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SHORT REPORT

A note on the Bulgarian Danube White pig – reproduction, fattening and slaughter indicators

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Danube White (DW) sows are characterized by high fertility (total no. of piglets born) reaching 10.3 and 11.5. piglets in the first and fourth litter, as well as by high no. of piglets born alive – 10.0 and 10.6, respectively. Mean daily live weight gain of DW pigs fattened over a period of 91 days amounts to 780 g, and feed conversion ratio to 3,365 kg/kg gain. The mean backfat thickness from three measurements reaches 25 mm with high coefficient of variation suggesting a need and feasibility of further intensive selection to decrease the trait value. Although DW pigs are recognized as stress-resistant (sensitivity to stress appears in 12.2% individuals), periodical control of the spread of Hal$^+$ individuals within the population is suggested, assisted with a proper selection. DW pigs are considered suitable for traditional conditions of maintenance and feeding and thus for production of "ecological" meat.

KEY WORDS: carcass / Danube White pig / fattening / reproduction / slaughter / stress resistance

The Danube White pig was obtained from a long-time research and selection conducted by the team directed by Professor Iwan Angelov. Breeding work aimed at creating healthy pigs with good reproductive performance and high fattening and slaughter indicators. The breed was obtained as a result of many crossing variants of the Bulgarian

White, Large White, Landrace, Hampshire and Pietrain pigs, as well as one synthetic line, and in 1985 has officially been registered by Bulgarian Ministry of Agriculture. The today DW pigs are of harmonious body conformation with straight and wide back and well-formed hams. Heads are small, with ears leaned ahead. Legs are moderately long, thin, but sound.

In pedigree livestock herds in Bulgaria kept are more than 2000 DW sows, *i.e*. 20% of a total number of pedigree sows in the country. One of the breeding centres, keeping 300 sows, belongs to the Agricultural Institute, Shumen, where efforts to improve the breed are mostly focused. DW sows make up 15-18% of a total number of sows kept in reproduction herds for production of crossbreds.

The present report supplies data on essential traits of reproduction, fattening and slaughter indicators of DW pigs.

Material and methods

Considered were 662 litters of Danube White (DW) sows kept in pedigree livestock and(or) reproductive farms. Data concerning reproduction traits were withdrawn from the sows' breeding records which are routinely run according to the "Principles of estimation the breeding value, production and classification of pig breeding stock" issued at Shumen in 1985.

The analyses of fattening and slaughter performance were conducted on the basis of results officially recorded by the Station for the Pig Performance Testing, Shumen. In Bulgaria the test fattening period in pigs lasts from 30 to 90-100 kg live body weight, during which animals are fed *ad libitum*. After obtaining the required live weight pigs are slaughtered. The subsequent carcass evaluation is conducted on the right carcass side, cooled for 24 hours at 4°C. Next, linear measurements are taken and carcass-side is divided into cuts. Estimated are also certain meat quality parametres.

Presented are arithmetical means, their standard deviations (SD), coefficients of variation (V) and coefficients of phenotypic correlations (r_p) between selected traits.

Results and discussion

The DW sows showed high fertility (a total of 10.3 and 11.5 piglets born in litter I and IV, $P \leq 0.001$) – Table 1. The total number of piglets born alive and the litter weight at birth, increased from litter I to IV ($P \leq 0{,}001$), and then a slight decrease appeared. Similar trend in DW sows was found by Apostolov [1990], Angelov *et al*. [1993], Szostak [1993], and Stoikov and Apostolov [1994]. The litter size on day 21 varied from 8.9 in litter III to 9.3 in litter IV, but the differences were not found significant. The litter weights on day 21 were highest in litter IV and V (45.9 and 45.4 kg), differing ($P \leq 0.05$) from remaining litters.

