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Analysis of some cattle farms focused on milk production

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Abstract: This study was conducted in the municipalities of Pale and Sokolac on a sample of 30 Simmental and Holstein-Friesian dairy cattle farms. Farm size, land area, number of household members, average milk fat content, protein content and total milk production per dairy cow were analyzed. Slight variations were observed due to the same climatic conditions and the same technology and breeding method used. The slightly higher milk fat percentage in Simmental cows is their breed characteristic.

Key words: Simmental, Holstein-Friesian, characteristics of cattle farms.

Introduction

Cattle breeding and the milk production sector are very important for the satisfaction of human nutrition needs and the production of animal proteins in every country around the world. Cattle production is the most important segment of livestock production i.e. an indicator of the overall development of the

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agricultural and food sectors in the Republic of Srpska. The value gained from cattle breeding products accounts for more than 40% of the total agricultural production in the Republic of Srpska. The typical breed used in the cattle production in the Republic of Srpska is the one that has meat–milk and milk–meat production traits combined, whose basis is Simmental breed, whereas in East Herzegovina it is the Gatacko ox, as an indigenous strain of cattle.

Farm structure in the Republic of Srpska is very complex, consisting of small subsistence agricultural households, small semi-subsistence farms, large family farms, and privatized large enterprises with a mixed ownership structure (Bogdanov and Božić, 2010). The main problem in cattle production is insufficient production of milk and meat. The agricultural structure is underdeveloped, farms are very small, with the average of 0.93 ha per farm, in contrast to 18.4 ha in the EU. In European Union countries, attention is focused on production systems and marketing (Gabina, 2006). Special attention is given to new techniques for sustainable production and milk quality (Petrović, 2007).

Lactation, milk yield and milk composition are considered breed traits, regardless of extremes in terms of milk yield and milk composition. In the study area, breed structure is similar to that in the wider area of the Republic of Srpska and Bosnia and Herzegovina. Unfavorable characteristics of milk production in the Republic of Srpska include low milk yield per cow, disadvantaged breed structure and low marketability of production. Depending on the type of crossbreeds (Buša, Simmental or Holstein Friesian), the production is highly variable, and is estimated to range from 2,000 to 4,000 kg, with lactation in Buša and Simmental crossbred cows typically being shorter than the standard lactation and their total milk production lower (2,000–3,000 kg). In EU countries, which practice intensive cattle farming, apart from specialized dairy breeds (Holstein Friesian), other breeds are also significantly raised for milk production, such as Simmental, Brown Swiss, Montbeliard and Normandy, and the crosses are not further improved, but purebred selection is underway. Typical examples are Germany with an average of 6,776 kg per cow (Simmental cattle accounting for about 30 % of the total cattle population in Germany), Austria with an average of 6,028 kg (Simmental cattle accounting for over 80% of the total cattle population in Austria), and France, where Holstein Friesian, Montbeliard, Simmental and Normandy breeds are used for milk production. The Simmental breed is mostly raised in the Republic of Srpska, as a breed combining different production traits (Perišić et al., 2009). Holstein Friesian is a high-yielding dairy cow in temperate climates. With good feeding and milking management, HF cows can yield more than 9,000 kg/cow/305 day lactation period (Chandan et al., 2008).

The profitability of milk production on individual farms is mostly affected by feed costs which should be reduced as much as possible. One way to achieve this is through farm's own fodder production. Large areas of uncultivated and quality land open up the potential for the production of additional quantities of cheap feed and the ability to increase competitiveness. Besides price, calculations can

result in other values, such as certain categories of costs, total costs, the market value of production, financial results, the level of labor productivity, the coefficient of efficiency, profitability level and others.

The aim of this research was to determine whether there are differences in production characteristics between Simmental and Holstein Friesian cattle breeds.

Materials and methods

To obtain a highly precise description of both dairy farm structure and the characteristics of dairy production systems, and to assess possibilities for improving milk production and farming conditions, survey-based research was conducted, targeting selected farms. The survey was carried out in the municipalities of Pale and Sokolac. The sample consisted of 30 farms including Holstein Friesian and Simmental cattle. The following characteristics were analyzed: number of household members, number of dairy cows in the herd, total land area, average annual milk yield per dairy cow, average milk fat content, protein content, and total annual production per dairy cow without premium. Data were analyzed using descriptive statistics for the specified characteristics. Measures of central tendency and measures of variation were used. The following indicators of variations were used: the minimum, the maximum, the variation interval, standard deviation and the coefficient of variation. Data were processed using methods applied in specific fields of research. Results are presented as tables.

