Performance of Lithuanian indigenous wattle pigs in their two- and three-way crosses with Durocs

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Lithuanian indigenous wattle pigs should be preserved for future generations not only from the point of genetic diversity, but also as a genetic material for selection and crossbreeding. Complete studies of the biological and farming qualities of indigenous pigs should also include possibilities for these pigs in the production of leaner pork by using them as a dam breed in various combinations of commercial crossbreeding. Crossing Lithuanian purebred indigenous pigs and Lithuanian indigenous × Norwegian Landrace pigs with Duroc boars did not result in higher prolificacy, but crossbred piglets were larger. Even 53.6% of Lithuanian indigenous × Duroc crossbreds inherited a pair of wattles, that distinctive morphological feature of Lithuanian indigenous wattle pigs, but three-way crossbred piglets practically did not inherit this feature. Crossbreds showed higher performance than purebreds for growth and carcass traits. The average daily gain of Lithuanian indigenous – Duroc and Lithuanian indigenous – Norwegian Landrace – Duroc crossbreds was, respectively, by 166.8 (23.9%) and 203.5 g (29.1%) higher ($P < 0.001$) than that of purebred indigenous pigs. The average backfat thickness of crossbreds was, respectively, 24.5 and 21.6 mm or by 2.6 and 5.5 mm lower ($P < 0.001$) than that of Lithuanian indigenous wattle pigs.

Key words: pig, genetic diversity, selection, crossbreeding

INTRODUCTION

Conservation of Lithuanian farm animal genetic resources was initiated and based upon the primary goal to save the old breeds at a high risk of extinction. J. Šveistys have noted that the sequence of conservation should be formation of isolated herds and maintenance of their genealogical structure, complete investigation of biological and farming qualities, and search for possibilities of their introduction into the general breeding system of corresponding animal species [1]. Thus, Lithuanian indigenous wattle pigs should be preserved for future generations not only from the point of genetic diversity, but also as a genetic material for selection and crossbreeding by using them as a dam breed in various combinations of commercial crossbreeding for production of leaner pork. The Duroc is often used in the crosses of various breeds, and the authors report high benefit of such crossing for growth rate, feed efficiency and high carcass quality [2–8]. Therefore, the purpose of the present study was to determine the performance of Lithuanian indigenous wattle pigs in their two- and three-way crosses with Durocs.

MATERIALS AND METHODS

The study was conducted at the Lithuanian Institute of Animal Science. For the study purebred Lithuanian wattle pigs, including sows, F_1-sows and terminal crossbreds were considered. Performance home data records on 169 purebred indigenous and crossbred (Lithuanian Wattle × Duroc and Lithuanian Wattle × Norwegian Landrace × Duroc) piglets from 17 litters have been analysed. The station test data contained individual performance records for growth and carcass traits on 75 pigs. The investigation data were computed by Snedecor [9].

RESULTS AND DISCUSSION

Crossing Lithuanian indigenous wattle and crossbred Lithuanian indigenous wattle × Norwegian Landrace pigs with Duroc boars did not result in even a little higher prolificacy in comparison with purebred Lithuanian indigenous wattle pigs. 53.6% of indigenous wattle × Duroc piglets inherited a pair of wattles, that distinctive morphological feature of Lithuanian indigenous pigs, and only 2.5% of indigenous wattle × Norwegian Landarce × Duroc piglets

inherited only one wattle. Crossbred piglets were coloured, but larger in size at birth and gained weight better during the suckling period. The weight at birth of indigenous wattle × Duroc, indigenous wattle × Norwegian Landarce × Duroc crosses was by 0.1 ($P < 0.050$) and 0.33 kg ($P < 0.001$), respectively, higher than that of purebreds (Table 1). As expected, the increased birth weight of piglets appears to be associated with a decrease in litter size and level of heterosis [10]. The lower weight at birth is characteristic of Lithuanian indigenous wattle pigs, and in consequence the weight at birth of crossbred piglets should be determined by the genotype of dam and sire breeds, not only by the level of heterosis. Newborn piglets distribute in a wide range of weight (Table 2). Mostly very small piglets have been born in the purebred group. The variability of weight at birth for indigenous wattle piglets was lower, for crossbred indigenous wattle × Duroc was higher, and for piglets of three-way crossing was highest. As other authors [10–12] have reported, weight at birth is very important for growth and it is positively correlated with the survival rate and growth rate. In our study, the correlation between the weight of piglets at birth and their weight at 21 and 60 days was positive, but the correlation coefficients were higher for these traits of purebred Lithuanian indigenous wattle and indigenous wattle × Duroc crossbreds than for indigenous wattle × Norwegian Landrace × Duroc crossbreds (Table 3).

