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Izvorni znanstveni članak
Original scientific paper**MILK PRODUCTION IN COMMERCIAL CATTLE DAIRY
FARMS IN KOSOVA****H. Bytyqi, M. Rrustemi, H. Mehmeti, A. Kryeziu,
V. Gjinovci, M. Gjonbalaj****Summary**

A study research was carried out in comercial dairy farms in Kosovo with the aim to contribute to the understanding of the situation of milk production and factors affecting milk productivity. Seventeen dairy cattle farms were selected for the study. The fresh milk samples were collected and record analyses were done according to the International Committee for Animal Recording using the A4 standard method, and were carried out from August 2007 till September 2008. Meanwhile, 4694 milk samples from 461 individual cows were collected. Depending on the cow breed, daily milk yield was very different ($P < 0.0001$) ranging from 18.92 ± 0.22 to 12.34 ± 0.53 . Effect of the farm and lactation number was also very significant ($P < 0.0001$), showing that there are huge management variation from farm to farm (for about 14.87 kg/day) and during different lactations (16.91 ± 0.26 to 18.43 ± 0.24 kg/day). According to this study, although in generally milk yield was very much constant, in some months of year cows in Kosovo tend to produce more milk. Huge differences (about 29.06%) were noticed also within the same breed comparing the current production in Kosovo and from cow breed origine in Austria .

It was concluded that low milk yield was achieved for all breeds compared to their genetic potential. Furthermore, according to current dairy farm management condition in Kosovo, more favorable breeds tend to be dual purpose breeds compare to more milk specialized ones.

Key words: Dairy farms, cow breed, fresh milk, lactation, milk yield, significant.

Introduction

The cattle production is very important part of Kosovo rural families. For a long time period all involved worldwide Institutions that dealt with cattle breeding were engaged in more intensive improvement of the cattle breeding in order to achieve a better production. The population of the world is growing, thus the feeding of people and the increased consumption of livestock production has become an immediate necessity.

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For this reason, nowadays the researches in general give a significant role to livestock production performing different researches. In that field, cattle are quite useful animals because we get from them precious productions used for human feeding thus cattle are the biggest producers of milk, meat and their sub-productions.

Milk is the most significant cattle production among other ones, which is produced within milk glands and it is used as a primary food for young individuals providing them with the necessary proteins, fat, immunoglobulin, minerals, vitamins, etc.

The recent scientific achievements have significantly influenced on managing the cattle, increasing their production rate and also it has enabled changing the breed structure with the aim to fulfill the needs of the modern society by their products. Therefore, the development of the production capacities especially the milk production has influenced creating high production breeds and increasing the worldwide milking breeds. As in many commercial farms in Europe, also in Kosovo on dairy farms mainly dominated breeds are: Holstein (Black and Red), Brawn Swiss, Simmental, and Montbeliard. In Alps (mainly in Austria and Italy) and some mountain areas in Kosovo Tyrol Gray can found as well. However, introduction of highly yielding breeds of dairy cattle into a new and sometimes harsh environment can lead to reduced milk production (Horan, et al. 2005; Calus and Veerkamp, 2003; Cienfugos-Rivas, et al. 1999) and might be sources of genetic variation in production efficiency of dairy cow (Veerkamp, et al. 1995).

The dairy farming sector is closely related with the milk productivity and its productions. The milk gland of the mammals is developed to feed their newborn offspring. At the same time, people have improved the animal feeding and breeding towards achieving the increased milk productivity (Svendensen, 1993; Ray, et al. 1992).

In general, the factors that essentially influence on milk industry are multi-dimensional, like: animal selection, breeding, rearing young animals, feed production, feeding, housing, milking, milking system, hygiene, disease control, milk marketing, animal stocks and animal manure.

There are different dairy cow breeding practices in Kosovo, varying from one farm to the other. Most individual and commercial farmers in Kosovo seem to have experience breeding the native breed, which is smaller in size, produces less milk and has modest feeding requirements (Bytyqi, et al. 2006; 2007). It is worth to mention that majority of farmers had followed the same practice

with imported cattle that have larger body frame, produce more milk and have special feeding requirements. Therefore, in major cases offered daily ratio is very far from the real feeding needs for animals in specific production stages and their breeding. The hygiene in some stalls is at a low level and frequently is a source of different diseases (mastitis, pneumonia etc.) that directly influence the productivity and animal health. Usually, during the winter period cows are kept in the stall almost during the whole time. Grazing the animals usually begins in the second half of May and as a result of small land parcels of private farmers (2.3 ha per family) and often fragmented in 4-5 small pieces. The remote distance from the stall to the grassland makes the grazing period in some Kosovo farms to start after the first mowing of meadows that lasts about 6 months (Bytyqi, et al. 2005).

