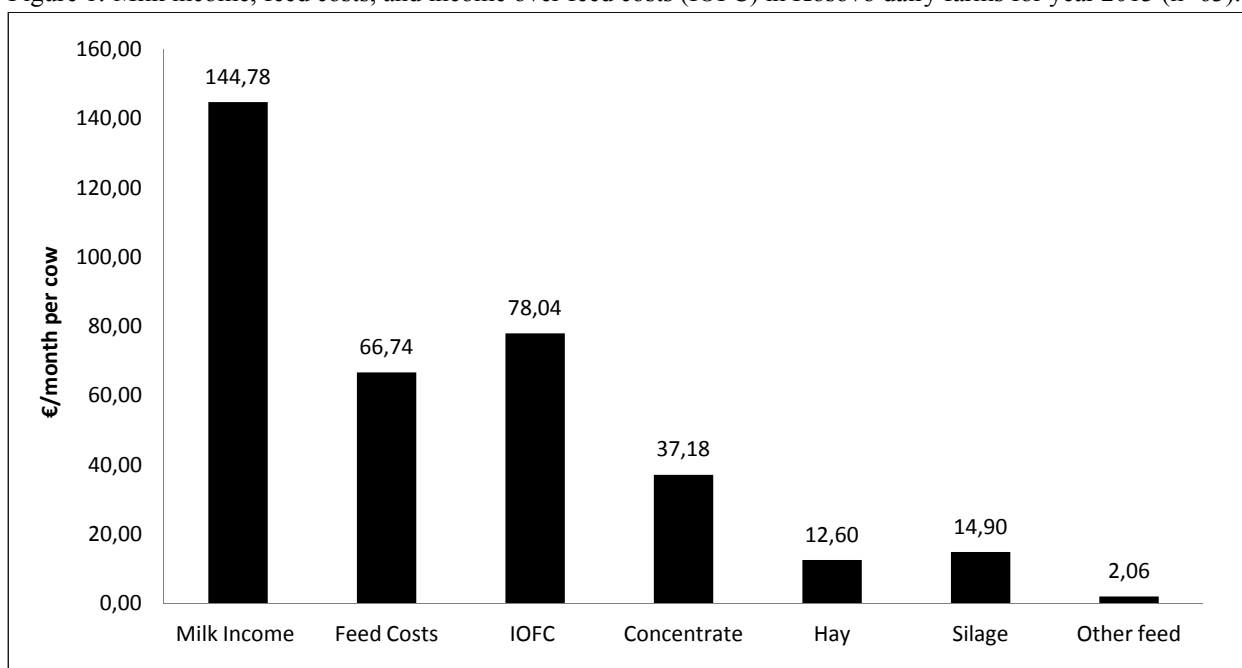
Item	-----Young stock age in months-----				Average
	≤ 3	$4 \leq 12$	$13 \leq 24$	> 24	
Health	1.26 \pm 0.9	1.04 \pm 0.5	1.31 \pm 0.7	2.00 \pm 1.2	1.40 \pm 0.8
Forage	1.40 \pm 1.1	4.50 \pm 2.1	8.11 \pm 4.6	8.33 \pm 5.3	5.59 \pm 2.7
Silage	0.50 \pm 0.2	2.50 \pm 1.3	7.34 \pm 2.3	9.58 \pm 5.6	4.98 \pm 3.2
Concentrate	3.53 \pm 2.3	9.91 \pm 4.5	12.84 \pm 6.5	15.27 \pm 7.8	10.39 \pm 5.5
Milk feed	67.10 \pm 15.2	7.67 \pm 2.3	--	--	37.38 \pm 29.1
Milk Replacer	0.00 \pm 0.0	0.00 \pm 0.0	--	--	0.00 \pm 0.0
Other costs	0.01 \pm 0.1	0.03 \pm 0.1	0.82 \pm 0.2	0.00 \pm 0.0	0.29 \pm 0.1
Total	73.80 \pm 25.6	25.65 \pm 13.1	30.42 \pm 12.3	35.17 \pm 13.1	41.26 \pm 17.9

Cows' milk income, feed costs, and income over feed costs

Milk income, feed costs, and income over feed costs (IOFC) is presented in Figure 1. As seen, the average milk income per cow was calculated at €144.78/month or €4.83/day per cow. Feed costs represented 46.10% of the milk income (€66.74/month or €2.22/day per cow). Hence, the income over feed cost was €78.04/month or €2.60/day per cow, which represented 53.90% of the milk income or 116.93% the feed costs.

As in the case of young stocks, concentrates represents the greatest feed expenses (55.71%), which is followed by silage (22.32%), then by hay (18.89%), and finally by other feedstuffs (3.08%; Figure 1). The income over concentrate feed is €107.60/month per cow, income over silage feed is €129.88/month per cow, and the income over hay feed is €132,18/month per cow.

Figure 1: Milk income, feed costs, and income over feed costs (IOFC) in Kosovo dairy farms for year 2013 (n=63).