In Table 2 shown are coefficients of phenotypic correlation (r_p) between selected

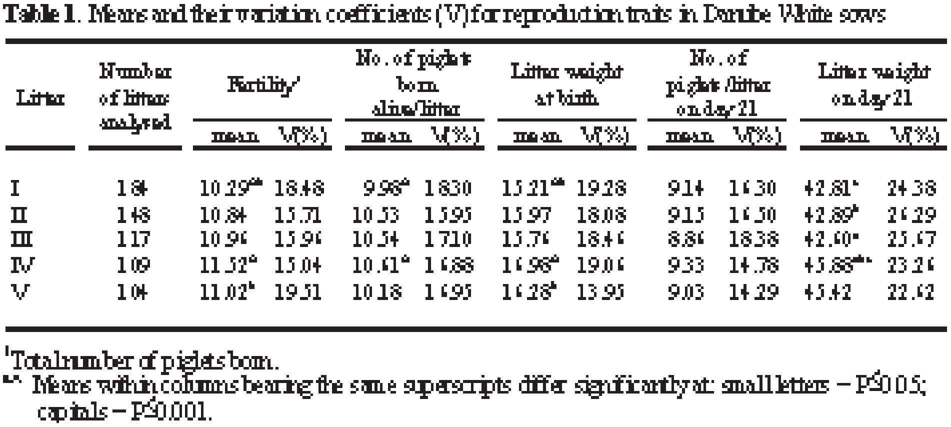

Table 1. Means and their variation coefficients (V) for reproduction traits in Danube White sows

Litter	Number of litters analysed	Fertility[1]		No. of piglets born alive/litter		Litter weight at birth		No. of piglets/litter on day 21		Litter weight on day 21	
		mean	V(%)	mean	V(%)	mean	V(%)	mean	V(%)	mean	V(%)
I	184	10.29^{ab}	18.48	9.98^{a}	18.30	15.21^{ab}	19.28	9.14	16.30	42.81^{a}	24.38
II	148	10.84	15.71	10.53	15.95	15.97	18.08	9.15	16.50	42.89^{b}	26.29
III	117	10.96	15.96	10.54	17.10	15.76	18.46	8.86	18.38	42.60^{c}	25.67
IV	109	11.52^{a}	15.04	10.61^{a}	16.88	16.98^{a}	19.06	9.33	14.78	45.88^{abc}	23.26
V	104	11.02^{b}	19.51	10.18	16.95	16.28^{b}	13.95	9.03	14.29	45.42	22.62

[1] Total number of piglets born.

a-c Means within columns bearing the same superscripts differ significantly at: small letters – P≤0.05; capitals – P≤0.001.

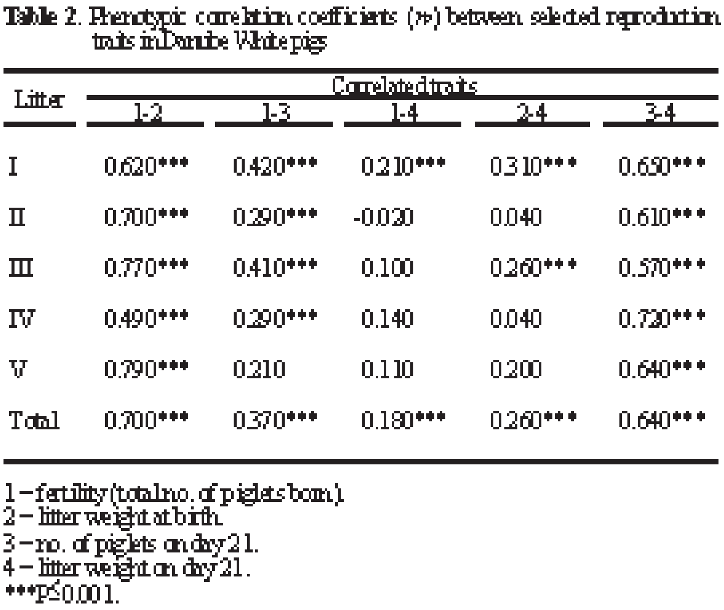

Table 2. Phenotypic correlation coefficients (r_P) between selected reproduction traits in Danube White pigs

Litter	Correlated traits				
	1-2	1-3	1-4	2-4	3-4
I	0.620***	0.420***	0.210***	0.310***	0.650***
II	0.700***	0.290***	-0.020	0.040	0.610***
III	0.770***	0.410***	0.100	0.260***	0.570***
IV	0.490***	0.290***	0.140	0.040	0.720***
V	0.790***	0.210	0.110	0.200	0.640***
Total	0.700***	0.370***	0.180***	0.260***	0.640***

