

GENETIC RESOURCES IN PIG BREEDING - MORAVKA**

M. Petrović¹ *, M. Mijatović¹, D. Radojković¹, Č. Radović², G. Marinkov², Lj. Stojanović²

¹ University in Belgrade, Faculty of Agriculture, Belgrade-Zemun,

² Institute for Animal Husbandry, Belgrade-Zemun

Corresponding author:

*Milica Petrović, e-mail: milica@agrifaculty.bg.ac.yu

** Originalni naučni rad (Original scientific paper)

Research presented in the paper was financed by the Ministry of Agriculture, forestry and Water Management of Republic of Serbia

Abstract: Objective of the paper was to present characteristics of native/autochthonous pig breed Moravka, reared in the previous century, as well as results relating to activities such as collection, selection, identification and production performance of investigated heads in 2004. Moravka is one of three pig breeds in Serbia included in the programme of preservation of animal genetic resources.

Key words: animal genetic resources, pig, native autochthonous breed, Moravka

Introduction

Literature data show that activities in preservation of animal genetic resources were initiated in our country approximately ten years ago with different success and numerous problems which accompanied these activities on different levels.

In Republic of Serbia, three native/autochthonous pig breeds are registered: Mangulica, Moravka and Resavka. Two autochthonous breeds (Šiška and Šumadinka) are extinct (*Gajić et al.*, 1997). 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.

Traits of Moravka pig breed reared in the last century

Both breeds, Moravka and Resavka, were reared in the same region of Serbia, and were studied in comparative research (*Živković and Kostić, 1952b*). Objective related to import of Berkshire and Yorkshire pig breeds in our country, at the beginning of the twentieth century, was to rear them in pure breed and use for crossing i.e. improvement of Šumadinka. Set goal wasn't accomplished, because of inadequate conditions of care and nutrition. However, Berkshire breed influenced the development of pig production in the region around rivers Velika Morava, Mlava and Resava. From documents such as Report of the Committee submitted to the minister of people's economy of Serbia (1907), it can be seen that experts had focused their attention on purchasing of domestic pigs called "English Black Moravka". It is pig of black colour but with great individual differences in type, shape of the head and other body parts. Report of the Committee on purchasing/procurement of pigs, as stated by *Živković and Kostić (1952b)*, represents the first written document on Moravka breed. Future of the herd differed also because Committee gave several suggestions from purchasing of large White breed and Moravka for State livestock department in Ljubičevo. The Committee recommended that these breeds were to be reared in pure breed with providing of best possible conditions of housing and nutrition and application of strict selection measures. Also crossing of these breeds was recommended, but there is no data on whether any of the mentioned suggestions had been realized. Housing of Moravka and Resavka in Pomoravlje region wasn't that much different from other regions in Serbia. Pigs were housed in pig stables which were of low hygienic standard, but most of the day animals spent in orchards and around house. Rearing without specific plan and mating of animals, as well as non-systematic selection had affected production traits of Moravka and Resavka.

Morphological traits of Moravka – Pigs of this breed are black without any marks on the body. Body is covered with thicker or not so thick black hair which is smooth and straight. On lower body parts hair was thinner and on rump, neck and lower body parts hair was coarse and longer. Contrary to those, there are heads with bodies covered in rare and thin hair. The name for this type used among people was "naked Moravka pigs". It is pointed out that such heads were characterized with slow growth, often with exterior faults (sagged back and thin, gentle extremities). In herds of Moravka pigs there are also heads with red hair and white spots on snout, around hoofs and end of tail (influence of Berkshire). Skin is relatively thin and pigmented (black). They are medium size pigs. Head is long, narrow with slightly sagged profile. Cheeks are not so distinctly covered with muscle tissue. Ears are lop-eared and semi lop-eared. Neck is medium long also not so covered with muscle tissue. Carcass is relatively long with flat or slightly sagged back line.