The average weight of indigenous wattle × × Duroc crossbreds at 21days of age was by 1.06 kg ($P < 0.001$), of indigenous wattle × Norwegian Landrace x Duroc crossbreds by 1.3 kg ($P < 0.001$) higher than of purebred Lithuanian indigenous wattle piglets. The average weight at 2 months of indigenous wattle × Duroc crossbreds was by 1.03 kg ($P > 0.200$), of indigenous wattle × Norwegian Landrace × Duroc crossbreds by 2.78 kg ($P < < 0.005$) higher than of purebred piglets.

Growth from 30 to 100 kg performance data at the test station indicated that the average daily gain of indigenous wattle × Duroc and indigenous wattle × Norwegian Landrace × Duroc crossbreds was, respectively, 865 and 901.7 g, or by 166.8 g and 203.5 g (23.9–29.1%) higher ($P < 0.001$) than that of purebred Lithuanian indigenous wattle pigs (Table 4). Crossbred pigs consumed, respectively, by 0.67 and

Table 1. **Growth performance of piglets**

Group	Weight					
	at birth, kg		at 21 days, kg		at 60 days, kg	
	M ± m	C	M ± m	C	M ± m	C
Lithuanian Wattle	1.24 ± 0.027	17.10	4.37 ± 0.198	32.71	13.77 ± 0.524	27.16
Lithuanian Wattle × Duroc	1.34 ± 0.039	23.79	5.43 ± 0.230	31.42	14.8 ± 0.556	26.31
Lithuanian Wattle × Norwegian Landrace × Duroc	1.57 ± 0.067	27.03	5.67 ± 0.241	25.81	16.56 ± 0.825	29.49

Table 2. **Distribution of newborn piglets by weight**

Birth weight, kg	Group		
	Lithuanian Wattle, %	Lithuanian Wattle × Duroc, %	Lithuanian Wattle × Norwegian Landrace × Duroc, %
0.5–0.99	15.5	11.6	7.5
1.0–1.19	25.2	20.3	20.0
1.2–1.39	30.6	26.1	7.5
1.4–1.59	18.0	17.4	12.5
1.6–1.79	8.7	18.8	10.0
1.8–1.99	1.9	2.9	22.5
2.0–2.19	–	2.9	17.5
2.2–2.39	–	–	2.5

Table 3. **Correlation between weights of piglets at different age**

Weight	Weight					
	at 21 days			at 60 days		
	LW	LW × D	(LW × NL) × D	LW	LW × D	(LW × NL) × D
At birth	0.642**	0.762**	0.684**	0.514**	0.755**	0.408*
At 21 days	–	–	–	0.665**	0.811**	0.455*

*$P < 0.025$; **$P < 0.001$.

Table 4. **Growing performance and carcass traits**

Items	Lithuanian Wattle	Lithuanian Wattle × Duroc	Lithuanian Wattle × Norwegian Landrace × Duroc
Age at 100 kg weight, d.	193.7 ± 2.319	171.1 ± 4.155	166.6 ± 3.948
Average daily gain, g	698.2 ± 11.766	865.0 ± 28.753	901.7 ± 47.211
Feed conversion, FU/kg	3.62 ± 0.035	2.95 ± 0.079	2.98 ± 0.101
Carcass length, cm	96.7 ± 0.426	95.2 ± 0.399	98.4 ± 0.713
Backfat thickness, mm:			
at 6–7 rib	33.9 ± 0.771	29.6 ± 0.907	27.3 ± 1.250
at 10 rib	31.5 ± 1.716	24.7 ± 1.016	20.6 ± 1.480
behind last rib	27.1 ± 0.796	24.5 ± 0.789	21.6 ± 1.749
Loin lean area, cm^2	31.1 ± 0.553	33.1 ± 1.027	31.7 ± 1.226
Ham weight, kg	10.23 ± 0.105	11.2 ± 0.116	11.0 ± 0.152

