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REPORT ON

THE COMMUNITY'S PROTEIN SUPPLIES

PART IV

Report

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INTRODUCTION

The Community policy on protein supplies intended for animal feeding reflects the abundance of raw materials which characterized the world market during the sixties. The magnitude and regularity of the quantities on offer, together with the reasonable prices ruling on the world market, led the Community to believe that a policy of free importation of protein-containing substances was sufficient to ensure that it obtained supplies. As a result of events in the spring of 1973, namely the measures affecting exports taken by certain countries exporting protein-containing substances, the Council of Ministers, at its meeting of 16 and 17 July 1973, requested the Commission to carry out a study of the Community's supply of protein intended for animal feeding.

This document has been prepared in response to the Council's request. It is divided into three chapters dealing with : the present supply position, supply and demand prospects and a review of the Community's potential resources.

During the preparation of this report the incompleteness and non-uniformity of the statistics available proved a major obstacle to an all-embracing analysis in depth of the situation. Should there, in the future, be regular reviews of the Community's protein supply, fuller, harmonized information from the Member States would be needed.

The conclusions drawn by the Commission from the analysis of the situation and the outlook in this field contained herein were presented in the memorandum of the adjustment of the common agricultural policy (Doc. COM(73)1850 final of 31 October 1973).

Chapter One : The present supply position

1. Raw materials for animal feedingstuffs are green fodder cereals and protein-containing substances. Green forage is still the basis of ruminant feeding in most countries. However, its relative importance in the Community is diminishing. During the last ten years acreages under permanent grass and pasture in the Community and arable land under green fodder have remained stable and the rate of increase in unit grass output appears very low. On the other hand, during the same period, beef and veal production increased by 22% and milk output by 10%. This was made possible by the growing use of compound feedingstuffs for feeding cattle.

   In addition, there has been a particularly strong rise in pigmeat and poultry production, a trend which should continue. Practically no fodder is used in the feeding of these animals. And, in view of the population density in the Community, we cannot expect bigger acreages to be put under grass and herbage in the future; nor can an increase in the use of green fodder be contemplated.

   Thus it is logical to believe that any change in the feed requirements of the Community's livestock population must be brought about, as in the last ten years, chiefly by a change in the use of raw materials other than green fodder.

2. Cereals especially are used as a source of energy, despite their having a protein content of 9-11%. It is noteworthy, however, that ruminants can synthesize certain amino acids from sources other than proteins. There is, therefore, under certain conditions a possibility of substituting cereals for protein-containing raw materials for such animals.

3. The raw materials used as protein sources are feedcake, animal meal, leguminous plants, grass meal and milk powder. Their protein content, expressed as a percentage of the weight of the product, varies between 18% (lucerne meal) and 70% (fish meal).

This report discusses the latter products in particular. In view of what was pointed out in the previous section, however, and of the connection between the various raw materials used in the manufacture of compound feedingstuffs, reference will also be made to the cereals supply position.

4. The table below gives the breakdown of the main raw materials, other than green fodder, used for livestock feeding in the Community.

Products used for livestock feeding in the Community

Year: 1971/1972 (1 000 metric tons)

	EUR - 6	EUR - 9
1. Cereals	46,902	67,668
2. Leguminous plant seed (field beans, etc.)	800	890
3. Feedcake	11,730	14,231
including soya	6,100	7,323
4. Fish and meat meal	1,401	2,226
5. Grass meal (lucerne etc.)	1,119	1,347
6. Milk powder	1,163	1,221

Source : Forage balance, SOEC Luxembourg.
* For Ireland : Calendar year 1971.

The same information, broken down by Community State, is given in Table 1 in the Annex.

It emerges from the above table that for every kilogramme of protein-containing raw materials (items 2 to 6) consumed in the Six, consumption of cereals is 2.89 kg. In the enlarged Community (the Nine) the ratio is 1:3.4 kg.

As regards the United Kingdom, where the guaranteed prices to cereal growers before accession were 25-45% below cereal prices in the Six, the ratio, for the year in question was 1:6.12. In the United States the ratio in the year 1971/72 was 1 kg of protein-containing materials (not including leguminous plants and grass meal) to 9.27 kg of cereals. The last-mentioned ratio can be explained both by the relative prices of cereals and feedcake in the United States at that time and by the large scale of beef and veal production, the expansion of which was fostered, moreover, by the abundance of grassland and pasture there.

