

## EFFECT OF LINSEED IN PIG DIET ON CARCASS VALUE AND MEAT QUALITY IN PREŠTICE BLACK-PIED BREED

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### Abstract

The quality of meat is influenced by many factors ranging from piglet rearing to the final mechanisms of meat processing. External factors determining the quality also include nutrition. The aim of the study was to evaluate the effect of linseed in diet of fattening Preštice Black-Pied pigs on their carcass value and meat quality. Sixteen Preštice Black-Pied pigs were divided into two groups and fed control diet (group C) and diet with 7 % of linseed addition (group L). The experiment started three months before slaughter. The intake of feed mixture and water was *ad libitum*. The average final live weight was  $114.13 \pm 10.09$  kg (C group) and  $110.00 \pm 9.46$  kg (L group). The carcass value and growth parameters (daily weight gain, lean meat content and backfat thickness) and meat quality (drip loss, intramuscular fat content, cholesterol content and meat colour values -  $L^*$  lightness;  $a^*$  redness;  $b^*$  yellowness) were determined. The carcass value was not affected by linseed addition into feed mixture ( $P > 0.05$ ). Intramuscular fat content was decreased in linseed fed pigs ( $1.94 \pm 0.37$  %) compared to control group ( $2.32 \pm 0.71$  %). There were no statistically significant differences ( $P > 0.05$ ) in drip loss parameter between groups ( $2.37 \pm 0.34$  % in C group,  $2.51 \pm 0.29$  % in L group), colour parameters and cholesterol content ( $74.68 \pm 3.13$  mg in C group,  $77.36 \pm 6.91$  mg in L group). Addition of linseed to feed mixture for fattening pigs can increase lean meat content but together with this improvement the decrease of intramuscular fat below recommended level (2.5 %) is monitored.

**Key Words:** Preštice Black Pied pig, linseed, carcass value, meat quality

Pork meat is generally recognised as a food with relevant nutritional properties because of its high content in proteins of high biological value, rich in essential amino acids, as well as group B vitamins, minerals especially heme iron, trace elements and other bioactive compounds. But pork meat also contributes to the intake of fat, saturated fatty acids, cholesterol, and other substances that, in inappropriate amounts, may result in negative physiologically effects (Reig et al., 2013). The quality of meat is influenced by many factors ranging from piglet rearing to the final mechanisms of meat processing. External factors determining the quality also include nutrition. Feed mixture based on cereals provides n-6 fatty acids and only small amount of n-3 polyunsaturated fatty acids. The components with higher proportion of n-3 fatty acids must be added to feed in order to change fatty acid profile. In pig diet, an emphasis is laid on the omega-3 fatty acids in fish oil and vegetable oils (soy, olive, linseed, sunflower and rapeseed). An interest in the composition of fatty acids of meat stems mainly from the need to find ways of producing healthier meat, i.e. with a higher ratio of polyunsaturated fatty acids (PUFA) to saturated fatty acids (SFA) and a more favourable balance between n-6 and n-3 PUFA (Wood et al., 2004).

Preštice Black-Pied pig is Czech national breed. The importance of this breed lies in its good reproduction performance, adaptability, good vitality and resistance to diseases. The breed is characterised by higher backfat thickness and very good meat quality (Lustykova et al., 2008).

The aim of the study was to evaluate the effect of linseed in diet of fattening Preštice Black-Pied pigs on their carcass value and meat quality.

### Material and Methods

Sixteen Preštice Black-Pied pigs were divided into two

groups and fed control diet (group C) and diet with 7 % of linseed addition (group L). The control feed mixture was characterized by 2.81 rel. % of omega 3 polyunsaturated fatty acids (PUFA) and omega6/omega 3 PUFA ratio 9.39. In experimental feed mixture was determined 12.06 rel. % of omega 3 PUFA and omega6/omega 3 PUFA ratio 2.78. The experiment started three months before slaughter. The intake of feed mixture and water was *ad libitum*. The average initial live weight was  $73.88 \pm 8.49$  kg in C group and  $71.75 \pm 8.14$  kg in L group, average final live weight was  $114.13 \pm 10.09$  kg (C group) and  $110.00 \pm 9.46$  kg (L group).

The carcass value and growth parameters (daily weight gain, lean meat content and backfat thickness) and meat quality (drip loss, intramuscular fat content, cholesterol content and meat colour values -  $L^*$  lightness;  $a^*$  redness;  $b^*$  yellowness) were determined. Intramuscular fat content was determined by ether extraction according to ČSN 570185.

