Improved nutritional quality of pork by feeding fish oil containing diets

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Aim

The objective of this study was to:

• Improve the nutritional quality of pork meat by increasing the content of very long chain (VLC) *n*-3 fatty acids without compromising the sensory quality

Introduction

In recent years the focus on nutritional quality has been increasing and the fatty acid composition has changed towards more unsaturated fatty acids in animal products. The positive health effects of VLC*n*-3 fatty acids in connection with cardiovascular diseases in humans are well established. A dietary supply of VLC*n*-3 fatty acids to pigs will increase the deposition and improve the nutritional quality of the pork. Such fatty acids are, however, more susceptible to oxidation and might produce off-flavors and off-odors especial with prolonged frozen storage.

Materials and methods

Seventy two crossbred (LYDD) male and female pigs were individually and fed according to a restricted scale. Six experimental diets, two low fat diets with or without 0.5% EPA and DHA rich fish oil, and four medium fat diets added palm kernel oil and fish oil blends from 4.1:0 to 3.4:0.7%, were used. At a live weight of approximately 95 kg the pigs were slaughtered and samples of *M. Longissimus dorsi* (LD) and belly were collected. Bellies were sliced, vacuum packed and either stored at -80˚C for four months (named short-term) and stored at -80 ˚C for 12 months and additional six months at -20 ˚C (named long-term stored). LD was analyzed for fatty acid composition and bellies, both short- and long-term stored, were sensory evaluated according to ISO 6564. Also a reheating procedure was conducted with a subsequent sensory evaluation of the long-term frozen stored belly.

Results

The presented results are the fat content and fatty acid composition of the dietary treatment (Table 1), VLC*n*-3 fatty acid composition of *M. longissimus dorsi* (Figure 1) and the sensory evaluation after long-term frozen storage and reheating treatment (Figure 2).

Conclusion

• Using dietary fish oil gives higher deposition of VLC*n*-3 fatty acids in *M. Longissimus dorsi*
• Increased efficiency in retaining VLC*n*-3 fatty acids was obtained when feeding diets with added fat
• Fresh or long-term frozen stored belly gave no significant off-odour and off-flavour, however, after reheating the highest fish oil group gave significant higher off-odours and off-flavours
• 0.5% dietary fish oil (LFF2 and PK3F2) gave no unwanted off-odours and off-flavours even after reheating procedure

Table 1. Dietary fish oil inclusion (%), fat content (% of DM) and fatty acid composition (% of total fatty acids)

	LF	LFF2	PK1	PK2F1	PK3F2	PK4F3
Fish oil, %	0	0.5	0	0.25	0.5	0.7
Fat % of DM	2.9	3.4	6.7	7.3	7.3	7.3
C18:3*n*-3	5.7	4.8	1.7	1.8	1.8	1.9
C20:5*n*-3	0.1	3.5	<0.1	0.9	1.6	2.2
C22:5*n*-3	<0.1	0.3	<0.1	0.1	0.2	0.2
C22:6*n*-3	<0.1	2.7	<0.1	0.5	1.4	1.6

