CATTLE FARMS GROSS MARGIN - THE CASE OF ALBANIA AND KOSOVO

Ylli BIÇOKU[1], Medin ZEQIRI[2], Grigor GJEÇI[3], Ergent PIRE[4]

[1]Agricultural University of Tirana, Tirana, Albania.
[2]Food Science and Biotechnology UBT, Lagja Kalabria, Prishtine, Kosovo, Albania
[3]Ministry of Agriculture, Rural Development and Water Administration, Albania
[4]Creative Business Solutions (CBS), Tirana, Albania

Corresponding author email: ybicoku@ubt.edu.al

Abstract

The aim of this paper was to analyze the economic efficiency of dairy cattle farms in Albania and Kosovo. It's a descriptive and quantitative survey and the target populations were the dairy farmers in six regions of Albania and seven regions of Kosovo. The random sampling technique was used to select the respondents in both countries (in Albania 79 farms and in Kosovo138 farms), in Albania from the list of the Regional Agricultural Directories and in Kosovo from the list of Paying Agency. Two methods of data analysis were used, namely: descriptive statistics, and gross margin analysis. The objective of this study was the comparison of the performance of the 5-10 cows farms (considered small farms) and 11cows farms (considered medium/large sized dairy farms). Data on: milk production, farm expenses and returns, use of milking machine, artificial insemination, fodder production, and feed bought in the market for each farm were recorded during the period 2015-2016. In Kosovo, the Gross Margin per Farm from milk and meat and Gross Margin per Farmfrom milk for the farms with 5-10 milking cows have negative values -318 Euro/farm and -673 Euro/farm, respectively, while the 11+ cows farms have positive values (3743 Euro/farm and 922 Euro/farm, respectively). While in Albania, as average the GMpF milk+meat and GMpF milk in both type of farms have positive results, however 15.8 percent of the 5-10 cows are showing negative results for the GMpF milk (loosing money), while for the 11+ cows farms this indicator is 31.7 percent, as the cost of production is very high. Taking into account the results obtain is a must that extension service to train the farmers for better: management of their farm, feeding system, fodder production, animal health etc.

Key words: dairy farm, gross margin per farm, income per farm, milk cost.

INTRODUCTION

Both countries continue to be predominantly rural economies with about 20 percent of the Gross Domestic Product (GDP) generated by agriculture in Albania, and 13% in Kosovo. Agriculture is also the largest employing sector, accounting for it employs about 42 percent of the active force in Albania and approximately 35 percent in Kosovo. (MAFRD, 2017; INSTAT, 2018).
The government of Albania considers priority the dairy sector (MBZHRAU, 2014)[1].The cattle sector is one of the most important sub-sectors in agriculture since it provided during 2017- 85 percent of milk, and 44.7 percent of meat production (INSTAT, 2017a).

Small-scale farming system is dominant for milk and beef production. Most of the cattle small sized farms continue to produce in the traditional way and market their animal origin products through informal channels. The number of cows is approximately 349,200, and one farm family as average is managing 2.29 cattle or 1.65 cows (INSTAT, 2017a). Cow milk production is 983 000 ton, but only ½ of the production reach the markets while the other half is used for consumption (by animals or processed on the farm). From the part of milk that reach the market only 11.2% (110,000 tons) is processed by the dairy industry, while the remaining 38.8% (381,000 tones) reaches consumers directly. The cow milk yield in 2016 reached 2815 kg/cow/year (INSTAT, 2017 b).
In Kosovo, livestock production is the most profitable activity and is of economic importance, and cattle milk dominates raw milk production. According MAFRD (2017), the

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[1]Ministry of Agriculture full name was Ministry of Agriculture, Food and Consumer Protection(MAFCP) until 2013, and as of 2013, following institutional changed, it is named Ministry of Agriculture, Rural Development and Water Administration (MARDWA), since 2017 and on the name is Ministry of Agriculture and Rural Development (MARD).

cattle fund is approximately 265,000 heads of which 136,780 are cows and milk production is 285,000 tones. The cow milk yield in 2016 reached 2085 kg/cow/year. Small and middle-sized farms are the dominant farms and most small dairy farms produce for self-consumption. On average, the farm size is 3.2 ha agricultural land (including common land/pasture), about 3.9 cattle (about 2 dairy cows), and it is estimated that today there are about 91,200 livestock farms in Kosovo (ASK, 2015). According to MAFRD (2014) small farms (1-4 cows) account for 94.2 percent of farms that breed dairy cows. During 2014, there were 5,472 commercial farms (5.8 percent of dairy farms) that have more than 4 dairy cows and are the main suppliers in the dairy industry with a total of about 62 million liters of milk per year; or about 18 percent of domestically produced milk (AZHB, 2015; MBPZHR, 2015a).

