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Lietuvos Vietinė (Lithuanian Indigenous Wattle) Pig

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Abstract

Lietuvos vietinė pigs were developed in Lithuanian ethnic lands following natural selection and introduction of some imported pigs. Earlier, no purposeful selection was carried out for this old Lithuanian pig breed. Lietuvos vietinė pigs as other local pig breeds are adapted to the specific local environment and could be fed with various locally available feedstuffs. So besides their genetic merit for agrobiodiversity, they represent the basis for sustainable local pork chains. The present chapter aims to present history and current status of Lietuvos vietinė pig breed, its exterior phenotypic characteristics, geographical location, production system and main products from this Lithuanian autochthonous 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 vietinė pig breed were carried out. Reproductive and growth performance was estimated in different stages. 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 the 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” planimetric system. Meat quality traits of the longissimus muscle were evaluated by means of pH at 45 min and 24 hours after slaughter.

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

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

The Lithuanian indigenous wattle (Lithuanian: Lietuvos vietinė) is a domestic pig native to Lithuania and is one of the oldest pig varieties in Europe. Census of Lietuvos vietinė pig breed is presented in **Figure 1**. Presently, there are only two registered farms of Lietuvos vietinė pigs with about 43 breeding sows and 11 boars in the latest available status (December 2017).

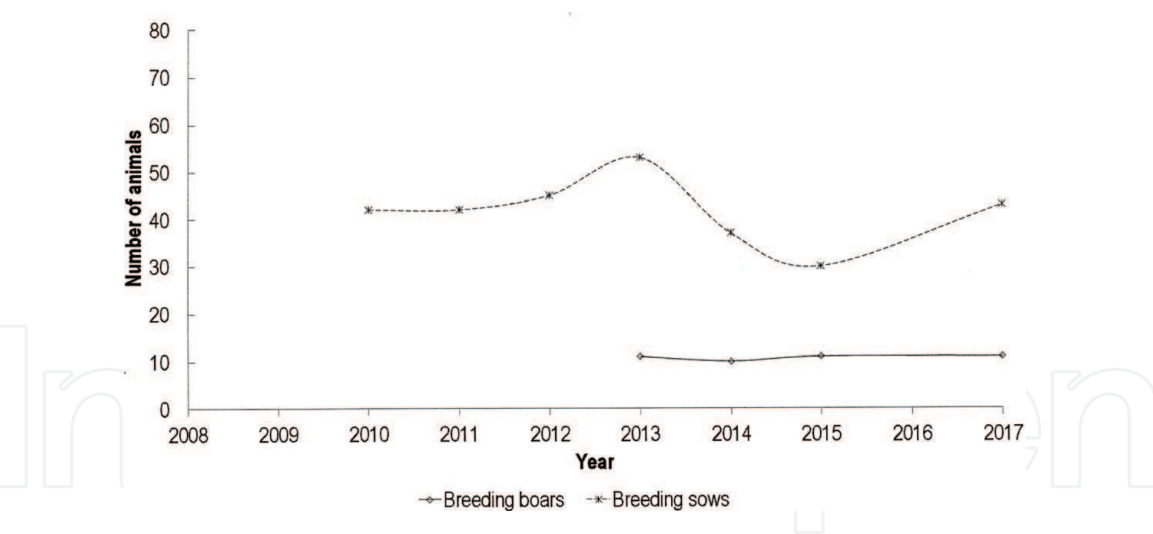


Figure 1.
Census of Lietuvos vietinė pig breed, presenting a number of sows and boars per year, starting with the year of heard book establishment.

2. Exterior phenotypic characteristics

The Lietuvos vietinė pig breed morphology information is summarised in **Table 1**. It is a middle-sized breed with wattles under the neck, and usually large

Measurement (average)	Adult male	Adult female
Body weight (kg)	277.8	215.2
Body length ¹ (cm)	166.6	156.7
Head length (cm)	32.9	30.3
Tail length (cm)	39.0	35.9
Ear length (cm)	26.3	25.0
Chest girth (cm)	157.9	143.6
Height at withers (cm)	88.6	78.3
Number of teats	13.1	13.1

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

Table 1.
Summary of morphology information on Lietuvos vietinė pig breed.



Figure 2.
Lietuvos vietinė sow with piglets.



Figure 3.
Lietuvos vietinė boar.

black spots on the body, but colour variations include black and white, ginger, black and tricoloured (**Figures 2 and 3**). They have a friendly temperament. Being insensitive to the sun, these pigs are suitable for grazing.

