Genetic Trends of Milk Production in Select Herds of the Slovak Spotted Breed

Jozef Bujko[1], Anna Trakovická[1], Jozef Pjontek[1], Július Žitný[1], Cyril Hrnčár[2]

[1] *Deparment of Genetic and Breeding Biology, Faculty of Agrobiology and Food Resources, Slovak Agricultural University in Nitra, A. Hlinku 2, 949 76 Nitra, Slovak Republic*
[2] *Department of Poultry Science and Small Animal Husbandry, Faculty of Agrobiology and Food Resources Slovak Agricultural University in Nitra, A. Hlinku 2, 949 76 Nitra, Slovak Republic*

Abstract
The aim of this study was to perform analysis genetic trends of traits of milk production in select herds of the Slovak spotted breed. The genetic gain for milk, fat and proteins production in kg was calculated by different methods. Genetic trends were between 68.31 - 109.11 kg for milk production, 2.98 - 5.44 kg for fat production and 2.26 - 3.46 kg for proteins production. Increase of inbreeding was estimate 1.520 - 1.860 - 3.190 % behind generation. Prediction genetic trends by „Truncation" selection was 12.2 to 111.6 kg for milk at fathers of daughter and 29.2 to 96.1 kg for milk at mothers of daughter.

Keywords: Slovak spotted breed, dairy cows, genetic trends, traits of milk production.

1. Introduction

In the connection of improving productive characters of cattle which is realised by breeding programme in the population of Slovak Spotted breed the aimed breeding has most important significance in the process of breed improvement. The aim is every year immersed into test breeding better generation of offspring's and reaches genetic trends [1].
The breeding work is one of the main factors to influence the animal production. Increased utility is directly dependent on herd quality and on grades exploitation his productive ability.
Genetic trends for the traits of milk production were published [2, 3, 4], in Slovak spotted breed population [5, 6, 7], as well as in Slovak pinzgau breed population [8].

2. Materials and methods

The material for solving the established aim was obtained from breeding evidence of Breeding Services of the Slovak republic [8]. We used the data about traits of milk production three breeding herds of the Slovak spotted breed (A, B, C). The traits of milk production was evaluating at 2 414 cows of the Slovak spotted breed for 1990-2002 period.
The genetic trend was calculated by gene-flow method [9] and basic informations about traits of milk, fat and proteins were in control utility of dairy cows from 2001/2002. For estimation genetic trends and increase of inbreeding for generation was used software for optimalization breeding programme *SelAction* [10].
Parameters of traits of milk production were analysed using the Statistical Analysis System version 9.3.1 [11].

* Corresponding author: Ing. Jozef Bujko, PhD., Tel.: +421 37 641 4294, Jozef.Bujko@uniag.sk

3. Results and discussion

These results of basic statistical characteristic of traits milk production was presented in Table1.
The highest average milk production after all observed lactations was reached in the herd (C) 4 586.78 kg of milk, 182.46 kg of fat, 148.33 kg of proteins and the lowest in the herd (A) 3 308.19 kg of milk, 129.25 kg of fat, 106.89 kg of proteins. In this work was analyzed age of structure in individual of herds and was construction matrix transfer of gene with 13 ages of classes for bulls of daughters and age of classes of cows was detection for each selected herds. The fixation of genic portion individual groups ages of class to determine after 37 or 35 or 40 years in individual herds.
In Table 2 showed in genetic trends calculated by gene-flow in select herds. The genetic trends were between 68.31 - 109.11 kg for milk production, 2.98 - 5.44 kg for fat production and 2.26 - 3.46 kg for proteins production.

Table 1 Statistical characteristic traits of milk production in select herds of Slovak spotted breed

Herds	Number of lactation	Traits	$\bar{x}$	s	v
A	524	Milk (kg)	3 308.19	779.84	23.57
		Fat (kg)	129.25	34.04	26.34
		Protein (kg)	106.89	25.85	24.18
B	125	Milk (kg)	4 567.85	1 248.62	27.33
		Fat (kg)	202.08	62,24	30.88
		Protein (kg)	150.12	39.63	26.40
C	1 465	Milk (kg)	4 586.78	1 109.58	24.19
		Fat (kg)	182.46	49.23	26.98
		Protein (kg)	148.33	36.28	24.46

Table 2 Genetic gain for milk, fat and proteins production calculated by gene-flow in select herds of the Slovak spotted breed

Herds	Traits (in kg)	$\bar{x}$	s	gene-flow	genetic trends in kg
A	Milk	3308.19	779.84	0.0876003	68.31
	Fat	129.26	34.04		2.98
	Protein	106.89	25.82		2.26
B	Milk	4567.85	1248.62	0.0873871	109.11
	Fat	202.08	62.24		5.44
	Protein	150.12	39.63		3.46
C	Milk	4586.78	1109.58	0.0897357	99.57
	Fat	182.46	49.23		4.42
	Protein	148.33	36.28		3.26

In individual cycle of selection we used cumulative genetic trend. For each herd, we constructed matrix for transfer of gene (P), matrix of growing old (Q) and reproduction of matrix (R). The format of each matrix answered number of ages of class at bulls and cows.
In Table 3 showed calculated prediction of genetic trends for 10 years beforehand or 10 cycles of selection for milk in kg.

