EFFECT OF DIETARY ECHIUM OIL SUPPLEMENTATION ON THE OMEGA-3 FATTY ACID COMPOSITION AND SENSORY QUALITY OF PORK

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I. INTRODUCTION

It is widely accepted that dietary long chain omega-3 polyunsaturated fatty acids play an important role in minimizing the risk of cardiovascular disease [1]. Marine sources were an efficient method of increasing the omega-3 fatty acid content of pork. This is not a sustainable strategy due to overexploitation [2]. *Echium plantagineum* is a rich source of the omega-3 fatty acid, C18:4 (stearidonic acid). Stearidonic acid lies in a more advanced position than linolenic acid in the omega-3 biosynthetic pathway. Therefore dietary Echium oil supplementation may lead to higher levels of eicosapentaenoic (EPA) and docosahexaenoic (DHA) omega-3 fatty acids in pork.

II. MATERIALS AND METHODS

Sixty gilts, weighing approximately 30kg, were randomly divided into 5 groups and assigned to one of the following dietary treatments: A control diet containing 1% palm oil, and experimental diets containing 1 % linseed oil, 1 % soya oil, 1 % fish oil, 1 % echium oil. Pigs were slaughtered at a live weight of 110kg. After slaughter meat from the pigs were evaluated for fatty acid composition and sensory properties. Fatty acid methyl esters were quantified with gas chromatography. A 10 member trained sensory panel was used for the sensory analysis of the pork. Data was statistically analyzed with analysis of variance (ANOVA) to determine breed differences. Breed means was compare with the Tukey-Kramer multiple comparison test at $\alpha = 0.05$.

III. RESULTS AND DISCUSSION

In both muscle and fat, the echium treatment had the highest levels of stearidonic acid (Fig 1 & 2). The muscle and fat of the echium treatment also had significantly higher levels of EPA compared to the control but it was still significantly lower than that of the fish oil treatment. The same was observed for DPA in the fat. In muscle, DPA was significantly higher in the echium treatment but it did not differ significantly from the fish oil treatment. No significant difference was observed between the echium and control group for docosahexanoic acid (DHA) in the muscle and fat. According to Whelan [3], the only way to increase tissue levels of DHA is by dietary supplementation of preformed DHA.

The sensory panel could not detect a difference between the meat of the control and echium diet for aroma, taste, juiciness, tenderness or aftertaste (Table 1). The meat and fat of the fish oil treatment had a fishy aroma and the meat had a fishy, rancid taste and aftertaste. It is known that incorporating fish oils in monogastric animal diets can result in off-flavours and odours in the product, even at relatively low levels [4]

I. CONCLUSION

Dietary Echium oil supplementation did not have any negative effect on the sensory quality of fresh pork. It did increase the EPA and DPA content, but had no effect on the DHA content of the muscle or fat.

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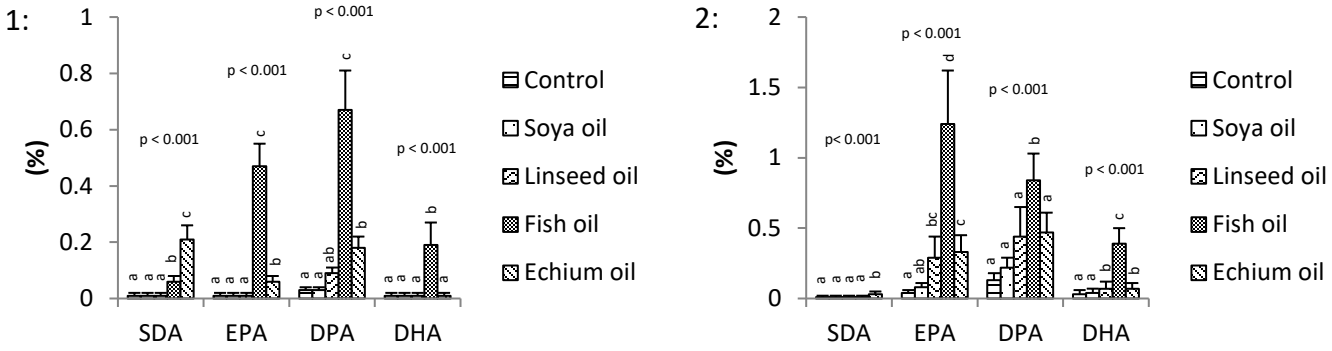

Figure 1 & 2: Fatty acid composition of subcutaneous (1) and intramuscular (2) fat from different treatments. Bars with different superscripts for each fatty acid differ significantly. Bars represent average values and error bars represent standard deviations.

Table 1: Sensory scores for the pork M.longissimus muscle and fat samples from the five different treatments.

AROMA: FAT	**Control**	**Soya**	**Linseed**	**Fish**	**Echium**	**P value**
Fresh pork fat	4.98^{b}	5.00^{b}	4.79^{b}	4.30^{a}	4.96^{b}	0.0119
Roast pork fat (caramel)	5.50^{b}	5.21^{b}	5.07^{b}	4.48^{a}	5.2^{b}	0.0023
Fishy	1.12^{a}	1.21^{a}	1.19^{a}	1.99^{b}	1.12^{a}	<0.0001
AROMA: MEAT						
Roast pork meat	3.33	3.30	3.45	3.27	3.26	0.3875
Fresh cooked pork meat	5.22^{b}	5.23^{b}	5.17^{b}	4.87^{a}	5.25^{b}	0.0511
Fishy	1.02^{a}	1.05^{a}	1.07^{a}	1.29^{b}	1.05^{a}	0.0009
FLAVOUR: MEAT						
Roast pork meat	3.42	3.33	3.42	3.16	3.37	0.2762
Cooked pork meat	5.36	5.44	5.26	5.12	5.31	0.0640
Fishy	1.04^{a}	1.07^{a}	1.08^{a}	1.56^{b}	1.03^{a}	<0.0001
AFTER TASTE						
Cooked pork meat	5.04^{c}	4.99^{c}	4.82^{b}	4.58^{a}	4.92^{bc}	<0.0001
Fishy	1.08^{a}	1.03^{a}	1.05^{a}	1.45^{b}	1.03^{a}	0.0001

Means with different superscripts in the same column differ significantly.

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