

## The influence of various origins of first calving Simmental and Black-White cows on production and content of milk

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### **Abstract**

*A total of 1 070 Simmental and Black-White first calving cows and the same number of mother cows were investigated. The first calving cows originally arrived from Slovenia, the Netherlands, Germany and Denmark. No statistically significant differences were established in the milk production and quality of milk between the first calving cows from abroad compared to the first calving Slovenian cows. Statistically significant higher milk production ( $8\ 004 \pm 981$  kg;  $P \leq 0.001$ ) had mother cows of the imported Black-White compared to the Slovene ( $6\ 514 \pm 1\ 142$  kg) ones. There were no statistically significant differences, in the milk production and quality of milk, between the imported mothers of first calving cows of Simmental breed comparing with Slovenian mothers of first calving cows of the same breed. The milk production between the mothers and their Simmental daughters had a statistically significant correlation ( $r_p = 0.125$ ;  $P \leq 0.01$ ). The higher correlation coefficient for this characteristic was established between the Black-White mothers and their daughters ( $r_p = 0.302$ ;  $P \leq 0.001$ ). Among the milk production of first calving cows and protein content in milk a statistically negative significant correlation ( $r_p = -0.198$ ;  $P \leq 0.001$ ) was established. This result confirmed that the purchase of more expensive animals with better genetic potential is economically unjustified for the breeder who does not reach intensive technology of basic quality voluminous fodder.*

*Key words: cattle, Simmental, Black-White, milk production, protein, fat*

### **Introduction**

In the past years the import of breeding cattle has strongly increased in Slovenia. Simmental and Black-White, as well as Red Holstain pregnant breeding heifers are imported from abroad. Such a great import of breeding calves from some European countries is partly the result of unsatisfying market situation of breeding calves in Slovenia. Imported breeding calves reach up to a 50 index point higher price than calves from domestic breeds (Smolinger, 2001). Because of higher prices of imported breeding calves it is wise to think that production technology is related to the genetic potential of

animals and therefore investments will be justified. When purchasing, the breeder must be aware of productive characteristics of the mother cow, which they intend to buy. The milk production of the mother of the imported breeding calves, must be higher than the average milk production of the country from which the animal is being imported. It is also important to look at the breeding calves and discover any mistakes on the exterior which could mean loss of income or even elimination of the animals.

### ***Materials and methods***

#### **Materials**

A total of 2 140 Simmental and Black-White animals were used, from this, 1 070 of first calving cows with closed the first lactation in 1997 - 2000 and the same number of their mothers were taken into consideration of this investigation. The 289 Simmental Slovenian first calving cows and 44 imported first calving cows and the same number of their mothers were included in this research. The 459 Black-White Slovenian first calving cows and their mothers and 278 Black-White first calving cows and their mothers from abroad were included in this research as well. All of the herd from which the Simmental and Black-White come from, in Slovenia were in A and AP control productivity. The imported animals that come from Germany, the Netherlands and Denmark were reared in Slovenia in the same farms as the Slovenian first calving cows which were comprised in the research.

#### **Methods**

The informations of the cows milk production were collected from the programme "rodovnik" (pedigree) where the informations were easily reachable for the region of the Veterinary and Animal Husbandry Department Ptuj. The remaining information about milk composition was taken from the Agricultural Institute of Slovenia and from district institutions of cattle breeding service.

#### **Statistical analysis**

The database was performed on to the Microsoft Excel for Windows programme. The cows with incomplete lactation or any incomplete information were excluded. The data on the milk production of mothers of domestic animals were previously put together into the Access programme in which the average lactation for the quantity and content of fat and protein in

the milk was calculated. Because of the unequal number of analysed animals from abroad and from Slovenia the analysis of variance by the method GLM (General Linear Model) using SPSS 10.0 for Windows programme has been used. The LSQ (least square means) value of analysed variables was tested by the method of contrast with Duncan's test. The differences which were statistically significant were indicated with the sign  $P < 0.05$ ,  $P \leq 0.01$  and  $P \leq 0.001$ .