5. The Community's relative self-sufficiency in the raw materials used in livestock feeding varies according to the product. In general, it can be said that dependence on non-member countries is much greater for some protein-containing substances (feedcakes, fish meal) than for cereals. It emerges from Table 2 of the Annex that three-quarters of the cereals used for livestock feeding are produced in the Community and the other quarter is imported. On the other hand, there is almost total dependence on non-member countries for supplies of feedcake, which cover the bulk of protein requirements, as the 612 000 metric tons of feedcake produced from Community-grown seeds account for only 4.3% of the total consumption in the Community.

All the Community's soya-beancake is imported, and it accounts for more than half the total consumption of feedcake. In the fish-meal sector the Community is a little less dependent although the Community's output accounts for only one-third of its consumption.

Imports of the other product groups (leguminous plant seed, grass meal, meat meal and milk powder) are either nil or represent a very small part of consumption.

An overall view of the degree of self-sufficiency in protein-containing concentrates cannot, however, be obtained without first finding a common denominator for them, which requires their conversion into weight of raw protein. The data resulting are given in Table 3

in the Annex, from which it emerges that the Community imports about 80% of its total requirements of protein concentrates.

6. No review of the Community's present position with regard to the supply of proteinaceous products for livestock feeding would be complete without an examination of how the use of the various raw materials in livestock feeding has varied over the last decade, compared with the movements in the production of compound feedingstuffs and the various animal substances (meats, etc.) over the same period.

Nevertheless, the development observed over the last ten years in the new Member States in terms of quantities of meat, milk and eggs produced and quantities of animal feedingstuffs is so different from that observed in the Community of Six that the two must be studied separately. The necessary data for this study are set out in Tables 4 and 5.

7. Meat production in the Community of Six over the ten-year period shown increased on average by 3.9% per year. This growth rate, valid for meat production as a whole, was also seen in the production of pigmeat. Poultrymeat production rose the furthest, by 9.1% per year, whereas beef and veal only increased by 2.3% per year. It should also be noted that the total meat production increased more quickly at the end of the period under consideration. The growth rate of meat production was only 3% during the period 1960/62 to 1965/67 but 4.8% during the period 1965/67 to 1970/72.

Milk production developed at a comparatively slow rate, since the Community was already self-sufficient in milk products in 1960. Egg production increased by 3.8% per year on average.

8. The production of compound feedingstuffs increased much more quickly than animal production in the Community of Six. During the period under consideration the total production of compound animal feedingstuffs

increased by 9.7% a year on average as against 3.9% for meat production. This means that generally during the period under consideration ever-increasing amounts of compound feedingstuffs were consumed per head of livestock, instead of traditional farmyard feedingstuffs. This can be illustrated, for example, in the pigmeat sector by the figures in Table 4. At the beginning of the Sixties, 1.25 kg of compound feedingstuffs, plus a certain amount of simple feedingstuffs, often farm products, were used to produce 1 kg of pigmeat, more especially after the changing and rationalizing of the farm structure which in this sector shifted increasingly from family enterprise to industrial enterprise. Ten years later more than twice this amount i.e., 2.80 kg of compound feedstuffs, were used to produce the same kilogramme of pigmeat. However, the rate of penetration of compound feedingstuffs, which expresses the percentage of compound feed used in the total amount of feed consumed, did not increase at the same pace in the various sectors. In 1960 the penetration rate was highest in the poultry meat sector and since then it has only increased slightly in that sector.

Finally, it should be noted that compound feedingstuffs manufactured for cattle represent the smallest fraction (22% in 1970-1972) of compound feedingstuffs as a whole.

9. In the Community of Six, during the period 1960/62 to 1970/72 the use of certain protein-containing substances for animal feed increased more quickly than that of energy-giving raw materials. Thus in the period mentioned the average annual growth rate in the consumption of oilcake was 10.5%, animal meals 3.7% and grass meals 12.8%, compared with 3.3% a year for the consumption of cereals by livestock. It should be observed that the production of other sources of protein, such as field beans, was reduced by 1.4% a year.

