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PROFITABILITY OF DAIRY FARMS IN CENTRAL KOSOVO

Review
Article

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Abstract

This research is conducted with a sample of dairy farmers - beneficiaries of direct payments for milk quality in Central Kosovo, respectively in the region of Pristina. It is aimed to provide a better understanding of the operations of those farms, and also to measure their competitiveness by using profitability ratios. In Kosovo the average production goes up to 3050l, while in the sampled farms the average was 4480l. Holstein Frisian and Simmental are the most used cow breeds in Kosovo, and also in this study. The sample is derived from the list of beneficiaries' farms of direct payments for milk quality in Central Kosovo, respectively in the region of Pristina. Results showed that mid-size farms (10-25 heads) and large farms (25< heads) tend to have higher profitability and efficiency than small farms (1-10 heads). Generally, all farms had low labour productivity and low asset turnover. Feed cost has the highest portion of the total cost (up to 72%), and with a given cost of production (av. 0.25 Euro), and selling price (av. 0.30 Euro), direct payments contribute with 21.4% to incomes from the milk.

INTRODUCTION

With the majority of the population living in rural areas (KAS, 2013), agriculture in Kosovo plays an important role in income and employment creation (MBPZHR, 2017). In 2016, agriculture, forestry and fishing contributed with 9.2% to Kosovo's GDP (KAS, 2017). The contribution of the agricultural sector to GDP and employment is similar to the countries in the region but higher than in the OECD countries and EU member states. However, over the years, the contribution rate of this sector to Kosovo's GDP is declining (MAFRD, 2017b). Agricultural output is remaining relatively the same in the last years, however the overall GDP is increasing year by year, and thus the contribution of agriculture is declining as a result. To give an insight, in 2011, the total GDP was 4.814 mil Euro and agricultural contribution was 614 mil; in 2016 the total GDP was 6,070 mil Euro and agricultural contribution was 635 mil Euro (MAFRD, 2017a).

Kosovo's agriculture consists of relatively small farms, where 63.8% have less than five ha (MAFRD, 2017b). The utilized agricultural land area in 2016 in Kosovo was 415,683.12 hectares (including common land). From the total utilized area of agricultural land most of them are: meadows and pastures (including common land) representing 52.6%; as well as arable land, with 45.0% of crops, 2.1% of perennial crops (fruits, vineyards, seedlings) and 0.2% of gardens (ASK, 2016). Even though there is the smallest profit per hectare, the majority of agricultural production is oriented into cereals. Consequently, 71.9% of arable land consists of cereals, where wheat and corn are the most produced with 66.22% and 30.85% respectively (ASK, 2016).

For the dairy industry, cows represent the majority of animals used in milk production, followed by sheep and goats. According to MAFRD (2015), in 2013 total milk production was 376,762t, where 368,604t or 97.8% was from 178,557 heads of dairy cows. Sheep's milk production was 2%, or 7,348t, and goat milk production was 0.2% or 809 tons (MAFRD, 2015). In 2016 dairy cows represented 52% of bovine animals (MAFRD, 2017b). For the structure of breeds, the majority of dairy farms in Kosovo consist of mixed breeds (60%), Noble Races take place with 35%, and Busha¹ takes place with only 5% (MAFRD, 2015). The productivity of dairy farms in Kosovo is very low compared to other countries, with an average of milk production of 3050 litres per lactation for Noble Races (MAFRD, 2015), while developed countries have gone to 12,000 litres per lactation (Locke, 2015).

Moreover, it is not just small farm size and low productivity, the dairy sector in Kosovo faces other challenges/issues as well. Old buildings and

equipment, lack of financial means for investments (MBPZHR, 2017), and low level of knowledge and awareness about animal diseases, food safety and food safety institutions (Zeqiri, Bytyqi, Imami, & Biçoku, 2015) are just some to mention. Furthermore, most farms do not meet EU standards for food safety and hygiene, for animal welfare and environmental protection (MBPZHR, 2017).

