

# PRODUCTION AND REPRODUCTION CHARACTERISTICS OF SIMMENTAL AND HOLSTEIN FRIESIAN COWS IN SEMBERIJA AREA

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**Abstract:** Investigation of production and reproduction characteristics two breeds of cows, Simmental and Holstein Friesian in bad conditions of feeding and rearing was done and their results were compared. In the milk production Holstein Friesian breed had average production: 4795 kg in the first 5334 kg in the second 5417 kg in the third standard lactation. Simmental breed had average production in the first 4084 kg in the second 4440 kg and in the third 4483 kg milk. In the milk production Holstein Friesian breed, like we expected, had better results than Simmental. In the reproductive characteristics, Simmental was dominant when we compare with Holstein Friesian. These results are same like the other investigations for these two breeds of cows until now, because Simmental is two purpose breed and Holstein Friesian is breed for milk production. From this result, we can see that in very bad conditions of feeding and rearing we have genetic potential and the possibility of more efficient utilization and to get better production of milk and the good reproductive parameters.

**Key words:** Simmental breed, Holstein Friesian breed, production characteristics, reproduction characteristics

## Introduction

Milk production was always the subject of interest to great number of researchers, regardless of the accompanying problems or issues involved.

There is an age old dairy cattle farmers' desire to increase milk production, beating the competition, to show-case. As it's often the case, the quest for the ultimate milk yielding breed during standard lactation season is still in full swing as ever, of course with intent and driven by promise of a greater economic benefit.

In the past period, the number of cattle in Bosnia and Herzegovina was greatly reduced, decimated as a consequence of war, subsequently resulting in

import of great number of cattle sourced out from different countries of European Union (EU) and further world-wide.

Imported cattle often had appalling production traits, usually not meeting production criteria for further rearing in land of origin. Nevertheless, the potential in developed cattle-farming countries is great. According to *Burri and Schleppe (2000)* milk production in 1999, Simmental breed in Switzerland was 5.502 kg with 4,02 % fat and 3,28 % protein. The average milk yield for Holstein Friesian breed in Israel in 2004, was 11.200 kg per each cow, 3,54 % fat and protein 3,08% contents (*ICBA, 2004*).

Studying the production characteristic of Simmental cows presented on exhibitions, *Stelja et al. (2008)* established average milk production in standard lactation of 5613 kg, production of milk fat of 221.47 kg, and content of milk fat of 3.94 %. Analysis of variance showed that the region, year of exhibition and lactation groups had significant effect ( $P < 0.05$ ) on all investigated milk traits. According to data of the Selection service of the Republic of Serbia in the Institute for Animal Husbandry, Belgrade-Zemun, average milk performance of bull dams in the first lactation at the level of Central Serbia for 2008 was 5540 kg of milk with 3.97 % milk fat, i.e. 218.8 kg of milk fat. Average maximum milk performance was 6503 kg with 3.99 % i.e. 257.8 kg of milk fat. Average duration of first lactation was 310 days, and maximum lactation was 316 days (*Institute for Animal Husbandry, 2009*).

*Croatian livestock selection centre (2003)* in their annual report presented data, that in Croatia during 2002 average production of milk in standard lactation was 6238 kg with 4.10% of milk fat and 256 kg milk fat. The highest production of milk of 6477 kg and 4.14% milk fat content, i.e. 268 kg of milk fat was recorded in the third lactation.

Production of milk and milk fat of bull dams of Simmental breed is considerably above the average realized by registered cows under milk recording control in Serbia, but bellow the level of production which bull dams have in Western European countries (*Pantelic et al., 2010*).

Production and reproduction traits, more or less depend on genetic and paragenetic factors.

Based hypothetically on assumption that Holstein Friesian breed will have higher milk production result per each cow, and Simmental breed will have lower number in milk kg, having higher content of milk fat. With regard to the reproductive parameters Simmental breed results should lead above Holstein in comparison.

## Materials and Methods

The research of production and reproduction characteristics was conducted on the dairy cattle farm, that is part of Agricultural commune »Semberija«, based in Novo Selo near Bijeljina, Republika Srpska, Bosnia and Hercegovina. For the purpose of the research 77 cows of Holstein Friesian breed were selected, having been calved there between 1990 and 1998 and concluding four lactation seasons.

