



**FISHMEAL  
INFORMATION  
NETWORK**

# Fishmeal for **POULTRY**

## **Fishmeal for poultry – a feed with a very healthy future**

### **Benefits for the producer – productivity, health and welfare**

- 1 High in protein, energy, minerals, vitamins and micronutrients
- 2 Improves feed conversion efficiency (FCE) and growth rate
- 3 Promotes livestock health – low antigenicity and anti-inflammatory properties improve disease resistance
- 4 Reduces mortality
- 5 High in health promoting omega-3s

### **Benefits for the consumer – safety, welfare, natural, human health**

- 1 High welfare – recognised by the RSPCA to improve animal welfare
- 2 Accepted by safety assurance schemes
- 3 Positive nutrition – fishmeal can help produce ‘designer’ eggs with extra omega-3 which promote health and wellbeing, and prevent heart disease and cancer
- 4 A natural product, produced from monitored and managed fish stocks

### **Benefits for the environment – less pollution of air and water**

- 1 Water supplies – fishmeal’s proteins are efficiently absorbed by the animal, so reducing levels excreted

Feed ingredients need to meet the producers’ demands for high feed conversion efficiency and growth rate. Equally, today ingredients must comply with the consumers’ wish for assurances that products are safe and healthy, and produced with care for animal welfare and the environment.

As this leaflet explains, independent scientific evidence suggests that fishmeal has a positive contribution to make on both counts.

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# Benefits of fishmeal in POULTRY RATIONS

## The benefits of fishmeal in poultry rations

### 1 Nutritional value

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Fishmeal is a natural balanced feed ingredient that is high in protein, energy, minerals (calcium and phosphorus), a natural source of vitamins (including choline, biotin and vitamin B<sub>12</sub>, A and E) and the micronutrients – selenium and iodine.

It is the compositional quality of the nutrients in fishmeal that make it distinctive, in particular its content of essential amino acids and the very long chain polyunsaturated omega-3 fatty acids (omega-3s).

The condition of ascites may develop in commercial broiler flocks; fish oil included in the diets of broilers reared in such a way to develop this condition, demonstrated reduced incidence of the complaint<sup>3</sup>.

The bone development of chicks has also been reported to have been improved following the inclusion of fish oil to improve the ratio of omega-6 to omega-3 fatty acids in the diet<sup>4</sup>.

An increase in fertility of cockerels has been reported when salmon oil was fed; fertility increased from 91% to 96%<sup>3</sup>.

Fishmeal is also a natural source of retinol (vitamin A) and tocopherols (vitamin E). Both of these vitamins act as antioxidants, as does ubiquinone which has a similar structure to vitamin E and is also found in fish. All these substances can help to maintain and protect cell membranes and increased levels of the protective antioxidant enzymes have been reported in the liver of animals fed fish oil.

### 2 Health promotion

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Diets including fishmeal have been shown to reduce infection and promote health leading to higher productivity and reduced losses. It is believed that its omega-3 content improves immune status and lessens inflammatory conditions.

In addition, it has long been recognised that the antigenicity of fish protein is low and coupled with the anti-inflammatory properties of fishmeal, its inclusion in chick diets has been shown to improve disease resistance in poultry.

Prof. Kirk Klasing at the University of California has developed a model for challenging birds in the absence of medication and monitoring the reaction of the immune system. His research has shown that following a challenge with salmonella, feed intake, growth and immune response of birds were superior in the group receiving 2% fish oil in their diet compared to a control of corn oil<sup>1</sup>.

Chicks challenged with coccidiosis also showed a lower adverse effect on growth and reduced gut lesions when fish oil was included in the diet<sup>2</sup>.

### 3 Welfare

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The natural balance of vital nutrients in fishmeal is widely believed to play a role in reducing major welfare problems. For example, a broiler producer in the USA who conducted a large-scale trial with fishmeal demonstrated the commercial viability of using fishmeal in broiler diets; it involved 1.3million birds in 48 houses. They were supplied with starter and grower diets containing 8% and 4% fishmeal respectively. There was a positive effect on mortality and weight gain; condemnation of carcasses from septic, inflammatory processes and cellulitis were significantly lower in the fishmeal fed birds<sup>3</sup>.



