

FERTILITY TRAITS OF AUTOCHTHONOUS BREEDS OF MANGALITSA, MORAVKA AND RESAVKA

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Abstract: Objective of this paper was to evaluate phenotypic variability of fertility traits of indigenous breeds of Mangalitsa (Swallow-Belly Strain Mangalitsa–SBSM), Moravka breed (M) and Resavka (R). Indigenous pig populations are usually constituted by a quite low number of active boars and sows. Their pedigree information is lacking or absent, complete phenotypic description is usually not available for most of these populations that are very well adapted to specific local agro-climatic environments. In controlled herds in period of four years, the average age at first farrowing (AFF) was 18.5 months with large variability of 5.9 months for Swallow belly Mangalitsa. Less AFF (14.3 months) and less variability (4.4 months), in relation to SBSM, determined for Moravka breed while for Resavka determined age of 14.7 months with at least variability for this trait from 4.4 months. The average number of piglets born alive (for a period of four years) of SBSM was the lowest from 4.37 to 4.81; in case of M and R, this value was significantly ($P < 0.001$) higher (from 5.75 to 8.17 and for R breed 6.40 to 9.00). With average duration of suckling period (duration of lactation - DL) of 52.92 days in the first year for the breed SBSM with the lowest number of reared piglets (NRP=4.10) whereas the DL for M and R breeds was shorter (from 45.75 to 52.03 day) with a higher NRP (from 4.57 to 8.92 reared piglets).

Key words: pig, indigenous breeds, reproductive parameters, parity, piglets

Introduction

Pig production in the Republic of Serbia has a long tradition. During the 19th century, pigs were the main export product. In Republic of Serbia Šiška is our

most primitive breed of pigs, created by domestication of wild pigs, it most resembles a wild boar, not only in appearance and features, but also lifestyle. Šiška once had enormous significance, in the relatively recent past (eighteenth century), not only in Serbia but also Croatia, Slovenia, Hungary, Romania and Bulgaria. In the 19th century Šiška pushed Šumadinka. Šumadinka is improved Šiška reared in slightly better conditions. Both of these breeds are permanently lost in their original form. Šumadinka which served as the basis for creating Mangalitsa. Today in Serbia there are three local indigenous pig breeds: Mangalitsa, Moravka and Resavka breeds. Mangalitsa was very popular in Vojvodina (especially in Srem) and Hungary in the period from the 19th century until the fifties, and recently farming of this breed has been restored. In the Republic of Serbia there are three Mangalitsa breed strains, the Swallow-belly Strain (Srem Black Mangalitsa or Buđanovci pig), white and Subotica strain. In Hungary and Romania there is also so called red strain of this breed. Swallow belly Mangalitsa developed in the area of Srem (near Ruma, village of Buđanovci, the residents of this village in Srem are called "Lasans"). It is late maturing breed. The sexual maturity is reached at the age of 8-12 months, breeding maturity at the age of 15-18 months, and growth stops at the age of 3-4 years. Reproductive ability is poorly expressed. Mangalitsa is typical fatty pig breed, it has in carcass sides 65-70% of fat and approx. 28 % meat (Petrović et al., 2009). Moravka and Resavka, were reared in the same region of Serbia around rivers Velika Morava, Mlava and Resava. Moravka and Resavka are breeds of combined production abilities. Moravka was created by crossing Šumadinka and Berkshire (unplanned) while the Black Slavonian pig breed was created deliberately. It was completely black without any marks. Resavka and Moravka breeds were created simultaneously, in a similar manner, but in smaller numbers. The only difference is the colour, as the Moravka is black, Resavka breed pigs are spotted (white-yellow-black). It was created as a result of non-systematic crossing with Šumadinka, Berkshire and Yorkshire for whom there are no relevant data. Moravka and Resavka is more fertile with litters of 6 to 8 piglets (Živković and Kostić, 1952; Petrović et al., 2007a) and meatier than Mangalitsa (30.00 : 24.85 % meat; Petrović et al., 2007b). Also Moravka and Resavka are in danger of being extinct, which means that it is necessary to work on their preservation and sustainable use. It is known that by extinction of one breed or strain also the genetic diversity contained within them is lost. Importance of these breeds reflects in genes which provide excellent ability of adapting to breeding conditions, good vitality and resistance to diseases. The breed is very resistant and well adapted to extensive housing conditions, animals of this breed need only a simple shelter from rain and snow.