Results and Discussion

Breeding of cattle having combined production traits on small farms housing a small number of animals is practiced under various moderately intensive conditions which are dominant on farms in the Republic of Srpska. Dairy cattle production has traditionally been one of the most important segments of livestock production in the Republic of Srpska.

Natural resources of the Republic of Srpska provide the following development opportunities: mountainous areas, combined ox type, meat–milk and meat types; lowland areas, type of cattle for milk production, milk–meat type, and fattening cattle for meat production (Table 1).

Table 1. Production characteristics of cattle

No.	Breed	Breeding target	Breeding principle	Type of production
1	Simmental	Milk–Meat or Meat–Milk	Pure-breeding, possible crossing with the red Holstein	Breed for both milk and meat production
2	Holstein Friesian	Milk	Pure-breeding	Breed for milk production

Indicators of farm size

Agricultural land is the basis for dealing with livestock production. In the Sarajevo – Romanija region, agricultural land covers 79,887 ha, accounting for 38.66% of the total area (Table 2).

Table 2. Indicators of descriptive statistics for the size of farms producing Holstein Friesian cattle

Parameter	Number of members	Number of heads/ dairy cows	Land (ha)
Min	3.00	5.00	2.63
Max	11.00	12.00	40.63
Variation interval	8.00	7.00	37.99
Average	6.70	8.80	13.29
Standard deviation	2.21	2.30	11.38
Coefficient of variation	33.04	26.13	85.62

Herd size of Holstein Friesian cattle farms ranges from 5-12, and the size of Simmental herds from 3-12. Standard deviation for Holstein-Friesian cattle farms is 2.30, while variation for Simmental farms is 2.55. Households differ in total land area, ranging from 2.63 to 40.63 (Table 2) and from 2.91 to 15.94 (Tables 3 and 4).

Table 3. Indicators of descriptive statistics for the size of Simmental cattle farms

Parameter	Number of members	Number of heads/ dairy cows	Land (ha)
Min	1.00	3.00	2.91
Max	7.00	12.00	15.94
Variation interval	6.00	9.00	13.03
Average	4.30	5.75	8.51
Standard deviation	1.75	2.55	3.58
Coefficient of variation	40.70	44.38	42.11

Table 4. Indicators of descriptive statistics for the size of Holstein Friesian and Simmental cattle farms

Parameter	Number of members	Number of heads/ dairy cows	Land (ha)
Min	1.00	3.00	2.63
Max	11.00	12.00	40.63
Variation interval	10.00	9-00	37.99
Average	5.10	6.77	10.11
Standard deviation	2.20	2.84	7.34
Coefficient of variation	43.19	41.92	72.63

Indicators of productivity

Indicators of productivity are shown in Tables 5, 6 and 7.

Table 5. Indicators of descriptive statistics for the production characteristics of Holstein Friesian cattle farms

Parameter	Annual milk yield per dairy cow	Average mm	Value of production per cow (KM)	Average protein content
Min	4634.00	2.92	1645.00	2.29
Max	4987.00	3.35	1904.60	2.65
Variation interval	353.00	0.43	259.60	0.36
Average	4761.50	3.13	1791.19	2.51
Standard deviation	114.28	0.15	96.47	0.11
CV	2.40	4.76	5.39	4.27

Table 6. Indicators of descriptive statistics for the production characteristics of Simmental cattle farms

Parameter	Annual milk yield per dairy cow	Average mm	Value of production per cow (KM)	Average protein content
Min	4239.00	3.08	1587.30	2.58
Max	4498.00	3.65	1970.12	3.13
Variation interval	259.00	0.57	382.82	0.55
Average	4372.90	3.35	1757.50	2.73
Standard deviation	86.72	0.16	114.75	0.14
CV	1.98	4.75	6.53	5.26

Table 7. Indicators of descriptive statistics for the production characteristics of Holstein Friesian and Simmental cattle farms