Many small sized farms in Albania and Kosovo have experience in growingthe local breed or their crosses which are smaller in size (body weight), produce less milk and has modest feeding requirements compare with pure milk breeds. This is one of the main causes behind the low production performance and high production cost.

However the success of dairy farms largely depends on the effective management of operations. Returns in dairy farming are deeply determined by variable cost and production cost and the correlations existing between farm size, milk yield, variable cost, total cost and milk price are important to be studied and keep under control by farmers (Dhuyvetter, 2010).

According to Popescu (2012) the advantage of gross margin is the fact that it allows the comparison, in terms of profitability, between various activities running in a farm. Serban (2010) cited by Popescu (2012) is mentioning that the higher production performance and the lower variable costs, the higher gross margin.

In addition, Popescu (2009) is emphasizing that dairy farm structure is close related to the economic efficiency, being well known the fact that the higher the farm size and milk yield, the higher the economic efficiency. While Alvarez et al. (2014) points out that the gross margin reveals a direct link between production efficiency and characteristics for each dairy

farm such as farm size, milking system, used feeding system, and so on. According to Keskin and Dellal (2011), the gross margin is recognized as an important benchmark for success in determining competitive production capability, and is used in comparing enterprise across the EU within the Farm Accountancy Data Network (FADN).

Moran (2009) is mentioning that milk price generally has the biggest influence on farm profits.

Ford and Shonkwiler (1994) emphasized that financial structure, labor efficiency, and milk per cow was very important characteristics of managerial ability. Increasing dairy managerial ability would have a larger impact on profitability for many farms than increasing herd size. Nastić et al. (2011) is mentioning some of the factors affecting milk production such as natural conditions; prices of crop products used for feeding of milking cows; prices of other inputs used for the fodder and all the production chain, subsidies; breeds that are managed, etc.

This paper aimed to make a comparison between the profitability of the dairy cattle farms in Albania and Kosovo. In addition, the paper presents an analysis of milk production in various farms of different herd size and also the main aspects of economic efficiency in order to put in evidence the importance of farm size for increasing profitability and competitiveness in dairy farming. For this purpose, the data were collected from farms of seven regions of Kosovo and six regions of Albania. They were processed according to the specific methodology for calculating the gross margin and profit.

MATERIALS AND METHODS

This study, in both countries, was conducted to collect farm data pertaining to revenue and expenses on farms managing 5-10 cows and those with 11+[2] cows to make an economic analysis based on gross margin. For this purpose, the gross margin was used as comparison criteria. The gross margin is calculated as the difference between total

[2]In Albania were interviewed farms with 11+ cows (11-170) while in Kosovo 11-50 cows

income and the variable cost. Variable cost includes the cost of:

- feed (from farm fodder production and feed bought in the market),
- labor (from family member and hired labor),
- veterinary service (including and insemination),
- water,
- electricity,
- transportation, and miscellaneous.

For Kosovo was used the list of dairy farms, breeding more than four cows, which is available from the Ministry of Agriculture, Forestry and Rural Development (MAFRD) based on the direct payments. The random sampling techniques were used to select the respondents. One hundred and thirty-eight dairy farm were monitored and interviewed in the seven regions of Kosovo (or 2.6 percent of all farms with over 4 cows)[3].

While in Albania were monitored 79 dairy cattle farms (or 2.1% of all Albania's farms, with over 4 cows) randomly selected from the list of farms that breed more than four cows, and are available from the Regional Agricultural Directorates (DRBs)[4].

In both countries the interviewed took place during the period December 2015 - April 2016.