1 – fertility (total no. of piglets born).
2 – litter weight at birth.
3 – no. of piglets on day 21.
4 – litter weight on day 21.
***P≤0.001.

traits of reproductive performance of DW sows. Obtained were high r_P values (from 0.620 to 0.790) between fertility (*i.e.* total no. piglets born) and litter weight at birth, depending on the litter parity. For litter IV the estimated correlation was the lowest (r_P = 0.490). Similar (P≤0.001) correlation coefficients were found for day 21 between litter size and litter weight (r_P from 0.570 to 0.720). The remaining r_P varied from low to moderate. Found was a highly significant correlation (r_P = 0.370) between fertility (*i.e.* total no. of piglets born) and litter size on day 21. Correlations between litter size at birth and litter weight on day 21 day decreased along with litter parity.

In Table 3 shown are means and their variation indicators for traits of fattening and slaughter performance of DW fatteners. The mean daily live weight gain amounted to 780 g, and feed conversion was 3.365 kg/kg gain (V = 10.36 %). The relatively high V coefficient shows a feasibility of further selection aiming at improving feed conversion ratio in DW fatteners. Similar results were obtained by Benkov *et al*. [1994] and Kounev *et al*. [1996].

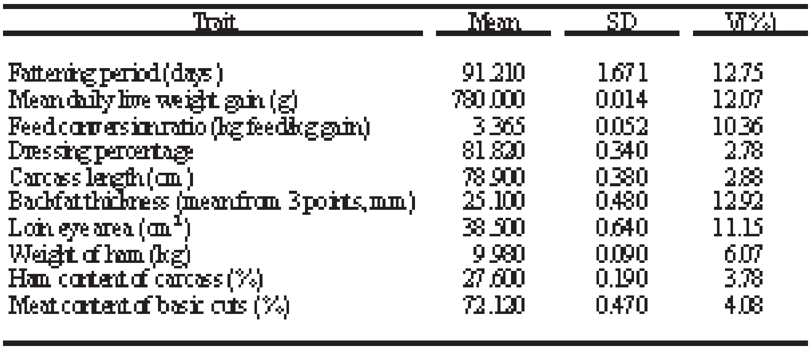

Table 3. Means, their standard deviations (SD) and coefficients of variation (V) for fattening and slaughter traits in 45 Danube White fatteners

Trait	Mean	SD	V(%)
Fattening period (days)	91.210	1.671	12.75
Mean daily live weight gain (g)	780.000	0.014	12.07
Feed conversion ratio (kg feed/kg gain)	3.365	0.052	10.36
Dressing percentage	81.820	0.340	2.78
Carcass length (cm)	78.900	0.380	2.88
Backfat thickness (mean from 3 points, mm)	25.100	0.480	12.92
Loin eye area (cm^2)	38.500	0.640	11.15
Weight of ham (kg)	9.980	0.090	6.07
Ham content of carcass (%)	27.600	0.190	3.78
Meat content of basic cuts (%)	72.120	0.470	4.08

The mean backfat thickness from three measurements amounted to 25.1 mm (Tab. 3), again with the wide variation (V=12.9%), allowing for the further selection towards decreasing the level of the trait.

In the study on stress sensitivity of DW pigs Yablanski *et al*. [1989] obtained much better slaughter indicators in halothane-sensitive than in halothane-resistant individuals, the former constituting about 12.2% of the total DW population. The carcasses of Hal$^+$ fatteners were characterized by thinner backfat, larger muscle eye area and higher meat content. However, the meat quality as indicated by colour and pH was significantly lower. Consequently Angelov and Stoikov [1996] suggest selection of DW pigs for stress sensitivity.

In Table 4 shown are coefficients of phenotypic correlations between selected fattening and slaughter indicators in DW pigs. As expected, correlation between the length of fattening period and mean daily live weight gain was found high and negative ($r_P = -0.587$, $P \le 0.001$). A similar but positive r_p appeared between the length of fattening period and feed conversion ratio (0.591, $P \le 0.001$), and negative between the latter and daily live weight gain (-0.872, $P \le 0.001$). High and negative r_p was found between the backfat thickness and meat content of carcass ($r_p = -0.623$, $P \le 0.001$).