# Use of fishmeal in POULTRY RATIONS

## The use of fishmeal in poultry rations

More than 81,000 tonnes of fishmeal are used in UK poultry rations each year. This represents around 30% of the 270,000 tonnes of fishmeal consumed annually in the UK. Recommended

rates of inclusion in poultry diets are shown in Table 1.

The beneficial effects of fishmeal relative to other protein sources are well documented. Early work showed that the inclusion of 3.9% fishmeal in broiler diets led to

improvements in both feed conversion efficiency (FCE) (1.9%), and growth (2.4%). In 1995, more recent research was carried out using modern poultry diets including 3.8% fishmeal; a 3.9% improvement in growth was recorded in birds up to 42 days of age.

Similar results have been reported with turkey poult, where 5% fishmeal inclusion led to 2.8% improvement in FCE and 3.6% increase in growth. Layer performance was also enhanced when 4.3% fishmeal was incorporated in the diet; there was 15.4% improvement in FCE and 4.2% more eggs were produced.



## High in protein

### Contribution to protein nutrition

Fishmeal is a rich source of the essential amino acids required for animal growth and maintenance, especially lysine, methionine, threonine and tryptophan. These are present in a readily digested form. Lysine is often the first limiting amino acid when poultry diets are formulated from cereals and vegetable proteins. Fishmeal is not only a good source of lysine but also highly digestible (see Table 2).

As protein is an expensive component in the diet, using sources that are efficiently used makes good sense, not only from a financial aspect, but also as protein excretion in the faeces is minimised thereby reducing the environmental impact of the litter.

## Essential fatty acid intake

### Contribution to essential fatty acid intake

Fishmeal, and fish oil, are unique and are now virtually the sole sources of the very long chain omega-3s in the diet of animals. Formerly meat and bone meal and other animal products could have provided a dietary source of omega-3s.

Table 1.  
**Rates of inclusion of fishmeal in poultry diets for optimum benefit**

Poultry	% inclusion
Chick rearing	up to 3
Broiler	2-5
Layer	2
Breeder	1-5
Turkey	3-10
Pheasant/game	3-7

Bulk density: 550-650kg/m<sup>3</sup>  
Source: The Feeds Directory

Table 2.  
**A comparison of fishmeal with other protein sources**

Feed ingredient % in dry matter	Fishmeal			Soyabean meal - Hipro	Milk powder - skimmed
	Chilean	Herring	White		
Crude protein	73	77	72	55	37
Digestible CP	69	72	69	52	33
Essential amino acids:					
total lysine	5.5	6.1	4.8	3.1	2.5
available lysine	5.3	5.9	4.6	2.9	2.4
methionine + cysteine	2.7	2.9	2.6	1.5	1.3
tryptophan	0.9	0.9	0.7	0.9	0.4

Source: The Feeds Directory



The content of omega-3s in anchovy, herring, and white fishmeal respectively is 34, 26, and 35g/100g fatty acids.

Some vegetable oils contain the long chain fatty acid linolenic, which can be converted to the very long chain omega-3s. Nevertheless, every gram of fat in fishmeal contains more omega-3s per gram than fish oil, soyabean oil, and rapeseed oil. Only linseed oil is more concentrated.

Although at the present time there are no official guidelines on essential fatty acid intake for poultry, it is recognised that they can reduce infection, improve immune status and reduce inflammation.

More important than the amount of omega-3 is its ratio to omega-6 fatty acids. A desirable ratio would be about 4:1 of omega-6 to omega-3.

However, within commonly used feed there is an oversupply of omega-6 and an undersupply of omega-3, causing an imbalance in the diet.

The ratio of omega-6: omega-3 in the above-mentioned fishmeals is 1:8, 1:11 and 1:10 respectively (i.e. they contain about 10 times as much omega-3 as omega-6). This means the inclusion of fishmeal into the diet can produce the overall desired ratio of 4:1.

# Beyond the FARM GATE

## Beyond the farm gate

### FISHMEAL – for healthier chickens and eggs

Human diets are low in the omega-3s and raising the omega-3 content of livestock produce can make a significant contribution to reducing this deficit.

