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Growth of the Krškopolje pig

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Abstract. The Krškopolje pig or blackbelted pig is the only indigenous pig breed in Slovenia. It shows good adaptability to poor feeding and environmental conditions. The breed had an average fertility, a good appetite and high growth ability. The breed is known for its good meat quality, suitable for dried meat products. In our study 40 pigs were included, 22 gilts and 18 barrows. The pigs were kept in one group on bedding (mostly straw) and they were fed with a restricted concentrate and hay at will. At housing, pigs were 140 days old and weighed on average 50 kg. The fixed part of the model for weight included sex, season and age. Age nested within animal and animal was treated as random effect. For daily gain the model included sex and season as fixed part and animal was treated as random effect. At the age 340 days animals weighed an average of 150 kg. Average daily gain during the test ranged between 370 and 780 g, varied depending on the season. Animals, heavier in the beginning, are generally more likely to gain weight, until slaughter. Based on the results we can say that the Krškopolje pigs are suitable for fattening to greater weight.

Keywords. .Pig – Krškopolje pig – Growth – Slovenia.

La croissance du porc Krškopolje

Résumé. Le porc Kraškopolje est l'unique race de cochon autochtone en Slovénie. Il a démontré une grande adaptabilité à des conditions environnementales et alimentaires pauvres. Cette race se caractérise par une fertilité moyenne ainsi que par un bon appétit et une bonne croissance. La viande de ces cochons est de bonne qualité et se prête bien au produit fabriqué à partir de viande sèche. Dans notre étude, 40 cochons ont été inclus, 22 jeunes femelles (âge <2 ans et n'ayant pas encore été gestantes) et 18 mâles castrés. L'ensemble des porcs constituait un groupe disposant de litière (principalement de la paille) et ils ont été nourris avec un régime restrictif composé d'un mélange de grain (orge, maïs et blé) ainsi que par du foin ad libitum. Au moment de la stabulation, les porcs étaient âgés de 140 jours et leur poids moyen était de 50 kg. Concernant notre étude de variation de poids, le sexe, la saison et l'âge ont été considérés comme des variables fixes. L'âge emboîté dans l'animal, ainsi que l'animal, ont été traités en tant qu'effets aléatoires. Pour les études de gain de poids journalier, notre modèle considère le sexe et la saison comme des variables fixes et l'animal comme effet aléatoire. A l'âge de 340 jours, les animaux pesaient 150 kg en moyenne. Le gain de poids par jour, durant l'expérience, oscillait entre 370 et 780 g avec des variations dépendantes de la saison. Aucune différence n'a été notée entre les mâles et les femelles. Les animaux plus lourds au début de l'expérience ont connu une croissance supérieure aux autres et ce jusqu'à abattage. En nous basant sur l'ensemble de ces résultats, nous pouvons conclure que le porc Kraškopolje est approprié pour l'engraissement de par sa bonne augmentation de poids.

Mots-clés. Cochon – Porc Kraškopolje – Croissance – Slovénie.

I – Introduction

The Krškopolje pig is the only preserved indigenous pig breed in Slovenia. The Slovenian indigenous pig is black, with white unbroken belt over the shoulders and down to both front feet (Fig. 1). Under extensive management, it shows good adaptability to poor feeding and breeding conditions (Šalehar, 1994). The breed was formed and developed under the influence of the environment, animal husbandry, selection, and domestic economic conditions. The breed has an average fertility, relatively high losses, a good appetite and growth ability. Adult animals weigh 250-300 kg.



Fig. 1. The Krškopolje pig (Foto: Š. Malovrh).

Between 1970 and 1990, the Krškopolje breed was more than ever, left to itself. During this time, there wasn't any systematic breeding work. There were some uncontrolled integration of other breeds used for mating due to low number of sires. In 1990 the breed reconstruction began by increasing the population size and setting up a breeding program (Šalehar *et al.*, 1992). German Saddleback was included in 2003 in order to reduce the high risk of inbreeding (Šalehar, 2008).

