Chapter

Lietuvos Baltosios Senojo Tipo (Lithuanian White) Pig

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Abstract

Lietuvos Baltosios senojo tipo pigs are remaining purebred pigs of local Lithuanian pig breed (Lietuvos Baltosios) adapted to the specific local environment and locally available feedstuffs. Although previously Lietuvos Baltosios was the main dam pig breed in Lithuania, regarding scientific substantiation, their performances and products are, as in the case of Lietuvos Baltosios remains (senojo tipo-old type) pigs, practically untapped. Thus, the present chapter aims to present history and current status of Lietuvos Baltosios senojo tipo pig breed, its exterior phenotypic characteristics, geographical location, production system and main products from this Lithuanian breed of pigs, one of the local pig breeds investigated in the project TREASURE. Moreover, a collection and review of available literature data, available until August 2017, on reproductive and productive traits of Lietuvos Baltosios senojo tipo pig breed were carried out. Reproductive and growth performance, and feed intake in different stages was estimated. Lean meat content was measured by ultrasonic equipment Piglog on the side of live pigs at the position of 12 ribs. Measurements of backfat thickness were taken with a ruler on the left side of carcasses at dorsal line of the mid-back at the last rib and loin area at the 1/2 lumbar vertebra by digital camera EX-Z110 and, afterwards, were planimetrically measured by means of the "SCAN-STAR K" planimetrical system. Meat quality traits of the longissimus muscle were evaluated using pH at 45 min and 24 h after slaughter, objective colour (CIE L*, a*, b*) and intramuscular fat content.

Keywords: traditional European breed, TREASURE, productive traits, phenotype, Lithuania

1. History and the current status of the breed (census)

The Lithuanian White old genotype (Lietuvos Baltosios senojo tipo) is a domestic pig native to Lithuania. This breed was developed by the process of improving old Lietuvos vietinės pigs with Large White, Middle White, Edelsweine, Berkshire and local Danish pigs. Until the twenty-first century, Lietuvos Baltosios pig breed was one of the main pig breeds used as dam breed in commercial crossing combinations. Since 2003, all purebred boars in breeding farms were castrated, and this caused a fast decline in pig numbers of original Lietuvos Baltosios breed and conservation of the old genotype of the Lithuanian White pig breed. Census of Lietuvos Baltosios senojo tipo pig breed is presented in **Figure 1**. Presently,

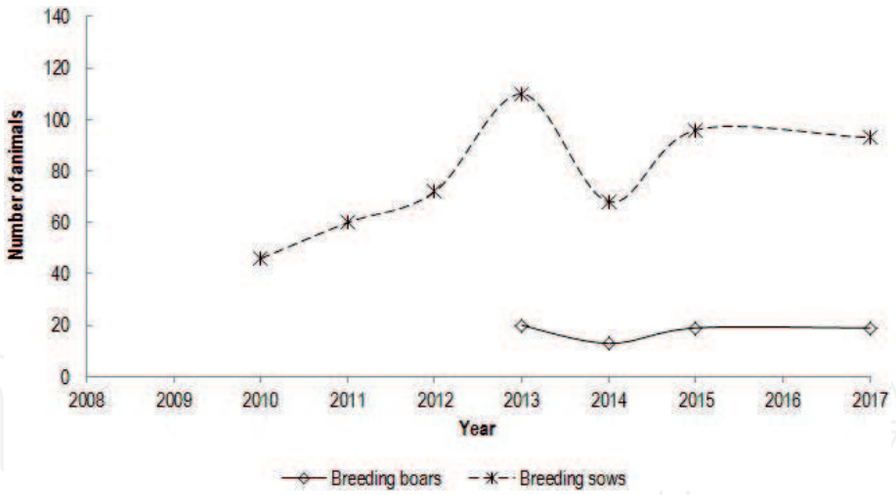

Figure 1.
Census of Lietuvos Baltosios senojo tipo pig breed, presenting number of sows and boars per year, starting with the year of heard-book establishment.

there are three registered farms of Lietuvos Baltosios senojo tipo pigs with about 93 breeding sows and 19 boars in the latest available status (December 2017).

2. Exterior phenotypic characteristics

The Lietuvos Baltosios senojo tipo pig breed morphology information is summarised in **Table 1**. It is a middle-sized, unicoloured white breed of pigs (**Figures 2** and **3**). The breed is well adapted to the local conditions. The animals are known for their strong constitution but low stress susceptibility.

