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Original Paper

Important genealogical Pinzgau cattle bloodlines in Slovakia

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The aim of this paper was to analyze sire bloodlines within the Slovak Pinzgau cattle. There were 13 genealogical bloodlines found together. The most widespread bloodline was Apollo. The average estimated breeding values (EBV) according to sire bloodlines were predominately negative. The best milk production EBV were found in Benito line (-39.35 kg). The best growth ability according to EBV for weaning weight (210 days) was found in Karst bloodline (+3.39 kg). Significant influence of genealogical bloodline was found on EBV for weight in 365 days, protein production and weaning weight (210 days).

Keywords: bloodline, cattle, breeding values, Pinzgau

1 Introduction

The Pinzgau represents typical cattle breed suitable for harsh environmental conditions. The Pinzgau is not able to compete in milk or beef production with highly specialized breeds (Kadlečík et al., 2004; Kadlečík and Kasarda, 2014; Antalík and Strapák, 2010). Slovak Pinzgau cattle are divided into two separate populations. The first is represented by dual-purpose type (dairy) and the second by suckler cows (beef). Pinzgau cattle are an original Alpine breed, which had been imported to Slovakia approximately 200 years ago. Thanks to its unique traits as longevity, fertility, health, grazing ability it had been bred in mountain regions of northern Slovakia, but there is significant decline of the population in recent years (Šidlová et al., 2014a; Šidlová et al., 2014b). The providing of EU subsidies for endangered local breeds is a very important precondition to avoid further reduction of the breed (Pavlík et al., 2014). Despite its population size, the breed is still used commercially, but its breeding strategy needs to be changed in order to preserve internal breed diversity. For this reason the preferred mating strategy is the one that would keep inbreeding levels low, allowing genetic gain to accumulate over time (Kasarda et al., 2014). Knowing sire bloodlines represents very easy tool how farmers may partially influence the risk of inbreeding. The aim of our work was to analyze Pinzgau sire bloodlines found in Slovak population.

2 Material and methods

The construction of genealogical bloodlines schemes was based on information obtained from pedigree dataset of The Breeding Services of Slovak Republic, s.e. We tried to find the furthest known male ancestor in individual bull pedigrees. Afterwards, according to mutual relations between bulls, bloodline schemes were constructed. Only bloodlines with sires involved in active population were taken into account.

In further analysis, the comparison of estimated breeding values (EBV) for milk (kg), fat (kg), protein (kg), weight in 120 days (kg), weight in 210 days (kg) and weight in 365 days among sire bloodlines was performed. In case of somatic cells score, relative estimated breeding values (REBV) were taken into account because of their easier interpretation. The limit of EBV reliability was 70 % in milk traits and 60 % in growth traits. One-way ANOVA was used to test the influence of sire bloodlines on given EBV and REBV. Statistical procedures were performed using the software SAS 9.2. (SAS, 2009).

3 Results and discussion

There were 13 genealogical bloodlines found in active Pinzgau sire population (number of sires registered in Slovak herd book in brackets) : Amigo (24), Apollo (34), Areit (4), Bartl (1), Benito (14), Brillant (26), Buschmann (13), Concorde (2), Karst (19), Labach (11), Roller (11), Salut (22) and Wasti (12). Bulls born after 2005 belonged to 6 bloodlines – Apollo, Bartl, Concorde, Karst, Labach and Salut. The most widespread bloodline was Apollo. This bloodline was represented by such bulls like Tell, Mascha and Mungo which influenced our population significantly. The average milk EBV were -200.58 kg for all

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Table 1 Average estimated breeding values according to sire bloodlines

