

Sheep breeding in the Czech Republic

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Abstract

Sheep farming is a small sector of livestock production in the Czech Republic compared with cattle and pig breeding, but over the past few years we have noticed a significant increase in the number of sheep. According to the official statistics in 2013, there were 125,136 ewes, from which 22,632 were included in performance recording. Sheep farmers are predominantly focused on heavy lamb production and landscape management. The main selection criteria within these production systems are litter size and lambs' live weight, adjusted to a constant age of 100 days. In terminal sire breeds, ultrasonic backfat thickness and eye-muscle depth measurements are also carried out when lambs are aged 100±20 days. For all these characteristics breeding values are estimated by the BLUP Animal Model methodology, and from these results the selection indexes are computed for individual breeds or groups of breeds. There is not a long tradition of dairy sheep farming in the Czech Republic, but now this industry is starting to develop. In 2013, 1,669 dairy ewes were recorded. The most numerous dairy sheep breeds are East Friesian and Lacaune, for which the AT recording method is in use. Breeding values for milk traits are estimated by Test-Day BLUP Animal Model methodology. Milk production is standardly adjusted to a 150-days milking period. Recently, development in the field of sheep breeding has been directed mainly at optimizing breeding programs for dairy sheep, including udder assessment and functional traits, especially those connected with lamb survivability.

Key words: sheep, milk recording, estimation of breeding values, performance recording.

Introduction

Sheep production enjoys a long tradition in the Czech Republic. The first written mention comes from 11th century. Fine wool production began in the Czech lands in the second half of the 18th century, a period known as 'the time of the golden fleece.' During this time outstanding results were achieved, especially by Ferdinand Geisselern (1751-1824) from Hoštice near Kroměžíř, who became the first person to breed wool sheep on the continent, earning him the name, 'Moravian Bakewell'. Soon afterwards, however, domestic as well as international conditions began to change and develop. Overcoming the three-field system and a growing intensification in agriculture production led to a substantial decrease in pasturage opportunities. Since then sheep numbers in the Czech lands have oscillated resulting in a slow decline. The last significant decline in sheep numbers occurred in the 1890s when wool prices fell. At that time the focus switched from sheep production to wool on meat, and from the start of the millennium sheep numbers in the Czech Republic have been slowly increasing again, as shown in Figure 1, and according to the Czech Statistical Office there were 220,521 sheep (all categories) in 2013.

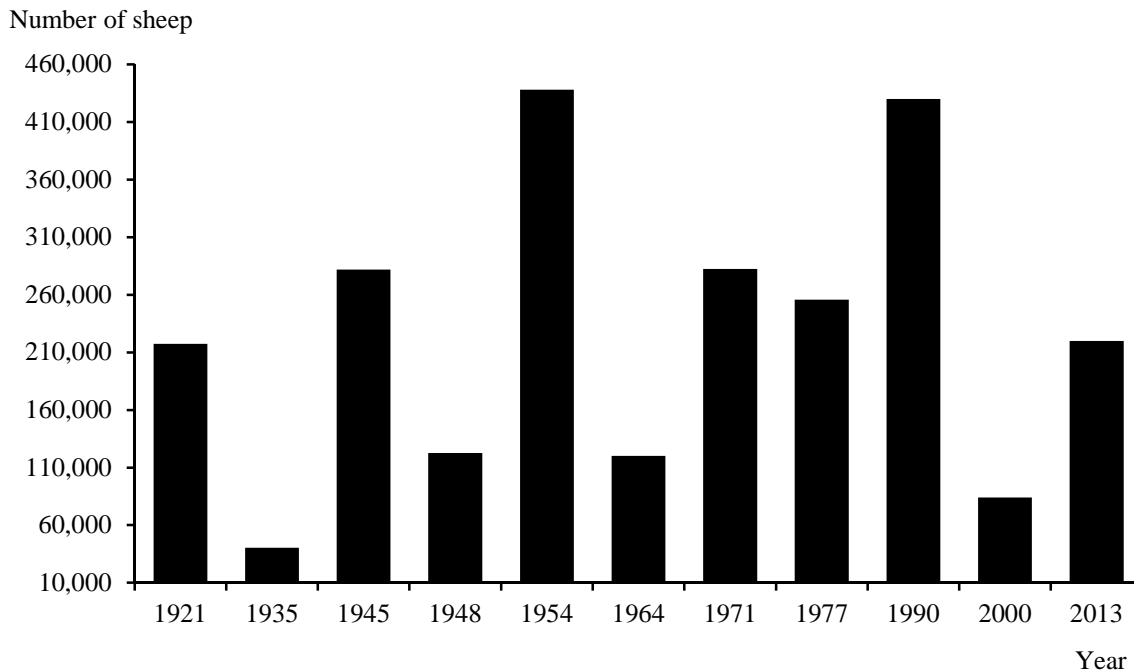


Figure 1. Changes in the total number of sheep in the Czech Republic (all categories).