The high amount of intramuscular fat, marbling and darker color have been highlighted as some of the most relevant quality aspects in muscles from Krškopolje pigs (Eiselt and Ferjan, 1972; Čandek-Potokar *et al.*, 2003; Furman *et al.*, 2010). Because of these properties the meat of Krškopolje pigs is suitable for processing into dry-cured products. Krškopolje dry-cured products are valuable Slovenian traditional meat products. Unfortunately, the Krškopolje pigs cannot be reared intensively because they become too fatty (Furman *et al.*, 2010).

The objective of this study was to examine the growth of the Krškopolje pigs breed.

II – Materials and methods

In the experiment, 40 Krškopolje pigs were included, 18 barrows and 22 gilts. All animals were raised on the same farm. The pigs were kept in one group on bedding (mostly straw) and they were fed with a restricted concentrate (wheat, barley, maize with vitamin mineral supplement) and hay at will. Animals were given water in the sink, which was cleaned twice daily and filled with fresh water. The area of pen was 150 m², which means 3.75 m² per animal. Barn, where pigs have been established, had a foreign climate.

At housing, pigs were 138.5 days old and weighed on average 48.9 kg (Table 1). The gilts were on average slightly lighter and for 2.9 days younger than barrows. At slaughter the average body weight of animals was 139 kg at the age 297.8 days. At the time of slaughter gilts were on average 4 kg heavier.

Table 1. Average age and weight with standard deviation for the pigs at the beginning of the experiment and before slaughter

	Beginning of the experiment		End of the experiment	
	Age (day)	Body weight (kg)	Age (day)	Body weight (kg)
Together	138.5 ± 11.8	48.9 ± 7.5	297.8 ± 33.1	139.0 ± 16.4
Barrows	136.9 ± 12.9	49.2 ± 8.3	288.3 ± 33.5	136.9 ± 17.2
Gilts	139.8 ± 11.0	48.8 ± 6.9	305.5 ± 31.5	140.7 ± 16.0

The fixed part of the model for weight included gender (G_i), season (S_j) and age (equation 1). Age nested within animal and animal was treated as random effect.

$$y_{ijk} = \mu + G_i + S_j + b_{ij}(x_{ijk} - \bar{x}) + a_{ijk} + e_{ijk} \quad (1)$$

For daily gain the model included gender and season as fixed part and animal was treated as random effect (equation 2).

$$y_{ijk} = \mu + G_i + S_j + a_{ijk} + e_{ijk} \quad (2)$$

In matrix notation, Eq. 1 and Eq. 2 can be written as: $\mathbf{y} = \mathbf{X}\beta + \mathbf{Z}_a\mathbf{a} + \mathbf{e}$

where the vectors \mathbf{y} , \mathbf{a} and \mathbf{e} are assumed to have the following structure of the expected value and variance:

$$E \begin{bmatrix} \mathbf{y} \\ \mathbf{a} \\ \mathbf{e} \end{bmatrix} = \begin{bmatrix} \mathbf{X}\beta \\ \mathbf{0} \\ \mathbf{0} \end{bmatrix}; V = \begin{bmatrix} \mathbf{a} \\ \mathbf{e} \end{bmatrix} = \begin{bmatrix} \mathbf{I}_a\sigma_a^2 & \mathbf{0} \\ \mathbf{0} & \mathbf{I}_e\sigma_e^2 \end{bmatrix}$$

Data were processed in the SAS statistical package (SAS Inst. Inc., 2001). Restricted likelihood method (REML) was used for linear mixed model.

III – Results

Season, age and animal were statistically significant in the model for body weight (Table 2). Age was the model for body weight included as a linear regression. Only season was proved as statistically significant as the model for the average daily gain. Animal and gender were not statistically significant.

Table 2. P-values of effect in model for body weight and daily gain

Effect	Body weight	Daily gain
Gender	0.5286	0.4767
Season	<0.0001	<0.0001
Age	<0.0001	/
Animal	<0.0001	0.1821

The biggest difference in body weight between the sexes at the age of 300 days, but differences were statistically insignificant, however.

