



BREEDING PERSPECTIVE AND ANALYSIS OF UTILITY PARAMETERS OF THE SUFFOLK SHEEP BREED

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ABSTRACT

Due to insufficient appreciation for the breeding of dairy sheep, breeds of sheep without market milk production have started to gain popularity in Slovakia. Particularly, meat breeds are coming to the forefront, with their breeding being less demanding and more efficient, reflected mainly in the daily weight gains of growing lambs. Study aimed to analyse the utility and reproductive parameters of breeding the meat breeds Suffolk, located in central Slovakia, in the Rimavská Sobota district. Analysis is supplemented by a detailed description of the breed standard and devotes attention to all the tasks carried out on the farm during the sheep farming year. It focuses mainly on a simple year-round grazing system without housing, utilizing only shelters for protection against adverse weather conditions. Analysed utility and reproductive parameters such as average daily gains, loin muscle thickness, backfat thickness, and fertility were compared and evaluated over the last seven years. Results indicate that the evaluated parameters are mainly influenced by the size of

the flock, the number of ewes put to ram, the individual approach to each breeding ewe, and environmental factors. Number of offspring is mainly influenced by the nutrition of the dam in the last third of pregnancy. Despite the simplicity of the breeding system, monitored breeding can achieve above-average results with proper management and innovative approaches.

Key words: average daily gains; farming system; fertility; loin muscle; Suffolk sheep

INTRODUCTION

Sheep breeding has an important and irreplaceable position in livestock production in Slovakia. Products made from sheep's milk and meat have been considered traditional products of Slovak gastronomy for several centuries. Its importance also extends to non-productive areas, contributing to employment and thus affecting rural development. It is also beneficial in terms of landscape formation, by maintaining land that is difficult to access

for agricultural machinery. In contrast to other livestock farming, sheep numbers in Slovakia were on an upward trend until 2012 [6].

The current position of sheep breeding is unfavourable. Animal numbers are declining almost every year. At the end of 2023, 307,000 sheep were registered, which is 93,000 (23.25 %) fewer than in 2015. This is a huge decrease. A few years ago, 630,000 sheep were registered in the Slovak Republic. In Slovakia 50 years ago, there were almost a million sheep on the territory [2].

Currently, there are almost 9,085 registered sheep farmers in Slovakia with 322,936 registered sheep, of which 285,457 are females. The most numerous breeds on our territory are the improved Wallachian (78,460), Tsigai (69,831), and Lacaune (63,272) [1].

This unfavourable trend continues and Slovak agriculture is currently facing many challenges and changes that require innovative practices in livestock farming. Livestock numbers are declining year by year, farm work is demanding, and the agro-sector is not attractive to young people. One way of attracting people to the sector is by breeding non-dairy sheep for meat production. One of the prospective breeds for this branch of livestock production is the Suffolk. The Suffolk sheep is a superior producer of lean meat due to rapid early growth, heavy muscling, and efficient conversion of forage and other feedstuffs. Suffolk sheep are striking in breed character and unrivalled in beauty, having jet-black, wool-free heads, and legs that sharply contrast their clean white fleeces and pink skin. Suffolk genetics are highly prized by commercial shepherds to improve the weights and carcass quality of their lamb crops, while the Suffolk head is designed to facilitate ease of lambing. All Suffolk sheep should be structurally and reproductively sound. Rams should be robust and masculine, with significant muscling, body volume, and mass as well as ample fertility and libido. Ewes should be feminine yet thickly muscled, and demonstrate a strong capacity for breeding, lambing ease, mothering instinct, and milking ability. In both sexes, preference is given to naturally wide-based, deep-bodied, easy-fleshing animals free of coarseness or over-refinement. As a meat breed, Suffolk breeding rams and ewes should produce fast-growing lambs that yield carcasses with superior composition and conformation, regardless of purebred or commercial crossbreds [12]. The live weight of lambs in 100 days of age is between 35–38 kg, indicating that the daily gain

is between 330–380 g. While the mature weights of Suffolk sheep may vary considerably, the live weight of ewes reaches 75–85 kg, and the weight of rams is higher and can climb up to 135 kg. The height of adult sheep of the Suffolk breed varies around 70 cm at the withers [13]. The appropriate frame size and growth curve should be chosen to match the specific commercial production environment and the target carcass weight [7].