In relation to milk industry in Kosovo there are several publications (Bajrami, Wailes, Dixon, Musliu, & Durand-Morat, 2017; Behluli, Musliu, Sherifi, Youngs, & Rexhepi, 2017; Bytyqi et al., 2014; GAP, 2016; Krasniqi, Kamberi, Emiri-Sallaku, Kastrati, & Tafaj, 2017; Rama, Latifi, Bajraktari, & Ramadani, 2015; Zeqiri, Bicoku, Gjeçi, & Pire, 2016b; Zeqiri et al., 2015; Zeqiri, Shahu, Bicoku, & Pire, 2016; Zeqiri, Biçoku, Gjeçi, & Pire, 2016a), but due to its complexity there is still a gap in the literature that deals in detail with the productivity and efficiency of Kosovo's dairy farmers.

Consequently, the aim of this study is to portray accurately the characteristics of small and middle dairy farms in Central Kosovo, respectively in the region of Pristina. It is meant to measure the profitability of dairy farms, beneficiaries of direct payments for milk quality from the MAFRD. A general data of inputs and outputs, and costs and revenues will be collected and analyzed. In addition, since it is the largest cost in the total cost, some more empathize will be put on the feeding of animals: the ingredients, feeding system, feeding interval, and the diet for each stage of lactation. So, the study will highlight the importance of a proper feeding system; the importance of knowing and using the right diet for each type of cows – and for each stage of life and lactation. And lastly, this paper will provide recommendations for better farm management and the right diets specifically for each stage of lactation. By doing so, it is aimed to help farmers be more efficient and competitive as a result, and as an insight to other stakeholders about the profitability of dairy farms in Kosovo.

MATERIALS AND METHODS

This is a descriptive or explanatory study, and is about the overall performance and efficiency of dairy farms in Central Kosovo. Both qualitative and quantitative data collection and analysis are employed. The application of mixed-method research would serve the advancement of the discipline as these approaches provide the richer understanding and more robust explanations of such phenomena (Golicic & Davis, 2012). Also, many scholars argue that using mixed methods in research has its advantages. Seaker, Waller & Dunn (1993) discuss the need for more formal contributions of research to theory, and argue that

“...application of more scientific research methodologies” is to be preferred (Seaker, Waller, & Dunn, 1993). Furthermore, also Stentoft Arlbjörn and Halldórsson (2002) assign methodology an important role in generating logistics knowledge, and in particular, facilitating an interplay between philosophy of science, theoretical perspectives and practice (Stentoft Arlbjörn & Halldórsson, 2002).

In this context, this study employed mixed-method research using qualitative and quantitative data.

To collect the primary data a survey is developed. For quantitative data, a face-to-face questionnaire method was employed, while qualitative data are collected through personal discussions with farmers, and observation of the farm’s buildings, cattle, and the feeding condition. A face-to-face questionnaire is when the interviewer (in this case the interviewer was the author) personally meets the respondents and ask them questions face to face (Saunders, Lewis, & Thornhill, 2016). Even though it is more expensive than the questionnaire method, data collected by face to face questionnaires can be more reliable, and so bring more accurate results (Kothari, 2004). In addition, it is very useful when dealing with farmers, where some of them can be illiterate, and some questions can be hard for them to understand.

On the other hand, the secondary data are gathered from literature from different sources, like national and international publishers, scientific journals, universities and governmental institutions, such as Ministries, Statistical Agencies, etc. However, because of their reliability, validity and accuracy, the main focus and the most imported data needed for this research were gathered directly from dairy farmers in Central Kosovo, respectively in the region of Pristina, who were beneficiaries of direct payments for milk quality from Agency for Agricultural Development (AAD). All the data are taken at the same point of time, thus, they are cross-sectional data. The target was on small and medium-sized dairy farms in the region of Pristina. To find the farmers, AAD facilitated the process by providing a list of farmers who were beneficiaries in direct payments for milk quality.

Objectives of this research are to portray accurately the characteristics of small and middle dairy farms in Central Kosovo. More specifically, it is aimed to show their performance, efficiency and productivity, and to see the distribution of costs. Furthermore, more emphasis is on animal feeding – the diet, cost, and the source of it, respectively what’s the proportion of feed that is planted within a farm, and the other part that is bought (if any). And last but not least, labour cost, cost of maintains and other costs relevant to farm management are taken and measured to evaluate the overall farm’s performance.