For each breed in the study the following statistical model was used:

$$y_{ijkl} = \mu + O_i + F_j + B_k + e_{ijkl}$$

$y_{ijkl}$  = 1<sup>th</sup> first calving cow or their mother, i<sup>th</sup> breed origin (Slovenia, abroad),  
j<sup>th</sup> father bull, k<sup>th</sup> breeder

$\mu$  = a population mean

$O_i$  = i<sup>th</sup> origin (i = 1, 2)

$F_j$  = j<sup>th</sup> father bull (j = 1, 2, ..., 233)

$B_k$  = k<sup>th</sup> breeder (k = 87)

$e_{ijkl}$  = random error

### **Results and discussion**

#### **The milk production of first calving cows and their mothers of Simmental breed**

Data for milk production and composition of first calving cows and their mothers of Simmental breed are presented regarding to their origin in Table 1.

There were no statistically significant differences in milk production in 305 days of lactation between the Slovenian first calving cows and imported first calving cows. It is obvious, that the average milk production of the domestic first calving cows was  $4\ 869.6 \pm 916.8$  kg and the average milk production of imported first calving cows was  $4\ 969.7 \pm 599.3$  kg of milk. In year 2000, the milk production of Slovenian and imported first calving cows was approximately 500 kg higher than the average for Simmental in Slovenia, and approximately 900 kg higher than the average milk production of first calving cows of Simmental breed in Slovenia (Govedorejska služba Slovenije, 2001). The milk production of the investigated first calving cows was actually comparable to the milk production in standard lactation of Simmental first

Table 1: Milk production and composition in 305 days of lactation of first calving cows and their mothers of Simmental breed

Tablica 1: Proizvodnja i sastav mlijeka tijekom 305 dana laktacije krava u prvoj laktaciji i njihovih majki simentalске pasmine

SIMMENTAL BREED SIMENTALSKE PASMINE			
Characteristics Karakteristike	Slovenian Slovenske (n)	Import Uvozne (n)	Statistical Sig. Statistička značajnost
First calving cows Krave u prvoj laktaciji	289	44	
Milk production (kg) Proizvodnja mlijeka (kg)	4 869 ± 917	4 969 ± 599	NS
Fat (%) / Mast (%)	4.28 ± 0.40	4.12 ± 0.39	NS
Protein (%) / Proteini (%)	3.43 ± 0.19	3.53 ± 0.23	NS
Mothers / Majke	289	44	
Milk production (kg) Proizvodnja mlijeka (kg)	4 778 ± 964	6 052 ± 617	NS
Fat (%) / Mast (%)	4.09 ± 0.34	4.31 ± 0.33	NS
Protein (%) / Proteini (%)	3.36 ± 0.17	3.52 ± 0.16	NS

NS = No statistically significant difference ( $P \geq 0.05$ )

NS = Nije statistički značajno ( $P > 0,05$ )

calving cows in Austria, which amount to 5 075 kg, in the year 2000 (Raganitsch, 2001). In Austria the average milk production in standard lactation of Simmental cows was 5 618 kg of milk (ZAR, 2000). Among the Slovenian mothers and imported Simmental first calving cows were no statistically significant differences for the quantity of milk in standard lactation. The milk production of imported mothers was  $6\,052.1 \pm 616.7$  kg of milk, whilst the milk production of mothers of Slovenian first calving cows was much lower and reached  $4\,777.6 \pm 964.5$  kg of milk in standard lactation.

### Contents of fat in milk of first calving cows and their mothers of Simmental breed

There there were no statistically significant differences between Slovenian and imported Simmental first calving cows for the fat content. The fat content in milk of Slovenian first calving cows was  $4.28 \pm 0.40\%$  and in milk of imported first calving cows was  $4.12 \pm 0.39\%$ . Noticeable was the higher fat contents in milk of Slovenian first calving cows as regards their mothers who

had  $4.09 \pm 0.34\%$  fat in milk. Mothers of imported first calving cows had  $4.31 \pm 0.33\%$  of fat in milk, which was higher than the content of their daughters. In Slovenia, the average content of milk fat of first calving Simmental cows amounted  $4.23\%$  in year 2000 (Govedorejska služba Slovenije, 2001) and it was comparable with  $4.20\%$  of milk fat of first calving cows in Austria (ZAR, 2000). There were no statistically significant differences in the milk fat content between mothers of imported and Slovenian Simmental first calving cows.

