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Litter Size and Weight of Piglets of the Turopolje Pig Breed in the Suckling Period

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SUMMARY

The Turopolje breed of pig, the only representative of Croatian indigenous breeds of pigs, is on the list of the World Watch of Livestock Breeds (Mason, 1988) along with many recognised and economically important breeds, kinds and hybrids of various countries. However, it has no very great economic importance, although according to Findrik (1948) in the past in the Croatia it constituted 20% of the total herd of pigs, and was maintained in outdoor conditions. In the fifties the Turopolje breed lost its market value because it was a type with a lot of fat, and the pig market had undergone changes with respect to consumption of fat meat. In addition, the development of the economy in the country meant that there was a halt to the outdoor production system.

Accordingly, today the Turopolje breed, as indigenous Croatian breed, is now on another world list, the World Watch List for Domestic Animal Diversity (Loftus and Scherf, 1993), among animals that are endangered and in danger of extinction, animals for which there is an FAO protection programme.

The aim of this work is to make some contribution to the preservation of the Turopolje breed, and to investigate the possibility of including the Turopolje breed genome into the creation of modern genotypes of pigs for production in an outdoor maintenance system.

The research was started in 1997 on the A population of the Turopolje breed. In the outdoor maintenance system (woods), sows from the same sire were mated with a single boar, and farrowed in the late spring.

The size of the litters, the weight, and daily weight gain of the piglets until weaning were analysed, nine litters with a total of 77 piglets being considered. The average numbers of piglets in litters were determined: total 8.56, live 6.67, dead 1.89, female 3.56, male 3.11. Weight (in kg) and daily weight gain (in g) until weaning were: total 4.42; 101.22; for females 4.42 and 103.93, and for males 3.92 and 98.13, which demonstrates the possibility that sows can be kept and piglets survive until weaning in the open maintenance system.

KEY WORDS

Turopolje breed, piglet daily weight gain, weight, age at weaning, sex

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Brojnost legala i mase prasadi u dojnom razdoblju turopoljske pasmine svinja

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SAŽETAK

Turopoljska pasmina svinja, premda se kao jedini predstavnik hrvatskih autohtonih pasmina nalazi na svjetskom popisu World Watch Dictionary of Livestock Breeds (Mason, 1988) među brojnim priznatim i gospodarski značajnim pasminama, sojevima i hibridima pojedinih zemalja svijeta, nema veću gospodarsku važnost iako je prema Findriku, 1948. u prošlosti u Hrvatskoj bilo 20% od ukupnog broja svinja ove pasmine s kojom se proizvodnja svinjskog mesa odvijala po tehnologijama u otvorenim (outdoor) sustavima držanja. Pedesetih godina turopoljska svinja gubi tržišnu vrijednost kao masni tip, jer na tržištu svinja dolazi do promjene u potrošnji mesa u odnosu na mast, a razvoj društveno ekonomskih odnosa u našoj zemlji zaustavlja razvoj tehnologija u outdoor sustavima proizvodnje.

Glede navedenog danas se Turopoljska pasmina kao autohtona hrvatska pasmina nalazi na još jednom svjetskom popisu World Watch List for Domestic Animal Diversity (Loftus i Scherf, 1993) među životinjama koje su ugrožene i u nestajanju, a za koje je postavljen FAO program zaštite.

Cilj je ovoga rada očuvanje, ali i istraživanje mogućnosti uključivanja genoma Turopoljske pasmine u stvaranju modernih genotipova svinja za proizvodnju u outdoor sustavima držanja.

Istraživanje je postavljeno 1997. godine na A populaciji Turopoljske pasmine. U otvorenom sustavu držanja (šuma) krmače kćeri istog oca, sparene su s jednim nerastom i oprašene u kasno proljeće.

Analizirana su svojstva brojnosti legala mase i dnevni prirasti prasadi do odbića u devet legala s ukupno 77 oprašene prasadi. Utvrđeni su rezultati brojnosti prasadi u leglu (kom): ukupno 8,56, živo 6,67, mrtvo 1,89, ženskih 3,56, muških 3,11; a mase (kg) i dnevni prirasti (gr.) do odbića: ukupno 4,42; 101,22; te za žensku 4,42; 103,93 i mušku 3,92 i 98,13 prasad što pokazuje mogućnost držanja krmača i preživljavanje prasadi do odbića u otvorenom sustavu držanja.

