

Growth Potential of Serbian Local Pig Breeds Mangalitsa and Moravka

Čedomir RADOVIĆ ¹(✉)

Milica PETROVIĆ ²

Radomir SAVIĆ ²

Marija GOGIĆ ¹

Miloš LUKIĆ ¹

Nikola STANIŠIĆ ¹

Marjeta ČANDEK-POTOKAR ³

Summary

The aim of this study was to examine the growth potential of indigenous pig breeds Mangalitsa (swallow bellied; n=12) and Moravka (n=10). The investigation included male castrates (surgical). Pigs were transferred from different farms to the institute's stable where pigs were housed. The fattening period started at an average weight of 24.3 kg and 173.1 days of age for Mangalitsa pigs and 29.9 and 170.8 days for Moravka pigs, respectively and finished at average weight of 115.5 kg and 357 days of age for Mangalitsa pigs and 131.3 kg and 363 days for Moravka pigs, respectively. During observation study Moravka pigs had 13% higher (but not significantly) growth rate than Mangalitsa breed (545 vs. 480 g/day, P=0.22). The maximal growth rate observed for Mangalitsa was 690 g and for Moravka 607 g in the period corresponding to average body weight (end of period) of 79 and 89 kg, respectively. Initial (at start of the study) difference in growth rate between Mangalitsa and Moravka was propagated along the study duration resulting in significant difference in body weight at slaughter (P<0.05).

Key words

complete feed mixture, fattening abilities, life gain, daily gain

¹ Institute for Animal Husbandry, Autoput 16, RS-11080 Belgrade-Zemun, Serbia

✉ e-mail: cedomirradovic.izs@gmail.com

² Faculty of Agriculture, University of Belgrade, Nemanjina 6, RS-11080 Belgrade-Zemun, Serbia

³ Agricultural Institute of Slovenia, Hacquetova ul. 17, SI-1000 Ljubljana, Slovenia

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Introduction

During the 19th century, pigs were the main export product in Serbia, especially in the northern part of the country (today's autonomous province of Vojvodina) and in the region of Šumadija (Central Serbia). In Šumadija, pigs were mostly fattened in the forests where they were searching for oak acorn and beech acorn and other forest feed resources. The majority of animals were exported to the former Austro-Hungarian empire. Nowadays, pig production is the most important livestock branch in the Republic of Serbia. Serbia has good environmental conditions for animal feed production (corn, barley, soybean and sunflower). Therefore, the pig sector is of importance. The great importance of pig sector is reflected in the fact that Serbia has very good conditions for animal feed production such as corn, barley, soybean and sunflower (Rajović and Bulatović 2014). Historically, in Serbia, Šiška was the most primitive breed of pigs, created by domestication of wild pigs (*Sus scrofa ferus*). Šiška is similar to wild boars' phenotype (Belić, 1951). Šiška once had enormous significance, in the relatively recent past (eighteenth century), not only in Serbia but also in Croatia, Slovenia, Hungary, Romania and Bulgaria. In the 19th century, also created by domestication of wild pigs (*Sus scrofa ferus*) reared in slightly better conditions, was created a new breed Šumadinka. Both of these breeds are lost in their original form. However, Šumadinka can be considered as an important ancestor of Mangalitsa. Today there are three indigenous pig breeds in Serbia: Mangalitsa, Moravka and Resavka. Considering that many small pig farms exist (to ten sows) in Serbia that cannot compete with big intensive farms (with a hundred and more sows). Small breeders are increasingly starting to grow indigenous breeds of pigs, in outdoor systems (organic pig farming, semi-intensive or intensive system) to produce meat and local products such as "Srem kulen" and "Sremska sausage", etc. Briznej (1949) reported an average daily gain of 125 g for the Mangalitsa piglets in the suckling period (until 8 weeks of age). Somewhat higher values for daily gain (138 g) were reported by Belić and Mitić (1954) for male piglets born in autumn (until 60 days of age). In case of diets with a high proportion of maize and barley at the end of the fattening period with 18 months, Briznej (1956) reported an average daily gain of 830 g for pigs of Mangalitsa breed. For Moravka pigs, Mitrović and Kostić (1954) recorded a daily gain of 600 g during winter fattening (61-124 kg), and during summer fattening (56 - 137 kg) a daily gain of 660 g, respectively. However, this is old data, while there is a lack of data on performance ability of the remaining stock of local pig breeds as preserved in the present phenotype. Also, their growth potential is not known, which is essential for improving the sustainability of productions systems with local pig breeds. Zekić et al. (2012) have established a life gain of 203 g for Mangalitsa breed of 100 kg body weight and life daily gain of 242 g of 132 kg body weight. Mangalitsa and Moravka are included in the EU research and innovation project TREASURE (www.treasure.kis.si), which is dealing with traditional genetic resources in which their potential for growth as well as the quality of their products is studied. The objective of this paper is to present first on growth potential two breeds Mangalitsa and Moravka fed *ad libitum* with the same complete feed mixture.