The statistical evaluation was performed using the computer program QCExpert (TriloByte Statistical Software Ltd.). Data were presented as the mean, standard deviation (SD) of each group and the significance levels.

### Results and Discussion

The results of the experiment are illustrated in Table 1. The carcass value was not affected by linseed addition into feed mixture ( $P > 0.05$ ). The average daily gain was found higher in control group ( $759.43 \pm 111.28$  g) compared to L group ( $721.69 \pm 87.19$  g) but there was no significant difference between control and experimental group (Figure 1). The lean meat proportion was measured higher ( $53.14 \pm 2.04$  %) and backfat thickness lower ( $21.10 \pm 2.45$  mm) in L group (Figure 2, Figure 3). The average lean meat content in carcass is 55.8 % in the Czech Republic (Hyšplerová et al., 2013). According to Nuernberg et al. (2005) linseed treatment does not affect growth and carcass traits. Our

results conform to these findings. Huang et al. (2008) found increased intramuscular fat content in pigs fed linseed diet. Dostálová et al. (2012) mentioned intramuscular fat content in Přeštice pigs from conventional rearing system at the level of 1.73 %. In our experiment, intramuscular fat content was decreased in linseed fed pigs ( $1.94 \pm 0.37$  %) compared to control group ( $2.32 \pm 0.71$  %). Similarly, there were no statistically significant differences ( $P > 0.05$ ) in drip loss parameter between groups ( $2.37 \pm 0.34$  % in C group,  $2.51 \pm 0.29$  % in L group).

It is possible to enhance the concentration of beneficial omega 3 PUFA in pig tissues through the use of different fat sources in feed because lipids in the meat of monogastric animals reflect the nature of dietary fat (Wood et al., 2003).

But the technological and sensory characteristics of pork meat are affected by its fatty acid profile. The dietary supplementation of omega 3 PUFA leads to meat suitable for fresh consumption but not for long time cured pork, due to oxidative phenomena (Cannata et al., 2010). According Morell et al. (2013) supplementation of feed mixture with different fatty acids did not affect intramuscular fat content and colour measurements.

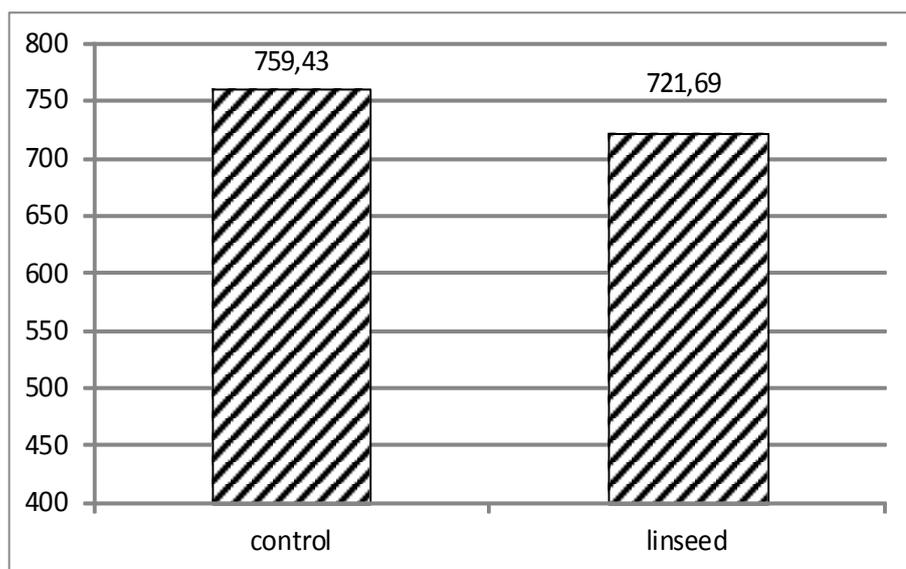
Cholesterol content in meat was found higher in L group ( $77.36 \pm 6.91$  mg/100 g of sample). Stajić et al. (2011) found that meat and fat from primitive breeds contain less cholesterol than those of modern breeds. There is also a trend to use the meat of autochthonous breeds for the production of traditional products. They compared cholesterol content in meat of Mangalica breed and Landrace breed.

