Bulgarian Journal of Agricultural Science, 12 (2006),581-586
National Centre for Agrarian Sciences

Comparative Investigation on the Productivity of Two-Bred Hybrid Pigs

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Abstract

APOSTOLOV, A., S. SLANEV and R. NEDEVA, 2006. Comparative investigation on the production of two-bred hybrid pigs. *Bulg. J. Agric. Sci.*, 12: 581-586

A scientific and economic trial was carried out comprising the following two-bred combinations: group I - ♀ Danube White x ♂ English Landrace (DW x EL) and group II - ♀ Landrace x ♂ Danube White (L x DW), raised at the Experimental Base of the Agricultural Institute. During the growing period the animals were raised and fed in groups of 6 in pen and 18 animals of each combination were controlled. During the fattening period the animals were raised in individual pens, by 15 pigs of each combination.

It was established that the animals from the hybrid combinations were characterized by good production traits during both periods.

The pigs from the combination Danube White x English Landrace (DW x EL) compared to those from the combination Landrace - synthetic line x Danube White (L x DW) showed retarded growth during the growing period, whereas during the fattening period the same animals realized significantly higher average daily gain - 0.767 kg ($P<0.01$) and better feed utilization - 3.975 kg/kg ($P<0.05$) respectively.

Key words: crosses, growing pigs, finishing pigs

Introduction

The productive qualities of the crosses and hybrid pigs and their combination ability define largely the effectiveness of pig breeding.

Through last decades the specialization of different breeds and lines of pigs is widely used in crossing schemes and hybridization. A number of authors report that crossing between breeds and hybridization are a continuous process towards increasing the effectiveness of pig breeding (Angelov et al., 1982; Benkov, 1985; English et al., 1988).

The breeding companies create synthetic lines by crossing of different breeds and lines of pigs, which have similar pro-

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ductive qualities, or offer new specialized sire and dam lines. There are a great number of studies on the productive traits of those crosses, which are used for increasing the effectiveness of hybridization (Stoikov et al., 1993; Nedeva et al., 2002; McLaren et al., 1983; Rothschild and Ruvinski, 1998).

The present study established the effectiveness of two-bred crosses and the positional effect in the hybridization schemes in breeds raised at the Experimental Base of the Agricultural Institute - Shumen.

The objective of this study was to determine the productive qualities of the crosses: Danube White x English Landrace (DW x EL) and Landrace - synthetic line x Danube White (L x DW).

Material and Methods

A scientific and economic trial was carried out comprising the following two-bred combinations: group I - ♀ Danube White x ♂ English Landrace (DW x EL) and group II - ♀ Landrace - synthetic line x ♂ Danube White (L x DW), raised at the Experimental Base of the Agricultural Institute. The trial began after weaning at 8.4 - 8.5 kg live weight and continued up to reaching 30.0 - 33.0 kg. During the growing period the animals were raised and fed in groups of 6 in pen and 18 animals were controlled. During the fattening period the animals were raised in individual pens, by 15 pigs of each combination. The fattening began at 35 kg live weight and finished at 100 kg.

The compound feeds were prepared at the Agricultural Institute - Shumen, balanced by nutrients in compliance with the Norms of Pig Feeding (1996). The compound feed composition and content of energy are given in Table 1. The content of dry matter (water), protein, fat, fibers, mineral traces, calcium and phosphor of the compound feeds was chemically analyzed in advance. The amino acids were recalculated on the basis of crude protein. The digestible and metabolizable energy was calculated on the basis of digestible nutrients according to our studies and by Beyer's (1974) and Nehring's (1976) equations. The following traits were controlled: live weight - individually and subperiodically and feed intake and health status - every day. The results obtained were processed by the methods of variation statistics.

Results and Discussion

During the growing period, the pigs from both combinations took almost equal amounts of compound feed per day (Table 2). There was an insignificant difference for the same trait during the second subperiod and for the whole growing period. The average feed intake per animal per day was higher by 199 g and 76 g in the pigs from L x DW combination. The pigs from this combination took during subperiod II and the whole growing period average per animal per day metabolizable energy more by 2.57 and 0.98 MJ; protein more by 2.99 and 11.6 g and lysine more by 1.6 and 0.7 g.

The average daily gain in both breed combinations was comparatively high, for the separate subperiods and for the whole growing period as well. There is a trend for higher gain in the crosses L x DW (51 - 80 g or 17 - 19% respectively) for the separate subperiods and for the whole

Table 1

Composition and content of energy and nutrients in 1 kg compound feed

Periods Ingredients, %	From weaning to 20 кg live weight	From 20 to 60 кg live weight	From 60 to 100кg live weight
Maize	37.36	43	-
Wheat	25	32	41.41
Barley	-	-	41
Wheat brans	8	8	8
Soybean meal	22.1	9.5	8.3
Sunflower meal	-	3	-
Fish meal	6	3	-
Synthetic lysine	0.04	0.15	0.14
Premix	0.2	0.2	0.2
Limestone	1.1	0.75	0.65
Dicalcium phosphate	-	0.1	-
Salt	0.2	0.3	0.3
Total:	100	100	100
1 kg compound feed contains:			
Digestible energy, kcal	3236	3202	3189
MJ	13.54	13.4	13.34
Metabolizable energy, kcal	3086	3086	3083
MJ	12.91	12.91	12.9
Protein, g	200.3	150.1	130
g/MJ OE	15.52	11.63	10.08
Lysine, g	11	8	6.6
g/MJ OE	0.85	0.62	0.51
g/100g Protein	5.5	5.3	5.1
Methionine+cystine, g	7.4	5.6	4.6
Tryptophane, g	2.5	1.8	1.7
Threonine, g	7.6	5.4	4.4
Calcium, g	8.7	6	5.2
Phosphor, g	7.4	5.1	4.1