Present status of sheep production in the Czech agricultural sector

Today sheep production only represents a marginal section of agriculture and livestock production in the Czech Republic. According to the official statistics in 2013, 125,136 ewes were documented, of which 22,632 were included in performance recording. Converted to unified livestock units, the sheep population represents only around 3% of the livestock sector in the Czech Republic. However, currently the importance of sheep in landscape management of permanent grasslands (23.5% of agricultural land) is becoming increasingly relevant. Since 1989 the sector has transformed and there have been noticeable changes to the organisation of sheep breeds. In 1990, numbers consisted of mostly wool sheep breeds (62.9%) and combined performance breeds (36.4%), with remaining breeds making up only 0.7%. The share of meat breeds, milk breeds and other breeds was negligible. In 2013 numbers comprised 48.0% of sheep breeds with combined performance, 40.0% of beef with meat performance and 12.0% of other breeds. Sheep breeds with wool performance were not documented in 2013. Sheep breeding in the Czech Republic is sensitive to the economic situation and the demands in sheep products. Owing to several crises over the last 100 years, there has been a significant increase and decrease in sheep numbers.

Consumption has stabilised over the last 10 years with current levels mostly at around 0.3 kg. By comparison, levels were at 0.7 kg in 1950 and 0.5 kg in 1965. The share of animals slaughtered at the slaughterhouse from 2007 until 2013 ranged from 6.8% to 12.8% for all slaughtered animals. Czech breeders produce mostly heavy lambs and the average slaughter weight in slaughterhouses was 32.6kg of the live weight. For the entire Czech Republic, farm slaughters are estimated to be at a higher level, averaging between 35 kg and 45 kg of the live weight. 144,319 animals are slaughtered per year. The price per kilogram of live weight is

between €1.43 to €2.15 per kilogram, i.e. €4.66 per kilogram of carcass. Overall there is a positive balance of foreign trade in live animals.

Organisation of breeding in the Czech Republic

The Association of Sheep and Goat Breeders in the Czech Republic plays a key role in sheep breeding, setting breeding goals, selecting programs and defending breeders' interests on a national and international level. Performance recording in the field is maintained mostly by the Association of Sheep and Goat Breeders in the Czech Republic, but other bodies are also involved in performance and milk recording on farms. In 2012 performance and milk recording was carried out by the Association of Sheep and Goat Breeders in the Czech Republic together with the Czech Moravian Breeders' Corporation. Inc. The development of breeding programs is carried out in collaboration with the Herdbook Board, the internal organisational body of the Association of Sheep and Goat Breeders in the Czech Republic and with research institutions (mostly with the Institute of Animal Science).

Performance recording

At the end of 2013, a total of 22,632 ewes consisting of 34 breeds were included in the performance recording system. Nevertheless only 17 breeds are numerous enough to use in the selection process (Bergschaf, Tsigai, Charollais, Romney, Merinoland, Lacaune, German Black Face, Oxford Down, Romanov, Bohemian Forest Sheep, Suffolk, Texel, Valachian, East Friesian, Improved Valachian, Zwartbles and Synthetic Dairy Line).

Reproduction and lamb survival

In ewes, fecundity and prolificacy are recorded by the farmer and then the reproduction data is collected by the association database. The number of lambs born, lambs born alive, lambs reared to an age of 14 days and lambs reared to weighing (70-130 days) are all recorded. In 2013, 20,301 lambings were recorded.

Growth intensity

In multipurpose and meat sheep breeds, lambs at an age range of 70-130 days are weighed on electronic scales in the presence of an authorized individual. Dairy sheep lambs are weighed at weaning. 22,332 lambs were weighed within the specified age range in 2013.