10. As far as the three new Member States were concerned during the period in question, the livestock sector, and consequently its feedingstuffs, developed much less than in the rest of the Community. This is chiefly due to the fact that in this sector the United Kingdom, by far the largest meat consumer of the new Member States, has always been largely dependent on supplies from other countries. The degree of self sufficiency in the United Kingdom in 1971/72 was 70.5% for

meat as a whole, 82.6% for beef and veal, 71.1% for pigmeat and 41.1% for mutton and lamb. The United Kingdom is also largely deficient in dairy products (butter). Dependence on other countries, particularly those of the Commonwealth for feedingstuffs, together with the policy adopted in this sphere, meant that livestock production did not expand to the same extent as in the Community of Six. Table 5 shows that meat and milk production in the three new Member States as a whole only increased by 2.3% and 0.3% a year respectively. The production of compound feedingstuffs together with the use of cereals for animal feed also developed less than in the Community of Six. In the United States the use of cake is actually dwindling.

11. In view of the importance of cake and seed imports to the Community supply arrangements, it would be useful to study their development over recent years. Non-availability of the necessary statistics makes it impossible to carry out a detailed study of the import position in the enlarged Community.

In the case of the Community of Six, the information on the growth of imports of protein-containing substances from third countries is given in Table 6.

This table shows that oilcake imports by the Six from third countries (including imported quantitities of seed expressed as oilcake equivalent) increased from 7.5 million metric tons in 1966 to 11 million tons on average during 1971 and 1972.

During the same period soyacake imports went from 4 million to nearly 7.5 million tons, thus showing an increase of nearly 3.2 million tons. This means that the increase in the Community's oilcake imports from 1966 to 1971-72m which amounts to 3.5 million tons. was met almost entirely by the increase in soyacake imports.

Table 4 also shows that the chief supplier of soyacake to the Community of Six is the United States; of the total 11 million metric tons of oilcake imported by the Community in 1971 and 1972, seven million tons, i.e., 63.5% originated from the United States.

In the case of the three new Member States, the statistics available reveal that in the United Kingdom, the chief consumer of proteinaceous products, some oil cake is being replaced by animal meal for livestock feeding. The consumption of oil cake and animal meal, which were 1.8 and 0.4 million metric tons respectively at the beginning of the Sixties, amounted to 1.2 and 0.6 million tons ten years later. A constant reduction is also reported in the use of groundnut cake in the United Kingdom.

12. The analysis contained in the preceding paragraphs stops at the 1971/72 marketing year, which is the last for which statistics are available. It should be observed that this marketing year seems very representative of the situation in the Community with regard to supplies of protein-containing products, following the development of supply and demand during the previous decade. During the 1972/73 marketing year, however, certain exceptional occurrences upset supplies of protein-containing substances in the Community and other importing countries.

The situation experienced in 1972/73 is the result of an exceptional combination of structural and economic factors.