Data collection: In both countries, a structured questionnaire was used for collection of all information related to dairy farming. The questionnaire was discussed with a panel of four specialists, to verify its content and validity, as well was tested with seven farmers, to avoid confounding questions and for clarity. Face-to-face interviews were conducted. According to the questionnaire the following data were recorded:

- Income and expenses: (i) Milk yield per cow; (ii) Milk production per farm; (iii) Quantity of milk sold; (iv) Price of milk sold; (v) Quantity and price of meat sold (live bodyweight); (vi) Expenses for the fodder production; (vii) Expenses for the animal feed bought in the market; (viii) Expenses for veterinary service and cow's insemination; (ix) Expenses for fuel, electricity, water, and trips; (x) Estimated cost of labor needed to take care

of the herd per year;(xi) Gross Margin per Farm from sales of milk and meat (GMpF milk+meat); (xii) Gross Margin per Farm from sales of milk (GMpF milk).

- Technical data, such as: Insemination (artificial or natural mating); milking (by machine or by hand); and type of animal feed used (including microelements or premix).

Data analysis: For data analysis was developed a model in Microsoft Excel program, while the statistical data processing was done with Statgraphics Centurion XVI.

RESULTS AND DISCUSSIONS

In Table 1 (data for Albania) and Table 2 (data for Kosovo) below are summarized the data of farms with 5-10 dairy cows and those with 11+ milking cows:

- Number of cattle and cows per farm
- Milk yield/cow/year
- Income per Farm (IpF milk+meat, and IpF milk),
- Variable cost per farm
- Gross Margin per Farm (GMpF milk+meat and GMpF milk)
- Milk cost per liter
- Ratio milk sold in the market vs total milk production
- Prices of milk and meat sold
- Milking and insemination method
- Feed expenses vs variable cost.

As far as the number of heads is concerned, on farms 5-10 heads, it is clear from the label itself that this is a variation of heads for farms, while at 11+ cows farms this variation is 11-170 cows.

On frms with 5-10 heads of cows rmilk yield ranging from 3400 to 7500 kg/cow/year while milk yield of farms with 11+ cows varies from 3000 to 7700 kg/cow/year or 15.7% higher than the first.

The income of dairy farms, studied, comes from milk and meat. But most of the income for all farms comes from milk 80.14 percent (81% on 5-10 cows farms and 80% on 11+ cows farms) and the rest from calves.

IpF milk+meat for 11+ cows farms are 5.29 times higher than 5-10 cows farms (69,639 Euro vs 13,147 Euro), while the IpF milk of 11+ cows farms is 5.23 times more than the 5-10 cows farms (55,711 Euro vs 10,646 Euro).

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[3]Gjilan, Gjakove, Ferizaj, Mitrovice, Peje, Prishtine, and Prizren.
[4]Elbasan, Lushnje, Fier, Shkodra, Korça and Tirana.

1. Albania

Table 1. Technical data of dairy farms in Albania

Number of heads	No of farms	No of cattle per farm	No of Cows per farm	Milk yield (liter)	IpF (milk + meat) Euro	IpF (milk) Euro	Variable cost per farm	GMpF (milk + meat) Euro	GMpF (milk) Euro
5-10 cows	38	12.02	8.1	4307	13147	10646	8996	4154	1650
11+ cows	41	56.92	37.95	4984	69639	55711	53199	16440	2512
Total/ average	79	35.33	23.6	4658	42465	33634	31342	11123	2292

Table 1 continue

Number of heads	Milk cost (Euro/kg)	Milk sold vs milk produced (%)	Price of milk sol (Euro)	Price of meat sold (Euro)	Milking		Insemination		Feed expense vs variable cost (%)
					By hand	by machine	Naturale	Artif.	
5-10 cows	0.246	88.0	0.348	3.68	25.8	74.2	0	100	62.9
11+ cows	0.238	99.7	0.321	3,40	9.6	90.4	0	100	71.2
Total/average	0.242	94.1	0.334	3,54	17.4	82.6	0	100	67.2

These significant differences are coming as the result of the number of cows, milk yield, the price of milk and meat sold, that in most of the cases are higher at 11+ cows farms compare with 5-10 cows farms.

The IpF milk+meat, IpF milk, GMpF milk+meat and GMpF milk are higher at 11+ farms compared with 5-10 cows farms. However 15.8 percent of the 5-10 cows farmare showing negative results (loosing money) for the GMpF milk, while for the 11+ cows farms this indicator is 31.7 percent, as the cost of production is very high. Other authors (Szalka, 2002; Demircan et al., 2006; Günden et al., 2010; Terin et al., 2017), report on losses of farms especially from dairy production. Authors emphasized that the lack of accurate knowledge about input usage among some of the farmers may be one of the main obstacles to efficient input use. Knowledge about production techniques is also needed along with efficient inputs.As Frank (1996) says, therefore, farmers should not continue to increase their business without understanding how to control costs, and once they have it in control to continue business growth.

