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FISHMEAL  
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NETWORK

# Fishmeal for SHEEP

## Fishmeal for sheep - a feed with a very healthy future

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

- 1 Improved forage utilisation during the key production phases of late pregnancy, early lactation and rapid growth
- 2 Improved immune status and reduced worm burden
- 3 Improved embryo survival, lamb vigour at birth and colostrum production
- 4 Milkier ewes
- 5 Increased wool production
- 6 Improved liveweight gain and leaner carcasses

### Benefits for the consumer – safety, welfare, natural, sustainable

- 1 *No* official restrictions on its use on safety grounds
- 2 RSPCA recognises the welfare benefits from fishmeal
- 3 Fishmeal helps reduce the need for routine drug treatment
- 4 Accepted by most farm assurance schemes
- 5 A natural product from sustainable fisheries

Fishmeal has long been recognised by shepherds and nutritionists as a feed ingredient which enhances breeding ewe and lamb performance, health and welfare.

Now feed ingredients must also comply with the consumers' wish for assurances that products are safe and healthy, and produced with care for animal welfare and the environment.

Independent scientific evidence suggests that fishmeal has a positive contribution to make on both counts.

### Inside

Benefits in detail	Page 2
Feeding fishmeal to in-lamb ewes during lactation and to growing lambs	Page 3/4
Typical inclusion rates	Page 5

# Benefits of fishmeal in SHEEP RATIONS

## The benefits of fishmeal in sheep rations

### 1 Forage utilisation

#### 1 Improved forage utilisation

Sheep predominately have a forage-based diet. However to meet their nutrient demands, they require concentrate-based supplements during key production phases such as late pregnancy,

early lactation and rapid growth. In order to maximise the efficiency of utilisation of their forage diet, the recommended supplement is a modest quantity of a high-quality product containing a low rumen degradable fishmeal. This

avoids the large depressions in forage intake and associated disturbances in rumen fermentation that accompany the alternative strategy of feeding large amounts of supplements containing alternative protein sources.

Compared with other protein sources fishmeal is a natural balanced feed ingredient, rich in high quality protein – particularly the digestible undegradable protein (DUP) that passes through the rumen.



### 2 Immune status

#### 2 Improved immune status

There is evidence to suggest that fishmeal enhances the ewes' immune status although the mechanisms are not yet fully explained. The nature of fishmeal is such that it supplies a wide range of essential nutrients, including amino acids, very long chain polyunsaturated omega-3 fatty acids (omega-3s), trace minerals and vitamins, which contribute to the well-being, health and productivity of the breeding ewe and growing lamb. It may well be that fishmeal's unique combination of nutrients act synergistically to enhance immune function.

### 3 Worm burden

#### 3 Reduced worm burden

The results of recent studies carried out in New Zealand<sup>1</sup> indicate that a dietary supplement of fishmeal during late pregnancy can play an additional important role in combating the breakdown in resistance to gastrointestinal parasites that occurs in ewes just before lambing and during early lactation – see Table 1.

From Table 1 it can be seen that the inclusion of 8% fishmeal in a lucerne hay/ground barley diet led to a significant reduction in worm burden of sheep in late pregnancy. In addition, ewes on the fishmeal supplement gained more weight and lost significantly less body condition score (minus 0.2 compared to minus 0.6).

Fishmeal in the diet of the ewe in late pregnancy is therefore an attractive alternative to anthelmintic treatment for reducing the worm challenge that is imposed on young lambs by their mothers in temperate pastoral production systems. This is particularly so, now that gastrointestinal parasitism is becoming increasingly difficult to combat due to anthelmintic resistance.

Table 1.

**The effect of a supplement of 8% fishmeal during late pregnancy on the worm burdens of ewes 3 weeks post-partum**

#### Energy intake

Daily Intake of ME (MJ)	Low 12	High 14.5		
Worm species	Control	Fishmeal	Control	Fishmeal
<i>T. colubriformis</i>	288	7	3,051	140
<i>T. circumcincta</i>	11,116	3,326	13,090	3,539

Source: Donaldson *et al.* 1998

# Use of fishmeal in SHEEP RATIONS

## The use of fishmeal in sheep rations

### 1 In late pregnancy

#### 1 In late pregnancy

It has long been recognised that during the last two to three weeks prior to lambing in twin or triplet bearing ewes intake of forage is reduced and there is a need for supplementary feed.

