

EFFECT OF CLA AND SUNFLOWER OIL IN PIG DIET ON CARCASS VALUE TRAITS AND MEAT QUALITY

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Abstract

The aim of the study was to evaluate the effect of conjugated linoleic acid (CLA) and sunflower oil addition to pig diet on carcass value traits and meat quality. Three feed mixtures were used in the experiment – feed mixture with 2 % of CLA (CLA), feed mixture with 2 % of sunflower oil (S) and control (C) group. The weight of carcass body, % of lean meat, pH₁, pH₂₄ and drip loss were monitored in control and experimental groups. Significant difference (P<0.05) in carcass body weight was found between S (96.60 ± 0.98 kg) and C group (91.58 ± 1.25 kg). Lean meat percentage was not statistically different among groups (P>0.05). The results from meat quality analyses showed only minimal differences in pH₁ value among groups (P>0.05). However, there was significantly (P<0.05, P<0.001) lower pH₂₄ value in S group (5.64 ± 0.01) compared to CLA (5.75 ± 0.02) and C (5.78 ± 0.03) group. The effect of gender on monitored carcass value traits and meat quality traits was significant only for lean meat percentage.

Key Words: Pigs, carcass, meat quality, CLA, sunflower oil

Pork has been competitive on meat market for long time, especially thanks to its physiochemical and culinary properties. These properties are influenced by different exogenous and endogenous factors. The composition of feed mixture is one of the major factors, it is able to effect the most important parameters of meat quality. The addition of conjugated linoleic acid to pig diet and its effect on productive traits has been studied recently. Vaclavkova and Beckova (2009) mentioned a positive effect of CLA on growth parameters of pigs and pork quality.

A positive influence of CLA in pig diet on a growth ability found Thiel-Cooper et al. (2001). The significant effect of CLA on carcass body weight is mentioned by Lauridsen et al. (2005). Pigs fed CLA had a higher content of lean meat in carcass body in the study of Tischendorf et al. (2002). The difference between CLA fed pigs and control pigs was 2 % of lean meat. Su et al. (2006) also found a significant effect of CLA on lean meat content. On the contrary, in many studies there was found any significant impact of feeding CLA on growth parameters of pigs (Ramsey et al., 2001; Gatlin et al., 2002; Wiegand et al., 2002; Lauridsen et al., 2005; Cechova et al., 2009). Bee et al. (2001) studied the effect of CLA diet on meat quality. They did not found a significant difference in drip loss between experimental and control group. Lauridsen et al. (2005) monitored effect of CLA diet on meat quality parameters-pH₁, pH₂₄ and drip loss. They also did not found significant action of the diet. Joo et al. (2002) and Tischendorf et al. (2002) also mentioned the same result. The influence of CLA in pig diet on meat quality was also studied by Corino et al. (2001, 2007).

Material and Methods

The experiment was carried out in farm condition. Pigs (N=116) were divided into 3 groups-two experimental and one control group. Pigs were housed in common fattening stable and were fed with standard feed mixture for fattening pigs. The live weight of pigs were investigated at the beginning of the experiment. Than pigs were divided into three groups according the design described in Table 1.

Pigs were fed *semi ad libitum* twice a day. The experiment started at the average live weight of pigs 80 kg. The samples of *M.longissimus lumborum et thoracis* for laboratory analysis were collected 24 h *post mortem*. After slaughter were measured following parameters:

- Weight of carcass body
- Lean meat percentage – FOM
- pH₁ – 45 min *post mortem*
- pH₂₄ – 24 h *post mortem*
- Drip loss

The results were processed by PC program STATISTICA ver.8.

Results and Discussion

The basic statistical parameters of carcass body and meat quality are given in Table 2. Pigs fed with sunflower oil feed mixture achieved the highest weight of carcass body (96,60 ± 6,22 kg), the lowest carcass body weight (91,58 ± 7,51 kg) was found in control group (Figure 1). The difference between S and C group was statistically significant (P<0,05).

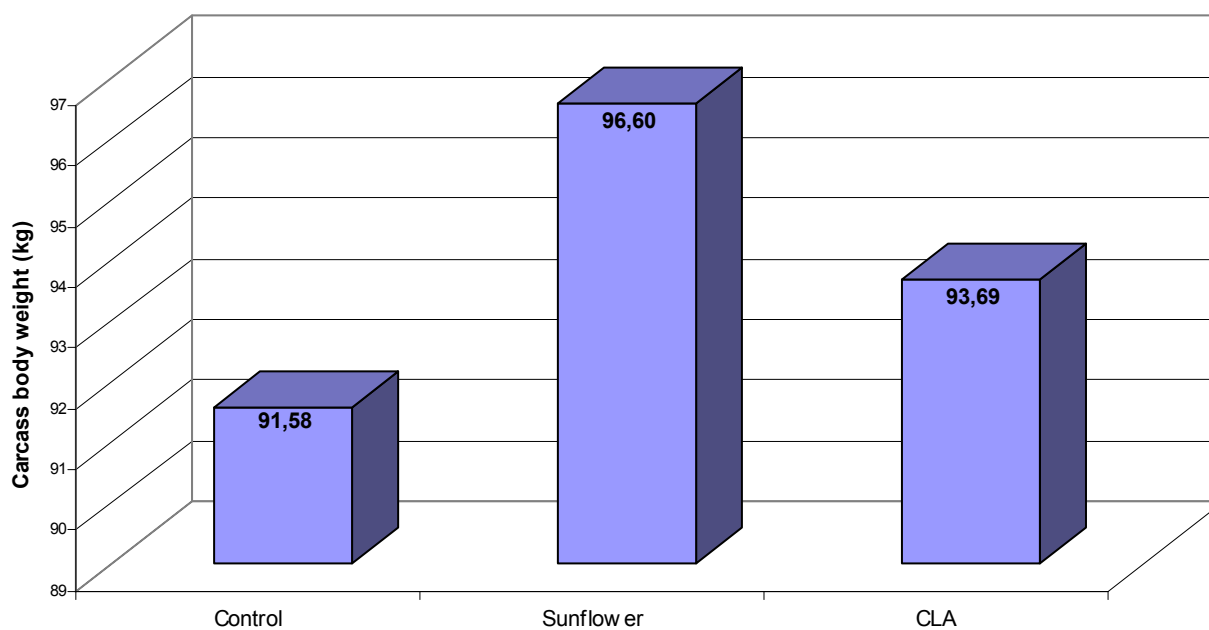
Table 1. The design of the experiment-number of pigs and feed mixture composition