3. Geographical location and production system

Lietuvos Baltosios pigs are conserved at the Centre for Farm Animal Genetic Resources, Coordination of Animal Science Institute, Lithuanian University of Health Sciences, where the nucleus herd with full genealogical structure is maintained. Most of the Lietuvos Baltosios pigs are concentrated in this nucleus

Measurement (average)	Adult male	Adult female
Body weight (kg)	299	212
Body length[1] (cm)	170.4	159.7
Head length (cm)	32.4	30.6
Tail length (cm)	44.1	39.2
Ear length	20.9	21.3
Chest girth (cm)	158.8	136.7
Height at withers (cm)	92.1	80.0
Number of teats	14	14

[1]*Measured from the back of the head to the starting point of the tail.*

Table 1.
Summary of morphology information on Lietuvos Baltosios senojo tipo pig breed.

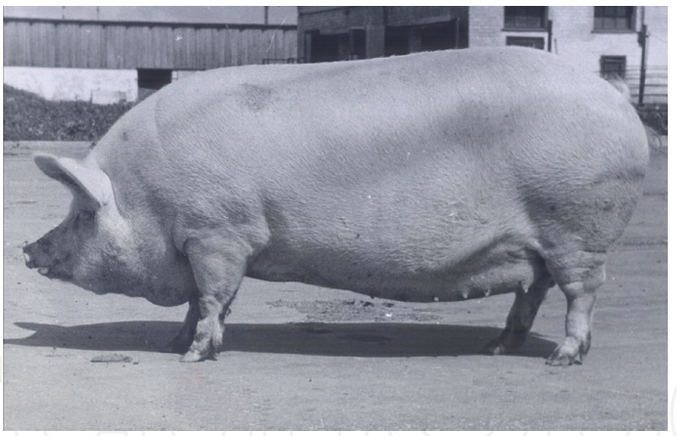

Figure 2.
Lietuvos Baltosios senojo tipo sow.

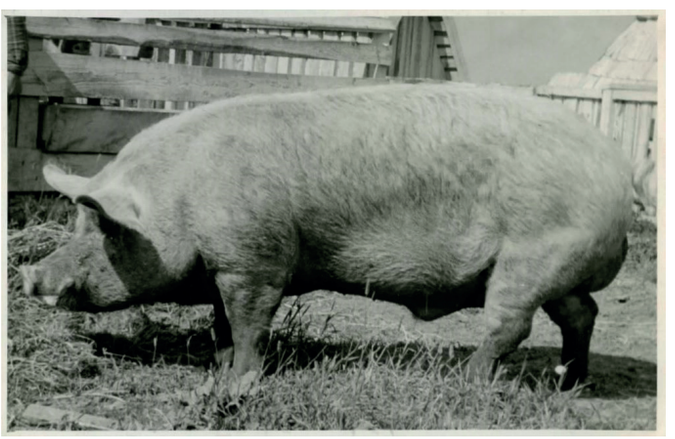

Figure 3.
Lietuvos Baltosios senojo tipo boar.

herd, which is located in Baisogala, Radviliškis district, in the central part of Lithuania (in the latitude of 55° 64′N and the longitude of 23° 70′E). Other recorded representatives of Lietuvos Baltosios pigs and their crosses with other breeds are in two farms located in Algimantai, Raseiniai district (in the latitude of 55° 26′N and in the longitude of 23° 50′E), and in Ažuolų Būda, Kazlų Rūda district (in the latitude of 54° 42′N and in the longitude of 23° 31′E). Previously in Lithuania, outdoor keeping or free access of outdoor enclosures during warm season for breeding pigs was recommended. The experiments showed that at average 13.7°C air temperature daily gain of outdoor pigs was 143 g higher and their daily feed intake (kg/day) was 3.5% lower than analogous indoor pigs [8]. However, nowadays due to the African swine fever in wild boars and high veterinary standards for biosecurity, all domestic pigs in Lithuania should be kept strictly indoors. Consequently, only conventional indoor pig rearing is possible, although Lietuvos Baltosios pigs are adapted to local conditions and suitable for ecological production.

4. Organisations for breeding, monitoring and conservation

The activities for conservation of Lietuvos Baltosios senojo tipo pig breed were launched in 1999 when a minimal herd of Lietuvos Baltosios pigs was formed at the

Institute of Animal Science, and thus their complete extinction has been prevented. Due to a small number of owners of Lithuanian pig breeds, it is not possible to establish a separate association. Lithuanian Pig Producers Association is responsible for organisation of pig breeding. Also, there is a joint company AB Kiaulių veislininkystė which is responsible for control of pig productivity, control of fattening and slaughter, carcass evaluation and data recording. Researches of Animal Science Institute of Lithuanian University of Health Sciences prepared the "National programme for the conservation of native farm animal genetic resources". The last version of consevation programme was adopted by the Ministry of Agriculture of Lithuania in 2008. The main purpose of this programme is collection, monitoring, investigation and conservation of Lithuanian national breeds in situ and ex situ. To achieve these goals, the National Farm Animal Genetic Resources Coordinating Centre was established at the Institute of Animal Science at the end of 2008. Lithuanian Endangered Farm Animal Breeders Association (LEFABA) was established at 2010 (**Table 2**).

