EFFECT OF RAPESEED OIL IN THE DIET ON CARCASS TRAITS AND MEAT QUALITY OF PIGS

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Key Words: Pig, rapeseed oil, carcass quality, meat quality, fatty acids

Introduction

Pig meat as a foodstuff is especially valued. Following dietary trends and emphasizing the need to consume healthy food, importance is put on the necessity to improve the quality of pig meat and to lower fat content, as well as to modify composition of fatty acids in favor of polyunsaturated n-3 fatty acids. Okuyama and Ikemoto (1999) stated that the main cause of cardiovascular diseases was unbalanced ratio of PUFA n-6/PUFA n-3. For that reason, the aim is set to create meat enriched with PUFA n-3 in order to assure better above mentioned ratio. This possibility is dealt with in the researches of Myer et al. (1992), Leskanich et al. (1997), and Sandström et al. (1998). The aim of our research was to assess supplementation of pig diet with rapeseed oil that is rich in LNA (C18:3), n-3) in order to examine the possibility to increase the content of PUFA n-3 in meat. Carcass traits and physical-chemical traits were also determined, as these are the factors that affect the nutritive value of meat.

Materials and Methods

Sixty pigs (LWxGL) were divided into three groups, and fed from 30 up to 100 kg of live weight. They were fed *ad libitum* with control diets (1st group) and experimental diets (2nd and 3rd group). Control diets contained maize, extruded soybean, fish flour, salt, limestone, phosphonal**,** synthetic lysine and premix and were balanced at 14.08 $MJ \cdot kg^{-1}$ ME and 155.9 g of crude protein. Instead of mixtures with maize and extruded soybean, the 2nd and 3rd experimental group were fed mixtures containing 3% and 6% of rapeseed oil, respectively, and had 14.68 $MJ \cdot kg^{-1}$ ME and 153.0 g of crude protein, and 14.72 $MJ \cdot kg^{-1}$ ME and 150.0 of g crude protein, respectively. Upon slaughtering, the following carcass traits were determined: weight and length, meatiness (according to the Regulations), portions of loin, shoulder, back and abdomen in carcass, as well as portions of tissues in main parts. Referring to physical-chemical traits of *musculus longissimus dorsi* (MLD), content of water, protein, fat and ash were determined. Fatty acid profile in MLD was determined on 10 samples of each group by the Chrompack CP-9000 chromatograph equipped with flame ionization detector (Csapó et al., 2000; Varga-Visi and Csapó, 2002). Content of LNA (C18:3n-3, n-3), EPA (C20:5, n-3) and DHA (C22:6, n-3) were presented as a percentage of 100 g of meat, as well as of fat.

Results and Discussion

Different portions of rapeseed oil added to diets (Table 1) did not have statistically significant influence ($P>0.05$) on carcass weight, portion of loins, backs and shoulders, while the portion of rib in carcass was statistically lower ($P<0.05$) in pigs of the 2nd group, if compared to the 1st and 3rd group. Pigs of the 3rd group had statistically less ($P<0.05$) fatty tissue in back and statistically more ($P<0.05$) muscular tissue in shoulders than pigs of the 1st and 2nd group. Thacher (1998) concluded that feeding of pigs with rapeseed oil did not influence carcass traits, although he noticed higher deposition of fatty tissue and weaker meatiness than of the control. Dugan et al. (2003) published results that opposed those of above mentioned author. They stated that feeding with rapeseed oil resulted in reduced deposition of fatty tissue in sows. Muscular tissue of all pig groups was of good quality if considering criteria for border values recommended by Hofmann (1994) for pH_{45} (>6.0); Forrest (1998) for pH_{24} (>5.5), as well as by Blendl et al. (1991) for W.H.C. (<8 cm^2). If considering portion of protein and minerals, the best nutritive quality was assessed in the 3rd group. Samples of MLD of pigs fed with supplemented rapeseed oil (2nd group with 3% and 3rd group with 6%) contained statistically significantly more LNA than the control. The same occurrence was noticed in the MLD lipids. Consequently, content of S PUFA n-3 was statistically significantly increased, being presented in % of 100 g of MLD, i.e. in MLD lipids ($P<0.05$). These results correspond with those obtained in our previous researches (Kralik et al., 2006), as well as with the results reported by Myer et al. (1992), Leskanic et al. (1997), and Sandström et al. (1998). Very long chain equivalent (Ollis et al., 1999) was statistically significantly better ($P<0.05$) in meat of experimental groups than of the control.

Conclusions

Supplementation of rapeseed oil in pigs' diets had statistically significant effect ($P<0.05$) on the increase of muscular tissue in shoulders and on the lowering of fatty tissue in back part. Muscular tissue of all pig groups was of good quality (pH_{45}, pH_{24}, W.H.C.). In comparison to the control, statistically significantly more ($P<0.05$) LNA and S PUFA n-3, and more favorable VLCE were determined in MLD samples of pigs fed with rapeseed oil supplemented in the amount of 3% and 6%.

Table 1. Carcass traits and physical-chemical traits of MLD from pigs raised on a control and experimental diets

Carcass	Control	Experimental diets		Phy.-chem.	Control	Experimental diets	
Trait	1st group	2nd group	3rd group	trait	1st group	2nd group	3rd group
Carcass weight, kg	80.97	83.97	83.72	pH_{45}	6.16	6.26	6.20
Carcass length, cm	89.06	83.92	89,91	pH_{24}	5.71	5.64	5.61
Ham, %	24.04	23.77	23.96	W.H.C, cm^2	7.85	7.21	7.35
- muscle tissue,%	64.49	65.01	65.14	Water, %	69.97	69.16	70.32
- fatty tissue, %	27.38	27.13	27.23	Protein, %	24.19	24.37	23.61
- bones, %	8.15	7.86	7.62	Fat, %	4.74	5.40	5.02
Loin part, %	16.41	16.62	16.44	Ash, %	1.11	1.08	1.05
- muscle tissue, %	51.59	51.05	52.84	Fatty acid contents (% in 100 g of MLD)			
- fatty tissue, %	36.32[b]	36.30[b]	34.93[a]	C18:3n-3	0.010[a]	0.021[b]	0.022[b]
- bones, %	13.30	12.56	12.30	C20:5n-3	0.006	0.006	0.006
Shoulder, %	13.49	13.57	13.05	C22:6n-3	0.010	0.011	0.012
- muscle tissue, %	61.54[a]	61.37[a]	65.50[b]	å PUFA n-3	0,026[a]	0,038[b]	0,040[b]
- fatty tissue, %	28.10	28.66	28.81	Fatty acid contents (% in 100 g of MLD lipids)			
- bones, %	10.36	9.96	10.37	C18:3n-3	0.208[a]	0.376[b]	0.440[b]
Rib part, %	9.85[b]	9.76[a]	10.17[b]	C20:5n-3	0.125	0.106	0.127
- muscle tissue, %	45.33	44.88	45.56	C22:6n-3	0.216	0.197	0.230
- fatty tissue, %	45.33	45.95	45.69	å PUFA n-3	0,539[a]	0,679[b]	0,797[b]
- bones, %	9.34	9.18	9.21	VLCE[1], g	0,018[a]	0,019[b]	0,021[b]
Meatiness, %	54.41	55.39	55.80				

[a-b] Means in the same row marked with the same letter do not differ significantly at the 0.05 level of significance

[1] VLCE = 0.18 C18:3n-3 + C20:5n-3 + C22:6n3/very long chain equivalent (Ollis et al., 1999)

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