Whereas, according to Dijkhuizen and Huirne, (1997) gross margin analysis is used to calculate farm milk profits because it is the simplest and most viable method of assessing enterprise profitability and is widely used in the farm management economy. When the size of the dairy cattle farm is statistically significant (p = 0.000) and its coefficient is positive, meaning that the increase with each cow unit

results in an increase in the milk production profitability. This is in line with what Cain et al. (2007) emphasized that the benefit of a dairy enterprise is highly related to the size of the herd.

The milk cost of 5-10 cows farms is 3.4 percent higher than 11+ cows farms, while the milk price of 5-10 cows farms is 8.4 percent higher than the 11+ cows farms. The highest selling price from 5-10 cows farms comes as a result of selling milk (65-100 percent of sales) to the people houses or in the market where they have the highest price. 42.1 percent of farms with 5-10 heads of cows sell milk to the house or market versus 21.9 percent of farms 11+ cows.

In variable cost, feed took the highest share by 67.2 percent, ranging from 62.9 percent for the 5-10 cows farms to 71.2 percent of the 11+ cows farms, because the last ones are spending more on concentrate feed as the milk yield is higher compared with 5-10 cows farms.

Gloy et al. (2002) says that in terms of milk, some studies have found a negative relationship between spending on purchasing feed for cows and financial benefit measures.

While several studies carried out in different countries (Moran, 2005; Aktürk et al., 2010; Keskin and Dellal 2011; Semerci et al., 2014; Beldman et al., 2017; Zeqiri 2018; Krasniqi et al., 2018),the authors report that feed costs account for 57.0-87.5 percent of variable costs. Both type of farms use only artificial insemination for their cows.

Knowing that in our country the spread of artificial insemination covers 62 percent of the

cows population, it is understood that on the farms taken in the study this indicator is very positive in favor of artificial insemination since the regions where surveillance is conducted are the main regions of milk production, and should be considered that all farms are lying in the field area.

Regarding the method of milking by hand or by using milking machines, at 11+ cows farms, this indicator is higher in favor of milking machines, compared with 5-10 cows, indeed, we have 90.4 percent versus 74.2 percent,

respectively. In 5-10 cows farms, all work is carried out by family members, while in the case of farms with 11+ cows in 22 percent of them, apart from family members, there are also employed workers because of the large number of heads.

Statgraphics Centurion XVI was used for statistical data processing, to compare 5-10 cows farms and 11+ cows farms for: GMpF milk+meat vs. Number of cows/year;

GMpF milk vs. Number of cows/year; and results are shown below:
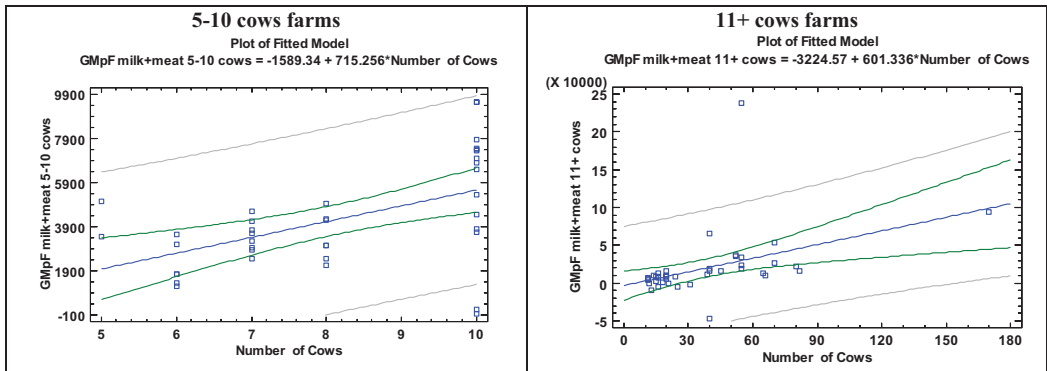
GMpF milk+meat vs number of cows

Figure 1. 5-10 and 11+ cows farms GMpF milk+meat vs Number of Cows

5-10 cows farms: GMpF milk+meat 5-10 cows = -1589.34 + 715.256*Number of Cows. The correlation coefficient equals 0.519478, indicating a moderately strong relationship between the variables. Since $p<0.05(0.0008)$ there is a statistically relationship between GMpF milk+meat 5-10 cows and Number of Cows at the 95.0% confidence level.

