# REPRODUCTIVE TRAITS OF PIGS OF MANGALITSA BREED

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## ABSTRACT

The aim of this study was to investigate the reproductive traits of sows of Swallow Belly Mangalitsa breed. The study was conducted in two herds (Herd 1 and 2) in which the pigs were grown in extensive conditions. The analysis covered reproductive characteristics of 53 sows in the first four parities (n = 129 litters). Effect of season (breeding and parity) was analysed in two periods: winter-spring and summer-autumn. Data analysis was performed using the statistical package SAS 9.1.3 (SAS Inst. Inc., 2002–2003). The results indicate low reproductive performance of this breed. Average values of the duration of age at mating (AM), age at farrowing (AF), gestation (G), lactation (LAK), farrowing-mating period (IFM) and the reproductive cycle (RC) were: 717.95; 832.89; 114.91; 52.57; 92.31 and 206.51 days, respectively. Sows farrowed in average 4.60 live born, 0.30 still born and 4.09 weaned/reared piglets. All studied traits, except G, showed high absolute and relative variation. Variation of IFM was influenced by herd (H, $P < 0.05$) and age of sows expressed through parities (F, $P < 0.05$), and the number of weaned/reared piglets (NWP, $P < 0.01$). Only the NWP, of all properties of litter size, varied under the influence of herd ($P < 0.05$).

Key words: breed / Mangalitsa / reproductive traits / herd / variability

## 1 INTRODUCTION

Preservation of indigenous breeds of pigs is an important segment in the swine breeding programs. When it comes to Mangalitsa, which is the most common of all the indigenous breeds in Serbia, it is necessary to make efforts to increase the number of animals in the population and control its productivity. This is the only way the breed can be preserved as an important genetic resource in pig production and breeding not only of Serbia, but also the entire region. Regardless of the fact that it is more numerous than the others, in small, uncontrolled herds of indigenous breeds of pigs in our country, the inbreeding occurs which leads to depression of reproductive traits of the breed. Mangalitsa is late maturing pig breed. This breed is fatty type, with relatively poor reproductive performance, pronounced maternal instinct and good adaptability to extensive housing conditions (Egerszegi et al., 2003). According to research by Belić et al. (1967), age of White and Subotica Mangalitsa at farrowing was in average 598.45 ± 86.16 days and 480.46 ± 87.19 days, respectively, with high absolute variation in both breeds (347–696 and 385–665 days). In a herd of Swallow Belly Mangalitsa, Parunović (2012) found higher average mean values for average age at first mating (522.65 days) and parity (615.65 days). For herds of Swallow Belly Mangalitsa in Serbia, it is characteristic that they originate from sows and boars from several herds, and that a small number of boars were imported into the country. The same author established low fertility of sows, i.e. the average number of live born piglets (the first five parities) from 3.91 to 6.56 piglets. According Egerszegi et al. (2003), poor reproductive performance of this breed is due to negative selection. Regardless of the low fertil-

ity traits of the breed, by providing better housing conditions (food and housing) and control of productivity (planned mating and selection), reproductive performance can be improved. Because this breed is valuable genetic resource, the aim of this work was to evaluate the factors affecting the variability of fertility traits in order to improve the reproductive performance of the breed.

## 2 MATERIALS AND METHODS

The study used the data on reproductive traits of Mangalitsa sows from two herds. Herd 1 consisted of purchased gilts (gestating sows) and boars. The pigs were kept in an open system in the forest. During farrowing and lactation sows were kept in an enclosed building (wooden structure), in individual boxes. The farrowing took place in the boxes except for some pregnant sows that separated from the herd and farrowed in the forests. Sows were fed in the herd/group and in boxes with piglets. In the forest, sows consumed grass, roots, berries, insects, etc. They were fed corn while in a group, and a complete mixture was distributed to them in the boxes, according to the subjective assessment of breeder. Herd 2 was a family farm where sows included in the study were born and grown. Pigs were kept in extensive conditions. Sows were in the free ranges (garden) during the day and consumed the green mass. In the evening and at night they were with piglets. During lactation, sows were fed additional concentrated feed (corn and other grains), according to the subjective assessment of breeders.

The analysis covered reproductive traits of 53 sows in the first four parities (n = 129 litters). Due to the lack of complete records, the number of litters per analysed reproductive traits was different. Effect of season was observed through two periods: winter-spring (period December–May), summer–autumn (the period June–November). The study covered the following reproductive traits: age at mating (AM, days), age at farrowing (AF days), duration of pregnancy (G, day), duration of lactation (LAK, days), period farrowing-mating (IFM, days) and duration of the reproductive cycle (RC days). In addition, the analysis included traits of litter size: the total number of live born piglets (NBA), number of still born piglets (NBD) and the number of weaned/reared piglets (NWP). In Tables 1 and 2 are presented all reproductive traits, and in the Table 3 only the ones with the significant effects. Data analysis was performed using GLM procedure of statistical package SAS 9.1.3 (SAS Inst. Inc., 2002–2003). Depending on the analysed fertility traits, various models were used and differences between least-squares means (LSMean) evaluated using t-test.