Material and methods

The study was carried out on the experimental pig farm of the Institute for Animal Husbandry, Belgrade, Serbia. Investigation included male castrates - surgical castrates of two breeds - Mangalitsa (swallow bellied; n=12) and Moravka (n=10). Pigs were not siblings and came from different farms (Mangalitsa; n=4 farms and Moravka; n=5 farms) from 12 different litters in Mangalitsa and 10 in Moravka breed. The study started at average weight of 24.2 kg and 173.1 days of age for Mangalitsa pigs and 29.9 and 170.8 days for Moravka pigs, respectively. Pigs were kept in groups in open housing system with each group confined to 190 m² (130 m² open section and 60.5 m² covered section). Pigs were slaughtered at an average body weight of 115.5 kg and 363 days of age for Mangalitsa pigs, and an average body weight of 131.3 kg at 357 days of age for Moravka pigs, respectively. During the entire experiment, animals were fed *ad libitum* a feed mixture with 12-13 MJ ME/kg; 13-15% crude protein according to production stage (Table 1). During the study, the pigs were weighed in equal intervals of a month, in total they were weighed 8-times. The data were statistically analyzed by ANOVA procedure of SAS package 9.1.3 (SAS Inst. Inc., 2002-2010), using the following model:

$$y_{ij} = \mu + B_i + \epsilon_{ij}$$

where: y_{ij} - observed growth trait, μ - general population average, B_i - fixed influence of the breed ($i=1,2$) and ϵ_{ij} - random error. Testing the homogeneity of variance was performed with Levene's test (Petrie and Watson, 2006). Differences between groups were assessed by Tukey test.

Table 1. The composition of complete feed mixtures

Ingredients (%)	I mixture (25-60 kg)	II mixture (60-100 kg)
Corn (dry)	63.27	69.15
Wheat flour	15.00	15.00
Soybean meal	13.90	9.00
Sunflower meal	5.00	4.00
Calcium carbonate	1.00	0.90
Dicalcium	0.90	1.00
Salt	0.43	0.45
Premix	0.50	0.50
MJ ME/kg	13.6	13.5
Protein, g/100 g	13.7	13.0
Lysine, g/100 g	0.66	0.55

Results and discussion

At the start of the study Moravka pigs were 5.6 kg (23%) heavier than Mangalitsa, denoting significant difference in growth rate prior to the start of the study which persisted along the study resulting in Moravka pigs being 15.8 kg (14%) heavier than Mangalitsa pigs at the end of the study (Figure 1).

Detailed data on growth rates of Mangalitsa and Moravka pigs fattened with complete feed mixtures are presented in Table 2. During the study, in overall, Moravka pigs exhibited higher average growth rate than Mangalitsa pigs (545 vs. 480