Croup is slightly down. Along belly line there are 4-6 pairs of tits. Extremities are medium long, sometimes of considerably gentle built. Legs/hams are less covered with muscle tissue.

In table 1 body dimensions of heads of Moravka breed are presented. Body mass of boars and sows varies in wide interval (72-152 and 70-160kg). Rump height is by approximately 4% greater than height of withers which indicates **different built** of the animal. Carcass is by more than 32 i.e. 33% longer than height of withers. Breast depth (depth thoracic) in sows and boars makes 56,5 i.e. 56,2 % of the height of withers.

Tabela 1. Telesna razvijenost krmača i nerasta rase moravka starijih od 2 godine (Živković i Kostić, 1952b)

Table 1. Body development of sows and boars Moravka breed older than 2 years (Živković and Kostić, 1952b)

Osobina – Trait	Krmače - Sows		Nerasti –Boars	
	\bar{X}	SD	\bar{X}	SD
Telesna masa – Body weight (kg)	93,70	18,70	98,00	24,40
Visina grebena – Height withers (cm)	62,40	4,55	63,44	5,16
Visina krsta - Height rump (cm)	66,08	4,44	67,74	8,70
Dužina trupa – Body length(cm)	82,55	7,45	84,64	7,80
Dubina grudi – Depth thoracic (cm)	35,28	3,78	35,64	3,32
Širina grudi – Width thoracic (cm)	27,02	3,90	29,80	3,70
Obim grudi – Scope thoracic (cm)	107,02	10,45	112,20	12,70
Obim cevanice – Scope tibia (cm)	14,17	1,12	16,88	1,13

Sexual maturity of gilts is possible in age of 5-6 and breeding maturity in age of 10-12 months. Number of piglets in litters of sows varies from 5 to 12 i.e. 4 to 16 (Živković and Kostić, 1952b) or in average between 6 and 8 (Table 2). Fertility of sows varies in the same herd (Janković, 1948 cit. Belić et al., 1972, Čobić, 1949- cit. Belić et al., 1972 and Živković and Kostić, 1952b) but also depending on the breeding/mating method and season (Lalević, 1954). Number of born piglets in litter varies in years (6,60 – 7,20 i.e. 7,50 – 8,87 piglets) when mating methods used for sows and time of mating are the same (Lalević, 1954) as well as farrowing seasons (Lalević, 1953a).

Tabela 2. Veličina legla pri rođenju krmača rase moravka

Table 2. Litter size at birth of Moravka breed sows

Autor – Author	Broj rođene prasadi – Number born piglets
Janković (1948) - cit. Belić et al. (1972)	7,38
Čobić (1949) – cit. Belić et al. (1972)	6,00
Živković i Kostić (1952b)	8,64
Lalević (1954)	6,87 - 7,78

Body mass of piglets at birth varied from 1,16 (Živković and Kostić, 1952b) to 1,26 kg (Lalević, 1953b, Čobić, 1949-cit. Belić et al., 1972). At weaning in age of 60 days, average body weight of piglets was from 8,68 to 10,41 kg with differences relating to differences in rearing method during suckling period. In the period of lactation, piglets reared using alfalfa (Lalević, 1953b) increased their body weight at birth by 8,5 times (850%) and in stable rearing conditions less than 7 times (680%).

Average milk performance of sows of different ages, during lactation of 60 days, was 133,74 kg (Lalević, 1953a). The lowest yield of milk in lactation was determined in first farrowing sows (130,26 kg) and the highest in sows at the age of 2,5 years (135,92 kg). Yield of milk varies between individual animals of the same age in whole lactation and in lactation decades. Milk performance of sows increases from the first to the fourth i.e. fifth lactation decade (sows at the age of 4 years) and than it decreases.

Rearing of Moravka without specific plan (unplanned use in reproduction and inbreeding) before the Second World War, caused further weakening of constitution and production. Some measures were taken such as import of Cornwall pig and use of this breed for improvement of Moravka (Belić and Ognjanović, 1958). Positive results were achieved in improvement of the traits in their crosses. However, initiated work in improvement of people's pig production was very short lasting.