Under the profitability subsection, rate of production or total milk sold per worker, or hours that workers were engaged in crop production (used for animals feed), and also duties for farm operations. The formula employed for this measure of profitability is:

$$\frac{\text{Liters of milk sold per worker}}{\text{Total litres of milk sold}} = \frac{\text{Total litres of milk sold}}{\text{Total working hours}/2500}$$

Total feed cost per litre of milk sold is calculated by:

$$\frac{\text{Total feed cost per litre of milk sold}}{\text{Total feed cost (produced \& purchased)}} = \frac{\text{Total feed cost (produced \& purchased)}}{\text{Total milk sold}}$$

Operating expense ratio (OER) and gross profit margin ratio (GPMR) are calculated with the following formulas:

$$\frac{\text{OER}}{\text{Total operating expense} - \text{farm interest expense}} = \frac{\text{Gross farm income}}{\text{Gross farm income}} * 100$$

$$\text{GPMR} = \frac{\text{Gross Profit}}{\text{Revenues}} * 100$$

Asset Turnover ratio (ATR) is calculated with the following formula:

$$\text{ATR} = \frac{\text{Gross Farm Income}}{\text{Average total farm assets}}$$

The softwares used for data analysis are MS Excel, and IBM SPSS.

RESULTS AND DISCUSSION

Under this section, first will be presented an overall description of the situation of sampled farms, their conditions, and the way they operate. Next will be followed by profitability ratios and some recommendations that are believed to facilitate the growth of milk production and cost reduction as well, and consequently, higher productivity, higher incomes and welfare, as a result.

Descriptive Statistics

Farm structure varied in terms of livestock and land owned, as well. The number of livestock varied from six heads to 120 of total livestock, and for dairy cows, the smallest number was six heads of dairy cows up to 70, and a median was 25 for livestock, and 15 for dairy cows, respectively. However, for further analysis the farms are grouped into three categories based on the number

of dairy cows per farm. Thus, in the first category are small farms with up to ten heads of dairy cows. Mid-size farms with 10 to 25 heads of dairy cows are the second category, and large farms with more than 25 heads, in the third. Descriptive data for these types of farms are shown in the Table 1.

The grouping is done based on the averages of farm sizes in Kosovo.

Holstein Frisian and Simmental were the only breeds used in the sampled farms, and in the majority of farms both breeds were used simultaneously. Average lactation period according to farmer's responses was 280 days, and for lactation a Holstein produced on average 5,040l of milk, and Simmental averaged 3,920 litres of milk. In terms of feeding method, 75% of farmers used seasonal grazing, and 25% kept their cattle tied in farms, and thus closed system for the whole year is employed. Feed cost is the main cost for the sampled farms, even though there were variations between farm sizes. And generally, cost of production per litre of milk was 0.25 Euro, with a selling price on average 0.30 Euro.

From the farm's visits, it's been observed that the majority of farm buildings were old, except those who were beneficial from governmental investment grants that had new and relatively modern farms. Broadly speaking, all visited farms had the necessary equipment for plant production (used for animal feed), but lack in newer machinery for the dairy sector. Mainly all the assets used in farms were inherited and thus were relatively old, but functional. In general, small farmers have only one milking machine, while those with ten or more heads of dairy cows tend to have two or three, or in some cases – a more sophisticated, closed or a pipeline milking system. Furthermore, farms with larger herd number had a lacto-freezeⁱⁱ, as well.

The selling price for raw milk tends to be very stable in recent years and varies with 0.02 or 0.03 Euro within companies (milk processing or collecting points). In general, the price for a litre of milk was 0.28-0.31 Euro, according to the respondents. The collecting points and milk processing companies pay farmers for their milk based on the level of fat the milk has. Furthermore, prices are set based on the season, as well. So, in the summer farmers get 0.07 Euro for a percentage of milk's fat, and during winter, 0.08 Euro. Generally, farmers are not satisfied with the offered milk price. Furthermore, some of the farmers complained that some milk processing companies are not fair to farmers with price setting. Farmers complained about expensive and low-quality veterinary services, as well.

