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SLOVAK DAIRY SHEEP – NEW COMPOSITE SHEEP BREED RAISED IN SLOVAKIA

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Abstract

In the beginning of 1990–ies, the programme of formation of synthetic population of Slovak Dairy sheep (SD) was launched. The establishment of breed was divided into two periods: first, crosses of local breeds (Improved Valachian - IV, Tsigai - Ts and Merino) with improving breeds (Lacaune - LC, East Friesian - EF) of various proportions were formed; second, a close (inter se) breeding scheme within the crossbred population was applied. At present, five thousands SD ewes are included in performance testing. Milk and reproduction traits were analyzed using mixed model methodology during the period between 1995 and 2015. The standardized milk yield (SMY) and average daily milk yield (ADMY) increased more than twice: 79.8±5.36 l (1995) vs. 164.0±2.04 l (2015) and 495.1±33.5 ml (1995) vs. 1035.3±12.8 ml (2015), respectively. In ten percent of most productive ewes, SMY was equal to 257.6 l, ADMY was equal to 1604 ml and dry matter was equal to 26.6 kg. Ewes of SD have good udder traits. Litter size in top 50 % flocks is above 150 %. The population of SD was recognized as a new dairy breed in 2017. In 2017-2019 the best flocks achieved milk production higher than 220 liters. Based on a comprehensive analysis of the genetic structure of SD we found that the overall genetic proportion of improving breeds is in new breed 60%. The remaining 40% are domestic breeds, of which IV and Ts genes are represented in the SD breed at approximately the same level (18%).

Key words: dairy ewes, composite breed, milk traits, reproduction, genetic structure

STATE OF THE ART

Following breeder‘s goals oriented towards high production, reproduction and functional traits of dairy sheep in Slovakia, the improving programme with an intention of forming improved sheep population fitting semi-extensive production system was launched in Slovakia in 1990-ies. This was programme of forming Slovak Dairy Sheep (SD). The breeding scheme was divided into two periods (*Margetín and Čapistrák* 1994; *Margetín et al.*, 2000a,b,c). First, crosses of local breeds (Improved Valachian (IV), Tsigai (TS) and Merino (M)) with improving specialized breeds (Lacaune (LC), East Friesian (IF)) of various proportions were formed in some flocks involved in performance testing. Preliminary evaluations of crossbreds with proportion of LC and EF ranged from 12.5 to 87.5 % were aimed at analyses of milk traits and litter size that are considered as economically most important traits (*Apolen et al.*, 2000; *Čapistrák et al*. 2000, 2002, 2005, *Margetín et al*., 1993, 1999a,b). Further analyses showed that population with good shape udder, of appropriate cistern size and

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milkability was formed (*Čapistrák et al*., 2006a,b; *Mačuhová et al*., 2008; 2009; *Margetín et al*., 2005b,c; *Margetín et al*., 2011a,b; *Milerski et al*., 2005, 2006; *Tančin et al*., 2011). Crossbreds with various proportions of LC and IF were also confirmed to be of good growth traits both till and after weaning (*Margetín et al*. (2004a,b). In addition, genetic parameters and variance components of udder morphology and milkability traits were preliminary studied (*Margetín et al*. 2005a, 2008).

Second, a close (inter se) breeding scheme within the crossbred population was proposed (*Margetín et al*., 2010, 2011c, 2012b) and applied taking into account results of analyses during first period of programme. The aim was to stabilize composite population using inter se (i.e. purebred) mating scheme that included dam and sire animals used as parents of the next generation that were selected according to their breeding values for milk and litter size traits. During this period, a lot of analyses were also done. Performance testing data of flocks involved in the programme were used for evaluation. These included analyses of udder morphology and milkability traits since one goal was to form population of ewes that fit machine milking (*Margetín et al*., 2013b; *Makovický et al*., 2019a), have good udder morphology and functional traits (*Margetín et al*., 2012a; *Makovický et al*., 2013, 2014, 2015a, 2017a), are of appropriate cistern size (*Margetín et al*., 2011d; *Makovický et al*., 2015b,c; 2019b) and of minimal mastitis occurrence (*Margetín et al*. 2013a). Growth curves of lambs of various proportions of LC and EF within IV and TS genotypes were compared (*Makovický et al*., 2017b). Genetic parameters of milkability traits and somatic cell score were also studied (*Makovický et al*. 2018).