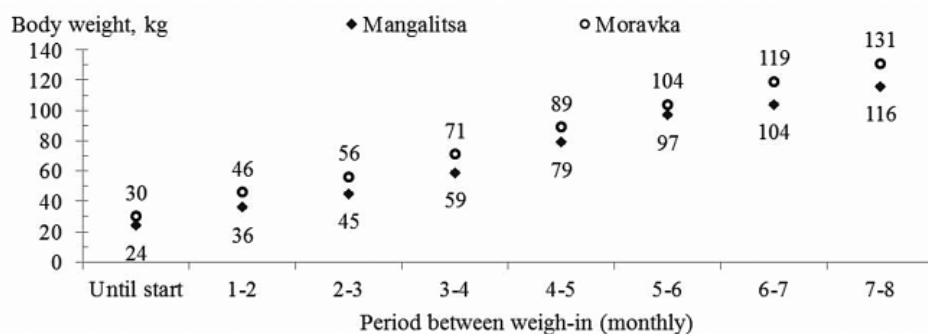


Figure 1. Body weight increase according to fattening period

Table 2. Average daily gain in Mangalitsa and Moravka pigs according to fattening period

Period	Average daily gain, g					Life time daily gain, g				
	Mangalitsa		Moravka		P-value	Mangalitsa		Moravka		P-value
	Mean	s.d.	Mean	s.d.		Mean	s.d.	Mean	s.d.	
Until start						141	39	184	52	0.0403
Weighing 1-2	367	172	466	150	0.1697	178	54	233	60	0.0350
Weighing 2-3	467	99	497	93	0.4726	204	52	257	57	0.0332
Weighing 3-4	515	134	568	124	0.3515	240	53	294	50	0.0239
Weighing 4-5	690	160	607	137	0.2134	287	36	328	47	0.0325
Weighing 5-6	333	106	483	111	0.0043	292	29	344	42	0.0026
Weighing 6-7	481	133	494	150	0.8396	309	25	358	37	0.0014
Weighing 7-8	439	116	459	261	0.8118	319	27	367	33	0.0012

s.d. standard deviation

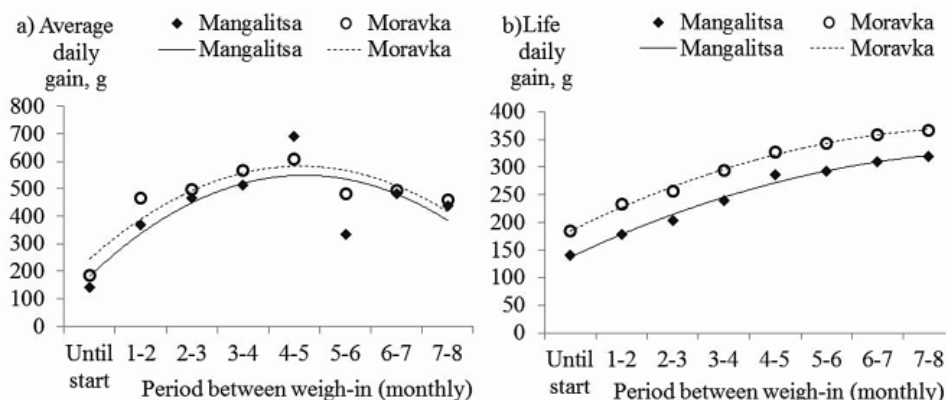


Figure 2. Average daily gain (a) and life time daily gain (b) of Mangalitsa and Moravka pigs in open housing system with complete feed mixture feeding

g/day, $P < 0.05$), in spite of no significant difference in either of partial period. In both breeds growth rate increased until 4th weigh-in, thereafter a decrease of average daily gain was noted (Figure 2a; Table 2).

Particularly strong reduction of growth rate was noted between weighing 5 and 6 (Table 2, Figure 2a) which took place in the summer time with very high temperatures in this period (up to 35°C). In this period, the pigs of Mangalitsa breed suffered from much greater reduction of growth rate (a decrease from 690 to 333 g/day) than Moravka pigs (a decrease from 607 to 483 g/day). Maximal growth rate was thus reached in both

breeds in the period between 4th and 5th weigh-in (as mentioned 607 and 690 g/day for Moravka and Mangalitsa, respectively) corresponding to the body weight (end of period) of 89 and 79 kg for Moravka and Mangalitsa pigs, respectively. Thereafter a decline of daily gain was noted in both breeds. Life time daily gain showed a continuous increase with weight and age in both breeds (Figure 2b) and it showed that initial difference in growth rate was propagated throughout the study.