0.64 FU less ($P < 0.001$) than purebred indigenous wattle pigs. As has been shown by Webb [10], improvement of feed efficiency must therefore slow down as fat levels approach an economic optimum. Comparative studies in other countries have indicated the Duroc to be superior in growth rate and efficient feed utilization [5, 6]. Advantages in growth rate may be offset by poorer carcass quality characteristics such as greater fatness and heavier shoulders [5, 8], but in other evaluation of different terminal sire breeds the Duroc has been found to be superior in overall economic merit [4, 5]. The greatest disadvantages of Lithuanian indigenous wattle pigs are slower growth, lower feed efficiency and poor carcass conformation. Two- and three-way crosses with Durocs were accompanied by high levels of improvement for growth rate and feed efficiency, however, the crosses were intermediate for lean growth. The backfat thickness at 10 rib of indigenous wattle × Duroc and indigenous wattle × Norwegian Landrace × Duroc crossbreds was, respectively, by 6.8 and by 10.9 mm lower ($P < 0.001$), and the backfat thickness behind the last rib in the two and three-way crosses was, respectively, by 2.6 and 5.5 mm lower ($P < 0.001$) than in purebred indigenous wattle pigs.

Crossbreds of two-way crossing showed a higher weight than purebreds, but the crossbreds of three-way crossing showed the highest performance for growth and carcass traits.

References

1. Razmaitė V. Gyvulininkystės tvarkymas: laikmečio aktualijos. Baisogala, 2001: 37–41.
2. Songailienė A, Šveistys J, Varkalienė I. LGMTI darbai. 1981; 18: 29–37.
3. Džiaugys V, Klimas R, Klimienė A. Gyvulininkystė. 1997; 30: 48–60.
4. Langloin A, Minwiele F. J. of Animal Science 1989; 67: 2018–24.
5. McGloughlin P, Allen P, Tarrant PV et al. Livestock Production Science 1988; 18: 275–88.
6. Quintana FE, Robinson OW. Zeitschrift für Tierzuchtung und Zuchtungsbiologie 1983; 100: 271–9.
7. Simpson SP, Webb AJ, Dick S. Animal Production 1987; 45: 111–6.
8. Edwards SA, Wood JD, Moncrieff CB et al. Animal Production 1992; 54: 289–97.
9. Snedecor GW, Cochran WG. Statistical Method. Ames, 1989. 503 p.
10. Webb AJ. Principles of Pig Science. Nottingham University Press, 1994: 1–22.
11. Hermesch S, Luxford BG, Graser HU. Proc. of the 6th World Congress on Genetics Applied to Livestock Production 1998; 23: 511–4.
12. Rydhmer L, Johansson K, Stern S et al. Acta Scand 1992; 42: 211–9.

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LIETUVOS VIETINIŲ KIAULIŲ IR DIUROKŲ KRYŽMINIMO DVIEJŲ IR TRIJŲ VEISLIŲ VARIANTAIS EFEKTYVUMAS

S a n t r a u k a

Lietuvos vietinės kiaulės turi būti išsaugotos ateities kartoms ne tik genetinės įvairovės atžvilgiu, bet ir kaip genetinė medžiaga selekcijai bei pramoniniam kryžminimui. Todėl visapusiškai tiriant jų biologines-ūkines savybes būtina ištirti ir panaudojimo liesesnės kiaulienos gamybai galimybes įvairiai kryžminant. Lietuvos vietinių ir jų mišrūnių su Norvegijos landrasais kryžminimas su diurokų veislės kuiliais nepadidino paršavedžių vislumo, tačiau gauti paršeliai buvo stambesni už grynaveislius. Net 53,6% Lietuvos vietinių ir diurokų mišrūnų paveldėjo išskirtinį vietinių kiaulių požymį – karoliukus po kaklu. Tik 2,5% trijų veislių mišrūnų paveldėjo po vieną karoliuką. Mišrūnai sparčiau augo, jų skerdena buvo liesesnė. Lietuvos vietinių ir diurokų, taip pat Lietuvos vietinių, Norvegijos landrasų ir diurokų mišrūnų vidutinis priesvoris per parą buvo atitinkamai 166,8 (23,9%) ir 203,5 g (29,1%) didesnis ($P < 0,001$), o vidutinis nugaros lašinių storis už paskutinio šonkaulio – 2,6 ir 5,5 mm ($P < 0,001$) mažesnis negu grynaveislių Lietuvos vietinių kiaulių.

Raktažodžiai: kiaulių genetinė įvairovė, selekcija, kryžminimas