Summarizing, Bulgarian Danube White sows are characterized by a very good reproductive performance, highly affecting economical effectiveness of keeping the purebred individuals of the breed. High fattening and slaughter indicators make Danube White pigs

Table 4. Coefficients of phenotypic correlation (r) between selected fattening and slaughter traits in Danube White boars

		2	3	4	5	6	7	8	9	10	11	12
1	Fattening period (days)	-[illegible]***	[illegible]***	-[illegible]	[illegible]**	-[illegible]	-[illegible]	[illegible]	[illegible]*	-[illegible]	-[illegible]	[illegible]
2	Mean daily live weight gain (kg)		-[illegible]***	[illegible]	-[illegible]**	-[illegible]	[illegible]**	-[illegible]	-[illegible]***	[illegible]	-[illegible]	[illegible]
3	Feed conversion ratio (kg feed/kg gain)			[illegible]	[illegible]**	-[illegible]	-[illegible]**	[illegible]	[illegible]**	-[illegible]	[illegible]	-[illegible]
4	Dressing percentage				[illegible]**	-[illegible]	[illegible]	[illegible]***	[illegible]***	[illegible]	[illegible]	-[illegible]
5	Yield of the right carcass side (kg)					[illegible]***	-[illegible]**	[illegible]***	[illegible]***	[illegible]**	[illegible]*	-[illegible]**
6	Carcass length (cm)						[illegible]	[illegible]	[illegible]***	[illegible]	[illegible]	-[illegible]
7	Backfat thickness (mean from 3 points, mm)							-[illegible]***	-[illegible]*	-[illegible]*	-[illegible]**	[illegible]**
8	Loin eye area (cm^2)								[illegible]***	[illegible]**	[illegible]**	-[illegible]**
9	Weight of ham (kg)									[illegible]	[illegible]**	-[illegible]**
10	Meat content of carcass (%)										[illegible]**	-[illegible]**
11	Meat content of lean cuts (%)											-[illegible]**
12	Fat content of lean cuts (%)											

*P<0.05; **P<0.01; ***P<0.001

very popular, especially among those who apply traditional raising and feeding methods. High level of variation of certain slaughter indicators points out the need of further selection in order to improve meat value of Danube White population in Bulgaria.

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Charakterystyka cech użytkowych świń rasy dunajskiej białej

Streszczenie

Rasa dunajska biała jest rodzimą, współczesną rasą świń w Bułgarii. Twórcą jej był I. Angelov, a urzędowo uznana została w 1985 r. Powstała w dorzeczu Dunaju, ale prace badawcze związane z jej powstaniem i doskonaleniem prowadzono głównie w ośrodku badawczym Instytutu Rolnictwa w Szumenie. Materiał wyjściowy stanowiła rasa bułgarska biała, wielka biała angielska, landrace, hampshire i pietrain, oraz jedna linia syntetyczna. Zastosowano wiele wariantów krzyżowania i uzyskano populację zwierząt, w której prowadzi się ostrą selekcję i staranny dobór par rodzicielskich.

Zestawiono wybrane wskaźniki użytkowości rozpłodowej, tucznej i rzeźnej świni dunajskiej białej. Świnie tej rasy charakteryzują się dobrą użytkowością rozpłodową (10,3 do 11,5 wszystkich prosiąt urodzonych w miocie i 10,0 do 10,6 prosiąt urodzonych żywo), wysokimi przyrostami dobowymi (780 g) i średnim otłuszczeniem tuszy. Znaczne wahania współczynnika zmienności otłuszczenia tuszy sugerują potrzebę i zarazem możliwość prowadzenia intensywniejszej selekcji w obrębie tej cechy. Podatność na stres występuje u osobników stanowiących 12,2% populacji. Podkreślono, że świnie rasy dunajskiej białej mogą być chowane w tradycyjnych warunkach i nadają się do ekologicznej produkcji wieprzowiny.