Name of organisation	Address	Web address
Lithuanian Pig Producers Association	Verkių 5, LT-08218 Vilnius, Lithuania	http://www.kiaules.lt
Lithuanian Endangered Farm Animal Breeders Association	R. Žebenkos 12, LT-82317 Baisogala, Radviliškis distr., Lithuania	https://luga.lt/
National Farm Animal Genetic Resources Coordinating Centre	R. Žebenkos 12, LT-82317 Baisogala, Radviliškis distr., Lithuania	https://gic.lsmuni.lt/

Table 2.
Contact details of breeding organisation for Lietuvos Baltosios senojo tipo pig breed.

5. Productive performance

5.1 Reproductive traits

The basic data obtained on reproductive traits in this review are presented in **Table 3**. The age of sows of Lietuvos Baltosios senojo tipo pig breed at the first parturition is 14 [3]. They have 9.6–10.4 piglets per litter [1, 3, 4] of approximately 1.3 kg live body weight [2, 3, 5]. Stillborn percentage of piglets is in between 7 and 8% [1, 4], whereas piglet mortality rate until weaning in the considered studies was 10.8 and 19.7% [3, 4]. Duration of lactation is prolonged in comparison to modern intensive systems (to 58 days on average [2, 4]), which also leads to a higher piglet weaning weight (app. 12 kg [2, 4]).

5.2 Growth performance

The basic data on growth performance obtained in this review are presented in **Tables 4** and **5**. Due to big differences between studies with regard to the live weight range covered, we defined the stages for growth performance as lactation (regardless of how long it was), growing stage (from weaning to approximately 30 kg live body weight) and early and middle fattening stages estimated between approximately 30–60 kg and 60–100 kg live body weight, respectively. Sometimes, the source provided only the overall growth rate for the whole fattening stage (defined as overall) or even from birth to slaughter (defined as birth-slaughter, which is often calculated from the data given on live weight and age of pigs). It

Reference	Sow age at first parturition (mth)	No. of piglets alive per litter	Piglet live weight (kg)	Stillborn per litter (%)	Mortality at weaning (%)	Piglet weaning weight (kg)	Duration of lactation (d)
[1]	–	10.4	–	8.1	–	–	–
[2]	–	–	1.3	–	–	12.0	60
[3]	14.0	9.6	1.3	–	19.7	–	–
[4]	–	10.2	–	7.1	10.8	11.9	56
[5]	–	–	1.3	–	–	–	–

No. = number, mth = month, d = days.

Table 3.
Summary of collected literature data on reproduction traits in Lietuvos Baltosios senojo tipo pig breed.

Reference	Feeding	No. of animals	ADG lactation[1]	ADG fattening[2]			ADG birth-slaughter
				Early	Middle	Overall	
[5]	–	–	–	–	–	683	–
[6]	–	–	–	–	–	–	500
	–	–	–	–	–	–	525
[7]	Ad Lib	28	275	846	746	777	541
	Rest	28	275	864	632	709	508

No. = number, ADG = average daily gain in g, Ad Lib = ad libitum feeding regime, Rest = restrictive feeding regime.

[1]ADG in a period of lactation regardless of how long it was.
[2]ADG in a period of fattening is reported for early and middle fattening stages estimated between approximately 30–60 kg and 60–100 kg live body weight, respectively. Sometimes, the source provided only the overall growth rate for the whole studied period (in that case defined as overall).

Table 4.
Summary of collected literature data on growth performance in Lietuvos Baltosios senojo tipo pig breed.

Reference	Feeding	ME content of feed (MJ/kg)	CP content of feed (%)	No. of animals	ADFI fattening[1]		
					Early	Middle	Overall
[7]	Ad Lib	12	16	28	2.22	2.94	2.65
	Rest	12	16	28	2.2	2.45	2.35

No. = number, ADFI = average daily feed intake in kg/day, ME = metabolisable energy, CP = crude protein, Ad Lib = ad libitum feeding regime, Rest = restrictive feeding regime.
[1]ADFI in a period of fattening is reported for early and middle fattening stages estimated between approximately 30–60 kg and 60–100 kg body weight, respectively. Sometimes, the source provided only the overall daily feed intake for the whole studied period (in that case defined as overall).