In 2016, a complex analysis of SD synthetic population involving period 1995 to 2015 was done. Mixed model methodology (SAS, ver. 9.2) was employed. When milk yield during milking period (MY), standardized (SMY) and daily milk yield (DMY) as well as fat % (F%), protein % (P%), dry matter % (DM%), free of fat dry matter (DM-F%) and usable dry matter (UDM; kg) were investigated, following fixed effects: flock (52 levels), year (21 levels), parity (3 levels: first, second and third+ parity), litter size (4 levels: one lamb, two, three + lambs born and missing information about number of lambs born), covariates: milking period (in days) and interval between lambing and first test-day measurement (days) and random effect of ewe were considered. A total, 20511 records that belonged to 11026 ewes (1.86 records per ewe) entered the model for analyses of MY, SMY, DMY and 18081 records entered the model for analyses of F%, P%, DM-F% and UDM. When litter size was investigated, the following fixed effects: flock (26 levels), year (19 levels) and age of dam (8 levels, one year old up to eight+ years old) and random effect of ewe were considered. A total, 30034 litter size records that belonged to 9671 ewes entered the model.

Study of *Margetín* (2016) confirmed that improving programme that resulted in acknowledgement of SD sheep with more favourable traits than those of local breeds was fulfilled. During period of 21 years (from 1995 to 2015), SMY increased about twice (from 79.8 l in 1995 to 167.0 l in 2015). Similarly, DMY and production of usable dry matter increased by 109 and 79 %. Most productive flocks reached MY ranging from 170 to 190 l. Top 10 % ewes reached SMY above 250 l, DMY reached more than 1600 ml and production of usable dry matter was above 26 kg. Average F% and P% slightly decreased (7 and 2.4 %, respectively). Also, ewes of SD population were of good udder morphology and functional udder traits. Prolificacy did not fulfill expectations and was equal to 141.1 %. Nevertheless, it was about 160 % in top flocks. Average daily gain till weaning was about 300 g in male lambs and about 260 g in female lambs. The frequency of ARR allele of the prion gene ranged from 0.711 to 0.789 (*Margetín et al*., 2016).

Results of SD sheep flocks resulted in fact that this population was recognized as a native breed on May 26, 2017. Detailed information about history of breeding this population can be found in study of *Margetín et al*. (2017). Moreover, the importance of development of

this population from social and breeder's point of view is described in study of *Margetín* (2017a,b). In 2017-2019 the best flocks achieved milk production higher than 220 liters. The average fat content of ewes in the performance control (15 flocks) was 7.01 resp. 7.03 % and protein content of 5.60 resp. 5.43% in 2017 and 2018. Based on a comprehensive analysis of the genetic structure of SD we found that the overall genetic proportion of improving breeds (LC, EF) is in new breed 60%. The remaining 40% are domestic breeds, of which IV and Ts genes are represented in the SD breed at approximately the same level (18%; *Margetín et al*. (2018b). Based on the analysis of SD breed, we can conclude that the genes of LC breed are more prevalent (54 %) in the SD breed than the EF genes (6 %), although the chances of both improving breeds at the beginning of the breeding process were equal (breeding programs recommended use both breeds).

CONCLUSION

Population of SD breed is accordingly large (more than 5 ths. females in performance testing, 35 % yearling females enter mating schemes), so it can be successfully bred in Slovakia in the future. Breeders are satisfied with level of production and reproduction traits reached (*Pavlík et al*., 2017; *Chrenek et al*., 2018; *Margetín et al*., 2018a, 2019). With respect to appropriate effective population size, it is important that more than 300 sires of Slovak Dairy sheep are produced each year. In the next years, not only numbers of SD population, its production and reproduction traits, but also its exterior traits including wool characteristics need to be continuously stabilized (*Margetín*, 2017c).

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