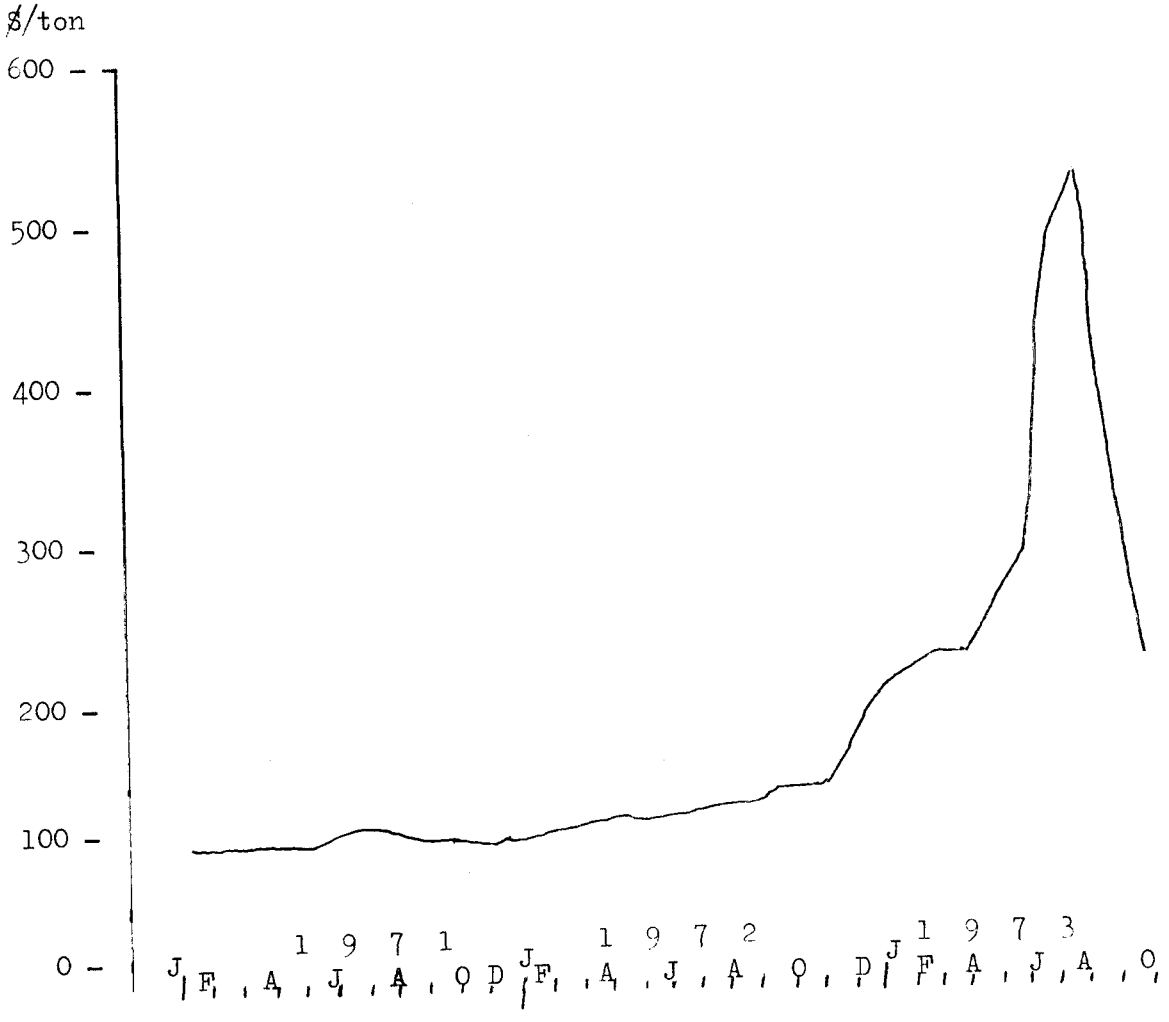
Among the structural factors the general growth of demand for animal products in several parts of the world and the development of intensive livestock production methods are worthy of note. Other factors may persist for some time to come : exports of fish meal from South America have disappeared almost completely and there has been a reduction in the deliveries of certain oleaginous seed, such as groundnuts and sunflower. The purchase by the Soviet Union of exceptionally large amounts of cereals and soya following a poor harvest in that country in 1972 and a difficult rice situation in Asia are economic factors. This critical situation arose in spite of the generally high level of cereal and soya production throughout the world.

Because all these factors coincided there was an increased, unexpected world demand, first of all for soya, with the result that the soya-bean stocks in the United States on 31 August 1973 were down to 1 600 000 tons, which represents less than 15 days' world consumption of that product.

It should be noted that only four years ago this stock amounted to nearly 9 million tons and that it has constantly diminished since then. The situation described above caused a price explosion on the world market and led the governments of certain exporting countries to take restrictive measures with regard to the export of protein-containing products during the summer of 1973.

Soya Meal Prices - 44 %

Origin United States - CIF Rotterdam



Source : Oil World

Chapter Two : Supply and demand prospects

13. In view of the fact that the events which characterized the world protein supply situation during the 1972/73 marketing year cannot be attributed solely to short-term economic factors, one must ask whether, in the future, the foreseeable protein supply will suffice to meet demand without difficulty, or, whether there is a risk of new crises occuring, with all the ensuing consequences for Community supplies, in view of the high degree of Community dependence (80%) on the world market.

In order to answer these questions, we must first try to assess supply and demand prospects with regard to animal products. Subsequently, we should look into the question of which animal feedingstuffs could be used to produce this meat, taking into account the foreseeable rationalization of stock feeding. Lastly, we will deal with possible sources of supply in respect of those raw materials which are likely to be the subject of increased demand.

Forecasting always involves an element of risk, which grows disproportionately higher where longer periods are covered by the forecast. Thus, in order to minimize the possibilities of error, this chapter will not attempt to make any forecasts beyond the 1977/78 marketing year.

14. On the basis of the 1967/68 production balance-sheets for animal products and taking into account the increase in population and incomes and the gradual changes in national eating habits, it is possible to forecast consumption for the year 1977/78, while at the same time checking the 1971/72 figures for beef, veal and pigmeat. The findings thus obtained for the Community of Nine are set out in the table below :

Community of Nine : Estimates for the consumption of animal products for the year 1977/78

	1967/68 (1 000 metric tons)	1971/72 (1 000 metric tons)	1977/78 (1 000 metric tons)	Index 1977/78 (1967/68 = 100)	Annual rate of growth (%)
BEEF AND VEAL	5 192	5 675	6 550	126	2.4
PIGMEAT	5 978	6 795	7 933	132	2.9
POULTRYMEAT	2 272	-	3 723	164	5.1
EGGS	3 318	-	3 882	117	1.6
MILK	93 839	-	108 378[1]	115	1.5

[1]Subject to statistical adjustment

Source: SOEC and DG VI.