Fishmeal supplementation during the last few weeks of pregnancy has been shown in our earlier studies (Robinson *et al.*) to increase colostrum production in the first 24 hours after lambing – a vital period for survival and growth of lambs.

#### Improved embryo survival

While science continues to try to unravel the many production benefits of fishmeal, new and unexpected ones appear. Currently it is fishmeal's ability to maintain pregnancy and improve embryo survival through enhancement of the expression of the biochemical pathways which is attracting the attention of researchers (Thatcher *et al.* 1997)<sup>3</sup>.

#### Increased wool production

The low rumen degradability of ruminant fishmeal proteins and their high content of essential amino acids, which are readily digested in the small intestine, encourages wool growth. Increases of 55% and 67% in wool production during late pregnancy and early lactation respectively were observed by Australian researchers

(Masters *et al.* 1998)<sup>4</sup>. The ewes were offered the same level of supplementary protein in the form of fishmeal as opposed to lupin seed.

In these studies the fishmeal increased the ewes' circulating concentrations of the essential amino acids, arginine, histidine, lysine and threonine during early lactation. It also increased circulating insulin concentrations during late pregnancy and induced a degree of insulin resistance in maternal tissues that is known to divert essential substrates to the foetus.

#### Enhanced vigour at birth and improved heat production

Flockmasters have claimed that lambs born to ewes receiving fishmeal supplements display enhanced vigour at birth. The enhanced vigour may also be linked to the natural high levels of selenium and iodine in fishmeal; both of these play key roles in the initiation and maintenance of heat production by new-born lambs from their brown adipose tissue (reviewed by Robinson, Sinclair and McEvoy, 1999)<sup>5</sup>.

### 2 In early lactation

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#### Enhanced colostrum production for stronger lambs

Supplements of fishmeal in the diet have been shown to enhance colostrum production in the important three-hour period post-lambing.

In this trial<sup>2</sup> (Table 2) the inclusion of fishmeal in the diet of pregnant ewes led to almost half as much again colostrum in ewes on a low plane of nutrition, and an additional 0.21kg colostrum for ewes on a high energy diet.

Colostrum is essential as a source of nutrients for lamb survival and as a provider of immunoglobulins for the acquisition of the passive immunity that is required to combat disease. Lambs receiving more colostrum have a higher chance of survival.

Table 2.

#### The effect on the colostrum production of twin-bearing Finn Dorset ewes

##### Energy intake

Daily Intake of ME (MJ)	Low 8.1	High 14.5		
	Control	Fishmeal	Control	Fishmeal
Daily intake of protein (g)	80	128	128	185
<i>Colostrum production (kg) after lambing</i>				
First 3 hours	0.15	0.32	0.38	0.64
First 24 hours	1.02	1.58	1.89	2.10

Source: Robinson & McDonald (1989)



### Milkier Ewes

Fishmeal also improves milk production by ewes. Research carried out at Aberdeen<sup>6</sup> demonstrated that ewes fed on either a low (18.3 MJ/day) or a high metabolisable energy intake (28.3MJ/day), and three different levels of protein produced more milk at all levels of supplementation when fed fishmeal compared to soyabean meal.

Lamb litter weight was significantly higher when ewes were fed silage diets with a supplement of fishmeal compared to a protein source low in DUP (Vipond *et al.* 1996)<sup>7</sup>. In addition, colostrum quality was improved and lamb weight was significantly higher. In a further trial by the Scottish Group a range of protein sources were compared; ewes were described as milkier when fishmeal was the protein source, indicating that over and above the well established benefits of feeding fishmeal as a protein source to pregnant ewes there are beneficial effects on both lamb's birth weight and colostrum. These aspects both help the lamb thrive.

## 3 In growing lamb diets

### Improved liveweight gain

Fishmeal increased the growth rate of early – weaned lambs at pasture (see Figure 1)<sup>8</sup>. The inclusion of fishmeal at a level of 3.25g/kg body weight increased liveweight gain by 65g/day (32% increase) on fescue pasture and by 57g/day (17%) on clover swards. These production responses reflect the low rumen degradability of ruminant fishmeal proteins and their high content of essential amino acids, which are readily digested in the small intestine.

For intensively reared lambs researchers at the Rowett Research Institute concluded that for young intensively reared early weaned lambs fishmeal was superior to other sources, and increased liveweight gain and lean content in the carcass.

## 4 In finishing lamb diets

### Leaner carcasses

Fishmeal supplements given to finishing lambs on silage-based diets enhance silage intake with consequent increases in live-weight gain.