The breeding of Suffolk sheep offers an interesting and sustainable approach to the development of Slovak agriculture [10]. Traditionally considered a marginal part of the flock, non-milking meat sheep are gaining in importance and popularity mainly due to their versatility. They not only provide us with meat and wool but also contribute to landscape formation. They offer a completely new perspective on breeding, with new technological practices and possibilities [9].

The study aimed to analyse the utility and reproductive parameters of Suffolk meat breeding and its environmental benefits with the possibilities of innovations and technological solutions that could contribute to efficient management.

MATERIALS AND METHODS

Farm and method of breeding

The monitored farm is located in the middle of Slovakia in a settlement between Rimavská Sobota and Ožďany, called Mlynárka. There are 180 sheep registered on the farm, of which 48 are breeding rams, of which 5 rams are intended for insemination, and the other 43 are included in breeding with their resale. In 2023, 119 sheep were inseminated by natural mating (in November) with five rams. The long-term goal of a farm of 120 ewes has almost been met in 2023. In 2024, the number of 120 ewes has been met and no further numbers will be increased as quality breeding material is easier to achieve with controllable conditions.

The Suffolk breed is characterized by very low demands on housing and a breeding system, which is fully used on the monitored farm. Sheep are kept in the most natural conditions possible, using all the potential of natural grazing, without unnecessary intervention. Suffolk is not a typical herd sheep, as evidenced by the way they graze. They graze best in the early morning and late evening

hours, which cannot be fully ensured by herd grazing with a shepherd. Therefore, Suffolk sheep on this farm are bred with a fence system. The feeding system is semi-intensive, which means that grazing is used as the main source during the summer months and hay and haylage are the main sources of energy in winter [8]. Almost all year round, sheep are also given grain feed, which is composed of barley, oats, and triticale, in different proportions according to the current situation. The dosage of grain feed depends on the quality of roughage and serves only as a dietary supplement. For rams, a mixture of ammonium chloride to the core feed serves to prevent formation of urinary stones, to which they are susceptible. Sheep have access to mineral licks and salts all year round.

Monitored utility and reproductive parameters

In the study, 233 male lambs and 220 ewe lambs were compared and evaluated over the past seven years. For this study, the fixation and measuring of the sheep was according to the EU legislation 2010/63/EU, article 1–5 (practices not likely to cause pain, suffering, distress, or lasting harm equivalent to or higher than, that caused by the introduction of a need to follow good veterinary practice).

Monitored utility parameters in rams as well as ewe lambs were measured approximately at the age of 100 days, namely: loin muscle thickness (MLLT – *musculus longissimus lumborum et thoracis*), backfat thickness, live weight, and average daily gains according to the study conducted by Drozd [3]. Ultrasonographic diagnosis of MLLT and backfat thickness (USG) was performed in breeding lambs of both sexes included in the utility control during each monitored year. Measurement of MLLT and backfat thickness was performed in lambs at approximately the age of 100 days using an ultrasonograph (ALOKA SSD 500, USA). At the same time, lambs were weighed individually as part of utility control. The average daily gain was calculated from the absolute gain and the number of feeding days at 100 days of age. Sheep fertility, which is one of the main reproductive indicators, was calculated as a proportion of total number of lambing sheep to the number of lambs, expressed in per cent:

$$\% = \text{total number of ewes} / \text{number of lambs} \times 100$$

Statistical analysis

Utility indicators such as MLLT, backfat thickness, live weight, and average daily gains in lambs of both sexes

were evaluated using Microsoft Excel 20. For the comparison of the means of every monitored parameter during the 7-year monitored period, Tukey's multiple comparison test was employed. The differences among the individual parameters were considered significant at $P < 0.05$.

RESULTS

Measuring the thickness of MLLT and backfat by weighing approximately at the age of 100 days was done to evaluate the growth potential of the monitored lambs. The main indicators for the past 7 years are summarized in Tables 1 and 2, which compare the thickness of MLLT, and the thickness of backfat in ewe lambs (Table 1) and ram lambs (Table 2). The most significant differences ($P < 0.05$) were detected in 2020, when there was recorded the highest thickness of MLLT and backfat in the lambs studied at 100 days of age. Conversely, the lowest thickness of both parameters was recorded in 2023 compared to the previous periods ($P < 0.05$).