## 3 RESULTS AND DISCUSION

The average values and variability of the studied reproductive traits of sows are shown in Table 1.

*Table 1: Basic statistical parameters of reproductive traits*

| Trait | Mean | SD | LSMean | |
| | | | $H_1$ | $H_2$ |
| --- | --- | --- | --- | --- |
| AM | 717.95 | 306.40 | 864.10 | 564.42 |
| AF | 832.89 | 306.67 | 966.64 | 691.17 |
| G | 114.91 | 2.72 | 115.34 | 114.36 |
| LAK | 52.57 | 15.24 | 52.26 | 53.09 |
| IFM | 92.31 | 61.66 | 95.27 | 65.06 |
| RC | 206.51 | 56.85 | 209.78 | 182.14 |
| NBA | 4.60 | 1.65 | 4.54 | 4.87 |
| NBD | 0.30 | 0.97 | 0.39 | 0.29 |
| NWP | 4.09 | 1.91 | 3.83 | 4.80 |

AM–age at mating, AF–age at farrowing, LAK–duration of lactation, G–duration of pregnancy, RC–duration of the reproductive cycle, IFM–period farrowing-mating, NBA–total number of live born piglets, NBD–number of still born piglets, NWP–number of weaned/reared piglets, H1–Herd 1, H2–Herd 2

Gestation is the biological trait of the species and lasted approximately 114.91 days. This trait exhibited the lowest phenotypic variability compared to the other studied reproductive traits. Lactation lasted in average 52.57 days. Period farrowing-mating (IFM), in average lasted 92.31 days with the highest absolute variation of studied traits. Sows with long IFM periods influenced the prolonging of RC of sows in the herd and reduction of the number of parities per sow per year. Breeders of indigenous breeds are intended to keep in the herd each sow, and therefore, among other things, there is no continuous systematic selection. Average duration of RC was 206.51 days, so the number of possible parities during the year was 1.77. Examined sows farrowed in average 4.60 live born and 0.30 stillborn piglets per litter. The average number of NWP was 4.09, which means that the mortality rate of piglets during lactation was 11.09% compared to the NBA. Better reproductive parameters of sows in herd 2 are reflected in shorter IFM and RC (by 30.21 and 27.64 days), higher NBA and NWP (by 0.33 and 0.97 piglets) and lower NBD (by 0.10 piglets) compared to Herd 1.

In the study by Parunović (2012), the average duration of pregnancy was 115.37 days and 53.82 days duration of lactation, whereas in the present study, the values of these properties were lower. Contrary to this study, the average duration of lactation in the study by Miclea *et al.*

*Table 2: Significance of factors included in the models on variability of observed reproductive traits*

| Trait | Factors | | | | | |
|-------|-----|-----|-------|-----|-----|---------|
|       | H   | F   | H × F | SM  | SF  | b (NWP) |
| AM    | *** | *** | ns    | -   | -   | -       |
| AF    | *** | *** | ns    | -   | -   | -       |
| G     | ns  | ns  | ns    | ns  | -   | -       |
| LAK   | ns  | ns  | ns    | -   | ns  | -       |
| IFM   | *   | *   | ns    | -   | ns  | **      |
| RC    | ns  | ns  | ns    | -   | ns  | -       |
| NBA   | ns  | ns  | ns    | ns  | -   | -       |
| NBD   | ns  | ns  | ns    | -   | ns  | -       |
| NWP   | *   | ns  | ns    | -   | ns  | -       |

AM–age at mating, AF–age at farrowing, LAK–duration of lactation, G–duration of pregnancy, RC–duration of the reproductive cycle, IFM–period farrowing-mating, NBA–total number of live born piglets, NBD–number of still born piglets, NWP–number of weaned/reared piglets, H–herd, F–farrowing (parity), SM–season of the mating, SF–season of the farrowing, b (NWP)–linear regression effect of the NWP, *** P < 0.001, ** P < 0.01, * P < 0.05, ns–not significant

(2012) in the first five parities was shorter (from 38.41 to 42.12 days). According to various sources, reported in the review paper by Egerszegi *et al.* (2003), for the period from 1955 to 1994, the NBA was in the range from 4.5 to 6.9 piglets per litter. By comparison with the research of Jardas (1948), where the average time between two parities was 179 days (from 173.2 to 185.7 days), the average RC in the present study was longer. Mortality of piglets during the suckling period in the present research was 11.1% and higher compared to the results of Belić and Mitić (1954) showing for sows of White and Swallow Belly Mangalitsa 6.35 and 7.43% mortality during lactation, respectively. Number of parities per sow per year in conducted research (1.77 parities) was slightly higher compared to that reported by Parunović (2012, 1.72 parities) and lower than in the study by Szabó (2002, 1.86 parities).