Material and Methods

Investigation included sows three registered native, autochthonous breeds: Swallow-Belly Strain Mangalitsa (SBSM; n=356), Moravka (M; n=93) and Resavka (R; n=45). Of the reproductive traits, were monitored in controlled herds for a period of four years, are included the average age at first farrowing (AFF), number of live born piglets (NLB), number of stillborn piglets (NSB), duration of suckling period (DL) and number of weaned piglets (NWP). Determination of the status of vulnerability is one of the important indicators of the state of the locally adapted breeds in the Republic of Serbia. Defining the status of endangered breeds depends on numerous factors, including: the number of reproductive-age males and females, level of breeding in relationship, the effects of reproduction and population trends. Calculation of the effective population size (N_e), is carried out according to the formula:

$$N_e = 4N_m N_f / N$$

Where:

N_e - effective population size

N_m - number of reproductive-age males

N_f - number of reproductive-age females

N - total number of reproductive-age individuals

Data on numbers of Mangalitsa, Moravka and Resavka obtained from Main breeding organization.

Results and Discussion

In Table 1, we see that the age at first farrowing varied highly statistically ($P < 0.001$) between breeds while in regard to the number of live born and reared piglet, highly statistically significant difference was found with respect to fertility of Mangalitsa breed. No differences ($P > 0.05$) were established between Moravka and Resavka for the mentioned traits. Also no differences were determined between the studied breeds in the number of stillborn piglets and duration of suckling period.

Table 1. Reproductive traits of indigenous breeds

Breed/Trait	Age at first farrowing	Number of live born piglets	Number of stillborn piglets	Duration of suckling period	Number of reared piglets
Mangalitsa; n=356	556 ±176.65 ^a	4.65 ±1.62 ^a	0.30 ±0.77	50.04 ±6.03	4.33 ±1.74 ^a
Moravka; n=93	428 ±132.46 ^b	7.31 ±2.52 ^b	0.49 ±0.94	48.73 ±9.08	7.11 ±2.67 ^b
Resavka; n=45	441 ±87.86 ^c	7.96 ±1.76 ^b	0.11 ±0.11	48.11 ±10.48	6.96 ±3.01 ^b

a, b, c Means in column with different superscript are significantly different at $P < 0.001$

For the fertility traits, by years, a statistically significant difference was found only for the duration of lactation ($P < 0.05$), while for other traits no statistically significant difference was recorded.

Table 2. Mangalitsa fertility traits by years of study

Year/Trait	Number of live born piglets	Number of stillborn piglets	Duration of suckling period	Number of reared piglets
I	4.37±1.36	0.33±0.47	52.92± 2.56	4.10±1.42
II	4.56±1.63	0.31±0.88	50.73±6.52	4.37±1.53
III	4.81±1.59	0.34±0.87	49.38±7.29	4.26±2.00
IV	4.74±1.75	0.24±0.63	48.34±4.17	4.49±1.81

Table 3. Moravka fertility traits by years of study

Year/Trait	Number of live born piglets	Number of stillborn piglets	Duration of suckling period	Number of reared piglets
I	6.00±3.24	0.92±1.27	52.03± 4.47	6.00±3.24
II	5.75±2.08	0.88±1.36	51.25±14.25	5.38±2.53
III	9.08±1.68	0.25±0.45	45.92±2.71	8.92±1.62
IV	8.17±2.08	0.42±0.67	46.83±3.41	8.08±1.98

Table 4. Resavka fertility traits by years of study

Year/Trait	Number of live born piglets	Number of stillborn piglets	Duration of suckling period	Number of reared piglets
I	6.71±1.60	0.44±0.68	50.00±5.33	4.57±2.82
II	9.14±1.35	0.14±0.38	46.14±10.78	7.86±3.72
III	9.00±1.20	0.13±0.35	45.75±3.20	8.88±1.36
IV	6.40±0.89	0.36±0.73	52.00±2.35	6.00±1.73

In regard to parities, a statistically significant difference was established for the mentioned traits, except for number of stillborn piglets.