### Slimmer lambs

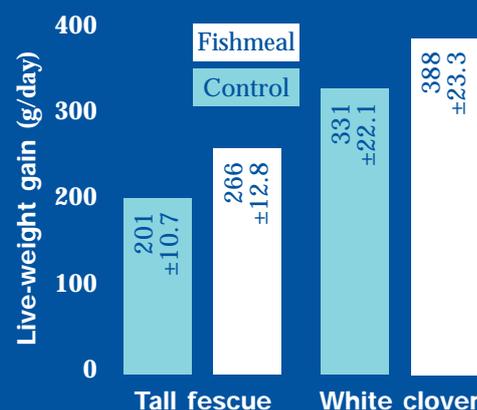
Similarly when given in conjunction with barley straw to appetite, fishmeal is highly effective in reducing the fat content of the carcasses of over fat lambs while, at the same time, maintaining the growth of lean tissue.

### Stimulating compensatory growth

At the other extreme, namely the 'store' lamb that has suffered a restriction in its growth and a depletion of its labile body proteins, the unique ability of ruminant fishmeal to quickly replete essential body proteins imparts major health and production benefits.

Figure 1.

The effect of a dietary supplement of fishmeal (3.25g fishmeal dry matter per kg lamb liveweight per day) on the growth rate of lambs grazing either tall fescue or white clover pastures



Source: Poppi et al. (1988)

# Beyond the FARM GATE

## Beyond the farm gate

## Nutritional data

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, D and E) and the micronutrients – selenium and iodine.

### FISHMEAL – accepted by most farm assurance schemes

The FABBL and RSPCA Freedom Foods standards accept fishmeal for all categories of sheep and lambs. The RSPCA standards specify a maximum inclusion rate of 10% of the total dry matter in compounds for all sheep. The SQBLA standards recognise the unique role that fishmeal can play in breeding ewe nutrition and permit its use in breeding ewe diets, but exclude it from other sheep diets.

### 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 light brown flour produced by cooking, pressing, drying and milling fresh raw fish. It is mainly produced from whole fish, but also provides a valuable outlet to recycle the trimmings from food fish processing. It is a primary product, not a by-product, manufactured in purpose-built plants according to stringent safety and quality criteria. Each consignment of fishmeal is subject to strict controls to maintain its quality and integrity from factory to farm.

### FISHMEAL – from sustainable resources

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 subject to science-based monitoring and management regimes to ensure that fishing is conducted in a responsible and sustainable manner.

Table 3. Fishmeal nutritional value

Feed ingredient % as fed	Fishmeal		
	White	South American	Herring
Crude protein	65	66	7,066
Digestible CP	63	63	65
Oil	6	9	10
Moisture	7–9	9	7–9
Ash	19	11	11
Metabolisable energy MJ/kgDM	13.1	13.4	16.4

Source: The Feed Directory, Rowett Research Institute

Table 4. Typical fishmeal inclusion rates

Sheep	g/day	% inclusion in compound/home mix
<b>Breeding ewes</b>		
pregnant	20–100	2–7.5
lactating	75–200	5–10
<b>Growing lambs</b>		
early weaned intensively reared	50–100	2.5–7.5
finishing lambs on forage diets	50–100	2.5–7.5
reduce body fat on overfat lambs	75–100	5–10

Table 5. Using fishmeal in home mixes for breeding ewes and finishing lambs

Feed material	% inclusion				
	Breeding ewes		Finishing lambs		
Fishmeal	5	7.5	10	2.5	5
Molassed sugar beet pulp	50	45	40	30	30
Barley	27.5	30	27.5	30	40
Maize gluten	—	—	20	27.5	22.5
Soyabean meal	15	15	—	7.5	—
Minerals	2.5	2.5	2.5	2.5	2.5

# Reasons to use FISHMEAL

## Seven reasons to use fishmeal

- 1** Rich source of protein with high content of digestible undegradable protein – for improved health in pregnancy and milkier ewes
- 2** Natural source of health promoting compounds – provides a dietary alternative to anthelmintics, enhances embryo survival
- 3** Rich source of the essential fatty acids – to help reduce disease and improve immune status for healthier ewes and lambs
- 4** Concentrated nutrients – that improve forage utilisation and efficiency
- 5** 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
- 6** Natural source of anti-oxidant vitamins and selenium – to promote good health, protect cell membranes and improve immune status
- 7** Fish stocks are monitored and subject to controls – to meet the requirements of supermarkets and farm assurance schemes

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