Genetic features of Russian Simmental cattle population different origin derived by assessing milk production and fertility traits

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RESULTS

The heritability coefficients showed moderate variability for milk yield *$h^2=0.140$*, fat percentage *$h^2=0.194$*, protein percentage *$h^2=0.184$* and live weight *$h^2=0.163$*, as an indirect predictor for meat production. The variability for fertility features like number of inseminations per conception and days open was *$h^2=0.073$* and *$h^2=0.061$*, respectively. Genetic correlation between milk yield and fat percentage was $r_g=0.149$, and for milk yield and protein percentage – $r_g=0.180$, while between fat percentage and protein percentage – $r_g=0.226$ (**table 1**).

The average **bulls' EBV** for milk traits in **Red Holsteins** consisted **+23 kg** milk yield, +0.002% fat percentage and +0.001% protein percentage, by **Austrian Simmental +10 kg** milk yield, +0.013% fat percentage and +0.002% protein percentage. For Russian Simmental origin animals was signed negative selection response for milk yield (-23 kg), fat percentage (-0.001%) and protein percentage (-0.003%). High average **EBV for imported Simmental cows** were revealed **+146 kg** milk yield, +0.009% fat percentage and +0.004% protein percentage, while in **Russian Simmental** we got negative values for milk yield **-70 kg** and protein percentage -0.004% but only for fat percentage was showed positive level +0.001% (**table 2**).

OBJECTIVES

Since the beginning of the 20th century, over 43 thousand animals of Simmental cattle and related breeds have been imported to Russia from Europe. This had a significant impact on the selection intensity and genetic structure within the pale-motley population.

MATERIALS AND METHODS

The research included **42** breeding herds from **14** regions of Russia. The EBV using the BLUPF90 program based on the ANIMAL MODEL procedure was calculated. Totally of **1471** bulls by using **61816** daughters were estimated.

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Table 1. Selection and genetic parameters the traits of milk productivity, fertility and development in the population of Simmental cattle
(*diagonal - the heritability coefficient, below the diagonal - genetic correlations*)

Traits	Number of insemination per conception	Days open	Live weight	Milk yield	Fat percentage	Milk fat	Protein percentage	Milk protein
Number of insemination per conception	**0,073**							
Days open	-0,049	**0,061**						
Live weight	0,050	0,196	**0,163**					
Milk yield	0,125	0,249	0,229	**0,140**				
Fat percentage	0,130	0,263	0,230	0,977	**0,194**			
Milk fat	0,071	0,106	0,058	0,149	0,350	**0,142**		
Protein percentage	0,130	0,251	0,255	0,991	0,973	0,166	**0,184**	
Milk protein	0,024	0,085	0,269	0,180	0,227	0,226	0,305	**0,140**

Table 2. Milk productivity and average of the estimate breeding value (EBV) of Simmental bulls and cows by different origin

Traits	Bulls			Cows	
	Foreign origin		Russian origin	Foreign origin	Russian origin
	Red Holstein	Austrian Simmental	Russian Simmental	Foreign origin	Russian origin
milk production of bulls' daughters				milk production	
n	9890	15228	8740	25066	36750
Milk yield, kg	6096±57	5763±18	4469±34	5390±8,6	4743±7,3
Fat percentage, %	3.96±0,010	4.04±0,003	3,87±0.007	3,97±0,002	3,91±0,001
Protein percentage, %	3,23±0,004	3,19±0,002	3,20±0,005	3,21±0,001	3,18±0,001
Estimate breeding value (EBV)					
n	300	1027	144	25066	36750
Milk yield, kg	+23,3	+10,2	-23,2	+145,6	-70,1
Fat percentage, %	+0,002	+0,013	-0,001	+0,0086	+0,0007
Protein percentage, %	+0,001	+0,002	-0,003	+0,0044	-0,0039

CONCLUSION

Simmental breed improvement strategy in Russia focused not only to increasing milk yield but also to improving milk compositions with stabilizing cows' reproductive traits using the world gene pool of related breeds from Europe.