It should be noted that the estimated annual rate of growth in the consumption of the various kinds of meat over the next five years is lower than the rate of growth recorded for the Sixties (see Table 4). Despite the fact that the rate of growth of meat consumption could slow down somewhat over the next few years, the aggregate quantities of meat which will need to be produced for human consumption are nevertheless substantial.

15. In the light of such an estimated increase in Community consumption of animal products, we have to consider where the additional quantitites necessary to satisfy Community needs will come from. In this connection it should be pointed out that the enlarged Community is self-sufficient with regard to most animal products, beef and veal being the exceptions. For the year 1971/72 the various degrees of self-sufficiency expressed as percentages, were as follows :

beef and veal	about 90%
pigmeat	" 101%
poultrymeat	" 102%
eggs	" 99%
milk	" 108%

In the case of beef and veal, a certain degree of dependence on third countries would still be an acceptable possibility. Certain South American countries, for example, have a high cattle-breeding potential and the technical factors which prevent long-distance transportation of pigmeat and poultrymeat do not apply in the case of beef and veal. However, since the production of beef and veal does not require the use of as many protein-containing substances as the other forms of stockfarming, the expansion of such production in the Community will only have a slight effect on Community protein supplies.

In the pigmeat and poultrymeat sectors the Community might also under-produce and (allowing for the limited technical possibilities) resort to the world market.

Nevertheless, a solution of this nature would merely shift to another part of the world the problem of protein supplies for the production of meat intended to meet the needs of the Community. On the other hand, the crops in question enable certain farmers to practise intensive cropping in areas where the traditional farming activities are no longer sufficiently productive. Lastly, while development of the compound-feed industry depends on these crops, the reverse is true to some extent. Thus we may conclude that between now and the year 1977/78 Community's pigmeat and poultrymeat consumption will still be met, as in the past, by Community production.

16. Over the last decade the consumption of compound feeds has increased considerably in the Community. This situation is due not only to the increased number of livestock but also to a higher consumption of compound feeds per head of livestock. Furthermore, the rate of increase in the use of compound feeds in animal feedingstuffs should continue over the next few years; for although in the poultry sector the rate of use seems to have reached its peak (in fact it has not risen since 1960), the same certainly cannot be said of cattle and pigs.

Nevertheless, it seems unlikely that this increase in the use of compound feeds can continue at the same rapid rate as in the past, since the use of these feeds in certain Member States has already become so extensive that the likelihood of a continuing increase on this scale would appear to be remote.

17. During the 1972/73 marketing year there was an increase in the price of oilcakes, which incidentally pushed up the price of other protein-containing feedstuffs. If this rise is reflected, even only partially, over the next few years in the price of protein feedstuffs (and it is more than likely that this will be the case) Community stockfarmers might well be induced to consider cutting back on their purchases of protein feedstuffs. In looking for ways and means of economizing in the use of certain protein feedstuffs, we must distinguish between reminants and monogastric animals, since supplying proteins to the former (less demanding in their requirements) is considerably simpler than supplying monogastric animals whose ration must, of necessity, include about 10 indispensable amino acids. Thus any economies in the use of proteins are limited almost exclusively to the ruminants, the only sector where one could speak of a certain overemployment of protein foods in the past.

If in the light of present conditions it is difficult to envisage any extension of grassland acreage, it is nevertheless possible to assume that more effective use could be made of existing grassland through the perfecting of ensilage and haymaking methods.

A second possible way of cutting back the use of conventional proteins is by using non-protein nitrogenous compounds for animal feeding. Of these compounds, urea has been used longer than any other and is currently the most widespread. It should be pointed out, however, that for reasons of animal physiology, the use of urea is restricted to ruminants and it must not represent more than 30% of the total nitrogen in the feed ration. In addition, the use of urea automatically requires a high inclusion of cereals, so that the problem of supply may simply be shifted from one product to another.

For these reasons, and in view of the inherent practical difficulties, it is not unreasonable to suppose that any saving in protein-containing foodstuffs which might be achieved in the near future through the use of urea would probably be of only limited significance.