Table 3 Prediction of genetic gain for milk production in select herds

Herds \ Years		0	1	2	3	4	5	6	7	8	9	10
A	Gt - m (kg) [(1)]	0	114.51	102.03	98.61	78.66	62.13	58.11	68.31	49.38	42.31	39.11
B	Gt - m (kg) [(1)]	0	129.47	137.96	95.68	115.34	96.18	95.87	63.71	57.34	56.87	49.65
C	Gt - m (kg) [(1)]	0	126.49	78.74	71.59	66.21	116.58	112.61	56.4	50.27	55.11	45.92

[(1)] Cumulative of genetic gain (Gt) for milk (m) in kg

In Table 4 showed increase of inbreeding in select herds of Slovak spotted breed. The high of increase of inbreeding was detected for generation in C, than for A and B breeding herds. Increase of

inbreeding was estimate 1.520 - 1.860 - 3.190 % behind generation. Kadlečík et al. [8] showed that highest value of increase of inbreeding over 1 % for generation to indicate for risk of population (critical of population breed).

Table 4 Increase of inbreeding in select herds

Herds	A	B	C
increase of inbreeding for generation	1.520	1.860	3.190

Kadlečík et al. [13] advised that the low value of inbreeding non involved speedy risk, but this value is cumulating during breeding programme. On the other hand we can to observe, that influence of inbreeding has economic impact on indices production milk at combination breed.

Genetic trends were calculated for production of milk in euro at selected herds of the Slovak spotted breed. These results are presenting in Table 5. In Figure 1 showed prediction of genetic trend for milk production since 2002-2021 in selected herds. Prediction genetic trends by „Truncation“ selection was 12.2 to 111.6 kg for milk at fathers of daughter and 29.2 to 96.1 kg for milk at mothers of daughter (Table 5). This prediction is similar with results [2, 5, 6, 12].

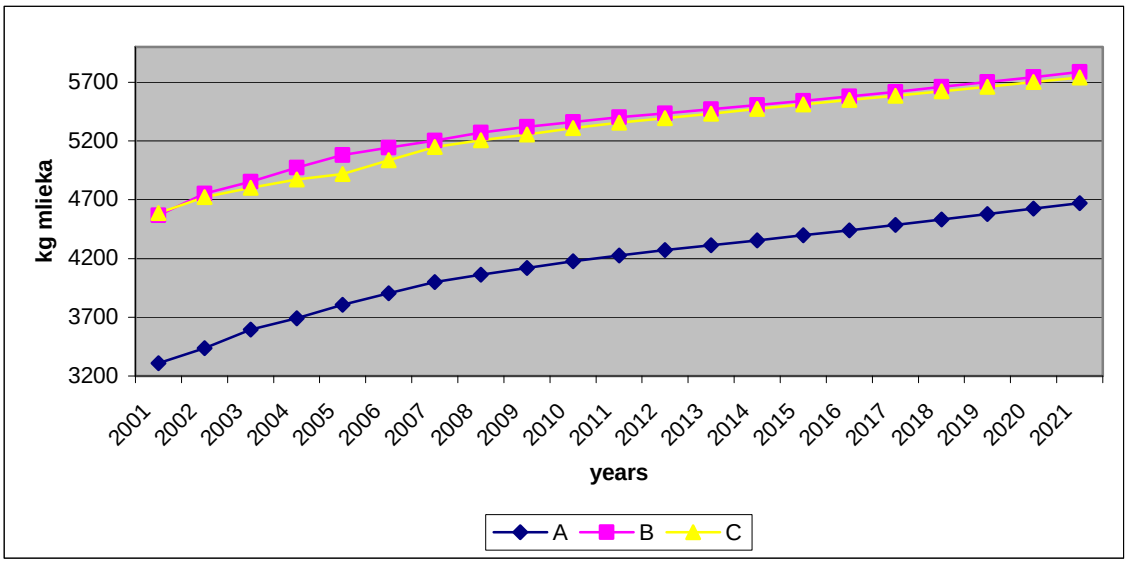

Figure 1 Prediction of genetic trend for milk production

Table 5 Genetic trends expressed for production of milk in kg

Herds	A			B			C		
milk in kg	M	F	Together (M+F)	M	F	Together (M+F)	M	F	Together (M+F)
Δ_G in kg	12.23	29.23	41.46	111.59	96.11	207.70	32.21	42.62	74.83
Δ_G in euro	0.51	1.11	1.61	4.02	3.47	7,48	1.19	1.56	2.76
% of portion on quite improvement	4.698	10.31	15.01	18.98	16.93	35.38	6.46	8.42	14.88

Δ_G – genetic trend, M - masculine, F- feminne

4. Conclusions

The finding we can to observe, that after fixation gene portion individual groups age class in genetic trends were between 68.31 - 109.11 kg for milk production, 2.98 - 5.44 kg for fat production and 2.26 - 3.46 kg for proteins production. Increase of inbreeding was estimate 1.520 - 1.860 - 3.190 % behind generation. Prediction genetic trends by „Truncation“ selection was 12.2 to 111.6 kg for

milk at fathers of daughter and 29.2 to 96.1 kg for milk at mothers of daughter.

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