Statistically significant effect of animals tells us that the animals had increased body weight at the start, usually before reaching a body weight that we want to slaughter (Fig. 2). At the age of about 140 days the average weight of animals was 50 kg and 150 kg at the age 340 days.

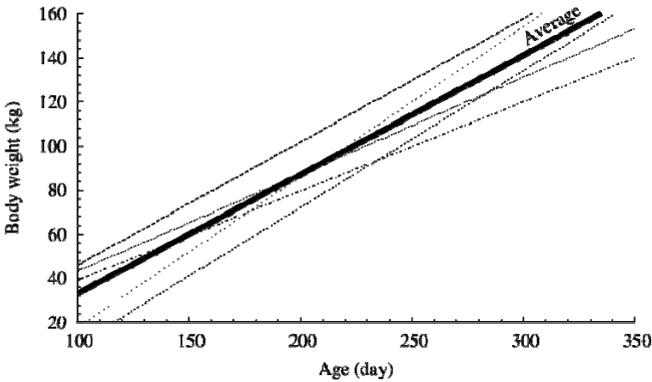


Fig. 2. Growth curve for individual animals.

In the literature, we identified records experiments where Krškopolje pigs fattened at lower body weight than we fattened pigs in our experiment. In one experiment, pre-slaughter pigs weighing between 110 and 167 kg (Kastelic, 2001). Otherwise, the weight at slaughter was between 107.8 kg (Ferjan, 1969) and 117.7 kg (Eiselt and Ferjan, 1972).

Daily gain was highest at around 60 kg body weight. During this period, the average daily gain was 727 (gilts) and 781 g per day (barrows). A smaller daily gains, below 400 g per day, were at about 100 kg body weight. During this period the temperature was below freezing barn so the pigs needed more energy to maintain body temperature.

Solid daily gain (over 550 g/day) was also at 150 kg body weight. Daily gain varies between season, which in this case represents the sequence weighting. The seasonal variations is presented - as an exception to the rest of the first season (Fig. 3). Calculated daily gain was not comparable with the Krškopolje breed pigs which were in the experiment growth rate of 39 to 132 kg weight .In this case, the average increment was 1003 g per day.

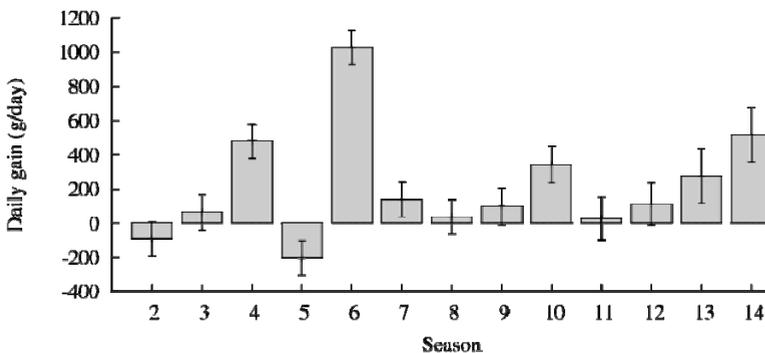


Fig. 3. Daily gain, depending on the season.

Daily gain of the Krškopolje pigs in our experiment can be compared with the increment in the experiment that was carried out by Krhin (1959), where average daily gain was 550 g per day. The average daily gain of the Krškopolje pigs was estimated at the 461 g per day (Ferjan, 1969) and 432 g per day (Eiselt and Ferjan, 1972). In both cases, the pigs increment was worse than in our experiment.

IV – Conclusions

Indigenous breeds have become an integral part of biodiversity, which makes the Krškopolje pig, as the only Slovenian indigenous pig breed, to gain in importance. There are little data on slaughter and fattening characteristics for this breed. Body mass varied both between animals and by age. There were no statistically significant differences between gender. All animals at slaughter exceeded 120 kg. In our experiment, daily gain of the Krškopolje pig was on average 557 g. Based on the results of the experiment it can be argued that the observed Krškopolje pigs are suitable for fattening at the greater weight.

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