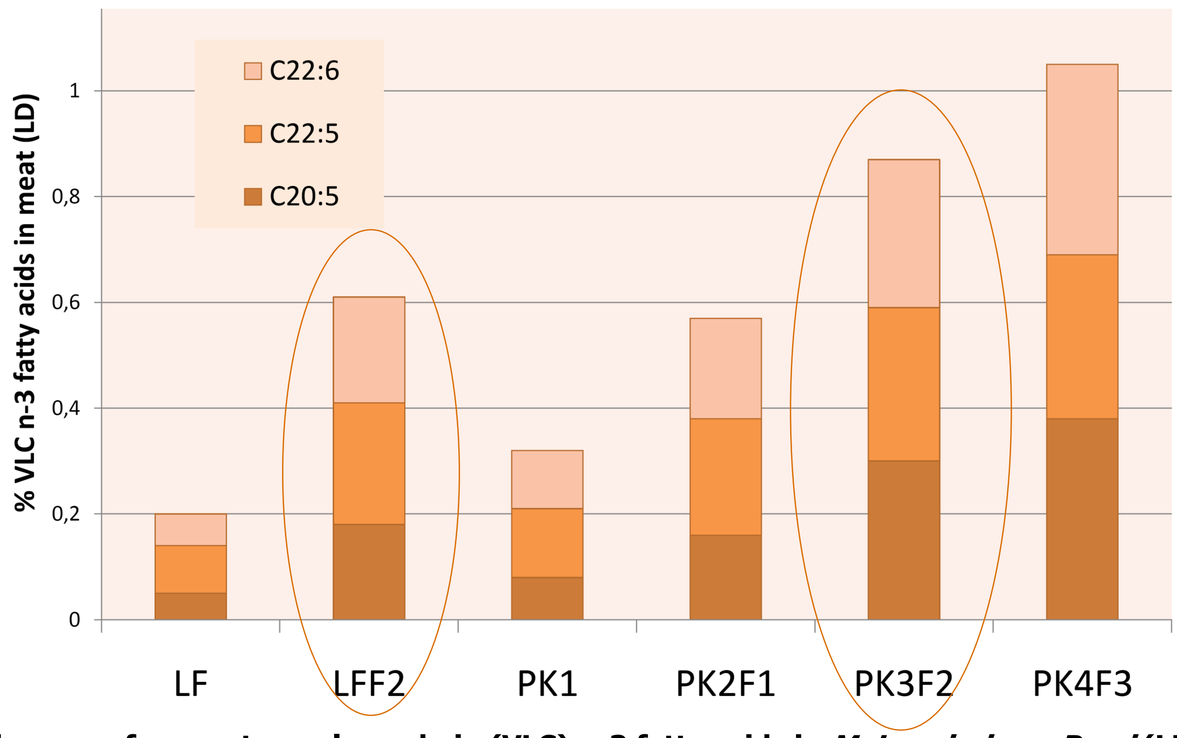

Figure1. The sum of percent very long chain (VLC) *n*-3 fatty acids in *M. Longissimus Dorsi* (LD). The two circled groups were given 0.5% dietary fish oil inclusion but LFF2 was a low-fat diet.

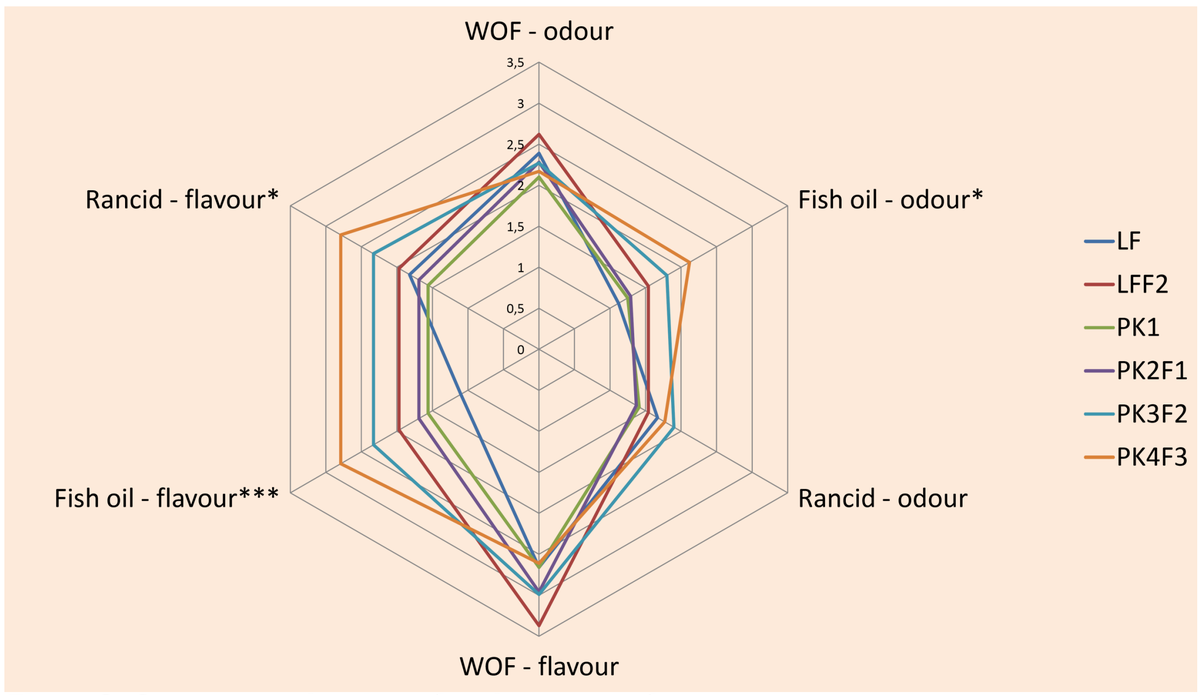

Figure2. Sensory evaluation after long-term frozen storage and reheating procedure

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