Identification, selection of heads and forming of pig herds of Moravka breed

According to literature data, the status of endangerment of Moravka and Resavka breeds is critical. There are no reliable data on size of population and the greatest number of heads of mentioned breeds wasn't included in the conservation program. This was one of the reasons to recommend the project for preservation of genetic basis of Moravka and Resavka breed.

In intent to preserve endangered breeds it is necessary to select sufficient number of representative animals and form herds in the breeding region. More animals in a herd provide less incidence of inbreeding in generations, but on the other hand increase the costs and burden the programme of the preservation of animal genetic resources. Activities relating to collection, selection and identification of heads of Moravka and Resavka breed and efforts for their preservation was continued in an organized manner in 2004 (Petrović et al., 2005).

First region where screening of situation was performed was in the villages of the Kuršumljia municipality and than in municipality of Topola. On the territory of Kuršumljia

municipality both pig breeds were identified as well as crosses with meat/fattening breeds. In group of Moravka pigs, heads with marks on the snout and lower legs were detected. Those heads were not confirmed/cleared to be included in the herd. Housing conditions, especially nutrition, have influenced the body condition of pigs in breeding. Fewer animals which were reared by breeders influenced the increase of inbreeding. Owners/keepers of pigs paid no attention to maturity and beginning of use of pigs in reproduction since animals mated freely without control. In this way, gilts farrowed their first litter before they were 12 months old. Also, mated again regardless of their condition, in other words soon after farrowing, which affected their condition and exploitation time (Figure 1). Body weight, i.e. body development of animals of both sexes at the beginning of their use was very variable. Rearing conditions of Moravka breed in municipality of Topola were better and therefore animals were in breeding and sometimes even in fattening condition (Figure 2).

On the territory of municipality Kuršumlija fewer animals of Resavka breed were identified (Figure 3) than of Moravka breed.

In forming of the herd also registering/marketing of breeding animals was carried out (boars at the beginning of their use and sows at their first farrowing) using plastic ear tags, and piglets were marked with mark on animal's ear. Special key for marking of animals' ears was suggested in order to identify litters and individually piglets in the litter. Two colours of ear marks were used, one colour for pigs from one region and the other colour for pigs from the other rearing region. Initial numbers used in marking of breeding pigs of Moravka and Resavka breed were different. Owners/keepers received documentation for main record keeping. Two herds of Moravka breed exist and forming of the third herd is in the progress. At the same time there are many activities regarding multiplication of the herd of Resavka breed.



Slika 1. Krmača rase moravka u slaboj kondiciji (selo Babice, opština Kuršumljija)
Figure 1. Sow of Moravka breed in poor condition (Babice village, municipality Kuršumljija)



Slika 2. Grla rase moravka (opština Topola)
Figure 2. Heads of Moravka breed (municipality Topola)

Slika 3. Grlo rase resavka (opština Kuršumljija)

Figure 3. Head of Resavka breed (municipality Kuršumljija)



Conditions of housing and nutrition: Pigs are kept around the house, in woods or orchards (Figure 5), which depends on the number of heads and size of the owner's farm/household. In the winter period, animals are housed in cheep, wooden pig sties (planks, branches of wood, sticks, etc.) (Figure 4). Rearing of pigs is extensive.



Slika 4. Tipovi svinjaca
Figure 4. Types of pig sties



Slika 5. Držanje svinja u svinjcu i na okućnici
Figure 5. Housing of pigs within pig sty and on farmstead

Nutrition of animals was also extensive with slight addition of grain feeds (maize). In ranges pigs were fed forest fruits, roots and acorns. Pigs were excellent in use of grazing.

Body development, reproductive and fattening traits of Moravka (rearing region – municipality of Kuršumljia)

Body development and production traits of Moravka pigs (herd in the village of Babice, municipality of Kuršumljia) are presented in table 3. Sows were 3 to 5 years old. Average body weight of sows was 77,67 kg and height of withers 63,83 cm.

