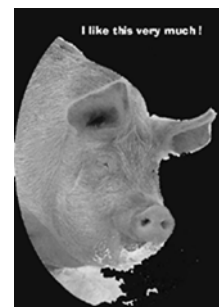


General conclusions



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This thesis has focussed on the dietary provision of polyunsaturated fatty acids (PUFAs) to weanling piglets in relation to growth performance and small intestinal integrity. The major results and conclusions of the various chapters above may be summarized as follows.

The status of n-3 and n-6 polyunsaturated fatty acids in piglets at weaning might determine their susceptibility to impaired growth performance and the development of post-weaning diarrhoea.

This thesis did not address the question whether the fatty acid composition of piglets at weaning affects post-weaning growth and/or the development of post-weaning disorders, but there is indirect evidence from studies in mice (Akisu et al., 1998, Ohtsuka et al., 1997) that it does. The observed lack of effect of the fatty acid composition of the weaner diet on growth performance and gut integrity might be explained by the use of piglets with sufficient fatty acid status at the time of weaning.

The lactation diet fed to the sows is a major determinant of the fatty acid status of the weanling piglet.

It is assumed that a sufficient status of PUFAs in combination with a high ratio of n-3:n-6 PUFAs will be beneficial as to coping with the multiple stressors at weaning. The fatty acid status at weaning is essentially determined by the fatty acid composition of the sow's milk which in turn is determined by the fatty acid composition of the fat mobilized by the sow and that of the lactation diet.

There may be no change of the status of n-3 and n-6 PUFAs in piglets around weaning.

The intake of n-3 and n-6 PUFAs was assessed in piglets kept under practical conditions from birth to two weeks post weaning. In addition, the fatty acid composition of erythrocyte membranes, liver fat and lymph nodular fat tissue was determined. It was found that between weaning and one week post weaning there was no clear difference in the status of n-3 and n-6 PUFAs. The low feed intake after weaning is associated with a low intake of PUFAs, but a sufficient status of PUFAs at weaning may have buffering capacity.

The requirement of ALA by weanling piglets to display maximum growth is not known, but it may be above 0.22% of metabolizable energy.

Weanling piglets were fed diets with different levels of ALA. Intakes of ALA above 0.22 energy% tended to increase growth during the first two weeks

post weaning and tended to reduce feed conversion during the first week. The average increase in weight gain was 9% and the decrease in feed conversion was 14%, but these effects did not reach statistical significance. The diet with 1.13 energy% ALA produced a significantly better body condition after two weeks than did the diet with 0.22 energy% ALA. A dietary level of 0.22 energy% is equivalent to about 0.8 g/kg air-dry diet. This level seems somewhat low in the light of the current practice of formulation of weaner diets, whereas the present evidence for this level is weak. However, Innis (1993) had suggested that ALA provision is adequate at an intake of about 0.3 energy%.

In one study dietary fish oil positively affected growth of weanling piglets, this effect not being mediated by counteracting the weaning-induced decrease in villus height. However, in another study the addition of fish oil to a weaner diet adequate in ALA did not enhance growth performance, faeces consistency and body condition of weanling piglets.

Weaner diets were formulated that contained two levels each of either fish oil or linseed oil, each level having similar ratios of n-3:n-6 PUFAs. The fish-oil diets on average increased post-weaning growth by 27%, when compared with the linseed-oil diets. The effect of fish oil was not statistically significant. Feed intake was not affected by the experimental diets. There was no systematic influence of diet on the villus:crypt ratio of small intestinal mucosa. In another feeding trial with weanling piglets there was no stimulatory effect of fish oil on growth performance. The lack of effect of fish oil in the second trial is explained by the high status of n-3 PUFAs at weaning masking any effect of fish oil consumption.

*There might be a positive effect of fish oil on the clinical response in weanling piglets to a challenge with pathogenic *E. Coli*.*

Weanling piglets were used to determine the effect of fish oil in the diet on the clinical response to an infection with a pathogenic *E. coli* O149:K91:K88. The average daily feed intake (ADFI) and average daily gain (ADG) after infection tended to be higher in the fish-oil group than in the control group. It appears that fish oil in the diet of weanling piglets enhances disease resistance, but given the specific conditions of the study the relevance for practice is not yet known.

Under practical conditions, the potential beneficial effect of changing the fatty acid composition of the weaner diet may be marginal and certainly is much smaller than that of increasing dry matter intake.

It is well-known that post-weaning feed intake and the risk of development of post-weaning disorders are negatively related. In an attempt to increase post-weaning feed intake, piglets were fed diets with increasing water contents. An

increasing content of the diet raised dry matter intake, total water intake and body weight gain in a dose-dependent fashion. For individual piglets there were direct relationships between dry matter intake and weight gain and also between total water intake and dry matter intake. This study does not show that a high water intake is essential for a high dry matter intake in weanling piglets, but it does indicate that the level of post-weaning feed intake is maintained better when a liquid diet instead of a dry diet is fed. When the magnitude of the effect on feed intake seen in this study is compared with that in the previous studies using diets with different fatty acid compositions, it follows that the effect of PUFAs is relatively small.

References

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General conclusions