KLJUČNE RIJEČI

turopoljska pasmina, dnevni prirast prasadi, masa, starost kod odbića, spol

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INTRODUCTION

Although it is the only indigenous Croatian breed (Mason, 1988), the Turopolje breed of pig, which is a fat type, with 55-65% of fat in the body, with 4–6 pigs weaned per sow per year (Vukina, 1961), has no economic importance in the production of pork today, although in 1933 it accounted for 20% of all pigs reared in the country (Findrik, 1948).

As early as 1931, Ritzoffy noted the competitiveness of English pigs on the European market for the production of bacon as against the Turopolje breed, which encouraged him to conduct the hitherto most comprehensive research on the origin of the cranial structure, the exterior, productive and reproductive characteristics, and the technological conditions of outdoor maintenance systems.

On the basis of this research, Ritzoffy concludes that "this is a breed of favourable health and a sturdy resistant constitution; it readily puts on weight; it is naturally intelligent and domesticated; it produces good meat and excellent bacon; it has a good basis for fattening and by nature, without any selection, it is adequately fertile" and on the basis of these characteristics proposed measures for the improvement and preservation of it as a domestic breed for production.

Thus, for the sake of the improvement of the exterior, physiological, productive and reproductive characteristics of the breed, as early as 1932, in Trebarjevo Desno, near Sisak, the first selection co-operative was set up for the breeding of Turopolje pigs, and later on there was a network of co-operatives, and a Federation of Pig Breeding Selection Co-ops was set up, centred on Zagreb, in which herd book of the Turopolje breed were kept.

According to data from the herd book, Šmalcelj (1939), Frindrik (1948), and Šram (1948), analysed the fertility of Turopolje sows through the property of numbers of piglets in a litter, while Šmalcelj (1939) and Ogrizek (1941) also analysed the weight of the pigs at birth, and the weight and weight gain of pigs and gilts at different ages, in order to set up standards for the breed and to constitute a basis for the establishment of breeding aims for its improvement.

However, it is clear that the selection of the Turopolje breed did not keep up with changes on the pig market during the fifties and sixties (Topel, 1986), with the demand for meat rather than fat, which had an impact on the creation of lean breeds and hybrid pigs with a muscle to fat ratio in the carcass e of 2.5:1, with a production rate of 25-30 piglets per sow per year, the breed consequently losing its economic importance and tending increasingly to disappear.

Thus the Turopolje breed of pig came onto the World List for Domestic Animal Diversity, among many animals that are disappearing and dying out, animals for which the FAO has launched a protection programme. The Universitas Communitas Nobilium Campi Turopolya has organised, in Turopoljski Lug (wood) the maintenance of a herd of Turopolje pigs.

This work describes research into the numbers in the litters of Turopolje sows, the weight and daily weight gain of pigs until weaning, with the objective of ascertaining the possibility of preserving the Turopolje breed as part of our heritage, and the world heritage, of animal diversity.

MATERIALS AND METHODS

Research was carried out on the Turopolje breed A population sows kept in the herd book of the Croatian Livestock Selection Centre, owned by the Universitas Communitas Nobilium Campi Turopolya of Turopolje, Velika Gorica.

In Turopolje lug, in 1997, in the outdoor maintenance system (in a biocenosis of lowland inundated forest of common oak), research was carried out on sows (n=9) sired by the boar MB-2 and mated with the boar MB-3. The sows farrowed (2nd and 3rd litters in a row) in late spring, between May 18 and June 7, 1997.

The following characteristics were investigated:

- numbers in the litters, including the total number of pigs farrowed, total live, male, female, stillborn, dying before weaning
- weight and weight gain of pigs until weaning at 4-5 and 6-7 weeks.

Analysis of these characteristics was carried out as an average for a litter and individually for each sow.

Testing was done of the differences in the weight and weight gain of piglets weaned at 4-5 and at 6-7 weeks.

Data processing was done according to Snedecor and Cochran (1967) with the use of the Quatro PRO 2 programme.

RESULTS

The data in table 1 show that from 9 sows a total of 77 piglets was farrowed, of which 60, or 77.92% were born alive, while 17 or 22.07% were stillborn or died before weaning. The average total numbers and piglets born alive of from 8.56 to 6.67 are higher than the standard for the breed as stated by Vukina (1961), which requires further research, for Ritzoffi (1931) says that in properly arranged breeding herds Turopolje sows never farrow fewer than seven piglets. Šmalcelj (1931) and Šram (1948), from a large number of litters investigated (236 and 588) say that 6.7 and 6.42 piglets, respectively, were farrowed per sow.