The comparison of live weights of 100-day-old lambs is shown in Fig. 4 (ewe lambs) and 5 (ram lambs). The highest average live weight in both sexes was recorded in 2020 (43.0 kg in ewe lambs and 49.1 kg in ram lambs), while the lowest weight was recorded in 2023 (35.8 kg in ewe lambs and 43.4 kg in ram lambs). A very important indicator is the average daily gain, which was calculated from the weights of lambs at 100 days of age. The gluttony of lambs is reflected in daily gains, which at 100 days of age reached an average of 409 g, which is almost 35 g more than indicated by the breed standard. In 2020, the highest daily weight increments of lambs reached 460.9 g, exceeding the breed standard by 70 g (Fig. 6).

Fertility is influenced by many factors, including the frequency and the size of litter. Fig. 7 shows the fertility of Suffolk sheep on the monitored farm during the period of 2017–2023. Satisfactory parameters were achieved in 2021 when fertility reached 183.7 %. In 2022, a deterioration in fertility indicators was observed. This was attributed to a higher incidence of single litters compared to the previous years.

DISCUSSION

The breeding of sheep of the Suffolk breed focuses mainly on meat production. In Slovakia, this type of sheep farming without market milk production began to develop more intensively at a higher breeding level only in the last 20–30 years. The numbers of individuals focused on meat production are increasing especially in the southern parts of Slovakia. In the past, Merino sheep were mainly bred in these territories [10].

The climatic situation in this area allows sheepdogs to use the so-called modified Anglo-Saxon breeding system. For this system to be economically advantageous, certain conditions must be met: selection of a suitable breed resistant to bad weather, undemanding feed quality, a certain degree of resistance of the hooves to rot, good maternal characteristics of the sheep, and others [9, 10]. Breeds suitable for this type of breeding also include the Suffolk breed [11], which is bred on the monitored farm located in the south of Slovakia, near Rimavská Sobota. It is precisely in these areas that the breeding of cattle, sheep, and goats without market milk production has been on the rise for the last 20 years. This is possible mainly due to very favourable climatic conditions.

In the monitored holding, which is implemented by a simple fence system, sheep are grazed all year round, with the possibility to hide from bad weather under static shelters located within fences. Nor is this an obstacle to achieving internationally competitive results. On the contrary, breeding is even highly efficient in comparison to individual performance parameters and results in cost reduction. The simplicity of such breeds is attractive and practical for future breeders.

At 100 days of age, USG was used to measure back muscle thickness (MLLT) as well as subcutaneous fat thickness. These two values are used to evaluate the growth potential of lambs [3]. Tables 1 and 2 record performance parameters by sex indicating the average values of weighted and measured lambs in monitored breeding holding in the south of Slovakia. The year 2020 was very favourable as all indicators exceeded those obtained in the previous years. The recorded weight was the highest average weight achieved in Slovakia in that year. Conversely, the lowest thickness of MLLT and backfat of lambs determined at 100 days of age was measured in 2023 compared to previous periods. The lower values obtained for subcutaneous

fat reflects the changes regarding the rearing system with the possibility of free movement of lambs. Conversely, extensive breeding in stables with limited enclosures resulted in higher values of subcutaneous fat [5]. In addition, in 2023, the grazing area on the monitored free-movement farm of sheep and lambs was extended, which resulted in increased movement and lower weight of lambs at 100 days of age.

Also, a very important indicator is the average daily gain, which was calculated from the weights of lambs at 100 days of age. Lambs are born very agile and viable. Their exceptional gluttony is reflected in daily gains, which reached an average of 409 g at 100 days of age, which is almost by 35 g higher than indicated by the breed standard. In 2020, the monitored farm managed to achieve daily lamb gains of 460.9 g, which exceeded the breed standard by 70 g.

The study by Janoš et al. [9], carried out in a school enterprise in Žabčice (SR), describes the growth ability of the Suffolk and Charolais breeds. Individuals were bred in the same conditions, intensively. They were weighed at ages 30, 100, 200, and 300 days. The results of weighing at 100 days of life indicated that the Suffolk breed had a better growth ability than the Charolais breed. The average daily gain was approximately 344 g. In Suffolk breeding, even in the year with the lowest daily gain, they exceeded this value by 27 g. The best breeding year in which the highest daily gains were achieved was 2022, when the breeder managed to exceed the value measured in Žabčice by 97 g, despite a different, simpler breeding system.