#### **Contents of protein in first calving cows and mothers of Simmental breed**

No significant difference in the percentage of protein in milk were established between Slovenian and imported Simmental first calving cows. Imported first calving cows had  $3.53 \pm 0.23\%$  of protein in milk. Slovenian first calving cows reached a lower  $3.42 \pm 0.19\%$  of protein in milk. In the year 2000, the average amount of protein in milk of Slovenian Simmental first calving cows was  $3.39\%$  (Govedorejska služba Slovenije, 2001). There were no statistically significant differences in the protein content in milk among mothers of imported and Slovenian first calving cows. Mothers of imported first calving cows had  $3.53 \pm 0.16\%$  of protein in milk, in comparison with Slovenian mothers that was lower  $3.36 \pm 0.17\%$ .

#### **Milk production of first calving cows and their mothers of Black-White breed**

The milk production and composition of first calving Black-White cows as regards their origin are presented in Table 2.

There were no statistically significant differences between the Slovenian and the imported first calving cows for the milk production in 305 days of lactation. The average milk yield of the Slovenian first calving cows was  $6\ 663.6 \pm 1\ 290.7$  kg and the average milk production of imported first calving cows was  $6\ 556.4 \pm 1\ 281.1$  kg of milk. The milk production of Slovenian and imported first calving cows did not differ significantly from the average milk production for the Black-White in Slovenia. However, in the year 2000, milk production was higher for approximately 500 kg comparing with the average milk production of Black-White of first calving cows in Slovenia (Govedorejska služba Slovenije, 2001). Moreover, compared to the Netherlands Black-White cows the milk production of Slovenian first calving

Table 2: Milk production and composition in 305 days of lactation of first calving cows and their mothers of Black-White breed

Tablica 2: Proizvodnja i sastav mlijeka tijekom 305 dana laktacije krava u prvoj laktaciji i njihovih majki holstein pasmine

BLACK-WHITE BREED HOLSTEIN PASMINA			
Characteristics Karakteristike	Slovenian Slovenska (n)	Imported Uvozna (n)	Statistical Sig. Statistička značajnost
First calving cows Krave u prvoj laktaciji	459	278	
Milk production (kg) Proizvodnja mlijeka (kg)	6 664 ± 1 291	6 556 ± 1 281	NS
Fat (%) / Mast (%)	4.10 ± 0.48	4.26 ± 0.54	NS
Protein (%) / Proteini (%)	3.30 ± 0.21	3.38 ± 0.19	NS
Mothers / Majke	459	278	
Milk production (kg) Proizvodnja mlijeka (kg)	6 514 ± 1 142	8 004 ± 981	***
Fat (%) / Mast (%)	4.12 ± 0.44	4.31 ± 0.40	NS
Protein (%) / Proteini (%)	3.21 ± 0.20	3.40 ± 0.18	NS

NS = No statistically significant difference ( $P > 0.05$ ; \*\*\*= $P < 0.001$ )

NS= Nije statistički značajno ( $P > 0,05$ ; \*\*\*= $P < 0,001$ )

cows was quite low as the average milk production of Black-White cattle, in the year 1998/1999 in Netherland amounted 8 016 kg of milk in standard lactation (Veepro magazine, 1999). The milk production of mothers of imported first calving cows amounted 8 004 ± 981.3 kg of milk, whilst the milk production of mothers of Slovenian first calving cows was lower 6 514.1 ± 1 142.4 kg of milk in standard lactation. Duncan's test established that Slovenian mothers of Black-White first calving cows had statistically significant ( $P < 0.001$ ) lower milk production compared to the milk production of mothers of imported first calving cows.

#### Contents of fat in milk in first calving cows and their mothers of Black-White breed

No statistically significant differences were found among the fat content in milk between Slovenian and imported first calving cows of Black-White breed. The imported first-calving cows had 4.27 ± 0.54% of fat in milk and the Slovenian first calving cows had a lower value 4.10 ± 0.48%. However, it was

higher than the average content of fat in milk in cattle of Black-White, in Slovenia, for the year 2000, which totals 4.05%. This was quite a low milk fat content comparing with Netherlands Black-White cows with 4.34% (Veeopro magazine, 1999.). For this characteristic there were no statistical significant differences between mothers of imported first calving cows and Slovenian Black-White first calving cows. The content of fat in mothers of imported first calving cows amounted  $4.31 \pm 0.40\%$  and in mothers of Slovenian first calving cows  $4.11 \pm 0.44\%$ .

