Inclusion of mussel meal in diets to growing/finishing pigs

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Implications

This study showed that inclusion of mussel meal in diets to growing/finishing pigs yielded growth rate similar to those obtained with a conventional diet, whereas feed conversion ratio was higher. This implies that mussel meal is a potential alternative protein source that can replace fish and soybean meal in organic diets. By using mussels it would be possible to compose diets with 100% organic feed ingredients. However, mussel meal is currently expensive to produce and in addition more research regarding optimal inclusion level and possible off-flavor of the meat is needed.

Background and objectives

Lysine and threonine have been shown to be the first and second limiting amino acids in cereal-based diets to pigs and both are essential. If the requirements of these amino acids are not fulfilled, performance, health and animal welfare can be negatively influenced. In order to assure an adequate supply of essential amino acids, pure (synthetic) amino acids are added to conventional diets. However, in organic diets such supplementation is not allowed and from 2015, 100% of the ingredients must be organically produced. Today, there are a limited number of organically produced protein feedstuffs available. Mussel meal can be an interesting alternative protein source for pig since it has high protein content and a balanced amino acid pattern. Thus, it has the potential to replace fish meal and other conventional protein feed ingredients in pig diets. Mussels are also extremely good filterers of water being an effective tool to clean sea waters from nitrogen and phosphorus that has leached into the water.

To the best of our knowledge, no study has yet investigated the effect of using mussel meal as a protein source to growing/finishing pigs. Therefore the objective of this study, which is a part of an EU-project (ICOPP), was to investigate the effect of inclusion of mussel meal in diets for growing/finishing pigs of two different genotypes. The hypothesis was that pigs will perform well with maintained production results when mussel meal replaces conventional protein feed.

Key results and discussion

Daily weight gain was relatively high, on average 950 g, without any significant difference between the two treatments (Table 1). Neither did diet affect dressing percentage nor carcass lean meat content. Consequently, no difference in daily lean meat growth was observed between diets. Genotype (Hampshire or Duroc boar) had no influence on performance ($P>0.05$ for all traits). The results indicate that at least 5% mussel meal can be included in diets to growing/finishing pigs with unaffected growth rate. However, feed conversion ratio was higher for pigs given mussel meal than for control pigs, 26.0 vs. 23.0

MJ NE/kg weight gain. The results indicate that mussel meal is a potential futural protein feedstuff in organic pig diets. However, mussel meal is today expensive and more research regarding optimal inclusion level is needed.

Table 1. Production performance

	5% Mussel meal	Commercial diet	P-value
Daily weight gain, g	944	949	0.899
Feed conversion ratio, MJ NE/kg	26.0	23.0	*<0.001*
Lean meat content, %	58.8	58.2	0.384
Dressing percentage, %	78.2	78.6	0.497
Daily lean meat growth, g	452	451	0.959

How work was carried out?

A total of 64 growing/finishing female and castrate pigs (Swedish Yorkshire dams × Hampshire sires or Duroc sires) from 12 litters were used in this study. The study was performed at the Research Station, Swedish University of Agricultural, Uppsala, in accordance with Swedish regulations for use of pigs. The sires used were randomly selected from sires available for artificial insemination. Pigs within litter were randomly allocated to four treatments, balanced to sex and live weight. Pigs in two treatments were given a commercial diet with conventional protein ingredients, whereas pigs in the two other treatments were fed a diet containing 5% inclusion of dry mussel meal and a nutrient composition equivalent to the commercial diet. This mussel meal was produced from mussel meat only, i.e. no shells were included. Both diets were given to the two genotypes.

The study started at a pig age of 69.6 ± 3.1 days (mean ± s.d.) and a live weight (LW) of 37.3 ± 5.1 kg. In total there were 16 pens, and each pen held four pigs (two females and two castrates). Consequently, there were four replicates (pens) per treatment. All pigs were fed restrictedly twice a day according to the standard feeding regimen in Sweden (Andersson et al., 1997). Pigs were weighed individually at the start of the study then fortnightly until their final weighing, one day before slaughter. Feed consumption was recorded on a daily basis and feed conversion ratio was calculated pen-wise. Slaughter was performed on two or three occasions per pen at an average age of 144.5 ± 9.3 days and an average LW of 107.6 ± 10.1 kg. Before cooling, carcass weight was recorded and lean meat content was evaluated with the Hennessy Grading Probe (Hennessy Grading Systems, Auckland, New Zealand). Two control pigs and one pig in the mussel meal group had to be excluded due to illness not related to the study. Data were analysed with the SAS software using analysis of variance (PROC MIXED). The model included the fixed factors of diet, genotype and sex, and the random factors of pen and litter. Initial weight was included in the model as a covariate for daily weight gain and carcass weight for lean meat content. Pig was the experimental unit for all traits except for feed conversion ratio, where pen was the unit. No significant interactions were found and were therefore excluded from the model.

References

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