Table 5.
Summary of collected literature data on average daily feed intake (in kg/day) in Lietuvos Baltosios senojo tipo pig breed.

should also be noted that a big part of the collected studies simulated practical conditions of the production systems used and that only a smaller part of the studies aimed at evaluating the breed potential for growth. In the considered studies, daily gain in lactation was 275 g/day [7], whereas average daily gain in early, middle and overall fattening stages was around 855, 689 and 723 g/day [5, 7] and 513 g/day from birth to slaughter [6, 7]. In the context of the evaluation of growth performance, it is also of interest to observe the extreme values, because it can be assumed that the maximum figures exhibit the growth potentials of Lietuvos Baltosios senojo tipo pigs in ad libitum conditions of feeding (≈777 g/day in overall fattening stage [7]).

In considered studies, the information on feed intake and feed nutritional value were scarce, which limits the evaluation of growth potential. Average daily feed intake increased from 2.2 kg/day in early fattening stage to 2.7 kg/day in the middle fattening stage [7].

5.3 Body composition and carcass traits

The basic data obtained in this review with some of the most commonly encountered carcass traits that could be compared are presented in **Table 6**. In considered studies, pigs of Lietuvos Baltosios senojo tipo breed were slaughtered at approximately 186 days of age [6], an average 100 kg live weight [6, 7]. Dressing yield was around 76% [7] and lean meat content approximately 50% [6]. The backfat thickness measured at the level of the last rib ranged from 17 to 31 mm [6, 7]. Muscularity measured as loin eye area averaged 28 cm^2 [6], and muscle thickness measured at the cranial edge of the gluteus medius muscle was 39 mm [7].

5.4 Meat quality

The basic data obtained in this review with some of the most commonly encountered meat quality traits measured in the longissimus muscle that could be found are presented in **Table 7**. In the only available study reporting meat quality of Lietuvos Baltosios senojo tipo pigs [7], pH measured in the longissimus muscle at 45 min and 24 h post-mortem were in average 6.20 and 5.45, respectively. The

Reference	No. of animals	Final age (d)	Final BW (kg)	Hot CW (kg)	Dressing yield (%)	Lean meat content (%)	Backfat thickness[1] (mm)	M^2 (mm)	Loin eye area (cm^2)
[5]	–	–	–	90	–	–	–	–	–
[6]	–	188	93	–	–	52.8	17	40	–
	–	184	96	–	–	46.9	23	38	–
[7]	19	–	106	80	75.4	–	31	–	23
	19	–	103	78	76.0	–	27	–	32

No. = number, BW = body weight, CW = carcass weight.

[1]Backfat thickness measured at the thinnest lumbar point according to ZP method (mm).
[2]M muscle thickness measured by ultrasonic equipment Piglog 105 (7 cm from the midline by ultrasonic equipment Piglog 105 (7 cm from the midline between 10 and 11 ribs (mm) on live pigs)).

Table 6.
Summary of collected literature data on body composition and carcass traits in Lietuvos Baltosios senojo tipo pig breed.

Reference	No. of animals	pH 45	pH 24	CIE[1]			IMF content (%)
				L*	a*	b*	
[7]	12	6.15	5.41	55	15.5	7.4	2.2
	12	6.25	5.48	53	15.6	6.8	2.0

No. = number, pH 45 = pH measured approximately 45 min post-mortem, pH 24 = pH measured approximately 24 h post-mortem, IMF = intramuscular fat.
[1]CIE, objective colour defined by the Commission Internationale de l'Eclairage; L greater value indicates a lighter colour; a* greater value indicates a redder colour; b* greater value indicates a more yellow colour.*

Table 7.
Summary of collected literature data on meat quality in Lietuvos Baltosios senojo tipo pig breed.

intramuscular fat content was around 2.1%, and colour measured in CIE L*, a* and b* colour space was 54, 15 and 7.1 for L*, a* and b*, respectively. Additionally, the longissimus muscle from Lietuvos Baltosios pigs has been shown to have lower contents of cholesterol (36.4 mg/100 g [7]) than lean conventional hybrids (44.24 mg/100 g).

6. Use of breed and main products

In the past Lietuvos Baltosios pigs were used as a main dam breed in commercial crossing combinations; however, currently the use of pigs from such a small population is limited. Their share of the total slaughtered pigs is lower than 0.2%. Most of the Lietuvos Baltosios pigs are used in the common pig production chain. Due to veterinarian restrictions related to the African swine fever, people refuse to keep growing pigs up to bacon condition for self-supply, although this was a common practice in the past among the people of the countryside. As a bacon-type breed, Lietuvos Baltosios are more popular pigs than fatty Lietuvos vietinės pigs. In addition to the pigs used in common pork chain, a part of pigs are used for production of home-made products. The traditional Lithuanian pork products produced are smoked backfat, smoked hams and bellies, loins and different fresh and smoked dry sausages. There is a small amount of unused carcass parts in pig production, because Lithuanian cuisine knows different dishes not only from lean and fat pork but also from the offal, like meat jelly, blood pudding, liver pate and others.

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