For the research of Simmental breed 73 cows were selected, having been calved between 1991 and 2000, from that number 72 cows had concluding four lactations and one cow had only three concluded lactations.

Controlled milk production was done in the interval of 28 days, using Tru-testing with graduated measures. Cow milking was done twice-daily, specifically at around 5 o'clock in the morning and at the same time in the afternoon, keeping the record of the milk volume for both, at the time of milking and adding it up for daily sum/total.

Reproduction data were taken over from the cow register.

The processing of the data collected was done by standard statistics' methods, in Microsoft Excel (Microsoft Corporation, Copyright 2000), and confirmation of findings, interpretation of the meaning of the statistics was done using the t-test.

## Results and Discussion

The research results on milk production are shown in the Table 1.

**Table 1. Milk production for Simmental and Holstein Friesian breeds**

Lactation	Simmental breed			Holstein Friesian breed		
	Number of cows	X	S <sub>x</sub>	Number of cows	X	S <sub>x</sub>
I	73	4084	72,75	77	4795	100,79
II	73	4440	87,31	77	5334	144,10
III	73	4483	87,79	77	5417	117,89

Processing data while applying the t-test confirmed that there is a significant difference in the value between first and second lactation of Simmental breed ( $P < 0,01$ ) as well as between the first and third lactation the difference being even higher ( $P < 0,001$ ), what was logical to expect: higher milking production from

more intense lactation season. The t-test undertaken had shown that difference in value between first and second lactation was highly significant ( $P < 0,01$ ).

Comparison of first and third lactation shows significant difference in milk production ( $P < 0,001$ ), which was the case with Simmental breed as well, as the milk production is increased with the increase of the order-number of lactation. The statistical significance between second and third lactation does not exist, simply there isn't any ( $P > 0,05$ ).

**Table 2. Fat and protein contents in milk production for both Simmental and Holstein Friesian breeds**

Lactation	Simmental breed				Holstein Friesian breeds			
	Milk fat contents		Milk fat production		Milk fat contents		Milk fat production	
	X	S <sub>x</sub>	X	S <sub>x</sub>	X	S <sub>x</sub>	X	S <sub>x</sub>
I	3,83	0,03	156,19	2,91	3,61	0,03	172,29	3,29
II	3,84	0,01	170,33	3,31	3,73	0,03	197,62	4,75
III	3,86	0,02	172,96	3,41	3,80	0,02	205,17	4,21

The difference is significant in value between first and second; and first and third lactation of Simmental breed ( $P < 0,001$ ), what tells us that significant increase happened for the total in fat content of milk production per kg. There is no significant difference between second and third lactation ( $P > 0,05$ ), or the difference is insignificant, whilst the difference in values is highly significant between first and second; and first and third lactation using the t-test ( $P < 0,001$ ). Following the completion of the test, the results had shown that fat content in milk production is far higher with Holstein Friesian breeds in comparison to Simmental breed.

The comparison of the all three test results shows that significant difference and value increases with the order-number of lactation.

**Table 3. Duration for service period /lactation season or intensity?? (?) for both Simmental and Holstein Friesian breeds**

Lactation	Simmental breed				Holstein Friesian breeds			
	Duration for ser. period		Calving interval (?)		Duration (?) ser. period		Calving interval (?)	
	X	S <sub>x</sub>	X	S <sub>x</sub>	X	S <sub>x</sub>	X	S <sub>x</sub>
I	163,97	11,33	444,35	11,43	217,90	14,03	497,07	13,99
II	136,85	10,83	417,27	10,86	171,40	12,13	452,09	12,07
III	126,43	10,49	406,72	10,62	180,00	15,70	460,24	15,82

From the Table 3 it is possible to see that Simmental breed has significant difference between first and second service period ( $P < 0,001$ ), which reflects in decrease in the duration of service period, which is highly desirable. On the

contrary, there is no significance between second and third ( $P > 0,05$ ), or to say there is insignificant difference and parameters show that duration for service period is the same/equalized.