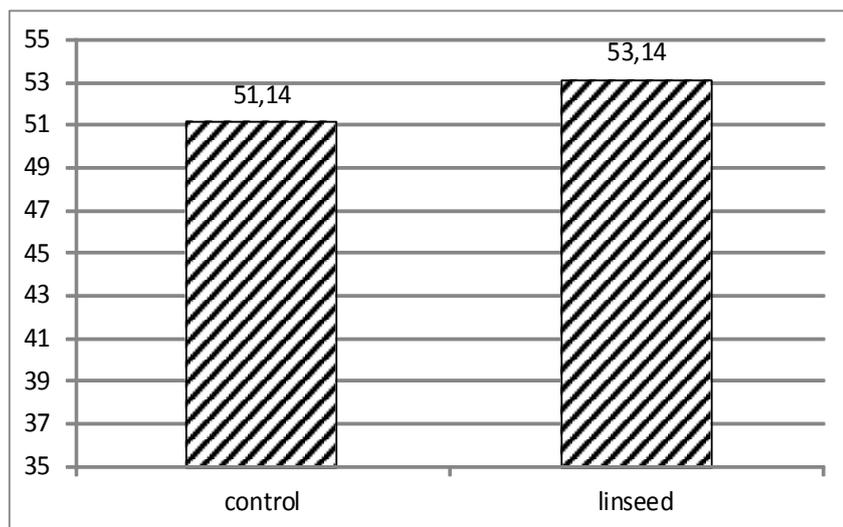
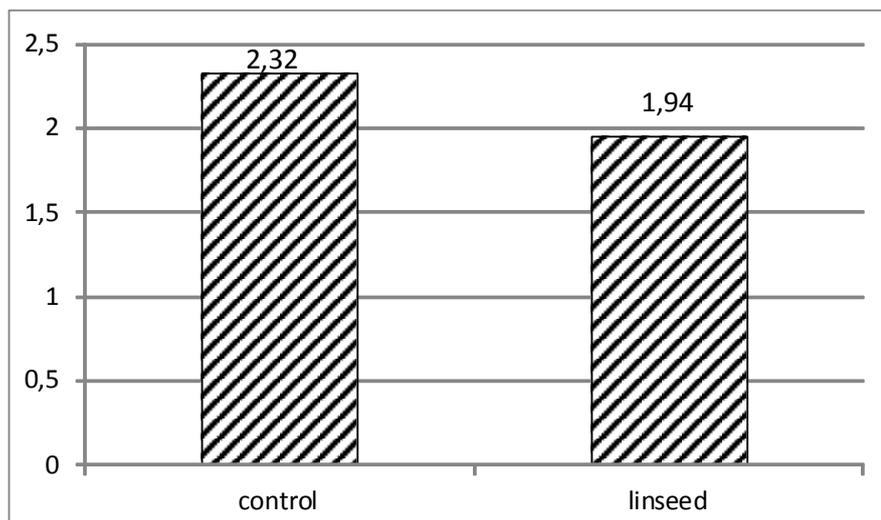
**Table 1. Carcass value and meat quality in control and experimental groups of Přeštice pigs**

	Group		Statistical significance
	C	L	
Weight gain (g/day)	$759.43 \pm 111.28$	$721.69 \pm 87.19$	NS
Lean meat (%)	$51.14 \pm 2.22$	$53.14 \pm 2.04$	NS
Backfat thickness (mm)	$23.42 \pm 2.78$	$21.10 \pm 2.45$	NS
Intramuscular fat (%)	$2.32 \pm 0.71$	$1.94 \pm 0.37$	NS
Drip loss (%)	$2.37 \pm 0.34$	$2.51 \pm 0.29$	NS
Colour L*	$51.10 \pm 4.99$	$54.89 \pm 3.41$	NS
a*	$-0.84 \pm 1.18$	$-0.98 \pm 0.96$	NS
b*	$10.43 \pm 1.51$	$11.17 \pm 1.10$	NS
Cholesterol content (mg/100 g)	$74.68 \pm 3.13$	$77.36 \pm 6.91$	NS

NS - differences are not statistically significant

**Figure 1. Average daily weight gain (g/day) in control and linseed fed pigs**



**Figure 2. Lean meat content (%) in control and linseed fed pigs****Figure 3. Intramuscular fat content in control and linseed fed pigs**

## Conclusion

The average lean meat content in carcass is 55.8 % in the Czech Republic. Prestice Black Pied breed does not reach the average result and cannot compete with modern hybrid pigs. Addition of linseed to feed mixture for fattening pigs can increase lean meat content but together with this improvement the decrease of intramuscular fat below recommended level (2.5 %) is monitored.

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