Table 5. Mangalitsa fertility traits by parity

Parity/Trait	Number of live born piglets	Number of stillborn piglets	Duration of suckling period	Number of reared piglets
1.	3.67±1.44	0.48±1.11	51.49±6.10	3.25±1.61
2.	4.45±1.53	0.26±0.73	49.23±6.37	4.28±1.65
3.	4.90±1.83	0.41±0.73	48.43±6.33	4.59±2.06
4.	4.72±1.47	0.23±0.54	49.19±5.04	4.49±1.59
5.	5.21±1.64	0.14±0.36	48.89±4.40	4.89±1.37
6.	5.36±1.26	0.74±1.15	49.32±3.93	5.14±1.28
7.	5.37±1.38	0.26±0.56	51.95±5.73	5.05±1.22
8.	5.79±1.25	0.37±0.27	55.00±6.92	4.93±1.98
9.	5.28±1.18	0.50±1.04	50.61±7.37	4.72±1.45

When we talk about autochthonous breeds most research was in the field of traits of growth and carcass quality at least in the area of reproduction. Mangalitsa is domestic primitive breed, created from the former Šumadinka and is "fatty" pig breed in regard to the production type. Mangalitsa gives on average of 4.60-6.64 piglets (Petrović *et al.*, 2013; Egerszegi *et al.*, 2003), with strong maternal instincts. In our research, Swallow-Belly Strain Mangalitsa (SBSM) and Moravka (M) had higher age and greater variability of the first parity compared to data presented in the Annual Report of the Institute for Animal Husbandry (2015) for SBSM=508.92 ± 127.56 days and M = 373.29 ± 10.19 days. Results obtained in the experimental farm of the Faculty of Agriculture in Zemun (Belić, 1951) show the average fertility of SBSM from 4.42 to 5.80 piglets in the period from 1945 to 1950, which is in accordance with our research and research of Petrović *et al.* (2013). In relation to our research, significantly higher average fertility (6.64 piglets) in 74 SBSM litters have been determined by Egerszegi *et al.* (2003). Moravka and Resavka are breeds of combined production abilities with more liveborn piglets and meat in carcass sides. Sexual maturity of gilts is possible at the age of 5-6 and breeding maturity at the age of 10-12 months. According to our research on Moravka breed, average value and the variation in fertility (M = 7.20 ± 2.04 piglets) were found in the study Petrović *et al.* (2007). Increased fertility (7.82 ± 2.06 and 8.17 ± 2.08 live born piglets) according to research of Živković and Kostić (1952) and in Annual Report of the Institute for Animal Husbandry (2015). In comparison with our results for the same length of suckling period (50 days) and Annual Report of the University of Belgrade - Faculty of Agriculture (2010) a larger number of weaned pigs (4.92 ± 2.24 pigs reared in 24 litters) is reported. Petrović *et al.* (2013), for longer duration of suckling period, report less reared piglets (4.09 ± 1.91 reared piglets) compared to our research. For Resavka breed, when it comes to fertility, we have very little data, i.e. there is only one recent report (Annual Report of the Institute for Animal Husbandry, 2015), the research of Živković and Kostić (1952), and Lalević (1952) as well as a textbook by Belić (1951) which state that the Resavka is characterized by good fertility, with 6 - 8 piglets. In our study, an increasing number of piglets was determined in 37 litters, compared to data stated in the Annual Report of the Institute for Animal Husbandry (2015) for 5 litters stating average 6.40 live born piglets and 6.00 reared piglets with suckling period of 52 days.

In-situ protection includes the preservation, maintenance or recovery of populations and species in their natural habitats. Endangered species can be protected only if their natural habitats are protected, to which they are inextricably linked. On the basis of the Law (Official Gazette of the Republic of Serbia, 2015) on incentives in agriculture and rural development is defined maximum amounts of incentives per head for breeding gilts, boars and sows of Mangalitsa, Moravka and Resavka. The tendency is that the number of breeders of indigenous breeds of pigs is increasing. Observing the the degree of endangered (data obtained from the main

breeding organizations in the Republic of Serbia) locally adapted breeds of pigs have the status of highly endangered (Mangalitsa FAO / EAAP - high risk; $N_e = 174.68$) and status of critically endangered populations (Moravka FAO / EAAP - critically endangered; $N_e = 13.71$ and Resavka FAO / EAAP - critically endangered; $N_e = 2.66$). *Ex – situ* protection of endangered species does not exist in Serbia.