Tabela 3. Telesna razvijenost i plodnost krmača rase moravka
Table 3 . Body development level and fertility of sows of Moravka breed

Osobina – Trait	$\bar{X} \pm SD$	Min - Max
Telesna masa - Body weight (kg)	77,67 ± 9,73	65 - 88
Visina grebena - Height of withers (cm)	63,83 ± 3,97	56 - 67
Ukupan broj sisa - Total number teats	11,8 ± 0,75	11 - 13
Broj rođene prasadi – Number of born piglets	7,20 ± 2,04	5 - 14

Body weight of sows was lower than body weight established by *Živković and Kostić* (1952b). However, absolute variation of body weight of sows in investigated herd was lower (9,73 to 18,70 kg) than the one determined by mentioned authors. Average height of withers was higher by approx. 1,43 cm than in sows registered in investigation of *Živković and Kostić* (1952b). Average value of total number of teats was 11,8 which indicates odd number along the belly line. Sows gave birth to average 7,20 piglets with variation from 5 to 14. It was established that fertility of sows was by 0,20 to 1,20 piglets higher than in conclusions by *Čobić* (1949) – cit. *Belić et al.* (1972) and *Lalević* (1953a, 1954). Contrary, it was by 0,18 to 1,44 piglets lower than determined in investigations by *Janković* (1948) – cit. *Belić et al.* (1972), *Lalevića* (1954) when pigs were reared using alfalfa and by *Živković and Kostić* (1952b).

Results of the investigation of the growth traits and use of maize in fattening of pigs of Moravka breed are presented in table 4. Fattening of pigs started at the age of 5 months and ended approx. at the age of 11,8 months. The first weighing of piglets (average

192 days) showed average body weight of 31,92 kg and the fifth weighing 94,33 kg with distinct individual differences. Scope of variation of body weight between heads in first weighing was 16,5 and in fifth 49,0 kg, which indicated presence of minus variants in the group, which influenced average demonstration of traits of all investigated animals.

Tabela 4. Tovne sposobnosti moravke
Table 4. Fattening abilities of Moravka

Merenje po redu – Order of weighing	Telesna masa – Body weight (kg) $\bar{X} \pm SD$	Min. – Max.	Dnevni prirast – Daily gain (g/dan, g/day)
1.	31,92 ± 7,27	25 – 41,5	-
2.	41,25 ± 7,72	33 – 52,5	311
3.	53,33 ± 8,71	41 – 64,5	390
4.	68,75 ± 13,42	53 – 86,0	514
5.	94,33 ± 20,48	67,5 – 116,5	360

Daily gain was the highest between 3rd and 4th weighing (514 g/day) which is in accordance with age of 253 to 283 days. However, during investigation period, average daily gain was 385g/day and feed conversion 3,74 kg of maize per kilogramme of gain of body weight.

Higher average daily gain of heads of Moravka breed (from 431 to 510g) was established by *Živković and Kostić* (1952a), *Belić and Ognjanović* (1958) and *Lalević* (1955). However, in conducted researches of mentioned authors pigs were fed prepared mixtures. In research of *Živković and Kostić* (1952a), one group of Moravka pigs was fed ground maize and average daily gain of these animals was 490g with variations between animals from 258 to 758g. In all stated studies feed conversion was higher (from 4,44 to 5,07 kg/kg gain).

Conclusion

In this paper, characteristics of native/autochthonous breed of pigs Moravka, reared in the last century, are presented, as well as results of activities in collection, selection, identification and production traits of heads of Moravka breed since 2004.

Average body weight of sows 3 to 5 years old was 77,67 kg and height of withers 63,83 cm. Sows farrowed in average 7,20 piglets with variation from 5 to 14.