In Ireland, as in Great Britain, the Suffolk breed is one of the most popular meat breeds. Study by Fitzmaurice et al. [5] compared the height of MLLT and fat between meat breeds of sheep: Texel, Suffolk, and Charolais. The value of both indicators, MLLT and subcutaneous fat thickness were determined by USG. These two indicators are very important for assessing the growth potential of lambs. Great emphasis is put on them mainly in breeds focused on production of heavy Easter lambs. These values were measured in lambs at approximately 150 days of age. These parameters were measured precisely in the Suffolk breed. The thickness of the MLLT was 34.1 mm on average and the fat was 8.5 mm thick. In 2020, which was the year with the best values, the MLLT thickness in the ewe lambs on the monitored farm was reached 38.1 ± 3.1 mm (Table 1), which is by 3.9 mm higher than that

Table 1. Comparison of MLLT and backfat thickness in ewe lambs during the years 2017–2023

Year	Number of lambs	Average age (days)	Thickness of MLLT (mm) at 100 days of age	Thickness of backfat (mm) at 100 days of age
2017	17	92.7 ± 5.1	34.5 ± 3.6b	4.4 ± 0.5 b
2018	20	98.6 ± 4.7	37.4 ± 3.0a,b	5.1 ± 0.4a,b
2019	44	104.2 ± 5.2	34.6 ± 2.8b	4.6 ± 0.5a,b
2020	30	100.4 ± 4.2	38.1 ± 3.1a	5.5 ± 0.3a
2021	41	98.0 ± 5.4	36.4 ± 4.2a,b	5.4 ± 0.6a
2022	47	100.8 ± 4.6	30.1 ± 2.6b	5.1 ± 0.4a
2023	21	102.4 ± 6.8	21.7 ± 2.5c	2.4 ± 0.2c

^{a,b,c} – different letters in the column indicate statistical significance $P \leq 0.05$; MLLT – *musculus longissimus lumborum et thoracis*

Table 2. Comparison of MLLT and backfat thickness in ram lambs during the years 2017–2023

Year	Number of lambs	Average age (days)	Thickness of MLLT (mm) at 100 days of age	Thickness of backfat (mm) at 100 days of age
2017	22	93.8 ± 4.6	33.6 ± 3.1a	4.0 ± 0.3a
2018	19	98.4 ± 5.1	38.2 ± 3.4b	4.5 ± 0.2a
2019	38	105.4 ± 6.8	35.0 ± 2.5a,b	4.3 ± 0.3a
2020	34	99.1 ± 4.8	38.0 ± 2.8b	5.5 ± 0.4b
2021	36	99.5 ± 5.0	37.7 ± 4.2a,b	5.0 ± 0.5a,b
2022	45	101.8 ± 5.2	31.1 ± 3.4a	5.1 ± 0.4a,b
2023	39	109.1 ± 6.0	21.2 ± 2.8c	2.3 ± 0.3c

^{a,b,c} – different letters in the column indicate statistical significance $P \leq 0.05$; MLLT – *musculus longissimus lumborum et thoracis*

measured in the Suffolk group in Ireland [13]. For ram lambs, the MLLT thickness was 38.0 ± 2.8 mm (Tab. 2), which is only by 0.1 mm lower than the value for lambs, and still exceeds the value measured for lambs in Ireland. The fat thickness was lower, reaching 5.5 ± 0.3 mm for ewe lambs with the same value in ram lambs. Our measurements showed that the fat thickness values were higher by about 3 mm. This can be ascribed to the system of lamb rearing. A lower amount of fat is observed in lambs with the possibility of free movement.

The Suffolk Sheep Society [13] annually publishes average values of monitored indicators: MLLT thickness, fat thickness, and average daily weight gain. It stated that the average birth weight of a twin lamb is 4.2 kg and the average weight of lambs at the age of 100 days is about 40 kg. From this it follows that the average daily weight gain is about 358 g. Despite the simplicity of the breeding system, the monitored farm managed to achieve better daily gains. MLLT and fat are evaluated for up to 150 days which did not allowed us to compare these indicators with the values of Suffolks bred in Slovakia.