Table 2 shows the significance of the factors included in the models on variability of reproductive traits. Reproductive traits (AM and AF) varied under the influence of herd and parity (P < 0.001). Variation of IFM was influenced by herd (H, P < 0.05), age of sows expressed through parities (F, P < 0.05) and number of piglets weaned/reared (NWP, P < 0.01). Litter size traits (NBA, NBD and NWP) were not influenced by observed factors, exception being herd effect on variability of NWP (H, P < 0.05).

These results are similar to the study conducted by Parunović (2012) regarding the effect of the parity (P < 0.01) and season of farrowing (P > 0.05) on the

variability of IFM. Differences exist with respect to the effect of the parity on the variability of the NBA, as in the research of this author it was significant. Comparing LSMean values of studied traits between herds, according to parity, differences were established (Table 3). Between the herds (1–2) from 1st to 4th parity, there were differences (P < 0.001) in AM (246.08; 261.86; 355.89; 330.58 days) and AF (229.08; 262.95; 338.54; 271.32 days). This high variability indicates that stricter control of productivity and providing more favourable housing conditions can improve these properties. In Herd 1, sows had a longer IFM and lower average number of NBA and NWP compared to Herd 2. Between the Herds (1 and 2) there was a difference (P < 0.01) in regard to the properties of IFM and NWP of sows in the first parity.

Parity influenced significantly the variability of IFM (Table 2), this period was in particular longer in first parity sows in Herd 1 compared to sows with more parities (Table 3). The reason for long intervals is that gilts/first parity sows have not completed their growth, as well as a weaker condition of first parity sows after weaning. Therefore, it is necessary to mate the gilts for the first time when they reach sexual and physical maturity, which is difficult in the free housing system and uncontrolled conditions in practice. In regard to NWP, the sows in Herd 2 reared more pigs that the sows in Herd 1 (mainly owing to the result of 1st parity). Longer IFM in gilts/first parity sows (134.10 ± 13.79 days) was determined also in the study by Parunović (2012), however, the IFM value of gilts/first parity sows in our study was higher in the

*Table 3: Results of the comparison of LSMean values of reproductive traits between herds and according parities*

| Trait | | F | | | |
|-------|------|--------|--------|---------|---------|
|       |      | 1      | 2      | 3       | 4       |
| AM    | H₁   | 522.65 | 746.78 | 998.22  | 1188.75 |
|       | H₂   | 276.57 | 484.92 | 642.33  | 858.17  |
|       | P    | ***    | ***    | ***     | ***     |
| AF    | H₁   | 615.65 | 861.87 | 1113.11 | 1275.92 |
|       | H₂   | 386.57 | 598.92 | 774.57  | 1004.60 |
|       | P    | ***    | ***    | ***     | ***     |
| IFM   | H₁   | 139.46 | 78.09  | 68.27   | -       |
|       | H₂   | 66.52  | 68.87  | 59.80   | -       |
|       | P    | **     | ns     | ns      | -       |
| NWP   | H₁   | 2.92   | 4.13   | 4.01    | 4.25    |
|       | H₂   | 5.22   | 4.51   | 4.21    | 5.25    |
|       | P    | **     | ns     | ns      | ns      |

AM–age at mating, AF–age at farrowing, IFM–period farrowing-mating, NWP–number of weaned/reared piglets, H1–Herd 1, H2–Herd 2, F–farrowing (parity), *** P < 0.001, ** P < 0.01, ns–not significant

first and lower in the second herd. Litter size (NBA and NWP) in this study, in both herds, was lower compared to the survey by Miclea *et al.* (2012), in which the NBA was in the range from 7.17 to 8.10, and NWP from 6.67 to 7.39 in the first five parities. Low NWP (3.07–4.86) has also been reported in the research of Parunović (2012) for the first five parities; however, the NWP in this study, in the second herd, was higher.

## 4    CONCLUSION

Mangalitsa is one of the most important indigenous pig breeds in Serbia, and its low reproductive performances are reflected in late sexual maturity and low litter size. Poor housing conditions and uncontrolled mating, contribute to poor reproductive parameters in this swine population. The variability of fertility traits established in the present study indicates the possibility of genetic improvement. Regardless of low fertility, this breed has to be preserved as an important genetic resource and included in breeding and selection programs.

## 5    ACKNOWLEDGEMENT

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