Kosovo is still dominated by crossbreeds, originated from native breed Busha. Generally, this type of breed is characterized with low production rate but is known for high resistance against different diseases and good adoption to extensive breeding conditions. Recently, in commercial farms can be seen crossbreeds of imported breeds such are: Simmental x Holstein, Simmental x Brown Swiss, Holstein x Brown Swiss.

The insemination practice of cows in Kosovo is based on natural and artificial insemination. The natural inseminations are apparently more used. Unsuccessful inseminations, lack of timely estrus detection and other failures have caused to use the artificial insemination at a lower rate even in the commercial farms.

Our study intended to investigate the indicative factors (breed, lactation number, month of the year, and farm divergences) affecting milk production in some commercial dairy farms in Kosovo.

Materials and Methods

Kosovo is situated in southeastern Europe with about 2 million people. The land size of Kosovo is 10.887 km², from which 53% is a cultivated land. The climate of Kosovo is typically semi-continental with average annual rainfalls of 631 mm and average temperature of 11°C during the last 20 years. The rural family numbers about 9.64 members and farm size is small where 55% possess about 1-3 ha (Agriculture rural development plan 2007-2013, 2006).

Table 1. shows the average number of cows and milk samples for each breed included in our study. There were 3909 milk samples collected from 389

head. The most representing breed was Black Holstein with 1413 milk samples, followed by Red Holstein (1020), Brown Swiss (848), Simmental (785), Montbeliard (258), different crossbreeds (250) and Tyrol Grey breed (120) milk samples.

Table 1 – NUMBER OF COWS AND MILK SAMPLES PER BREED

Breed	No. cows per breed	No. of milk samples per breed
Brown Swiss	84	848
Tyrol Grey	12	120
Red Holstein	102	1020
Black Holstein	141	1413
Crosses	25	250
Montbeliard	25	258
Simmental	72	785
Total	461	4694

The study was organized in 17 cattle dairy commercial farms representing all regions of Kosovo. For milk sampling and farm data collection were responsible employees of Kosovo Center for Livestock Breeding Project (KCLB). Normally, cattle are kept indoors from second part of November until the end of April (winter period). During this period feeding is completely dependent on the feed given by the farmer, mostly hay. Stables ventilation is often problem while the water is given “ad libitum”.

The fresh milk samples for analyses were collected using the standard method - A4 according to the International Committee for Animal Recording – ICAR, during the period August 2007. – September 2008. The samples were taken during evening and morning milking in amount of 40-50 ml milk and were put in sterile preserved bottles (AZIDOL), stored in mobile coolers in 4°C temperature and transferred to the laboratory for analyses. In order to record the data, the identification cards were used consisting of the following variables: identification number, breed, sample number, lactation number, farm, birth date, calving date, milk amount produced and some other data related to the livestock breeding. Incomplete and non realistic data were excluded from further analyses.

Statistical analysis: JMP-starter business unit program of SAS, (Institute SAS Inc. 2004) was used to analyze the data. An analysis of variances was performed to analyze the level of significances for effects of different variables

on milk production. Variations between different variables were tested using Duncan test (Steel and Torrie, 1980). All variable effects were considered as a fix.

Results

The least square means (LSM) and variance analyses ($P > F$) for effect of the cattle breed on milk production are represented in Table 2. The results from Table 2. show that breeds differ significantly ($P < 0.0001$) in milk production in analyzed conditions. The highest production was achieved for Black Holstein (18.92 kg/day), followed by Montbeliard, Simmental, Red Holstein, Brown Swiss (17.85, 18.70, 17.64 kg/day), respectively. Different crosses and Tyrol Grey breed produced less milk quantities (16.25 and 12.34 kg/day), respectively.

Table 2 – TEST DAY MILK YIELD OF DIFFERENT CATTLE BREEDS IN KOSOVO (kg/day).

Breed	Number of samples Milk production per farm (kg/day)		
	N	LSM	STD DEV
Brown Swiss	848	17.64 ^b	7.31
Tyrol Grey	120	12.34 ^d	5.79
Red Holstein	1020	17.80 ^b	7.70
Black Holstein	1413	18.92 ^a	8.27
Crosses	250	16.25 ^c	7.13
Montbeliard	258	18.70 ^a	6.53
Simmental	785	17.85 ^b	7.95

^{a, b, c, d} - Means within a row with different superscripts differ significantly at a $P < 0.0001$

Table 3 – EFFECT OF COW LACTATION NUMBER ON TEST DAY MILK PRODUCTION (kg/day).