In fattening from 31,92 to 94,33 kg average daily gain was 385g/day and feed conversion 3,74 kg of maize per kilogramme of gain of body weight. Average daily gain

was the highest between 3rd and 4th weighing (514 g/day) which is adequate to the age of 253 to 283 days.

Presented results show high variability of traits between individual animals of Moravka breed in investigated herd. Considering that herds were small, so far the main goal is their multiplication or increase of number of breeding animals using planned and controlled mating.

GENETIČKI RESURSI U SVINJARSTVU - MORAVKA

M. Petrović, M. Mijatović, D. Radojković, Č. Radović, G. Marinkov, Lj. Stojanović

Rezime

U našoj zemlji su evidentirane tri autohtone rase svinja: mangulica, moravka i resavka. Moravka i resavka su dve autohtone rase svinja koje su u opasnosti da nestanu, te su obuhvaćene programom očuvanja i održivog korišćenja.

U radu su prikazane karakteristike autohtone rase svinja moravka gajene u prošlom veku (Tabela 1 i 2) kao i rezultati rada na sakupljanju, odabiranju, identifikaciji i proizvodnim osobinama grla rase moravka od 2004. godine (Tabela 3 i 4).

Prosečna telesna masa krmača (u jednom zapatu) starosti od 3 do 5 godina, bila je 77,67 kg a visina grebena 63,83 cm. Krmače su oprasile prosečano 7,20 prasadi sa variranjem od 5 do 14.

U tovu od 31,92 do 94,33 kg prosečan dnevni prirast je bio 385g/dan a konverzija hrane 3,74 kg kukuruza za kilogram prirasta telesne mase. Prosečan dnevni prirast je bio najveći između 3. i 4. merenja (514 g/dan) što odgovara uzrastu od 253 do 283 dana.

Literatura

BELIĆ, J., GAJIĆ, Ž., ISAKOV, D., OGNJANOVIĆ, A., ŠTERK, V. (1972). Savremeno svinjarstvo, Privredni pregled, Beograd, 1-621.

BELIĆ, J., OGNJANOVIĆ, A. (1958). Poboljšanje tovnosti i klanične vrednosti moravke ukrštanjem s kornval rasom svinja. Arhiv za poljoprivredne nauke, XI, 34, 3-22.

GAJIĆ, Ž., ISAKOV, V., PUŠIĆ, M., MIJATOVIĆ, M., MAJOR, F. (1997). Genetički resursi u svinjarstvu. Savremena poljoprivreda, 46, 1-2, 229-237.

LALEVIĆ, D. (1953a). Prilog poznavanju mlečnosti svinje moravka. Arhiv za poljoprivredne nauke, VI, 13-14, 123-136.

- LALEVIĆ, D. (1953b). Uticaj paše na lucerki na porast težine prasadi moravke. Zbornik radova Poljoprivrednog fakulteta, I, 2, 2-10.
- LALEVIĆ, D. (1954). Uticaj načina i vremena pripusta na plodnost krmača. Zbornik radova Poljoprivrednog fakulteta, II, 1, 1-7.
- LALEVIĆ, D. (1955). Prilog poznavanju tovnne sposobnosti i klanične vrednosti svinja moravke. Zbornik radova Poljoprivrednog fakulteta, III, 2, 175-184.
- PETROVIĆ, M., MIJATOVIĆ, M., RADOJKOVIĆ, D. (2005). Sakupljanje, odabiranje i identifikacija grla rase moravka i resavka i rad na njihovom očuvanju. Izveštaj, Poljoprivredni fakultet, Zemun, 1-20.
- ŽIVKOVIĆ, R., KOSTIĆ, J. (1952a). Iskorišćavanje hrane i tovnost crne i šarene svinje (moravke i resavke). Arhiv za poljoprivredne nauke, V, 8, 1-21.
- ŽIVKOVIĆ, R., KOSTIĆ, J. (1952b). Prilog poznavanju crne i šarene svinje (moravke i resavke). Arhiv za poljoprivredne nauke, V, 10, 23-46.