The average number of 3.56 females and 3.11 males in a litter meant a ratio of 53% females to 47% males in the total number of piglets born alive.

Table 1. Numbers of pigs in the litters of Turopolje sows

Item	No of piglets born in a litler				
	Total	Live			Dead
		Total	Female	Male	
N	9	9	9	9	9
n	77	60	32	28	17
$\overline{X}$	8.56	6.67	3.56	3.11	1.89
s	1.51	1.94	1.51	1.27	1.17
s $\overline{X}$	0.50	0.65	0.50	0.42	0.39
Min - Max	5 - 10	2 - 8	1 - 5	1 - 5	0 - 4

N = number of sows – number of litters n = total number of piglets

Table 2. Number of pigs in a litter per sow

			Live		Dead
Sows	Total	Total	Female	Male	
1	9	8	5	3	1
2	10	8	4	4	2
3	9	7	2	5	2
4	5	2	1	1	3
5	9	7	5	2	2
6	8	6	2	4	2
7	8	8	4	4	0
8	10	6	4	2	4
9	9	8	5	3	1
Total	77	60	32	28	17

Table 3. Age, weight and daily weight gain of piglets until weaning

				Female		Male	
Item	Age days	Weight	Daily gain	Weight	Daily gain	Weight	Daily gain
		kg	gr.	kg	gr.	kg	gr
n		60	60	32	32	28	28
$\overline{X}$	41.33	4.19	101.2	4.42	103.93	3.92	98.13
s	7.23	1.97	33.18	1.33	29.56	1.39	37.21
s $\overline{X}$	0.934	0.177	4.284	0.235	5.223	0.262	7.031
Min - Max	31-51	0.95-6.90	30.6-194.1	0.95-6.9	30.6-186.5	1.5-6.6	34.9-194.1

Table 5. Weight, daily gain of piglets in different age

Group	Age – days		Weight of piglets kg		Daily gain gr	
	$\overline{X}$	s	$\overline{X}$	s	$\overline{X}$	s
I	33.92**	2.46	3.86	1.39	112.92*	38.06
II	47.19**	2.68	4.42	1.31	92.88*	26.76

**P<0.01 *P<0.05

The data in table 2 show that of the total of 9 sows, with 3, or 33%, there were between 5 and 8, and with 6, or 66%, there were between 9 and 10 piglets per litter. Of the total number of piglets farrowed, 17, or 22 %, were born dead or died before weaning, which is not a very great percentage considering the conditions in which they are kept and their feed, since the piglets do not need feeding at this age, although they do take some of the grains of maize that the sows are fed with. The number of live born piglets was high, except with three sows (no. 4, no. 6 and no. 8) and above the average of 5.75 stated by Šram (1948) for a large number of litters.

Table 4. Age, weight, and daily weight gain of piglets per litter

No sows	Age days	Total					Female					Male				
		No piglets	Weight kg		Daily gain kg		No piglets	Weight kg		Daily gain kg		No piglets	Weight kg		Daily gain kg	
		n	$\bar{x}$	s	$\bar{x}$	s	n	$\bar{x}$	s	$\bar{x}$	s	n	$\bar{x}$	s	$\bar{x}$	s
1	31	8	2,81	1,17	90,71	37,72	5	2,69	1,46	86,77	17,06	3	3,02	0,65	97,42	21,09
2	37	8	4,55	1,28	123,00	34,70	4	4,74	1,46	128,10	39,86	4	4,36	1,26	117,83	33,95
3	34	7	4,30	1,37	126,50	40,37	2	3,91	0,85	115,00	25,31	5	4,46	1,59	131,18	46,81
4	33	2	3,75	0,78	113,64	23,33	1	4,30	-	130,30	-	1	3,20	-	97,00	-
5	51	7	5,41	0,85	106,09	16,77	5	5,62	0,95	110,20	18,60	2	4,89	0,16	95,88	3,04
6	43	6	3,51	1,33	81,60	30,88	2	4,42	1,53	102,79	35,71	4	3,06	1,16	71,16	26,93
7	49	8	3,16	1,05	64,50	21,55	4	3,89	0,88	79,39	8,99	4	2,43	0,64	49,59	12,95
8	48	6	5,41	0,32	112,71	16,15	4	5,16	0,66	107,50	13,72	2	5,90	0,99	122,92	20,65
9	46	8	4,75	0,69	103,26	15,38	5	4,75	0,80	103,26	7,79	3	4,77	0,68	103,70	8,59

The sex ratio in the total live-born piglets in the litters varied from 1:1 to 1:1.5, 1:2 and 1:3.