Due to relatively old machinery, or in some cases they do not have it at all, there were losses in animal feed. For instance, according to EuroLonaⁱⁱⁱ's manager, due to the old wheat harvester, there are 5-7% losses in wheat. Furthermore, he remarked

that due to the old silos, 10% of silage is damaged (Sylejmani, 2018). In addition, smaller farms had the problem of the absence of the mixer for feed preparation as well

Based on the participant's responses, the lactation period lasts up to 300 days. However, the majority of farms mentioned that the lactation period for their dairy cows is approximately 280-285 days. In all farms with no exception, milking is done twice per day. None of the farms used to milk cows more than two times per day. Similarly, feeding is done once per day, or twice per day. When it is done once per day, farmers put a large amount of feed, then animals eat all the day.

Overall, the cost of production per kg of milk is relatively high, and based on the author's own calculations farmers have low-profit margins, and without subsidies per milk quality, they can operate with losses, as well. Furthermore, other agricultural activities help farmers to increase their overall incomes, and thus they cover potential losses from dairy operations, or in phases when milk production is low, like ending lactation or when cows are drying.

Profitability Ratios

Rate of Production

Rate of production is employed to measure the litres of total milk sold per worker, or the working hours that an employee was engaged in milk production. In addition, to translate in monetary value, the total litres are multiplied with the market price, and then the average annual salary (2400 Euro) of an employee is subtracted. Accordingly, by this measure is aimed to see how much each category of farms gets from an employee.

Data from Table 2 shows that small farms fail to best utilize its employees compared to the other two farm categories. With the average milk production for both breeds, Holstein and Simmental, an employee on small farms handles 5.1 heads of dairy cows; on mid-size farms, 8.5 heads of dairy cattle, and lastly on larger farms, 12.97 heads of dairy cattle. Furthermore, the number of employees is almost similar to medium and small-sized farms and does not have a significant difference with large farms, as well. However, medium-sized farms overall get 105.1% more Euro per worker than the small-sized farms which have almost the same number of employees. On the other hand, large farms get overall 53.5% more Euros from milk sold per worker than medium-sized farms, and 154.3% more than small sampled farms.

Thus, from these data, the small-sized farms should increase the number of herd, or decrease the number of employees, because they have very low labour productivity. Generally, all the sampled farms have low labour productivity, because for a closed feeding system, or permanently confined

cattle, a worker should be able to handle 30 to 35 cows, and for the free-stall system, 40-50 cows (Shoemaker et al., 2008). However, even though in the majority of studied farms the employees are family members, and do not get a regular salary, they still need money for everyday usage. Furthermore, while there is no need for too much labour force, they can utilize their time by engaging in other fields and thus provide more income for the family. And last but not least, herd productivity should be monitored as well. An improvement in herd productivity results in more euros from milk sold per worker. Some strategies to improve herd productivity include feeding balanced rations, optimizing cow comfort, using proven milk production technologies, filling facilities to above 100% of capacity, and milking more than two times per day (Shoemaker et al., 2008).

Total feed cost per litre of milk sold

In this undersection, the total feed cost per litre of milk sold is measured. Generally, in dairy farming, feed cost is the main and highest cost overall. Thus, to see the competitiveness of an entity in this industry, measuring the feed cost per litre of milk sold, is one of the first steps to do. In this context, from the database of the sampled farms first it is measured the percentage of feed cost on the total cost for each farm category, and then the total feed cost (feed produced within a farm, and purchased) per litre of milk sold.

Data on Table 3 shows that the larger the farm, the higher the contribution of feed cost to the total cost. However, medium and large farms have lower feed cost per litre of milk, and thus tend to be more competitive. On the other hand, small farms even in this measure recorded low profitability. It is shown in the rate of production, that small farms have low labour productivity, as well. In this respect, they should work in increasing production capacities by increasing the herd and operate with current other assets. Thus, it is supposed to work more effectively. Furthermore, other weaknesses of these farms are feeding the cattle with not high-quality forage, and not using the optimal diet for optimal or higher milk production.