The cows of Holstein Friesian breed have significantly high difference between first and second service period, whilst between second and third period has no statistical difference. Comparative test shows that Simmental breed cow had shorter service period, what was expected, and the difference between first and third service period shows very high significance ( $P < 0,001$ ).

On the basis of the stated research results obtained by domestic and foreign authors when studying the productive traits in Simmental and Holstein Friesian breed in different rearing systems, a remarkably lower milk production in Simmental and Holstein Friesian breed in our country is perceived in relation to an average production realized by the animals in majority of European countries.

## Conclusion

On the basis on the research we came to a conclusion that Simmental breed, in comparison with Holstein Friesian breed, had achieved lower milk production in the first lactation for 711 kg less, in the second for 894kg less and in the thirist for 934 kg less milk. Testing the meaning of the differences (t-test), very significant difference was confirmed ( $P < 0,001$ ), in milk production, between Simmental breed and Holstein Friesian breed cows, for all three lactations observed. Fat content in Simmental breed's milk was quite similar and valued at 3,83 % in first, 3,84 % in second and 3,86 % in third lactation.

Holstein Friesian breed had average milk fat content of: 3,61 % in first , 3,73 % in second and 3,80 % in third lactation. Comparative testing of the duration of service period between both breeds (t-test) gives us the following results: the difference between the first service period duration is highly significant, meaning Simmental breed had noticeably shorter service period duration than Holstein Friesian breed (164:218 dana); in the second service period, the difference is on the level of 95 % in advantage of Simmental breed (service period 137 days), in relation to Holstein Friesian breed (171 dana); between the service period duration in third cycle, the existing significance is very high (Simmental breed 126 days; Holstein Friesian breed 180 days).

All listed above, shows us that Holstein Friesian breed achieved better production results than Simmental breed and confirmed working hypothesis. Although Holstein Friesian breed cows achieved higher milk production results, it is not satisfactory as the expectations are for far better production results. The contributing factors that for sure are limiting milk production are inappropriate conditions for feeding and rearing, and obviously in better, improved situation, the production would significantly increase.

## Proizvodne i reproduktivne osobine simentalских i holštajn-frizijskih krava u regionu Semberije

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### Rezime

Istraživanje je obavljeno za proizvodne i reproduktivne osobine krava dve rase, Simentalske i Holštajn-Frizijske, u nepovoljnim, neodgovarajućim uslovima ishrane i gajenja sa komparativnom studijom dobijenih kompletnih rezultata. Proizvodnja mleka kod krava Holštajn-Frizijske rase bila je u proseku: 4795 kg u prvoj, 5334 kg u drugoj i 5417 kg u trećoj standardnoj laktaciji. Simentalska rasa ostvarila je u proseku u prvoj laktaciji 4084 kg, u drugoj 4440 kg i u trećoj 4483 kg mleka. Holštajn-Frizijska rasa je, kao što se i očekivalo, ostvarila bolje rezultate od Simentalske rase. Simentalska rasa bila je dominantna u reproduktivnim osobinama u poređenju sa Holštajn-Frizijskom rasom. Ovi rezultati potvrđuju sva ranija ispitivanja vezana za obe pomenute rase, dok je Simentalska rasa kombinovanih proizvodnih sposobnosti, Holštajn-Frizijska rasa namenjena je proizvodnji mleka-mlečnom govedarstvu. Iz dobijenih rezultata može se zaključiti da i pored neodgovarajućih, nepovoljnih uslova ishrane, gajenja i nege, postoji specifičan genetski potencijal koji se može efikasno iskoristiti u cilju ostvarivanja zadovoljavajuće proizvodnje mleka kao i dobrih proizvodnih parametara.