Ultrasound measurements

Ultrasound measurements of muscle depth and backfat thickness are performed in terminal sire breeds (Suffolk, Charollaise, Texel, Oxford Down, German Blackface) and in parts of the Romney population in the Czech Republic. Measurements take place together with lamb weighing at the age 70-130 days, allowing a high number of lambs to be scanned. Scanners

with linear probes are used. Scans are performed between the last lumbar and the first thoracic vertebrae. A total of 8,129 lambs were scanned using the ultrasound technique in 2013.

Milk production

Dairy sheep breeds are recorded using the AT method according to ICAR methodology. So far, a variety of equipment is in use for milk production recording (milk weighing, volume recording jars, True-Test milk meters). Milk production is adjusted to the standard 150 days milking period. Usually 4-5 test days are performed during the milking period of ewes. Milk samples are taken on each control day and fat content, protein content and lactose content are analysed in laboratories of the Czech Moravian Breeders' Corporation, Inc. 1,669 ewes were processed for milk recording in 2013.

Breeding values estimation

The BLUP Animal Model method is used to estimate breeding values for prolificacy (litter size), lamb weights at an age 100 days in 17 breeds, eye-muscle depth and back-fat layer thickness in 5 breeds, and milk and milk fat/protein production in 3 dairy populations. Effects included in the model equations are presented in Table 1.

Table 1 Effects included in model equations for estimating breeding values of various traits

Effect ¹	Trait			
	Prolificacy	Liveweight of lamb	Ultrasound measurements	Milk production
Contemporary group	R	R	R	F
Control day in flock				R
Sex		F	F	
Reared lambs		F	F	
Age	F	C	C	F
Mother age category		F	F	
More frequent lambing	F ²			
Live weight			C	
Days in milk				C
Permanent environment	R			R
Mother permanent environment		R		
Breeding value – individual	RR	RR	RR	RR
Breeding value - maternal	RR			
Random residual effect	R	R	R	R

¹ Explanatory notes: F – fixed categorical effect, C – co-variable, R- random effect, RR-random effect with relationship matrix

² in Romanov and Merinoland breeds

Breeding values are estimated from May to August in monthly intervals (for lamb selection) and additionally at the end of October (for daily sheep selection) and February (for young rams above the age of 1 year). From the point of view of reliability when estimating breeding values, unfavorable conditions arise from the lack of artificial insemination and the limited relationship in the connectedness between flocks.

Selection indexes (CPH)

Selection indexes (CPH) are computed on the basis of breeding values. Weight coefficients by which individual breeding values are multiplied are listed in Table 2.

Table 2: Weight coefficients for individual traits in selection indexes for various breeds or groups of breeds

Group of breeds	Breeding values of individual traits					Production ¹ (kg)
	Weight individual (kg)	Weight maternal (kg)	Prolific. (%)	Muscle depth (mm)	Back-fat thickness (mm)	
Suffolk	30	15	2	40	-70	
Texel	30	15	2.5	40	-42	
Other meat breeds	25	15	2.5	22	-42	
Merinoland	20	18	2.5			
Other combined	18	18	2.5			
Dairy breeds			2.5			37

¹ Production of milk fat and protein per milking period

Breeding rams classification

Breeding values and selection indexes are published on the breeders association website (www.schok.cz/plemenne-hodnoty/ovce) and in breeding rams catalogues. Breeding rams are classified in the majority of breeds from the age of 6 months. All classified rams have to be genotyped for the PrP gene and scrapie resistance in order to determine they are not a VRQ allele carrier. The parentage verification of the rams is verified by a genetic microsatellite test. Classified rams undergo a linear type assessment on a 1-5 code scale for body size, muscle conformation, chest width, rump width, backline, rump angle, side hock angle, fore and rear legs and foot angles and wool assessment. Based on the selection index (CPH) and the type assessment, each classified ram is included in the overall breeding class: Elite Record, Elite A, Elite B, I, II. If they are not included they are then eliminated from breeding.

Development of breeding work in the Czech Republic

Currently development is focused on functional traits that are mainly connected with lamb survival. In dairy sheep attention is paid to the assessment of the morphological and functional characteristics of udders. We are continuing to develop the highly prolific line of Merinoland breeds based on FecB allele carriers. In 2013 an insemination station for rams was established, allowing the possibility for a wider application of this method in sheep breeding programs in the Czech Republic.