### **Content of protein in milk in first calving cows and mothers of Black-White breed**

Between imported and Slovenian Black-White first calving cows no statistically significant difference was found in milk protein content (Table 2). Imported first calving cows had  $3.38 \pm 0.19\%$  of protein in milk. The Slovenian first calving cows attained a lower content and this was  $3.30 \pm 0.21\%$  of protein in milk. The average percentage of protein in milk in first calving cows and for other cows with numerous lactations for the year 2000 in Slovenia amounted 3.28% (Govedorejska služba Slovenije, 2001). In comparison, the cattle from the Netherlands had in the year 1998/1999 a 3.42% of protein in standard lactation. There were no statistically significant differences in the milk protein content between Black-White Slovenian and imported mothers of first calving cows. Imported mothers had higher amount of protein in milk ( $3.40 \pm 0.18\%$ ), but not significant, comparing with Slovenian Black-White mothers ( $3.21 \pm 0.20\%$ ).

### **Correlations**

The correlation between the milk production of mother and her daughters of Simmental breed was statistically significant ( $r_p = 0.125$ ;  $P \leq 0.01$ ). A higher statistical significant correlation, for this characteristic, was established for Black-White breed ( $r_p = 0.302$ ;  $P \leq 0.001$ ). For Black-White breed, statistically significant correlation was also established between the milk production of mothers and the milk protein content of first calving cows ( $r_p = 0.156$ ;  $P \leq 0.01$ ). A statistically negative significant correlation was found between the milk production of first calving cows and the milk protein content of first calving cows ( $r_p = -0.198$ ;  $P \leq 0.001$ ).

### **Conclusions**

No statistically significant differences in milk production (kg), milk fat and protein content of first calving cows of Simmental and Black-White breed of Slovenian and imported origin were established. Contrary, between the mothers of first calving cows of Slovenian and imported origin of Black-White breed a statistically significant difference in the amount of milk production (kg) was found. Breeding of first calving cows had statistically significant influence on the milk production and milk characteristics.

## **UTJECAJ PODRIJETLA SIMENTALSKE I HOLSTEIN PASMINE KRAVA NA PROIZVODNJU I SASTAV MLIJEKA U PRVOJ LAKTACIJI**

### **Sažetak**

*Cilj istraživanja bio je utvrditi, da li su krave u prvoj laktaciji stranog podrijetla usporedive s kravama prve laktacije iz slovenskog uzgoja. Analizirano je 1 070 krava simentalske i holstein pasmine u prvoj laktaciji i jednaki broj njihovih majki. Po podrijetlu krave su bile iz Slovenije, Nizozemske, Njemačke i Danske. Nismo utvrdili statistički signifikantne razlike u proizvodnji i sastavu mlijeka između stranih i domaćih krava u prvoj laktaciji. Statistički signifikantno ( $P \leq 0,001$ ) višu mliječnost imale su majke holstein pasmine iz uvoza ( $8\ 004 \pm 981$  kg;  $P \leq 0,001$ ) u usporedbi sa slovenskim ( $6\ 514 \pm 1\ 142$  kg). Kod simentalske pasmine stranih i slovenskih majki nije bilo statistički signifikantnih razlika u proizvodnji i sastavu mlijeka. Utvrđena je signifikantna korelacija ( $r_p = 0,302$ ;  $P \leq 0,001$ ) između mliječnosti majki i njezinih kćeri kod simentalske pasmine. Viši korelacijski koeficijent za to svojstvo utvrđen je između majki i kćeri holstein pasmine ( $r_p = 0,302$ ;  $P \leq 0,001$ ). Utvrđena je negativna statistički signifikantna korelacija ( $r_p = -0,198$ ;  $P \leq 0,001$ ) između proizvodnje mlijeka krava u prvoj laktaciji i sadržaja bjelančevina. Ovi rezultati pokazuju, da je nabava skupih životinja s boljim genetskim proizvodnim potencijalom ekonomski neopravdana za proizvođače, koji ne mogu savladati tehnologiju intenzivne proizvodnje voluminozne krme visoke kakvoće.*

*Ključne riječi: govedo, Simental, Holstein, proizvodnja mlijeka, bjelančevine, masnoća*



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