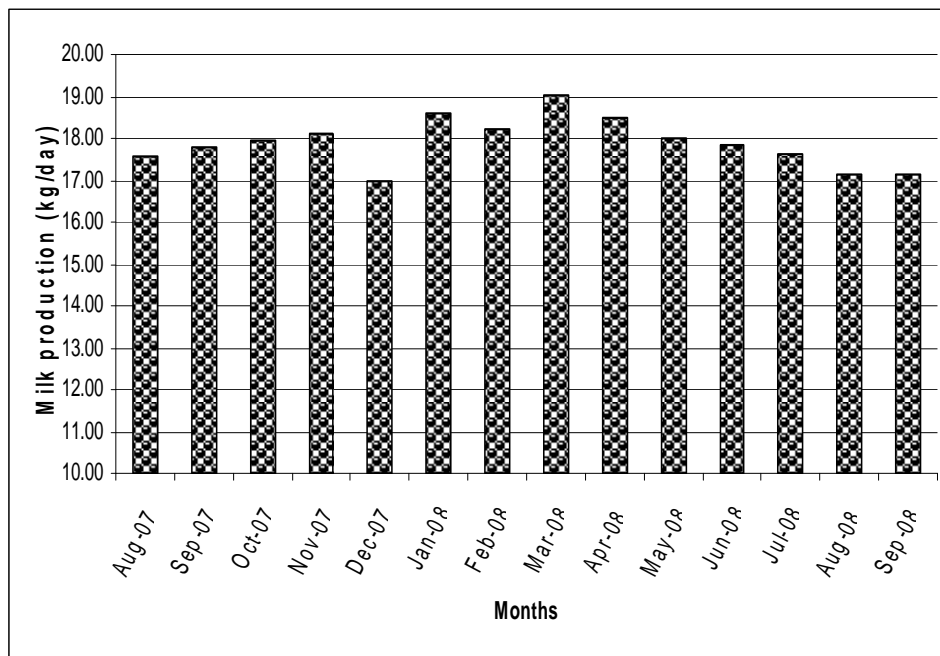
Effect of lactation number	Number of samples Milk production per lactation (kg/day)		
	N	LSM	STD DEV
Lactation I st	931	18.43 ^{ab}	7.40
Lactation II nd	836	17.20 ^{cdef}	7.58
Lactation III ^d	951	17.73 ^{ce}	7.81
Lactation IV th	939	16.91 ^{df}	7.96
> Lactation V th	517	17.72 ^{bcd}	7.52

^{a, b, c, d, e, f} - Means within a row with different superscripts differ significantly at a $P < 0.0001$

Table 3. represents the least square means and the variance analyses for the effect of the number of lactations of analyzed breeds in milk production for commercial farms involved in this study. The results show that cows in the first lactation produce more milk (18.43 kg/day), compared to the following lactations, those in the 2nd lactation (17.20 kg/day), 3rd (17.73 kg/day), 4th (16.91 kg/day), and those in lactation 5th and > 5th (17.72 kg/day). The differences regarding the effect of the number of lactations were highly significant ($P < 0.0001$).

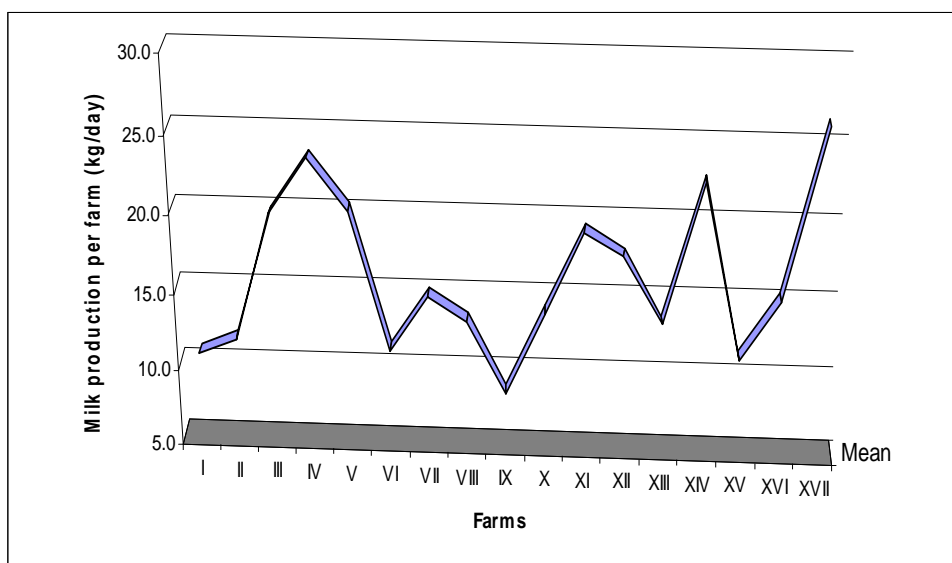
In Figure 1. is depicting the results of milk test yield per day during the whole study period, August 2007. - September 2008. During the research, we noticed that the average milk production during different seasons for all breeds and different farms was not significantly different. However, the milk yield for cows during the spring session tend to be higher for about 0.57 kg/milk per day compare to the winter period.