	Group		
	Control (C)	Sunflower (S)	CLA
	N=36 (19 gilts and 17 barrows)	N= 40 (20 gilts and 20 barrows)	N= 40 (20 gilts and 20 barrows)
Wheat (%)	10,0	10,0	10,0
Wheat bran (%)	10,0	10,0	10,0
Soya oil meat (%)	10,0	10,0	10,0
Mikrop A1-CDP-19 (%)	2,6	2,6	2,6
Maize (%)	67,4	65,4	65,4
Sunflower oil (%)	-	2,0	-
CLA (%)	-	-	2,0

Table 2. Carcass value traits and parameters of meat quality in control and experimental groups

Trait	C (n=36)	S (n=40)	CLA (n=40)
Carcass body weight (kg)	91,58 ± 7,51 ^a	96,60 ± 6,22 ^a	93,69 ± 7,25
Lean meat %	57,99 ± 2,03	58,26 ± 2,70	57,63 ± 2,65
pH ₁	6,12 ± 0,25	6,09 ± 0,33	6,22 ± 0,31
pH ₂₄	5,78 0,20 ^c	5,64 0,07 ^{b,c}	5,75 0,15 ^b
Drip loss (%)	2,54 ± 1,03	2,84 ± 0,96	2,48 ± 0,74

P<0,05 ^{a,b} P<0,001 ^c

Figure 1. Carcass body weight in control, sunflower and CLA group

Average carcass body weight in CLA group was measured at $93,69 \pm 7,25$ kg ($P>0,05$). Schinkel et al. (2000) found similar result in their experiment with two groups of sows, they did not observed a significant effect of CLA on growth ability of pigs. On the contrary, Thiel-Cooper et al. (2001) mentioned a positive influence of CLA on growth ability and Lauridsen et al. (2005) also found a significant effect of CLA on carcass body weight.

The percentage of lean meat in carcass body was not influenced by type of feed mixture in our experiment ($P>0,05$). The CLA group showed only slightly lower content of lean meat ($57,63 \pm 2,65$ %) in comparison with S group ($58,26 \pm 2,70$ %) and C group ($57,99 \pm 2,03$ %). Schinckel et al. (2000), Tischendorf et al. (2002) and Su et al. (2006) present a higher lean meat content after CLA addition to pig diet.

The parameters of meat quality - pH₁, pH₂₄ and drip loss - were investigated in our experiment. There were found only minimal differences ($P>0,05$) in pH₁ value among control and experimental groups (Table 2). The highest pH₁ value was measured in CLA group ($6,22 \pm 0,31$).

Value of pH₂₄ showed significant differences ($P<0,05$; $P<0,001$) among groups – the highest pH₂₄ was found in C group ($5,78 \pm 0,20$), the lowest in S group ($5,64 \pm 0,07$). Friesen et al. (1994) observed that CLA in feed mixture had significantly declined pH₂₄ value.

The analysis of results was also performed in reference to the gender of pigs. Table 3 shows records of carcass body weight, lean meat percentage and meat quality obtained in control and experimental groups. The statistically significant difference between gilts and barrows in lean meat percentage was found in C ($P<0,05$), S ($P<0,05$) and CLA ($P<0,001$) groups.

The weight of carcass body was higher in barrows than in gilts in all groups but without statistical significance. The initial weight of pigs was on the same level in control and experimental groups. Barrows had higher growth intensity than gilts. There was found the effect of gender on carcass value traits but meat quality was not affected by gender of pigs. However, the highest drip loss was measured in meat of barrows from S group ($3,06 \pm 1,11$ %).

Table 3. Carcass value traits and parameters of meat quality in control and experimental groups (with reference to gender)

Trait	C group		S group		CLA group	
	gilts	barrows	gilts	barrows	gilts	barrows
Carcass body weight (kg)	90,97±7,69	92,26±7,47	94,70±5,79	98,51±6,18	92,12±7,92	95,62±6,00
Lean meat %	58,61±1,88 ^a	57,29±2,02 ^a	59,15±1,50 ^a	57,36±3,31 ^a	58,91±2,06 ^c	56,06±2,48 ^e
pH ₁	6,08±0,24	6,16±0,26	6,00±0,32	6,17±0,32	6,22±0,31	6,22±0,31
pH ₂₄	5,80±0,14	5,77±0,25	5,64±0,07	5,65±0,07	5,75±0,14	5,75±0,17
Drip loss (%)	2,41±1,13	2,68±0,92	2,63±0,75	3,06±1,11	2,58±0,87	2,35±0,55

$P<0,05$ ^a $P<0,01$ ^b $P<0,001$ ^c

Conclusion

The pigs fed with sunflower feed mixture had higher growth ability than pigs from control and CLA fed groups. The addition of sunflower oil and CLA to feed mixture for fattening pigs caused statistically significant differences in pH₂₄ value. The difference between gilts and barrows in carcass value traits was confirmed in our experiment.

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