Enrichment of pork with omega-3 fatty acids from fishmeal

PRC Howe, M Abbey, DL Topping, B Belling, R Illman

CSIRO Division of Human Nutrition, Adelaide, SA 5000

Awareness of the potential health benefits of increased consumption of omega-3 fatty acids has prompted the development of new options for introducing them into our diet. One such option is omega-3 enriched pork, produced by feeding flaxseed to pigs (1). This results in substantial elevation of α-linolenic acid but little increase in the longer chain omega-3 eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), the purported mediators of the health benefits. Although the latter can be increased by dose-dependent addition of fish oil to pig rations, use of fish oil or excessive amounts of fishmeal has been avoided as it causes tainting of the pork (2). However, it appears that the tainting may be minimised by withdrawing fish oil for a suitable period before slaughter (2,3). Using this approach, we have examined the retention of long chain fatty acids in pigs fed fishmeal.

Six 9 wk old male pigs were fed a grower diet containing 20% Porcomega fishmeal for 6 or 10 wk, reverting to an isocaloric control diet one week before being slaughtered at a commercial abbatoir. Their growth rates and food conversion rates were comparable to that of age-matched pigs fed the control diet. Blood samples were taken at slaughter and one week beforehand. The latter revealed striking increases of plasma EPA and DHA in pigs eating fishmeal compared with controls. By the time of slaughter, however, the increases were largely attenuated (2.8 fold for EPA and 3.4 fold for DHA) and no differences in quality of the meat were observed during butchering. Nevertheless, fatty acid analysis of lean portions taken from fresh cuts of meat showed significant retention of long-chain omega-3 fatty acids in pork from the pigs fed fishmeal (Figures 1 and 2).

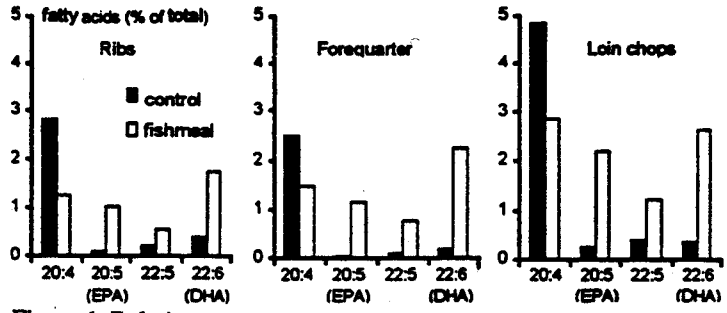

Figure 1. Relative proportions of long chain fatty acids in cuts cuts of meat from pigs fed control (n=4) or fishmeal diet diet (n=3) for 10 weeks

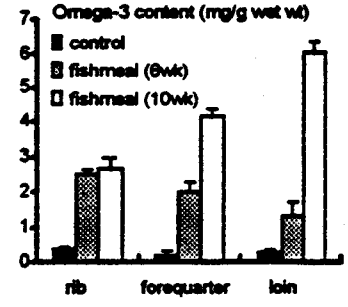

Figure 2. Omega-3 concentrations in meat from pigs fed control or fishmeal diet for six or 10 wks (mean±sem)

The degree of omega-3 enrichment of lean pork achieved by feeding fishmeal (up to 6 mg/g) not only exceeded that obtained by feeding 15% flaxseed (1) but the ratio of EPA and DHA to α-linolenic acid was at least 100 fold higher. Moreover, the relative enrichment of DHA to EPA was higher than in pigs fed fish oil (2). Thus omega-3 enriched pork offers an alternative dietary source of EPA and DHA which compares favourably with locally available fish or fish oil preparations. This study was sponsored by Bartlett Grain Pty Ltd, who also provided PorcOmega™.

1. Romans J, Johnson R, Wulf D et al. Effect of ground flaxseed in swine diets on pig performance and on physical and sensory characteristics and omega-3 content of pork. J Anim Sci 1995;73:1982-6.
2. Taugbol O. Omega-3 fatty acid incorporation in fat and muscle tissues of growing pigs fed supplements of fish oil. J Vet Med 1993;40:93-101.