### References

- ADR (1997): Rinderproduktion in der Bundesrepublik Deutschland 1996.  
ASR-Arbeitsgemeinschaft Süddeutscher Rinderzuchtverbände (1997): 4. Deutsche Fleckviehschau  
BAČVANSKI S., ČOBIĆ T., MEDIĆ D. (1987): A study of cow-calf production of Simmental breed. 38 Congresso da Federacao Europeia.  
BARNES M.A., PEARSON R.E., LUKES-WILSON A.J (1990): Effects of milking frequency and selection for milk yield on productive efficiency of Holstein cow. *Journal Dairy Science*, 73, 1603-1611.  
BURII A., SCHLEPPI Z. (2000): Die wichtigsten, Milchleistungs ergebnisse im Kontrolljahr 1998/99. *Sweizer Fleckvieh*, Nr. 1-8.  
ČOBIĆ T., ANTOV G. (1996): Govedarstvo Proizvodnja mleka.  
ČOBIĆ T., ANTOV G. (2001): Govedarstvo.  
ČOBIĆ T., ANTOV G., A. ANTOV (1995): Ispitivanje plodnosti krava različitih genoptipova u većim stadima. *Aktuelna pitanja govedarske proizvodnje na društvenim gazdinstvima*. Sv. 53, 27-39.

- DIERS H. (1988): Die Rotbuntzucht in Nordamerika. Die Tierzüchter, N. 2.
- GERMAN E. (1990): Die Simmentaler Fleckviehzucht in der Schwiez. Simmentaler Fleckvieh, Nr. 6.
- HRVATSKO STOČARSKO SELEKCIJSKI CENTAR (2003): Godišnje izvješće. Zagreb.
- INSTITUTE FOR ANIMAL HUSBANDRY - INSTITUT ZA STOČARSTVO (2009): Stručni izveštaj i rezultati obavljenih poslova koordinacije u 2008. godini, Beograd.
- IPN (1995): Selekcija stoke na teritoriji R. Srbije van teritorije AP za 1994. godinu.
- ISRAEL CATTLE BREEDERS' ASSOCIATION (1994): Israel Holstein Herdbook. Tel Aviv.
- ISRAEL CATTLE BREEDERS' ASSOCIATION (2004): Israel Holstein Herdbook. Tel Aviv.
- NENADOVIĆ M. (1980): Govedarstvo I.
- NENADOVIĆ M., PEJIĆ N., KARADŽIĆ V., GAVRILOVIĆ S, SUBAKOV A., PETROVIĆ V. (1988): Istraživanje optimalne tehnologije odgajivanja junica i njihovog uvođenja u priplod. Savremena poljoprivreda, 36, 1-2, 5-6.
- NENADOVIĆ M., VUČINOVIĆ J., GAVRILOVIĆ S., MIJIĆ D. (1981): Ispitivanje uticaja naslednih faktora na plodnost krava u toku života. Zbornik radova Instituta za stočarstvo, 11/12.
- Microsoft Corporation Software, Microsoft Excel (Data analyses), Copyright 2000.
- MINISTRY OF AGRICULTURE AND FORESTY (1991): The situation of zootechny and of Simmental breeding in Italy. XIX Assemblea Generale della Federazione Europea degli allevatori della razza Pezzata Rossa.
- PANTELIĆ, V., ALEKSIĆ S., STOJIC P., ĐURĐEVIĆ R., SAMOLOVAC LJ., JANKOVIĆ D., NIKIŠIĆ D. (2010): The effect of breeding and year on milk traits of simmental buls dam, Biotechnology in Animal Husbandry, 26 (5-6), 287-295.
- PERIŠIĆ P., SKALICKI Z., PETROVIĆ M.M., BOGDANOVIĆ V.,RUŽIĆ-MUSLIĆ D. (2009): Simmental cattle breed in different productions sistem, Biotechnology in Animal Husbandry, 25 (5-6), 315-326.
- SKALICKI Z. (1983): Fenotipska varijabilnost i povezanost reproduktivnih i proizvodnih osobina austrijskog i njemačkog simentalca u istim uslovim agajenja. Magistarski rad.
- STJELJA S., BOGDANOVIĆ V., ĐEDOVIĆ R., PERIŠIĆ P., PANTELIĆ V. (2008): Proizvodne karakteristike krava simentalске rase izlaganih na izložbama u Srbiji. Biotechnology in Animal Husbandry, 24, (spec issue), 95-104
- UREMOVIĆ Z., UREMOVIĆ M., PAVIĆ V., MIOČ B., MUŽIĆ S., JANJČEVIĆ Z. (2002): Govedarstvo.