Every year, the monthly Slovak Breeding magazine evaluates breeding achievements in the competition BEST Slovak Breeding. Individuals from the evaluated breeding

annually take the leading places in terms of meat sheep breeding. The average daily weight gains of lambs almost every year occupy the first place. The year 2018 was the first year when animals from the farm from Rimavská Sobota entered the competition. That year, the daily gain on this farm was 371 g, which was not enough for the first place by 8 g. Until 2022, Suffolk sheep from the south of Slovakia significantly dominated the competition statistics. In 2019, Suffolks achieved an average daily gain of 372.9 g, which was by 14.4 g higher than the other breeders. In 2020, it surpassed other breeders by 36 g. In 2021 it was higher by 17 g and in the last monitored year 2022 by 93 g. Suffolk breeding on the monitored farm differs from other breeds in Slovakia mainly because of the simplicity of the breeding system. Daily gains depend on good milkiness of ewes, lamb appetite, sufficient feed, and weather conditions [4].

Another major indicator observed in sheep is fertility, which depends on the frequency of the litter of ram to which the sheep was mated and on the frequency of the litter from which the parents themselves originated [14]. Fig. 7 compares the fertility of Suffolk sheep on the monitored farm during the period of 2017–2022. Satisfactory parameters were achieved in 2021 when the fertility



Fig. 1. Suffolk breed – rams and ewe with lamb
Photo: Gondová (2023)



Fig. 2. Year-round outdoor breeding method
Shelters serving as a protection against adverse weather conditions. Semi-intensive feeding system consists of pasture, hay, haylage and addition of grain feed
Photo: Gondová (2023)

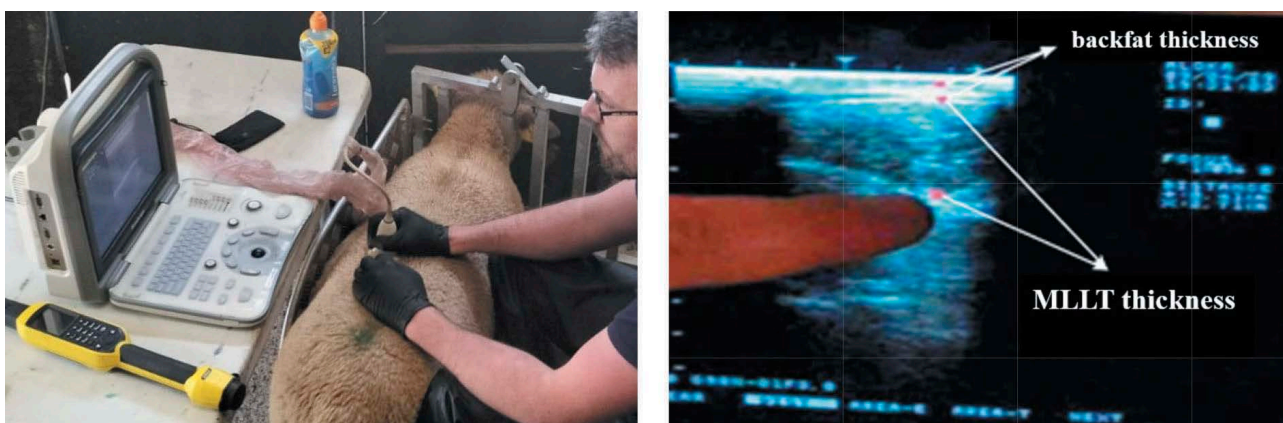


Fig. 3. Measurement of MLLT and backfat thickness
Photo: Gondová (2023) and Drozd (2009)

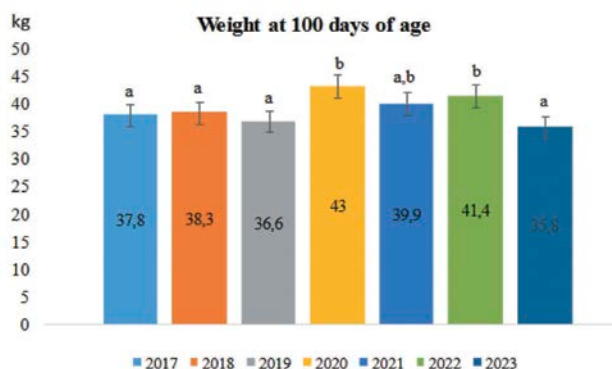


Fig. 4. Comparison of weight in ewe lambs during the years 2017–2023
a,b – different letters above the columns indicate significant differences $P \leq 0.05$.