Parameter	Annual milk yield per dairy cow	Average mm	Value of production per cow (KM)	Average protein content
Min	4239.00	2.92	1587.30	2.29
Max	4987.00	3.65	1970.12	3.13
Variation interval	748.00	0.73	382.82	0.84
Average	4502.43	3.28	1768.73	2.66
Standard deviation	209.03	0.18	108.52	0.17
CV	4.64	5.61	6.14	6.32

Variations in milk and milk yield depend on a range of factors, including genetics, stage of lactation, daily variation, type of diet, age, udder health and season, among others (Atil et al., 2001). According to Barnes et al (1990), in Switzerland, the milk production of Simmental cattle in 1999 was 5,502 kg, with 4.02% fat and 3.28% protein. The average milk yield of Holstein Friesian cattle in Israel in 2004 was 11,200 kg per cow, 3.54% fat and 3.08% protein (ICBA, 2004). Krupa et al. (2005) also found higher milk fat (4.10%) and milk protein (3.35%) percentages in Slovakian Pied cattle. Moreover, in three herds of Czech Fleckvieh cows, Wolfová et al. (2007) and Jílek et al. (2008) found milk fat percentage of 4.05%, 4.28% and 3.86%, respectively, and milk protein percentage of 3.42%, 3.45% and 3.24%, respectively. Low milk protein levels

are frequent due to the low ration protein and/or energy level (Wolfová et al., 2007).

The average milk production in European countries for Simmental cattle is significantly higher than in the Sarajevo–Romanija region and the Republic of Srpska. Milk yield in Germany for Simmental breed in 1994 amounted to 5,404 liters (Feddersen et al., 1995) and in Switzerland 5,171 liters (Schimtz-Hsu, 1995). Simmental cattle in Slovenia makes up around 47% of the breed structure, and the average milk yield in 2006 was 5,340 liters (Cook et al., 2009). The average milk yield in 2007 in Serbia was 2,663 liters (Bozic et al., 2009), in Croatia 3,555 liters (Kovacic and Božić, 2009), in the Czech Republic 7,365 liters (Bosco et al. 2009) and in Poland 4,400 liters (Szajner, 2009). Chaunan and Hayes (1991) found a phenotypic correlation between milk production traits of Holstein Friesian cows. The relationship between milk production and milk fat was medium to very positive 0.73 ± 0.004 , between content and yield of milk fat 0.38 ± 0.007 , and the correlation between milk yield and fat content was negative -0.31 ± 0.007 .

Conclusion

The results suggest the following: slight variations in terms of production capacity between Simmental and Holstein-Friesian cattle were determined, indicating the homogeneity of conditions and production technology; Simmental cows had a higher percentage of butterfat, while milk production was higher in Holstein Friesian animals.

The main characteristics of the dairy sector in the Republic of Serbia at the primary level include small-scale production, especially in upland areas; low average yields on small-scale farms due to the fact that low productive crosses of different breeds are reared (used for milk and meat production), and high costs of production. Improvement in production parameters for small and medium-sized dairy farms can be achieved through quantitative genetic research. Genetic progress must be oriented to improving profitability by reducing production costs, specifically by increasing animal productivity. The use of sustainable milk production systems would increase milk yield and recover dairy cattle production.

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ANALIZA GOVEDARSKIH FARMI USMJERENIH NA PROIZVODNJU MLIJEKA

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Rezime

Studija je provedena u opštinama Pale i Sokolac, analize su izvršene na 30 farmi. Uzorak se sastojao od 30 farmi simentalske i holštajn-frizijske rase. Analiziranje se odnosilo i na veličinu farmi, zemljišta i broj članova domaćinstva, kao i na prosječan sadržaj mliječne masti, proteina i ukupne vrijednosti proizvodnje mlijeka po muznom grlu. Dobijene su male varijacije, jer su isti klimatski uvjeti, kao i slična primjena tehnologije gajenja (držanja) i načina uzgoja muznih krava (muznih grla). Nešto veći udio mliječne masti vrijedno je pomenuti kod simentalske rase muznih grla, što je i njegova rasna karakteristika.

Ključne reči: Simentalska rasa, Holštajn-frizijska rasa, karakteristike stočarskih farmi.