Table 2

Results of feed intake, gain and feed conversion during the growing period

Groups / Traits	I subperiod		II subperiod		The whole experimental period	
	I - (DW x EL)	II - (L x DW)	I - (DW x EL)	II - (L x DW)	I - (DW x EL)	II - (L x DW)
Feed intake, per animal/per day						
Compound feed, kg	0.668	0.669	1.2	1.399	0.856	0.932
Metabolizable energy, MJ	8.62	8.64	15.49	18.06	11.05	12.03
Protein, g	133.8	134	180.1	210	149.8	161.4
Lysine, g	7.3	7.4	9.6	11.2	8.1	8.8
Live weight, кg						
- at the beginning of the trial	8.484	8.400	20.274	22.167	8.484	8.400
- at the end of the trial	20.274	22.167	29.632	33.278	29.632	33.278
Average daily gain, g	302	353	425	505	347	408
%	100.00	116.89	100.00	118.82	100.00	117.58
C	31.126	30.312	35.765	27.723	26.513	26.471
Feed conversion per 1 kg gain:						
Compound feed, кg	2.212	1.891	2.824	2.770	2.467	2.284
Metabolizable energy, MJ	28.56	24.46	36.46	35.76	31.85	29.49
Protein, g	443.1	379.6	423.9	415.8	431.7	395.6
Lysine, g	24.3	20.8	22.6	22.2	23.4	21.5

growing period, but the differences were slight and insignificant. The range of traits variation is quite wide (from 26.5 to 35.7%) which confirms the results mentioned above.

The pigs from the same combination (L x DW) for 1 kg gain consumed less compound feeds by 0.317 kg (14%) for period I; by 0.054 kg (2%) for period II and by 0.183 kg (7%) for the whole growing period. The utilization of nutrients (conversion of metabolizable energy, protein and lysine per 1 kg gain) is analogous to feed conversion.

On investigating the growth ability of growing pigs, Shostac et al. (1995) found out similar results - average daily gain 400 - 430 g and feed conversion per 1 kg gain - 2.2 - 2.4 kg.

The results characterizing the fattening abilities of pigs are given in Table 3. The animals from both combinations practically took equal amount of compound feed and nutrients. The data showed that

Table 3

Results of feed intake, gain and feed conversion during the fattening period

Groups	I group (DW x EL)			II group (L x DW)		
Traits	$\bar{x}$	E	C	$\bar{x}$	E	C
Feed intake, per animal/per day						
Compound feed, kg	2.748	0.792	2.963	2.803	0.574	2.224
Metabolizable energy, MJ	35.45	0.791	2.960	36.16	0.575	2.227
Protein, g	381.2	0.792	2.964	386.5	0.576	2.224
Lysine, g	19.8	0.889	3.328	20.2	0.576	2.231
Calcium, g	15.1	0.827	3.095	15.4	0.592	2.293
Phosphor, g	12.4	0.772	2.890	12.6	0.615	2.381
Live weight, kg						
- at the beginning of the trial	37.507	-	-	38.933	-	-
- at the end of the trial	100.971	-	-	100.813	-	-
Average daily gain, g	767b	2.371	8.870	708 b	1.622	6.281
%	100.00			92.31		
Fattening period, days	83.2			87.7		
Feed conversion per 1 kg gain:						
Compound feed, kg	3.615a	3.044	11.388	3.975a	2.038	7.891
Metabolizable energy, MJ	46.63a	3.044	11.389	51.28a	2.038	7.892
Protein, g	501.4a	3.044	11.390	548.1a	2.037	7.889
Lysine, g	26.0a	3.039	11.372	28.61a	2.037	7.888
Calcium, g	19.90a	3.043	11.387	21.9a	2.034	7.877
Phosphor, g	16.3a	3.061	11.453	17.9a	2.023	7.834

Note : The significant differences are: a - $P \leq 0.05$; b - $P \leq 0.01$.

the pigs from both origins were characterized by good average daily gain (767 and 708 g). The combination DW x EL showed higher average daily gain by 8% (58 g). The differences between DW x EL and L x DW were significant at $P<0.01$. During the fattening period the crosses DW x EL grew more intensively compared to the growing period, which could be owing to compensation effect as a result of the participation of the English Landrace (selected as sire line) and the better satisfied protein (or amino acids) needs. The animals with the same origin (DW x L) reached slaughter weight 4.5 days earlier.

The feed conversion per 1 kg gain in the pigs from the combination DW x EL was 3.615 kg or significantly less by 360 g compared to that of L x DW - 3.975 kg/kg ($P<0.05$).

The utilization of metabolizable energy protein, lysine, calcium and phosphor was lower in the animals from this combina-

tion and the differences were significant at P<0.05.

The range of traits variation was narrow. The utilization feed values of the crosses DW x EL were slightly higher. The accuracy index (E) showed more representative sample for the animals from group II (L x DW).

Conclusions

The animals from the hybrid combinations were characterized by good productive traits during the growing period and the fattening period as well.

The pigs from the combination Danube White x English Landrace (DW x EL) compared to Landrace x Danube White (L x DW) showed retarded growth during the growing period, whereas during the fattening period the same animals realized significantly higher average daily gain - 0.767 kg (P<0.01) and better feed utilization - 3.975 kg/kg (P<0.05) respectively.

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Received October, 10, 2005; accepted December,19, 2005.