Existing literature studies on growth performance of Mangalitsa and Moravka are not numerous. Živković and Kostić (1952) established average daily gain of 490 g in Moravka pigs fed

only corn between 55 kg to 115 kg body weight (with variations between pigs from 258-758 g), while another group in summer fattening fed concentrated mixture 85% corn+15% sunflower meal from 58-137 kg exhibited average daily gain 660 g (with variations between animals from 416-891 g) which is comparable with results of the present study. Higher growth rate for Mangalitsa than established in the present study was reported by Briznej (1956) for castrated males and castrated females of Mangalitsa breed in the intensive feeding with maize and barley (830 g/day for fattening period 59-158 kg). For Moravka pigs fattened between 32-94 kg, Petrovic *et al.* (2007) established daily gain of 385 g which may be compared to results in our study for the same breed (considering period between 30-90 kg the growth rate was 420 g/day; data not shown). In semi-intensive system, pigs of both sexes of Moravka breed, in a system of fattening with pasture and corn, Radović *et al.* (2017) reported growth rate of 369 g/day. Similarly, as in the present study, Radović *et al.* (2017) also report lower daily gain for Mangalitsa breed (268 g). Contrary to present study Petrović *et al.* (2011) observed no difference in growth rate between Mangalitsa and Moravka.

Conclusion

In the present study Moravka pigs exhibited slightly greater average daily gain than Mangalitsa breed which can be associated to the initial difference (at start of the study) in weight and growth rate which was propagated along the study duration. These are preliminary results and in continuation they will be related to feed (nutrient) intake in the corresponding periods. Carcass quality will be analysed to get a better insight into growth potential of these important Serbian local pig breeds.

References

- Belić J. (1951). Specijalna zootehnika (ovčarstvo i svinjarstvo). Naučna knjiga, Beograd, 1-376.
- Belić J., Mitić N. (1954). Broj prasadi jorkšira, bele i lasaste mangulice i njihovih meleza i porast istih do 2 meseca starosti. Arhiv za poljoprivredne nauke, VII, 16, 3-20.
- Briznej M. (1949). O prirastu prasadi lasaste mangulice. Stočarstvo, 1, 28-31.
- Briznej M. (1956). Poznavanje klaoničke vrijednosti lasaste mangulice. Stočarstvo, X, 11-12, 516-522.
- Mitrović D., Kostić J. (1954). Ispitivanje utroška hrane u zimskom tovu svinja. Arhiv za poljoprivredne nauke, Institut za stočarstvo NR Srbije-Zemun Polje, VII, 16, 46-58.
- Petrovic M., Mijatovic M., Radojkovic D., Radovic C., Marinkov G. and Stojanovic Lj. (2007). Genetic resources in pig breeding-Moravka. Biotechnology in Animal Husbandry, 23, 1-12.
- Petrović M., Radović Č., Mijatović M., Radojković D., Stanišić N., Parunović N. (2011). The share of tissues in pig carcass sides of autochthonous breeds depending on the body mass and sex. Biotechnology in Animal Husbandry, 27, 3, 561-569.
- Rajović G., Bulatović J. (2014): Status and Perspectives Livestock Production: The Case Region Polimlje-Ibar. International Letters of Natural Sciences, 6, 57-68.
- Radović Č., Petrović M., Parunović N., Radojković D., Savić R., Stanišić N., Gogić M. (2017). Carcass and pork quality traits of indigenous pure breeds (Mangalitsa, Moravka) and their cross-breeds. Indian Journal of Animal Research, 51, 2, 371-376.
- Zekić V., Tomović V., Milić D., Lukač D. (2012). Comparison of economic characteristics of porkers of Mangalitsa and Yorkshire race. Economics of Agriculture, 59, 4, 649-656.
- SAS Institute Inc (2002-2010). The SAS System for Windows, Cary, NC.
- Živković R., Kostić I. (1952). Iskorišćavanje hrane i tovnost crne i šarene svinje (moravke i resavke). Arhiva za poljoprivredne nauke, V, 8, 1-21.
- Petrie A., Watson P. F. 2006. Statistics for veterinary and animal science. Blackwell Publishing, second edition, 1-299.