Bloodline	EBV milk (kg)	EBV fat (kg)	EBV protein (kg)	REBV somatic cells score	EBV weight 120 days (kg)	EBV weight 210 days (kg)	EBV weight 365 days (kg)
Amigo	-334.97	-9.34	-11.30	94.33	-9.60	-15.08	-9.66
Apollo	-200.58	-3.67	-6.30	91.44	1.29	0.49	-0.17
Areit	-161.50	4.78	-0.32	96.00	–	–	–
Bartl	-1021.40	-36.39	-41.08	98.00	-4.99	-11.95	-13.47
Benito	-39.35	-2.92	-2.38	93.67	-7.26	-12.36	-8.63
Brillant	-231.68	-4.82	-5.33	89.17	1.79	0.79	-0.62
Buschmann	-222.07	-7.06	-7.32	90.17	-3.91	-6.37	-6.71
Concorde	-355.10	-13.12	-15.08	104.00	-4.91	-11.33	-8.85
Karst	-125.84	-1.67	-0.95	96.67	0.74	3.39	-0.80
Labach	-224.23	-4.39	-6.97	86.50	-1.98	-4.56	-8.33
Roller	-116.87	-1.63	-3.74	93.00	-1.49	1.14	3.40
Salut	-192.54	-5.04	-6.34	101.71	-3.16	-3.98	-2.50
Wasti	-181.22	-4.48	-5.85	94.33	-3.34	-0.38	7.63

EBV – estimated breeding values, REBV – relative estimated breeding values

Table 2 Average estimated breeding values according to sire bloodlines – bulls born after 2005

Bloodline	EBV milk (kg)	EBV fat (kg)	EBV protein (kg)	REBV somatic cell score	EBV weight 120 days (kg)	EBV weight 210 days (kg)	EBV weight 365 days (kg)
Apollo	342.00	5.30	10.48	106.00	2.54	-0.41	-4.04
Bartl	-1021.40	-36.39	-41.08	98.00	-4.99	-11.95	-13.47
Concorde	-355.10	-13.12	-15.08	104.00	-4.91	-11.33	-8.85
Karst	-54.22	-1.10	1.06	99.50	-0.05	2.53	-2.31
Labach	-159.23	-0.14	-4.66	88.33	-1.72	-1.60	-1.05
Salut	40.80	8.46	2.54	111.00	-1.39	0.61	8.69

EBV – estimated breeding values, REBV – relative estimated breeding values

bulls within Apollo line (table 1). In case of younger bulls (born after 2005), this value was +342.00 kg (table 2).

The best milk production EBV were found in Benito line (-39.35 kg), while the lowest EBV were observed in Bartl line (-1021.40 kg). This line was represented by only one bull whose AI doses were imported from Canada (beef type) for blood refreshment in our population. The best fat production EBV were found in Areit line (+4.78 kg) as well as in protein production EBV (-0.32). In younger bulls, the best fat production EBV were observed in Salut bloodline (+8.46 kg) and best protein production EBV were found in Apollo line (+10.48 kg). In somatic cells score, the most optimal REBV were observed in Concorde line (104). The best growth ability according to EBV for weaning weight (210 days) was found in Karst bloodline (+3.39 kg) as well as in younger bulls of this line (+2.53 kg). The overview of average EBV and REBV in whole set of bulls is presented in table 1. Table 2 contains the average EBV and REBV of younger bulls (born after 2005). In all milk performance traits, there were negative average breeding values estimated for all presented bloodlines. Kasarda and Kadlečík (2007) presented negative breeding values for milk production (-89.87 kg), fat production (-4.51 kg) and protein production (-2.69 kg) in Slovak Pinzgau cows population.

Table 3 Influence of bloodline factor on EBV and REBV

EBV/REBV	F	R^2
Milk (kg)	1.78^{NS}	0.22
Fat (kg)	1.83^{NS}	0.22
Protein (kg)	2.76**	0.30
Somatic cells score	0.99^{NS}	0.13
Weight in 120 days	1.72^{NS}	0.23
Weight in 210 days	2.12*	0.27
Weight in 365 days	3.10***	0.35

^{NS} – non-significant, * $P<0.05$, ** $P<0.01$, *** $P<0.001$

The influence of sire bloodline factor on EBV and REBV is presented in table 3. Statistically significant influence was observed on EBV for weight in 365 days***, protein production** and weaning weight* (210 days). The influence on the other EBV and REBV was not statistically significant.

4 Conclusions

Mentioned genealogical bloodlines schemes were issued as a separate poster and offered to farmers. The average breeding values according to sire bloodlines were predominately negative. In younger bulls, there were some positive average breeding values. The effect of bloodline on EBV was mostly not significant, except protein production and weights in 210 and 365 days. Therefore, it is tough to characterize presented bloodlines as „milk lines", „beef lines", „protein lines" etc. The main attention should be paid on inbreeding avoidance and knowing the relations between these bloodlines as the very useful tools for farmers.

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