Figure 1. – MILK TEST DAY YIELD (TDY) PRODUCED (kg/day) PER PERIOD AUGUST 2007 – SEPTEMBER 2008.



In Figure 2. are represented the results of test day milk yield for different farms involved in our study. The results show high variations between different farms ($P < 0.0001$). Higher productivity was depicted at the farm XV = 22.60 and IV = 23.48 kg/day milk. Lower production seems to be realized in farms IX and I, 8.61, and 10.72 kg/day milk, respectively.

Figure 2. – MILK TEST DAY YIELD (TDY) PRODUCED (kg/day) PER DIFFERENT FARMS - PERIOD AUGUST 2007 – SEPTEMBER 2008.



*Because of confidentiality farms are indicated using Roman numbers.

In Table 4. are given the changes in milk production for different breeds in Kosovo compared to those in Austria. Based on our findings, it comes out that there were great differences between two similar breeds managed in two countries. These variations were grater for Black Holstein, managed in Austria, which produce about 7.95 kg/day more milk than those bred in Kosovo. Fewer differences between two countries are shown with Tyrol Grey breed, around 3.30 kg/day milk, again the highest production rate belong those cows that are bred in Austria.

Table 4 – VARIATIONS ON MILK PRODUCTION BETWEEN SAME GENOTYPES (BREEDS) MANAGED IN KOSOVO AND AUSTRIA.

Breed	Production in Kosovo	Production in Austria	Differences	
	Milk (kg/day)	Milk (kg/day)	Milk (kg/day)	(%)
Brown Swiss	17.64	22.14	4.50	- 20.33
Tyrol Grey	12.33	15.63	3.30	- 21.11
Black Holstein	18.92	26.67	7.95	- 29.06
Simmental	17.85	21.26	3.41	- 16.04

If these values are emphasized during the whole corrected lactation period (305 day) and using the averages achieved in both countries, Kosovo and Austria (Table 4), and then the distinct differences are quite evident. In particular, these differences were for the breeds specialized for milk production. The Black Holstein in dairy farms in Austria used to produce about 2424.75 kg milk more within lactation period compared to those kept in Kosovo.

Discussion

The number of samples represented in this study corresponds with the breed structure of cattle in commercial farms in Kosovo. As stated in the study of Bytyqi et al. (2006), like in small scale dairy farming also in commercial farms in Kosovo, the dairy cattle breeds (i.e., Black and Red Holstein, and Brown Swiss) continue to produce more milk compared to those known as dual purpose production breeds. This result was almost expectable considering the productive genetic potential of milk for these breeds. An excellent performance was shown for Montbeliard breed that although belonging to dual purpose breeding cattle, in regard to milk yield production in Kosovo was ranked as a second. Compared to Black Holstein, Montbeliard cows produced about 0.22 kg/day less milk, while compared to Tyrol Grey produced about 6.36 kg/day more milk.

By all means, even apart of this production achieved the lack of using their milk production potential was very high almost at cow breeds included in the study. If they were compared with their country of origin (majority of the cows are daughters or imported cows from Austria and Germany), these differences were more evident for breeds specialized for milk like black Holstein, around

2524.75 kg milk, 30.50 kg fat, 2.06 kg proteins less in breeding conditions of Kosovo (Cattle breeding in Austria, 2007; Rinder produktion, 2002). This can be justified by huge farm management variation and applied practices in Kosovo.

Low production rate with regard to genetic potential and need for better breeding and management practices in our commercial farms is shown through result of the 1st lactation production. Cows in first lactation seem to produce more milk, about 1.23 and 0.70 kg/ per day than those in the second and third lactation, respectively. Physiologically and in the right breeding and management conditions, opposite results should be obtained. Also, the higher production was during the winter time (January – April), indicating that green feeds that enable higher milk production with fewer costs are not used in the best manner.

Conclusions

Although different cattle breeds on commercial farms compared to the same ones bred in extensive production conditions (small farms) in Kosovo produce more milk, still the milk production of almost all breeds is represented with limited potential. If the management of the commercial farms in Kosovo continues to be the like so far, the most preferable would be the dual purpose breeds (like Montbeliard and Simmental) due to their meat and milk production potential. Breeds that are specialized for milk production require intensive feeding and very good managing practices that can not be achieved in present management practices. By all means, in order to have the conclusions as accurate as possible, linked to relevant information regarding the suitability of cattle breeds for commercial farms in Kosovo conditions, it might be preferable to include in future study also the other traits like meat production, fertility and resistance against various diseases, etc.

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