

# Animal Feeds in Western Europe — A Huge Market for Fats

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*Animal feeds* (or feedstuffs), is the generic name for all the foods given to farm animals (cattle, pigs, sheep, chickens, etc.): their production volume world-wide is immense.

Simple animal feeds, like barley, oats, and oilseed meals are used as such and do not contain any added fat. Increasingly, however, the trend has been towards *mixed feeds* or *compounds*, which are a more sophisticated class of animal feeds made to formulas which usually include added fat. The degree of use of mixed feeds or compounds in a country is a barometer for the productivity of its animal husbandry, as well as being a significant indicator of its standard of living.

Because of the immense scale of production of compounds, which in EEC-9\* in 1984 stood at over 81 million tonnes, the amount of fat required is very large indeed.

Attention is also drawn to two types of compound which deserve special attention:—

- a) *Calf milk-replacers (CMR)*, which use higher-grade fats (e.g. tallow with FFA below 1%), and
- b) *Calcium soap supplements* which are downstream product of fatty acids and for which palm oil fatty acid distillate (PFAD) should be eminently suitable.

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\*EEC-9 means the European Economic Community comprising France, West Germany, Italy, the United Kingdom, the Netherlands, Belgium, Luxemburg, Norway and Denmark. The same group with the addition of Greece, Spain and Portugal is referred to as EEC-12.

## Animal Feeds

From *Table 1* it can be seen that the total consumption of oils and fats in Western Europe in 1985 was about 12.5 million tonnes; of this about 1 million tonnes (or 8%) was used in animal feeds, considerably more than the 0.6 million tonnes (4.8%) used in soap manufacture, and approaching the 1.2 million tonnes (9.6%) used in oleochemicals.

TABLE 1. CONSUMPTION OF OILS AND FATS  
IN WESTERN EUROPE, 1985 (million tonnes)

Total Oils and Fats	12.5 (100%)
Edible	9.7 (78%)
Non-Edible	2.8 (22%)
Non-Edible uses:	
Animal feeds	1.0 (8%)
Soap-manufacture	0.6 (4.8%)
Oleochemicals	1.2 (9.6%)

Animal feeds — with the exception of milk replacers — use the lowest grades of fats or acid oils and fatty acid distillates.

## Compound Feeds

Traditional animal feeds have been cereal grains like barley and oats, dried forage like hay and alfalfa, and oilseed press cakes. However, with the rapidly rising cost of animal rearing in Western Europe, there has been a trend towards what are called 'mixed feeds'; 'compound feeds' or simply 'compound'; which are specially formulated to provide a complete and balanced diet for the animals. They help rear healthier animals, bring them more quickly to slaughtering weight, or give enhanced milk production. In spite of their higher price, the

use of compounds results in lower overall costs for the farmer.

One of the essential constituents of compounds is fat, which raises the calorific value of the feed and hence leads to faster growth for the animals, provides essential fatty acids, and acts as a vitamin carrier. The necessary fat may be invisible fat present in oil seeds and press cakes – *e.g.* palm kernel (PK) meal has about 6% fat (Table 2) – or it may be visible fat added separately. The question is decided according to cost considerations from day to day and is worked out by computers. For example if oils happen to be expensive compared with oilseeds, it may pay the compounder to use lightly crushed soyabeans (18% fat) or palm kernels

(49% fat) without pressing the oil out, rather than use normal oil seed cakes plus extra fat. However the latter procedure is usually the most cost-effective.

Table 3 shows the trend in compound output in EEC-9 and the major producing countries. It can be seen that compound production in the EEC increased from 22.4 million tonnes in 1960 to 81.1 million tonnes in 1984, at an average annual rate of 5.5 percent. Growth was fast up to 1980, but since then it has been levelling off due to consumer concern about the health effects of high meat consumption and EEC restraints on excessive milk production.

**TABLE 2. CHEMICAL COMPOSITION OF PALM KERNEL MEAL**

Item	Mean	CV %
Volatile Matter	9.7	27.3
Crude Protein	14.4	6.9
Ash	3.9	18.6
Shell	12.7	41.6
Oil Content	6.3	71.4

Source: Siew W.L., 1985  
 PORIM Annual Research Report.  
 CV: Coefficient of variation.