Conclusion

The age at first farrowing varied highly statistically between breeds while in regard to the number of live born and reared piglet, highly statistically significant difference was found with respect to fertility of Mangalitsa breed. No differences were established between Moravka and Resavka for the mentioned traits. Also no differences were determined between the studied breeds in the number of stillborn piglets and duration of suckling period. For the fertility traits, by years, a statistically significant difference was found only for the duration of lactation ($P < 0.05$), while for other traits no statistically significant difference was recorded. The result was expected because it is the preservation of animal resources.

In the recent decades Europe one number of indigenous breeds pig is lost. Local pig populations are usually constituted by a quite low number of active boars and sows, pedigree information is lacking or absent, complete phenotypic description is not available for most of these populations that are very well adapted to specific local agro-climatic environments. However, only few cases of successful local breed chains exist in Europe, importance of these breeds reflects in genes which provide excellent ability of adapting to breeding conditions good vitality and resistance to diseases, and the vast majority of them remain an untapped potential. In terms of scientific substantiation, their performances and products are practically untapped and market potential of their products unexploited. Due to the extremely slow weight gain and high feed conversion, breeding of mentioned indigenous breeds may be economical justified only if the breeders are in the organic production system (applied pasture feeding system during most of the year as it was in the past) and receive state subsidy for this kind of production and preservation of the genes. It is necessary as soon as possible to form Gene bank and have *Ex – situ* protection of endangered breeds of pigs. Locally adapted breeds of pigs have the status of highly endangered and status of critically endangered populations. For their protection the following measures should be taken:

- continuous monitoring of trends and population structure,
- strict implementation of the breeding program and program of selection measures

- continuation of activities on the identification and description of the breed, of production characteristics and molecular-genetic typing,
- to establish gene bank and provide continuous storage of genetic material,
- intensive activities on the promotion of breed and their products,
- improve animal recording for these breeds
- to develop conservation programs by integrating with the conservation programs within the "agro-forestry" system.

Plodnost autohtonih rasa mangulice, moravke i resavke

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Rezime

Cilj ovog rada je bio da se utvrdi fenotipska varijabilnost osobina plodnosti autohtonih rasa mangulice (lasasta mangulica-SBSM), moravke (M) i resavke (R). Autohtone populacije svinja obično čini prilično mali broj aktivnih nerasta i krmača. Informacije o poreklu često nedostaju ili su nedostupne, kompletan fenotipski opis obično nije dostupan za većinu ovih populacija koje su vrlo dobro prilagođene specifičnim lokalnim agro-klimatskim uslovima. Kod kontrolisanih zapata, u periodu od četiri godine, prosečan uzrast pri prvom prašenju (AFF) iznosio je 18,5 meseci sa velikom varijacijom od 5,9 meseci kod lasaste mangulice. Manje vrednosti AFF (14,3 meseca) i manja varijabilnost (4,4 meseca), u odnosu na SBSM, utvrđen je za moravku, dok je za resavku utvrđen uzrast od 14,7 meseca sa najmanjom varijabilnošću za ovu osobinu od 4,4 meseca. Prosečan broj živo rođene prasadi (u trajanju od četiri godine) kod SBSM, je bio najniži od 4,37 do 4,81; kod svinja M i R, ova vrednost je značajno ($P < 0,001$) viša (od 5,75 do 8,17 i 6,40 do 9,00 respektivno). Prosečno trajanje perioda sisanja (trajanje laktacije - DL) od 52,92 dana u prvoj godini za rasu SBSM, sa najnižim brojem odgajenih prasadi (NRP = 4,10), dok je DL za M i R rase kraći (45,75 i 52,03 respektivno) sa većom vrednošću NRP (od 4,57 do 8,92 odgajenih prasadi).

Ključne reči: svinje, autohtone rase, reproduktivni parametri, paritet, prasad

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