Cow's feed is the fundament for milk production. Moreover, in the case of dairy farms, it has the highest share of the total cost. Sampled farmers used to graze their cattle, and also were engaged in the feed production. However, only maize, wheat, and in some cases alfalfa was produced, but not other plants that are rich in protein. In this context, due to the limited land area, farmers when deciding which plant to produce, should pay attention to "dry mater yield per acre, stand life (for alfalfa), acreage, and machinery size, type and use" (UW Extension Forage Resource Team, n.d.)

Furthermore, most of the farmers responded that have the same diet in all phases of lactation, with

some minor differences in the dry period. Consequently, one of the aims of this study is to focus on the right diet with the right ingredients for each phase of the lactation of dairy cows.

"Nutrition is a key factor in the performance, health, and welfare of dairy cattle" (National Academy of Sciences, 2001). In this context, it is taken a diet formulation from Philips (2001) (see Table 4), as a recommendation or guidance to those farms and other dairy farms in general for proper feed management. This would be the most important and immediate step to do in order to improve the overall profitability and efficiency on those farms.

Operating expense ratio and gross profit margin ratio

Operating expense ratio (OER) is employed to show the percentage of gross farm incomes used to cover operating expenses that are used for milk production. Generally, it is recommended that expenses should not exceed 70% of the gross farm income or revenues (Shoemaker et al., 2008).

Data from table 5 shows that small farms used in the sample have the highest operating expense ratio, followed by large-sized farms, and at the end, medium-size farms. Consequently, these two measures just support even more that medium-size farms are the most profitable from the other two categories used in the study. Both small and large size farms have a higher operating expense ratio than medium size, and a smaller gross profit margin ratio. In this respect, medium-size farms are utilizing more effectively its resources, and these results with an overall lower expense ratio and higher gross profit margin ratio. In percentage, medium-size farms, have 42.4% lower OER than small farms, and 23.4% lower than large size farms.

Feed cost contributes the most to the total cost, and thus the majority of expenses are related to animal feed. Furthermore, farmers complained about the low-quality seed that is used to produce animal feed, and also the purchased feed. According to them, they are spending more money on feed and getting less milk from their cows. Therefore, this can be one of the reasons for the high operating expense ratio, because other costs are more manageable.

Moreover, the machinery used in farms was inherited, and they did not mention that have any long term liability, or loans in banks. Thus, except feed cost, the other costs were related to overall farm maintains, like utilities, oil, and veterinary expenses. In this respect, improving cattle breeds, and producing/buying higher quality feed, can increase production and revenues with the current level of expenses, therefore operating more effectively. In addition, many dairy producers do not have the aspiration or the resources to make the

changes or improvements necessary to survive in this highly competitive and changing market. Even when they have the desire, limited resources, and difficulties in access to financial markets make some of these measures difficult for the average dairy producer to be achieved.

Asset turnover ratio (ATR)

The asset turnover ratio is calculated with the aim to see how effectively these farms are utilizing their assets in generating incomes or revenues. Even though ATR differs from industry to industry, in this case it is used to have an insight, in this respect.

First, it is important to mention that due to extreme values in both assets and revenues, the median is employed in order to give more realistic results.

Data in Table 6 shows that overall all the farms used in the study have a low asset turnover ratio. This is mainly driven by high land prices. On average, the price per hectare was 30,000 Euro, and when the value of buildings and machinery used in production is added it results in relatively high-value assets compared to the revenues. However, in general, these farms are not fully equipped with dairy cows, and there is an opportunity to increase the number of cattle, because they own all the necessary assets and tools for milk production, except dairy cows. The increase in the number of cattle would result in higher productivity and efficiency of these farms.

CONCLUSIONS

A sample of 20 dairy farms beneficiaries of direct payments for milk quality in the region of Pristina is used in this study. Region of Pristina is in the central Kosovo, and consists of eight municipalities, but the data collection was conducted in five of them. Pristina, Fushë Kosovë, Lipijan, Kastriot, and Drenas, were municipalities included in the study. After data processing, except for the description of the farm operations, the profitability of those farms is analyzed, as well.