**TABLE 3. TREND IN COMPOUND OUTPUT BY MAJOR WEST EUROPEAN PRODUCERS**  
 (million tonnes)

	West Germany	France	Italy	Netherlands	UK	EEC-9	Av. Annual Growth EEC-9 %
1960	3.6	2.2	0.8	4.3	8.8	22.4	.... 7.9
1970	9.7	7.6	3.6	7.9	11.0	47.8	..... 4.0
1975	11.5	11.1	6.0	10.7	10.2	58.1	.... 6.4
1980	16.8	14.7	10.5	14.5	11.1	79.1	.... 0.6
1984	17.2	15.0	11.0	16.0	10.7	81.1	
						Overall	5.5

Source: FEFAC

*Table 4* shows the amount of compound production in EEC-9 by the major producing countries by type in 1984. It can be seen that in EEC-9 compound production had reached 81 million tonnes and that the biggest volume, accounting for 34% of the total, was for cattle feed (including calf feed) with pig feed running a close second.

The largest single producer is West Germany with a 21% share of EEC production, France is second with 18% and Italy, the Netherlands and the UK are about equal in third position.

*Table 5* gives the formula of a typical compound feed (for dairy cow) and its added fat is 0.5%. It should also be noted that the fat is the most expensive ingredient by far. The fat content of compounds is similar irrespective of type and lies in the range of 3 to 6%, while the added fat is typically 0.5%.

*Table 6* shows the amounts of raw materials used in compound feeds in EEC-9 during 1981–83. It can be seen that the amount of fat reached about 1 million tonnes. Thus for Western Europe as a whole, this sector of the market should easily exceed a million tonnes.

The most usual fat for adding to compounds is lowest grade tallow/grease because of its low price and by tradition, while soya oil in the form of 'foots' is valued as a provider of essential fatty acids. However we have reliable reports (e.g. from the UK) that cows prefer palm oil – PFAD or PO – to tallow and these are freely used when their prices are competitive. Palm oil has a similar fatty acid range to tallow (*Table 7*) but with a lower level of stearic acid and much higher levels of palmitic and linoleic acids. The latter is a distinct advantage, since it is an essential fatty acid. Even PFAD has much better odour and resistance to oxidation than low grade tallow/grease, and on overall balance PO products are worth a small premium.

In the formulation of compounds the most important component is protein and its content varies from 16 to 32%; it is in this application that soya meal is so valuable because it contains a large amount of high quality protein.

Rapeseed meal is also high in protein but it can contain sulphur compounds which are harmful to animals. With special treatment however and new varieties of seed with very much reduced sulphur levels, this problem has now been largely overcome.

Palm kernel meal has low protein and high fibre content and so the level of its inclusion is more limited.

#### **Calf Milk Replacers (CMR)**

Calf milk replacers (or simply 'milk replacers') are a special class of cattle feed for weaning calves. They are essentially cow's milk in which the naturally present fat has been replaced by another fat and the product has then been dried to a powder.

*Table 8* shows the growth in output of CMR in the EEC and by its major producers since 1971. It can be seen that in EEC-9 in 1984 production was 2.3 million tonnes and in Western Europe as a whole it was probably around 2.5 million tonnes, having grown by 35% in the preceding 13 years. The largest producer by far is France with a 40% share of the total, followed by the Netherlands with 27 percent. Production by the other countries is very much lower. A typical level of fat content in this type of product is 15%, and on this basis the amount of fat used annually for this purpose in Western Europe is some 375 000 tonnes.

For CMR the most commonly used fat is high grade tallow, FFA max 1%. PV max 2 meq/kg and good odour (or deodorized). Sometimes 10–20% of CNO is added to make its fatty acid profile more similar to that of milk fat.