3. Geographical location and production system

Lietuvos vietinė pigs are conserved at the Centre for Farm Animal Genetic Resources in Coordination with Animal Science Institute, Lithuanian University of Health Sciences where the nucleus herd is maintained. Most of Lietuvos vietinė pigs are concentrated in this nucleus herd which is located in the central part of Lithuania, Baisogala, Radviliškis district (in the latitude of 55° 64'N and the longitude of 23° 70'E). Individually recorded representatives of Lietuvos vietinė pigs and their crossbreeds with other breeds are in the farm located in Algimantai, Raseiniai district (in the latitude of 55° 26'N and the longitude of 23° 50'E).

Previously in Lithuania some small farms kept pigs outdoor during warm season. The experiments showed that at 14.3–18.7°C air temperature the weight at 60 days of age outdoor-born piglets was 16.9–32.6% higher than that of indoor-born piglets. In individual and group enclosures with shelters, they consumed, respectively, 18.2–8.7% less feed than indoor piglets of Lietuvos vietinė breed. However, the loss of outdoor piglets until weaning, particularly in group enclosures, was by 8.0–8.5% higher than that of indoor piglets [11]. 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, the numbers of small pig farms and the numbers of local pigs have drastically decreased, because Lietuvos vietinė pigs are mainly intended for grazing. Currently, there is only a possibility for indoor rearing in semi-extensive conditions. Thus, Lietuvos vietinė pigs are kept, not for commercial purposes but for breed preservation and restoration and maintenance of herd stability by preserving biodiversity for future generations.

4. Organisations for breeding, monitoring and conservation

The activities for conservation of Lithuanian breeds were launched in 1994 when a minimal herd of Lietuvos vietinė pigs was formed at the Animal Science Institute, and thus their complete extinction has been prevented. Due to a small number of owners of Lithuanian local pigs, it is not possible to establish a separate association. Thus, Lithuanian Pig Producers Association is responsible for pig breeding.

Researchers of Animal Science Institute of Lithuanian University of Health Sciences prepared the National Programme for the Conservation of Native Farm Animal Genetic Resources adopted by the Ministry of Agriculture of Lithuania in 1996 and 2008. The main purpose of these programmes was a collection, monitoring, investigation and conservation of Lithuanian local breeds in situ and ex situ. To achieve these goals, the National Farm Animal Genetic Resources Coordinating Centre was established at the Animal Science Institute at the end of 2008. Lithuanian Endangered Farm Animal Breeders Association (LEFABA) was established in 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 vietinė pig breed.

5. Productive performance

5.1 Reproductive traits

The basic data obtained on reproductive traits in this review are presented in Table 3. Sows of Lietuvos vietinė pig breed have 7.2–9.7 piglets [1–3] of approximately 1.3 kg live body weight [1–4]. Stillborn percentage of piglets is in between 7.4 and 16.1% [1, 3], whereas piglet mortality rate until weaning in the considered studies varied between 14.6 and 31.1% [2, 3]. Duration of lactation is prolonged in comparison to modern intensive systems (to approximately 59 days [1, 3, 4]), which leads to a higher piglet weaning weight (around 14 kg [1, 3, 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

Reference	Piglets alive per litter	Piglet live weight (kg)	Stillborn per litter (%)	Mortality at weaning (%)	Piglet weaning weight (kg)	Duration of lactation (d)
[1]	9.7	1.31	7.35	—	14.68	56
[2]	8.8	1.21	—	31.1	—	—
[3]	7.42	1.5	16.1	14.6	13.9	60
[4]	—	1.24	—	—	13.77	60

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

Table 3.
Summary of collected literature data on traits of reproduction in the Lietuvos vietinė pig breed.

Reference	Feeding	No. of animals	ADG lactation ¹	ADG growing ²	ADG fattening ³			ADG birth–slaughter
					Early	Middle	Overall	
[4]	—	—	—	—	—	—	698	511
[5]	—	—	—	—	—	—	—	472
	—	—	—	—	—	—	—	504
[6]	—	25	—	—	—	—	—	403
[7]	Ad Lib	14	224	452	690	646	667	483
	Rest	14	238	381	653	530	567	435

No. = number, ADG = average daily gain in g, Ad Lib = ad libitum feeding regime, Rest = restrictive feeding regime.
¹ADG in a period of lactation regardless of how long it was.
²ADG in a growing period estimated from weaning to approximately 30 kg live body weight.
³ADG 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 the Lietuvos vietinė pig breed.

Reference	Feeding	ME content of feed (MJ/kg)	CP content of feed (%)	No. of animals	ADFI fattening ¹		
					Early	Middle	Overall
[4]	—	—	—	—	—	—	2.53
[7]	Ad Lib	12.4	16	14	2.04	2.8	2.51
	Rest	12.4	16	14	2.02	2.14	2.1

No. = number, ADFI = average daily feed intake in kg/day, Ad Lib = ad libitum feeding regime, Rest = restrictive feeding regime, ME = metabolisable energy, CP = crude protein.
¹ADFI 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 5.
Summary of collected literature data on the average daily feed intake (in kg/day) in the Lietuvos vietinė pig breed.