Cows' other income and costs

Animal sales are an important source of income in Kosovo dairy farms as they represent 34.80% (€50.38/month or €1.68/day per cow) of the income coming from milk sales or 25.91% of the total farm income (milk sales plus animal sales; Table 2). Within animal sales, those sales of meat are the most important and represent 58.46% of the total animal sales, followed by the sales of calves (22.87%), the sales of heifers (10.88%), and finally the sales of live animals for dairy (7.82%).

The next most important production costs besides feed costs are depreciation costs that are €8.94/month or €0.30/day per cow and represent 13.40% of the feed costs (Table 2). Within depreciation costs, the depreciation of equipment is the most important (60.40%), followed by depreciation of buildings (26.51%), and finally depreciation of milking facilities (12.98%; Table 2).

Next in the list of costs are reproduction and health costs, which are substantially smaller to feed costs. Both together (reproduction and health costs) represent only 4.58% of the costs of feeds. The major cost of reproduction is insemination, followed by pregnancy diagnosis and other costs. Seems that the use of timed artificial insemination is very limited in Kosovo as their related costs of synchronization are very small (Table 2). Health costs are even lower than those of reproduction and, as expected, within health costs, mastitis is the disease with higher costs among all diseases. Nonetheless, the cost of mastitis in Kosovo farms (€0.50/month or 0.017/day per cow)

seems insignificant compared to feed or other costs. Costs of reproduction, health, and depreciation add to €12.00/month or €0.40/day per cow and are only 17.98% the costs of feeds or 15.24% of all costs.

Table 2. Income and costs (average \pm standard deviation; €/month per cow) in Kosovo dairy farms for year 2013 (n=63)

Item	Income	Costs
Animals sales	50.38\pm42.9	
Meat	29.45 \pm 23.2	
Dairy	3.94 \pm 2.6	
Heifers	5.48 \pm 3.2	
Calves	11.52 \pm 8.6	
Reproduction costs		1.60\pm0.9
Insemination		1.19 \pm 0.7
Synchronization		0.01 \pm 0.1
Pregnancy diagnosis		0.27 \pm 0.2
Other		0.13 \pm 0.1
Health costs		1.46\pm1.0
Mastitis		0.50 \pm 0.4
Parturition		0.23 \pm 0.2
Other diseases		0.27 \pm 0.2
Other health related costs		0.46 \pm 0.4
Depreciation costs		8.94\pm6.5
Equipment		5.40 \pm 4.1
Milking facilities		1.16 \pm 1.8
Buildings		2.37 \pm 2.1

In addition to milk and animal sales other income (subsidies and milk consumed by the farm family) are calculated at €14.31/month or €0.48/day per cow (Table 3). Also additional costs reported are: interest for credits loans (€12.09/month per cow), labor costs (€27.35 €/month per cow), and other expenses such as gasoline, equipment maintenance, etc. (€14.61/month per cow) and total animals purchased (€9.46/month per cow; Table 3).

Net margin

Overall average Kosovo's dairy farms income and cost are presented in Table 3. The total income that includes milk sales, animal sales, and others are calculated to be €209.48/month or €6.98/day per cow, whereas the total costs that include feeds, reproduction, health, depreciation, interest, labor, animal purchases, and other costs are calculated at €67.44. Consequently the average computed net margin (income minus costs) for Kosovo farms in year 2013 is €67.44/month or €2.25/day per cow. Costs represent 67.80% of the income and the return rate is 1.47 or 47% above the investment: for every €1 invested (costs) there is €1.47 of income.

Table 3: Net margin (average \pm standard deviation; €/month per cow) in Kosovo dairy farms for year 2013 (n=63)

Income and Costs	----- €/month per cow -----	
Total income		209.48\pm56.5
Milk	144.78 \pm 34.9	
Animals Sales	50.38 \pm 42.9	
Other Income	14.31 \pm 9.2	
Total costs		142.03\pm40.9
Feed	66.74 \pm 10.7	
Reproduction	1.60 \pm 0.9	
Health	1.46 \pm 1.0	
Depreciation	8.94 \pm 6.5	
Interest	12.05 \pm 11.9	
Labor	27.26 \pm 13.9	
Animal purchased	9.42 \pm 25.7	
Other	14.57 \pm 12.9	
Net Margin		67.44\pm65.8

Conclusions

Dairy production economic patterns are undergoing various changes at present time in Kosovo. This study represents an opportunity to assess trends leading to this dynamic economic situation and ways in which dairy farming in Kosovo can increase its contribution to the well being of farmers and generate additional employment. Comparing the lower 20 percentile with the higher 20 percentile of farms regarding the net margin, the results show large differences between them favoring farms ranked in the higher 20 percentile (€160.50/day) compared to those ranked in lower 20 percentile (€-14.16/day) per cow (results not shown). This demonstrates the large opportunity existing to improve overall dairy farm net margin and overall contribution of the dairy industry in Kosovo economy. Factors that have an important economic impact on dairy farms include feed costs, health expenses, and depreciation rate. The main source of farm income is milk sales, which represent about 69.11% of total farm revenue. However, average milk yield per cow per month tend to be low, about 17 kg/d per cow, and therefore there is also an important opportunity to improve farm net margin by improving milk productivity. One reason for low productivity is the feeding basis, which is insufficient and of poor quality to support higher productivity.

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