**TABLE 4. COMPOUND PRODUCTION BY TYPE – MAJOR WEST EUROPEAN PRODUCERS, 1984 (thousand tonnes)**

	West Germany	France	Italy	Netherlands	UK	EEC-9
Poultry Feed	3 351	5 525	4 048	3 212	3 330	21 249
Pig Feed	6 192	4 440	2 442	6 579	2 099	26 543
Cattle Feed	6 491	2 757	3 505	5 427	4 775	26 582
Calf Feed	306	n.a*	n.a.	n.a.	n.a.	826
Calf Milk Replacer	312	926	265	573	28	2 237
All other compounds	567	1 320	740	249	512	3 701
Total	17 219	14 968	1 100	11 040	10 744	81 138

\*n.a. : Not available

Source : FEFAC

**TABLE 5. TYPICAL DAIRY COW COMPOUND IN NETHERLANDS**

Ingredients	Quantity %	Price/100 kg (Dutch Guilders)
Corn Gluten Pellets	30.64	40.30
Citrus Pulp	19.63	39.40
PKM Mech Extracted	11.26	41.25
Calcium	0.32	9.50
German Rapeseed	12.00	32.00
Molasses	9.00	21.00
Soyabean Hulls	8.00	35.50
Filipino Coconut	8.71	44.00
Feedgrade Tallow	0.50	106.00

Source: Osman A, Palm Oil Familiarisation Programme 1986.

**TABLE 6. INDUSTRIAL CONSUMPTION OF RAW MATERIALS FOR COMPOUNDS IN EEC-9 (thousand tonnes)**

	1981	1982	1983
Cereals	29 054	27 240	29 283
By-products from the Food Industry	14 384	18 251	19 472
Oils and Fats	876	900	997
Cakes and Meals	18 601	20 007	20 066
Dairy Products	1 671	2 671	2 300
Minerals, Vitamins, etc.	1 537	2 000	1 223
Miscellaneous	14 582	10 328	10 151
Total	80 705	81 397	83 492

Source: FEFAC

TABLE 7. FATTY ACID COMPOSITION OF BEEF TALLOW AND PALM OIL

	Beef Tallow	Palm Oil
C14:0	4	1
C16:0	26	45
C16:1	4	–
C18:0	22	4
C18:1	39	39
C18:2	2	10
C18:3	1	–
Others	2	1

TABLE 8. MILK REPLACER OUTPUT BY MAJOR WEST EUROPEAN PRODUCERS (thousand tonnes)

	West Germany	France	Italy	Netherlands	Belgium	EEC-9
1971	195	678	267	370	61	1 678
1974	424	720	287	431	56	2 003
1979	401	900	342	527	61	2 348
1984	312	914	265	607	73	2 259

Source: FEFAC

We see no reason why RBD PO should not be used for this product but it must be stated that most farmers are extremely conservative and very convincing tests and feeding trials will have to be done before PO is accepted.

### Concentrates and supplements

Concentrates are a special class of compound feeds. They are products formulated to provide higher levels of certain nutrients absent or deficient in simple feeds and so improve their performance. Supplements can provide one single nutrient, and of particular interest is a type of supplement based on the calcium soap of fatty acids. This provides about 80% fat and can be made in a very convenient free-flowing granular form.

Mixing of fat with other ingredients in the manufacture of compounds, especially on the relatively small scale practised by individual farmers, is not an easy matter. Liquid oils give a soggy, oily product and become rancid very quickly, while tallow greases have a very unplea-

sant odour, and hard fats have to be used hot, give a lumpy, sticky product and are very difficult to incorporate evenly. Using fat in the form of calcium soap granules overcomes these problems very conveniently.

Furthermore, calcium soap is not digested in the rumen of cattle and therefore the fatty acids it contains are not hydrogenated by the bacteria and enzymes present in the rumen. This protected fat modifies the composition of the milk produced by the cow and can increase its polyunsaturated level or alter the consistency of butter produced from it.

The most popular fat used in calcium soap supplements is PFAD because of its high FFA content and ease of reaction with calcium hydroxide as well as its better odour.

Calcium soap supplements are now popular in the UK and are sold under various brand names. Production volume is believed to be about 30 000 tonnes per annum.