In order to measure the profitability of these farms, the rate of production, total feed cost per litre of milk, operating expense ratio, gross profit margin ratio, and asset turnover ratio are employed. In the rate of production, small farms resulted to have relatively lower amount of milk sold per worker, more precisely 105.1% less than mid-size farms and 154.3% less than large farms. Feed cost has the lowest share in the total cost in the small farms compared to other two groups, but at the same time, total feed cost per litre of milk is the highest in the small farms (0.25 Euro), compared to medium and large farms (0.16 Euro).

In terms of the operating expense ratio, both small and large size farms have a higher operating

expense ratio than medium size, and a smaller gross profit margin ratio, respectively. In this respect, medium-size farms are utilizing more effectively their resources, and it results in an overall lower expense ratio, and a higher gross profit margin ratio. In percentage, medium-size farms have OER by 42.4% lower than small farms, and by 23.4% lower than large size farms. And last but not least, in terms of the Asset Turnover Ratio, all groups of farms scored low, with 0.12 per small and medium farms, and 0.11 for large farms.

However, in order to improve the overall productivity and efficiency, those farms should become data and business oriented. They need to focus on labor productivity, increase the herd number, and pay maximal attention to the feed diet for each type of animal and for each phase of lactation specifically.

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Tables

Table 1
Grouping of sampled farms, and their descriptive data

	Heads of dairy cows	Av. Farm size (ha)	Av. No. of livestock (heads)	Av. No. of dairy cows (heads)
Group 1	1-10	5.57	22	8
Group 2	11-25	6.2	27	17
Group 3	More than 25	45	81	43

Source (Own calculations by using sampled farm's data)

Table 2
Rate of Production for sampled farms

Farm	Litres of milk sold per worker	Revenues from the milk sold per worker (EUR)	Average no of employees (Person)	Gross profit per worker (EUR)
Small size	22,857	6,400	1.71	4,000
Medium size	37,874	10,605	1.90	8,205
Large size	58,130	16,276	3.00	13,876

Source (Own calculations by using sampled farm's data)

Table 3
Total feed cost per litre of milk and its contribution to total cost

Farms	Percentage of feed cost to the total cost (%)	Total feed cost per litre of milk (€/litre)
Small size	59	0.25
Medium size	66	0.16
Large size	72	0.16

Source (Own calculations by using sampled farm's data)

Table 4.
Diet formulation for each phase of lactation for dairy cows

	Lactation stage		
	Early	Mid	Late/dry
	30-		
Yield level (kg day^{-1} per cow)	40	20	10
Forage DM as proportion of total DM	0.3	0.5	0.7
Energy density (MJ kg^{-1} DM)	12	11	10
Crude protein (g kg^{-1} DM)	17	14	12
Modified acid-detergent fibre (g kg^{-1} DM)	16	25	30
Calcium (g kg^{-1} DM)	8	6	5
Phosphorus (g kg^{-1} DM)	4.5	3.5	3
Magnesium (g kg^{-1} DM)	1.8	1.5	1.5
Sodium	1.8	1.5	1.5

MJ – stand for mega-joules; DM – stands for Dry Matter

Source: (Philips, 2001)

Table 5

Operating expense ratio and gross profit margin ratio of sampled farm categories

Farm	Expenses	Revenues	Operating Expense Ratio	Gross Profit Margin Ratio
Small size	12,540	19,240	85.74%	14.26%
Medium size	16,007	28,108	60.20%	39.80%
Large size	48,620	80,988	74.27%	25.68%

Source (Own calculations by using sampled farm's data)

Table 6

Asset turnover ratio of the sampled farm categories

Farm	Total Assets	Revenues	Asset Turnover Ratio
Small size	162,300	19,240	0.12
Medium size	227,175	28,104	0.12
Large size	739,680	80,988	0.11

Source (Own calculations by using sampled farm's data)

Notes

ⁱ Busha is native breed which belongs to small or short horn group.

ⁱⁱ Equipment used for milk cooling and storage.

ⁱⁱⁱ Euroлона is a milk processing company in Miradi, region of Pristina. It produces milk as well, and in our study is the biggest milk producer with 120 heads of livestock, and 70 heads of dairy cows.