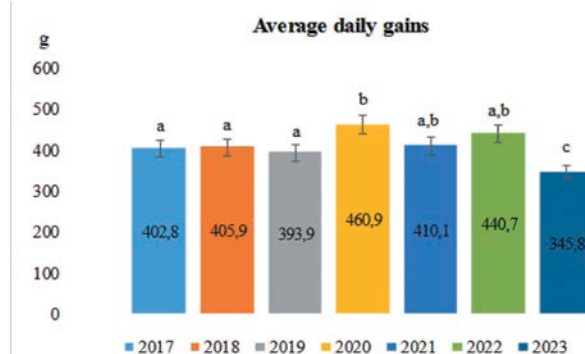


Fig. 6. Comparison of average daily gains of lambs at 100 days of age
a,b,c – different letters above the columns indicate statistical significance $P \leq 0.05$.

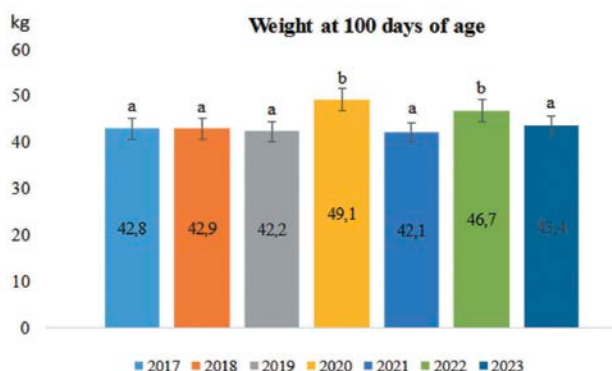


Fig. 5. Comparison of weight in ram lambs during the years 2017–2023
a,b – different letters above the columns indicate statistical significance $P \leq 0.05$.

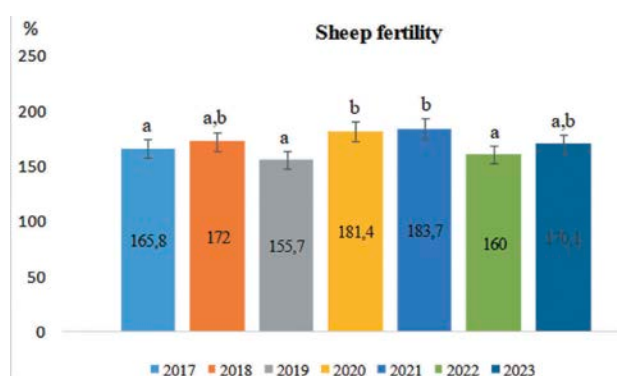


Fig. 7. Comparison of sheep fertility during the years 2017–2023
a,b – different letters above the columns indicate statistical significance $P \leq 0.05$.

reached 183.7 %. In 2022, a deterioration in indicators was observed. This was attributed to a higher incidence of single litters compared to the previous years.

According to the English Suffolk Breeders Association [13] an average number of lambs per bred ewe is 1.71. The monitored breeding in the south of Slovakia managed to achieve 1.83 lambs per ewe. The number of lambs is influenced by several factors. Most important is the abundance of the litter from which both parents come, particularly the ram. It is desirable to check how many siblings it comes from when choosing a new breeder. It is ideal when both the ram and the ewe come from a double litter. Then the probability of twins being born increases.

CONCLUSIONS

The results of this study showed that the evaluated parameters in individual years were significantly influenced mainly by the abundance of the herd, the number of sheep

admitted, the individual approach to individual ewes, environmental factors, and the size of the foetus that is influenced mainly by the nutrition of the mother in the last third of pregnancy. Reproductive indicators are mainly influenced by the frequency of litter from which the parents come. If both come from a double litter, twins are more likely.

However, we cannot forget that for such breeding to be feasible, it must be built on a good genetic basis. The basic herd must consist of strong individuals, resistant to climatic influences. Preference is given to breeds with black hoofs which is less prone to rotting and overgrowth. Mothers must have a good maternal instinct and enough milk to raise lambs. The knowledge gathered indicates that breeding of meat sheep breeds without market milk production has good potential in Slovakia.

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