

HEALTH BENEFITS FROM FEEDING FISH OIL AND FISH MEAL

THE ROLE OF LONG CHAIN
OMEGA-3 POLYUNSATURATED
FATTY ACIDS IN
ANIMAL FEEDING

by

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EXTENDED SUMMARY

Fish has long been recognised as a health promoting food. Increasing evidence points to the fat in fish, and particularly the long chain (C₂₀ and longer) omega-3 fatty acids it contains, as being an important factor in the diet of man and animals contributing to good health.

In man and intensively reared animals it appears that diets have become unbalanced in terms of the make-up of fat - particularly polyunsaturated fatty acids. The content of omega-3 (n-3) fatty acids has declined and that of omega-6 (n-6) fatty acids increased. By supplementing with fish lipids which are rich in long chain omega-3 fatty acids the balance can be restored. **A ratio of n-6:n-3 fatty acids of around 5:1 is now regarded as optimal particularly where the n-3 fatty acids are supplied as EPA and DHA.** The latter are found mainly in fish oils and certain marine algae. They are also present in the lipids in fish meal. Where the n-3 fatty acids are provided predominantly as linolenic acid which is found in plant oils, this is of limited effectiveness which varies between animal species. Furthermore, as the ratio increases beyond 5:1 effectiveness reduces further.

Researchers have cited evidence that the oil

(lipids) in fish, rich in long chain n-3 fatty acids may help reduce the incidence of the following diseases in humans:-

- * Impaired development of brain and visual acuity
 - reduced intellectual capacity in infants
 - aggression and depression
- * Neurological dysfunction, including visual symptoms
- * Coronary heart disease:
 - restenosis
 - cardiac arrhythmias
- * Mild hypertension (high blood pressure)
- * Inflammatory and auto-immune disorders
 - rheumatoid arthritis
 - psoriasis
 - ulcerative colitis
 - asthma

Fish Lipids to Improve Animal Health and Produce Healthier Food

In animals too there is increasing evidence that inclusion of fish lipids in the diet improves health. Both fish oil and fish meal supply lipids. For poultry they can improve disease resistance by moderating the immune reaction to disease challenge and improving

specific immunity. The long-chain n-3 fatty acids (EPA and DHA) were shown to be the active component of fish oil in terms of its effect on coccidia. Whilst flaxseed which also contains shorter chain (18 carbon) n-3 fatty acids (linolenic) has some benefit where birds are infected with coccidia, it is less effective than fish oil. Experimentally, benefits have been shown from feeding fish oil to birds challenged with coccidiosis and in those in which ascites (heart failure) was induced. Preliminary work in poultry shows improved bone formation also.

In pigs benefits were seen following a challenge with bacterial sepsis (*E.coli*). In cattle when lung tissue was infected with pneumonia, defence against this pathogen was increased with dietary fish oil.

In ruminants and pigs reproductive performance can be improved. Higher conception rates were obtained in dairy cows. Embryo implantation may also be improved.

Manipulating Fat Composition

Feeding the long chain n-3 fatty acids EPA and DHA leads to their deposition in intra-

muscular fat and in eggs, particularly phospholipids. There is some production of the animal of EPA and DHA from 18 carbon n-3 fatty acids (linolenic synthesis) which occurs in some vegetable oils such as linseed (flax) and fresh forages. Chain elongation, especially to DHA, tends to be limited. Dietary n-6 : n-3 ratios are high (over 10) there is evidence that chain elongation almost ceases. Consequently EPA and DHA deposition is more effective when these acids are provided as such rather than in the 18 carbon (linolenic acid) precursor form. Deposition of EPA and DHA in animal products such as meat and eggs provides a valuable source in the human diet. It tends to restore the n-6 : n-3 fatty acid balance in these products to levels closer to those in the animal's wild or extensively reared counterpart. Fish meal and oil provide the most cost effective source of EPA and DHA for animals. In the presence of adequate levels of vitamin E, up to 2% fish lipid can be incorporated in the diet without adversely affecting meat/egg flavour.

**THIS IS A COPY OF THE EXTENDED SUMMARY AND
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