11+ cows farms: GMpF milk+meat 11+ cows = -3224.57 + 601.336*Number of Cows. The correlation coefficient equals 0.438626, indicating a relatively weak relationship between the variables. Since $p<0.05$ (0.0041), there is a statistically relationship between GMpF milk+meat 11+ cows and Number of Cows at the 95.0% confidence level.
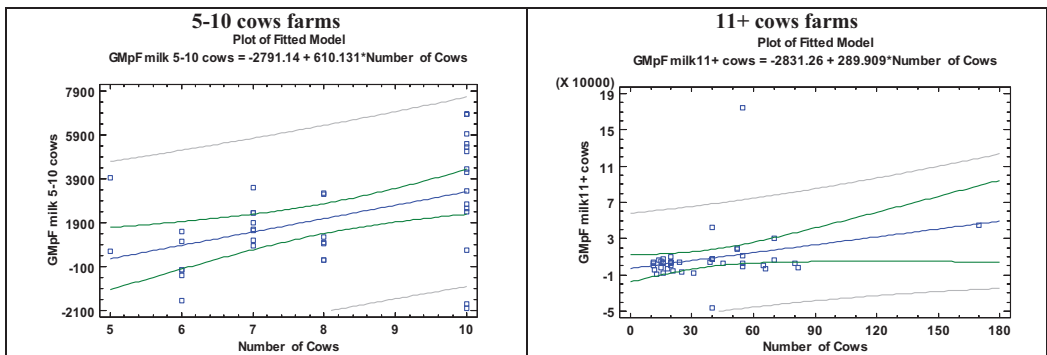
GMpF milk vs number of cows

Figure 2. 5-10 and 11+ cows farms GMpF milk vs Number of cows

5-10 cows farms: GMpF milk 5-10 cows = -2791.14 + 610.131*Number of Cows. The correlation coefficient equals 0.457578, indicating a relatively weak relationship between the variables. Since $p<0.05$ (0.0039), there is a statistically relationship between GMPF milk 5-10 cows and Number of Cows at the 95.0% confidence level.

11+ cows farms: GMpF milk11+ cows = -2831.26 + 289.909*Number of Cows. The correlation coefficient equals 0.289602, indicating a relatively weak relationship between the variables. Since $p<0.05$ (0.0663), there is not a statistically relationship between GMPF milk11+ cows and Number of Cows at the 95.0% or higher confidence level.

2. Kosovo

Table 2. Technical data of dairy farms in Kosovo

Number of heads	No of Farms	No of cattle per farm	No of Cows per farm (average)	Milk yield (liter)	IpF (milk + meat) Euro	IpF (milk) Euro	Variable cost per farm	GMpF (milk + meat) Euro	GMpF (milk) Euro
5-10 cows	68	12.54	7.25	3166	8168	7813	8486	*-318*	*-673*
11+ cows	70	37.85	20.93	3932	28736	25915	24993	3743	922
Total/average	138	25.38	14.19	3555	18601	16995	16859	1742	136

Table 2: Continue

Number of heads	Milk cost (Euro/kg)	Milk sold vs milk produced (%)	Price of milk sold (Euro)	Price of meat sold (Euro)	Milking		Insemination		Feed expense vs variable cost (%)
					by hand	by machine	Naturale	Artif.	
5-10 cows	0.369	62.96	0.347	2.69	44.1	55.9	44.1	55.9	66.4
11+ cows	0.298	71.60	0.333	3.02	11.4	88.6	37.1	62.9	71.8
Total/average	0.333	68.2	0.336	2.85	27.5	72.5	40.6	59.4	69.2

The milk yield of 11+ cows farms (ranging from 2000 to 6238 kg/cow) is 24.2 percent higher than the 5-10 cows farms (ranging from 1633 to 5742 kg/cow). The milk cost of 5-10 cows farms is 23.8% higher than 11+ cows farms, while the milk price of 5-10 cows farms (ranging from 0.25 to 0.60 euro cents/kg) is 4.2% higher than the 11+ cows farms (ranging from 0.22 to 0.50 euro cents/kg). About 12% of the farms in both type of farms are selling the milk directly tothe market and getting the highest price of 0.50-0.60 euro cents/kg.