The results of table 3 show that at the age of 41.33 days the average weight of piglets was 4.19 kg, with a standard deviation of 1.97 kg, and that they had an average daily weight gain of 101.2 g, 33.18 g standard deviation, much lower values than those given by Šmalcelj (1939), who determined a weight of 7.85 kg with a standard deviation of 1.23 kg for Turopolje piglets of six weeks of age. Female piglets were 0.5 kg heavier than male piglets, but no statistically significant differences were determined.

The results of table 4 show that in the litters of individual sows there are different values for the average weight of the piglets in the litter, and according to sexes irrespective of age and number of piglets in the litter, while for daily weight gain there are greater values when the piglets are weaned younger.

The results of Table 5 show that pigs younger at weaning had a greater daily weight gain than older piglets, although the difference in the weight, of 0.56 kg, was not statistically significant.

DISCUSSION

The results obtained from 8.56 farrowed and 6.67 weaned piglets per litter are higher than the standard for this breed stated by Vukina (1967). In this research it was ascertained that 33% of the sows farrowed 5–8, and 67% 9–10 piglets in a single litter. The results of Šram (1948), obtained on the basis of 588 litters studied, showed that the average number of piglets farrowed in a single litter was 6.42, with as many, however, as 70% of the sows having litters in excess of 8 piglets. The results tend to confirm the statement of Ritzoffy (1931) that the fertility of the Turopolje breed is high, and that in well arranged farms there is a large number of sows that will have more than 7 piglets in a litter, which means that further research is necessary.

It is of course clear that the numbers of piglets in the litters of Turopolje sows cannot be compared with those in the litters of modern genotypes of sows that have 10 to 12 piglets per litter, as shown by the works of Jurič et al. (1991), Sinković et al. (1991). The average number of male and female piglets as compared to the total number of live born piglets calculated for all litters had a ratio of 1:1, while in individual litters the ratio ranged from 1:2 to 1:3 (and vice versa according to sex), which shows that there should be no problem in increasing the size of this population. The average weights for all the litters of 4.19 kg, and the weights of 4.42 for female and 3.92 kg for male piglets at 41.33 days are lower than the results of Ogrizek (1941) and Šmalcelj (1939). A possible explanation for the differences in these results is the fact that the piglets in the experiments of Ogrizek were additionally fed, while the piglets in this research were not additionally fed, except insofar as they took maize grains fed to the sows. It is clear that the piglets in the suckling period should be additionally fed, because the results of Table 5, about

the testing of the daily weight gains of piglets of different ages, showed that younger piglets had a greater weight gain than older piglets, while their weights were not different. This can be linked with the fact that the milk of the sows up to the 4th week of lactation satisfies the needs of the piglets, while with the fall in milk production and the increase in the age of the piglets and their need for greater nourishment, the daily weight gain was lower.

The results obtained about the numbers in the litters during farrowing and at weaning, as well as those about the ratio of sexes, weights and daily weight gains at and by weaning point to the conclusion that it is possible to preserve and protect this breed in the outdoor maintenance system, with more feed, however, being given to the sows and the piglets during the suckling period.

Since according to the FAO data of Loftus and Scherf (1993) the population of the Turopolje breed has 250 sows and 10 boars registered in the country, for the preservation and protection of the breed by one of the methods in vivo and in situ prescribed by FAO, further investigation is required not only of the A population but also of other parts of the population of the Turopolje breed, as well as sows that are registered on family farms in the Turopolje district but are not entered into the herd book.

CONCLUSIONS

1. The numbers in the litters in the remaining drastically reduced population of the Turopolje breed of pig show no changes from the results of research undertaken fifty years ago.
2. In the maintenance conditions in which the piglets are not fed up to 42 days after being farrowed, the daily weight gain of the piglets declines after four weeks, as a consequence of the decrease in the sow's milk.

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