(regardless of how long it was), growing stage (from weaning to approximately 30 kg live body weight), 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 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 period was approximately 230 g/day [7]. The average daily gain was 417 g/day in growing stage; 672, 588 and 644 g/day in early, middle and overall fattening stage [4, 7]; and around 470 g/day from birth to slaughter [4–7], which indicates slower growth rate and lesser intensity of rearing in the Lietuvos vietinė pig breed. 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 vietinė pigs in ad libitum conditions of feeding (≈698 g/day in overall fattening stage [4]).

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 2.0 kg/day in early to 2.5 kg/day in middle fattening stage [7], whereas in the overall fattening stage, the average daily feed intake was 2.4 kg/day [4, 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 the Lietuvos vietinė breed were slaughtered at approximately 200 days of age [4–6] and between 57 and 108 kg live weight [4–9]. Dressing yield was around 74% [6–9] and lean meat content varied from 42 to 52% [5, 8, 9]. The backfat thickness measured on the withers was approximately 49 mm [6, 9], at the level of the last rib 29 mm [4–7, 9] and above gluteus medius muscle 28 mm [6]. Muscularity measured as loin eye area averaged 29 cm² [4, 6, 7], and longissimus muscle thickness measured on live animals was approximately 38 mm [5].

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 studies reporting meat quality of Lietuvos vietinė pigs, pH measured in the longissimus muscle at 45 min and 24 h post-mortem were 6.3 [7] and 5.4 [7, 9], respectively. The intramuscular fat content varied from 1.7 to 3.5% [7, 9], and colour measured in CIE L*, a* and b* colour space

Reference	No. of animals	Final age (d)	Final BW (kg)	Hot CW (kg)	Dressing yield (%)	Lean meat content (%)	Backfat thickness (mm)			M ¹ (mm)	Loin eye area (cm ²)
							S ²	At withers	At last rib		
[4]	—	194	100	—	—	—	—	—	27	—	31
[5]	—	199	93	—	—	49.5	—	—	21	40	—
	—	190	95	—	—	44.0	—	—	26	37	—
[6]	22	220	91	62	68.2	—	28	45	27	—	26
[7]	4	—	108	83	76.6	—	—	—	37	—	29
	4	—	99	75	75.9	—	—	—	34	—	29
[8]	8	—	57	41	72.3	51.7	—	—	—	—	—
	8	—	69	51	73.0	46.2	—	—	—	—	—
	8	—	76	56	73.8	47.3	—	—	—	—	—
	8	—	101	78	77.3	42.2	—	—	—	—	—
[9]	8	—	101	78	77.3	50.7	—	53	34	—	—

No. = number, BW = body weight, CW = carcass weight.
¹M 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).
²S backfat thickness measured at the thinnest lumbar point according to ZP method (mm).

Table 6.
Summary of collected literature data on body composition and carcass traits in the Lietuvos vietinė pig breed.

Reference	No. of animals	pH 45	pH 24	CIE ¹			IMF content (%)
				L*	a*	b*	
[7]	—	6.30	5.44	54	14.9	7.3	1.7
	—	6.33	5.50	56	14.6	7.8	2.5
[9]	8	—	5.12	—	—	—	3.5
[10]	13	—	—	—	—	—	—

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

Table 7.
Summary of collected literature data on meat quality in the Lietuvos vietinė pig breed.

was approximately 55, 15 and 7.6 for L*, a* and b*, respectively [7]. The longissimus muscle from Lietuvos vietinė pigs has lower contents of cholesterol (39.6 mg/100 g [7]) than those of lean conventional hybrids (44.24 mg/100 g).

6. Use of breed and main products

Due to the high fatness of Lietuvos vietinė pigs, implemented SEUROP grading system for carcass evaluation in abattoirs and import of cheap surplus meaty cuts of carcasses, Lietuvos vietinė pigs are not competitive on the market. Thus, their number is not increasing. Most of Lietuvos vietinė pigs are slaughtered and processed in the conventional 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. Most of the Lietuvos vietinė pigs from nucleus herd are used in the common pig production chain, whereas only the small part of pigs is being used for the production of home-made products. The traditional Lithuanian pork products produced are smoked backfat, including salt-cured backfat in the southeastern part of Lithuania, smoked hams and bellies, loins and different fresh and smoked dry sausages. The amount of unused carcass parts from Lietuvos vietinė pigs is small 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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