In variable cost, feed took the highest share by 69.2%. The same result is reported by Popescu (2009) where feeding keeps the highest share within Variable Costs: 75.44 - 77.36%. While for Kosovo is reported more than 60% (Zeqiri, 2018; Krasniqi et al., 2018).

The farms with 11+ cows had better access to artificial facilities (62.9% vs 55.9%) and milking machine (88.6 percent vs 55.9 percent) compare to the 5-10 cows farms. In addition, 25% of 5-10 cows farms and 57.1 percent of 11+ farms raise heifers in their herds. The returns of the dairy farms came from the sale of milk and meat. The highest share of total returns for all categories of farms came from the sale of milk (93.7-95.5%) and sale of calves (4.5-6.3%).

The GMpFmilk+meat and GMpF milk have negative values for the 5-10 cows farms (-318 Euro/farm and -673 Euro/farm, respectively), while the 11+ cows farms have positive values (3743 Euro/farm and 922 Euro/farm, respectively). However, for the all farms monitored, the values are positive 1742 Euro/farm for the GMpFmilk+meat and 922 Euro/farm for the GMpF milk. According to MBPZHR (2015b) analysis of competitiveness of agriculture of Kosovo shows that currently only a small share of farms can compete in the regional market, EU and international level.

In addition, several studies have found a negative relationship between expenditures for purchase feed per cow and measures of financial profitability (Gloy et al., 2002). Some

other studies have reported that the highest share in the milk production cost is represented by feeding, which is more sensitive to variation than average milk cost; therefore, milk economics deeply depend on feed cost (Sandor, 2003; Popescu, 2008; Popescu, 2009; Bytyqi et al., 2014). According to Popescu (2014) higher milk yield requires a higher production cost, an aspect that farmers should take into consideration and handle in the most efficient way.

The farm inefficiency decreased as farm size increased, it means that there is ample scope to

raise farm profitability by improving economic efficiency and minimizing profit loss. According to Gloy "et al" (2002) many studies have reported a positive relationship between milk production per cow and various measures of financial success.

Statgraphics Centurion XVI was used for statistical data processing, to compare 5-10 cows farms and 11+ cows farms for:
- GMpF milk+meat vs. Number of cows;
- GMpF milk vs. Number of cows/year; and results are shown below:
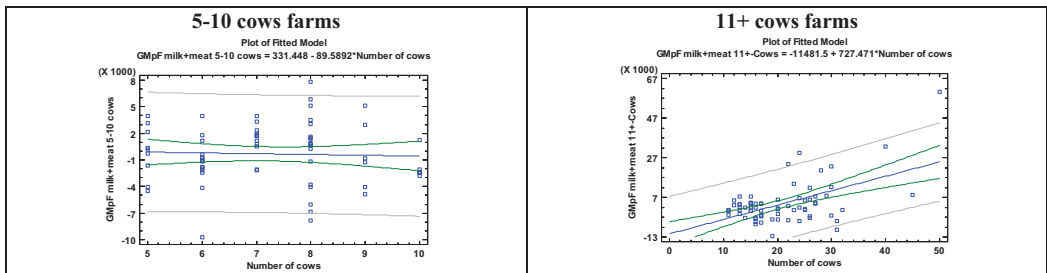
GMpF milk+meat vs number of cows

Figure 3. 5-10 and 11+ cows farms GMpF milk+meat vs Number of cows

5-10 cows farms: GMpF milk+meat 5-10 cows = 331.448 - 89.5892*Number of cows. The correlation coefficient equals -0.041, indicating a relatively weak relationship between the variables. Since $p>0.05(0.7383)$, there is not a statistically relationship between GMpF milk+meat 5-10 cows and Number of cows at the 95.0% or higher confidence level.