The intensification of production and the increasing use of oilseeds in poultry diets has led to an increase in the omega-6 fatty acid composition of both poultry meat and eggs. The net result of these changes is an adverse effect on the omega-6: omega-3 ratio in the meat and eggs.

Feeding fishmeal or fish oil has been shown to increase the PUFA content of poultry tissue without adversely affecting the eating quality. See Table 3.

It is recommended that fish products are withdrawn from the diet in the last week prior to slaughter.

Increasing the omega-3 content of eggs has been of particular interest, as the increase reported can make a significant contribution to the additional omega-3 required in the human diet<sup>5</sup>. For example, research carried out in Australia resulted in eggs having a higher

Table 3.  
**Influence of diet on the eating quality of cold roast chicken breast**

Attribute	Control	10% fishmeal	2% fish oil	5% fish oil
Texture	7.13b	6.70a	6.98b	6.98b
Juiciness	4.48	4.33	4.32	4.32
Flavour	4.18	3.68	4.02	4.02
Abnormal flavour	2.68	2.97	2.72	2.72
Overall liking	4.77	4.52	4.87	4.87

Where score is 0–5, higher score is preferable, except for abnormal flavour

omega-3 content in their yolk; values increased from 0.1–0.7g when fish oil was included in the diet<sup>5</sup>. Further research carried out by Maurice (1994) resulted in a threefold increase in DHA and EPA in eggs from laying hens fed fish oil<sup>6</sup>.

However, diets containing fishmeal and fish oil must be stabilised with antioxidant and supplemented with vitamin E.

NB: It is worth checking with your feed supplier if this is the case with feed materials that you are supplied.

## FISHMEAL – accepted by farm assurance schemes

Fishmeal is recognised as safe and natural and is an effective feed ingredient for poultry. Its use is permitted in most schemes, including the new Assured Chicken Production standards, provided that it is derived from sustainable sources.

The RSPCA Freedom Foods standards include the use of fishmeal – in fact, its welfare benefits are cited as reasons for its use.

The Lion Eggs standards permit the use of fishmeal in pullet and layer diets, although diets for commercial laying hens should be free from any feed material that is likely to produce taint (or toxins) in eggs. It has recommended that an inclusion of 15g/kg fish oil in the diet is the maximum used to achieve a favourable taste assessment and unchanged shelf life of the eggs.

## FISHMEAL – from sustainable sources

Fishmeal is a renewable feed source, produced almost exclusively from types of fish for which there is no demand for human food use.



According to independent scientific evidence, the majority of the fish stocks currently being used to produce fishmeal are within safe biological limits. All are subject to science-based monitoring and management regimes to ensure that fishing is conducted in a responsible and sustainable manner.

## FISHMEAL – suitable for GM-free rations

Where formulations call for GM free or low GM products, fishmeal is able to meet this requirement.

## FISHMEAL – a natural product

Fishmeal is the brown flour obtained after cooking, pressing, drying and milling fresh raw fish. It is produced almost exclusively from fish for which there is no human food demand – the so-called industrial species. It is a primary product – not a by-product – and is manufactured in purpose-built plants that meet stringent safety and quality criteria. There are extensive controls and checks throughout the supply chain to ensure the quality, safety and integrity of fishmeal.

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# Reasons to use FISHMEAL

## Six reasons to use fishmeal

- 1** Safe and traceable – meets the requirements of modern poultry production
- 2** Produced from sustainable fish stocks – to meet the requirements of farm assurance schemes
- 3** High protein content and good protein quality – used efficiently by poultry minimising the environmental impact of the litter
- 4** Rich source of the essential fatty acids – to help reduce disease, improve immune status and provide an alternative approach to health promotion
- 5** Natural source of anti-oxidant vitamins and selenium – to promote good health, protect cell membranes and improve immune status
- 6** Rich source of calcium, phosphorus and other minerals – contributes readily available minerals that are efficiently used, reducing the environmental burden and reducing the cost of supplementary minerals

### References

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- Maurice DV (1994).** *Feeding to produce designer eggs. Feed Management 45, 29 & 32.*

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Also available from FIN:

*Fishmeal for pigs*

*Fishmeal for sheep*

*Fishmeal for dairy cows*

For a full list of FIN publications, for further information about any aspect of fishmeal or to be added to the FIN database contact them at:

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