11+ cows farms: GMpF milk+meat 11+-Cows = -11481.5 + 727.471*Number of cows. The correlation coefficient equals 0.54, indicating a moderately strong relationship between the variables. Since $p<0.05(0.0000)$, there is a statistically relationship between GMpF milk+meat 11+-Cows and Number of cows at the 95.0% confidence level.
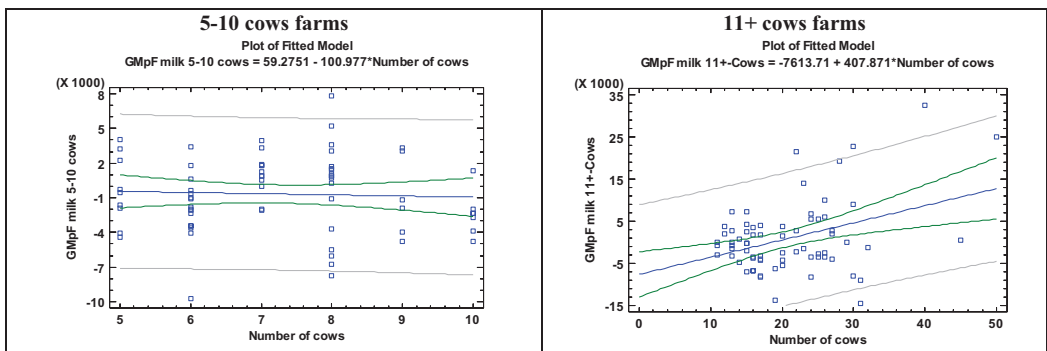
GMpF milk vs number of cows

Figure 4. 5-10 and 11+ cows farms GMpF milk vs Number of cows

5-10 cows farms: GMpF milk 5-10 cows = 59.2751 - 100.977*Number of cows. The correlation coefficient equals -0.047, indicating

a relatively weak relationship between the variables. Since $p>0.05$ (0.7043), there is not a statistically relationship between GMpF milk

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5-10 cows and Number of cows at the 95.0% or higher confidence level.

11+ cows farms: GMpF milk 11+-Cows = -7613.71 + 407.871*Number of cows. The correlation coefficient equals 0.379263, indicating a relatively weak relationship between the variables. Since $p<0.05$ (0.0012), there is a statistically relationship between GMpF milk 11+-Cows and Number of cows at the 95.0% confidence level.

These data of our study show that 11+ cows farms had better results than the 5-10 cows farms for milk yield, production cost, gross margin per cow, use of artificial insemination and milking machine.

Cocchi et al. (1998) found that small dairy farms were 12 to 20 percent less efficient than larger dairy farms. While Delgado (2008) says that smaller farms typically receive lower prices for their output and still manage to realize higher unit profits in some cases is only partly explained by not costing family labor, which lowers the unit costs of smallholder producers more than those of large producers. However, the differential impact across sizes of farm was different in different countries and for different commodities.

According to Nastić et al. (2011) competitiveness of milk production is largely dependent on access to price competitive and high quality feed inputs and quality cattle. In the variable cost structure, the most significant are the costs of animal feed, whose share is 46.93%, than the costs of operating machines (29.4%) and other costs (18.99%), while the costs of veterinary services and artificial insemination are less than 3%.

CONCLUSIONS

Cow milk is the most important livestock production in Albania and Kosovo.

Most farmers intuitively think about farm costs and returns. However, greater use should be made of ways to make them become aware of the relative importance of all their financial inputs, in terms of their contribution to the cost of production per kilogram of milk produced on the farm.

The economic results of our study (in both countries) are much better for 11+ cows farms than for 5-10 cows farms such as milk yield;

milk cost; better access to artificial facilities and use of milking machine.

In Kosovo, the GMpFmilk+meat and GMpF milk for the farms with 5-10 dairycows have negative values (-318 Euro/farm and -673 Euro/farm, respectively), while the 11+ cows farms have positive values (3743 Euro/farm and 922 Euro/farm, respectively). The efficiency of the farm has increased with the increase farm size, it means that there is ample scope to raise farm profitability by improving economic efficiency and minimizing the profit loss.

While in Albania, as average the GMpF milk+meat and GMpF milk in both type of farms have positive results, however 15.8 percent of the 5-10 cows are showing negative results for the GMpF milk (loosing money), while for the 11+ cows farms this indicator is 31.7%, as the cost of production is very high.

As the 5-10 cows farms, in Kosovo, and several in Albania have negative incomes for the milk production is a must for extension service to train farmers to keep the financial record separate for milk, and other crops. In addition the extension service needs to train the farmers for better: management of their farm, feeding system, fodder production, animal health etc.

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