The possibilities of cutting down on proteins in the poultry and pig sectors are far fewer, since these livestock, being monogastric, cannot synthesize certain amino acids as the ruminants do. Moreover, the cereals which normally make up more than half of the feed rations for poultry and pigs need to be supplemented, on account of their low protein (and in particular low lysin) content, either by oilcakes rich in these substances, such as soyacake, or by animal meal.

The consequences resulting from this are all the more important when one considers that more than two-thirds of the total Community production of compound feeds goes to pigs and poultry.

18. In such circumstances it does not appear unreasonable to estimate that over the period 1973/74 to 1977/78 the demand for proteins in the Community will increase by 3% a year, i.e., at the same rate as animal production. This corresponds to an average annual increase in requirements of about 600 000 metric tons of soya cake or equivalent products. It should be noted that some people think that the rate of increase could in fact be as high as 5% a year.

On the other hand, the FAO in its study "Tentative estimates regarding agricultural products 1970/80" has claimed that demand in the enlarged Community would increase from 12 600 000 to 16 300 000 metric tons between 1970 and 1980. This corresponds to an average annual rate of increase of 2.6%.

19. The rise in meat production over the next few years will not be confined merely to the Community, since there is every prospect of a greater consumption of meat in various parts of the world. Leaving aside for the moment meat consumption in the developing countries, where the transition from a starch-based to a meat-based diet is bound to be a long-term process, it cannot be denied that in a number of European countries, other than those in the Community, there already exists an important growth potential with regard to the consumption of meat.

In some countries a higher rate of meat consumption is, indeed, one of the explicit objectives of a general policy aimed at raising the standard of living of their peoples. Lastly, if one looks

beyond Europe, it will be seen that a considerable growth potential for the consumption of meat exists in a number of Asian and Latin American countries.

The increased meat production needed to meet growing demand will not be possible without a rationalization of feeding practices, which means a greater use of compound feeds. According to a study by the US Department of Agriculture, for example, increased meat production in seven East European countries (excluding the Soviet Union) could step up the use of soyacake by 8.2% a year up to 1980.

Even in those countries where meat consumption is already very high, there is reason to expect a mounting demand for protein-containing feedstuffs, owing to the growing use of compound feeds.

Thus we learn in another study published by the US Department of Agriculture that the domestic demand for soyacake in the United States may rise at an average rate of 3.6% a year between now and 1985. Other sources also point to a predictable increase in US demand in the immediate years to come, running at 6% a year. It should be pointed out that the growth of demand for soyacake in the United States will be determined largely by new developments in the direct use of soya proteins for human consumption. The world increase in meat production and the foreseeable swing towards the use of compound feeds for animal feeding purposes leads us to the conclusion that world demand for protein foods will continue to increase over the coming years. According to the FAO study (see paragraph 18), world demand for oilcakes and oleaginous meal should reach 71 400 000 metric tons by 1980, thus exceeding by 12 800 000 tons the level of consumption for 1970. This only represents an annual increase rate of 1.8%. It should be noted, however, that in the case of the United States (the chief world consumer) the FAO study forecasts only a modest increase in the consumption of oilcakes, i.e., 17 000 000 metric tons in 1980 as against 16 100 000 tons in 1970. Similarly, the estimated increase for the Soviet Union also seems

relatively conservative. An increase in world demand of 3% a year between now and 1977/78 (a figure which cannot be regarded as an overestimate) would call for an additional two million metric tons of oilcake a year.

20. Given these circumstances one must ask how the increasing world need for protein feedstuffs is to be met between now and 1977/78. Over the last few years the available stocks of oilcake, and in particular soya cake and fishmeal cake, have been such that there has been no problem in meeting the world demand (in 10 years, 1961/71, world oilcake production has risen from 34 500 000 to 55 600 000 metric tons and fishmeal production has gone up from 2 600 000 to 5 200 000 million metric tons).

As far as oilcake is concerned, this increase is due mainly to soya production which rose from 15 900 000 metric tons in 1961 to 31 900 000 metric tons in 1971. On the other hand, there has been a stagnation in world production of most of the other varieties of cake and in some cases even a falling-off over the last few years. This is particularly true of groundnut, sunflower and linseed cake.

As regards groundnut, it is doubtful whether this trend can be reversed in the short term. Cottonseed, colza and linseed cakes are secondary products whose patterns of production will depend on the demand for fibres in the case of cottonseed and for oil in the case of colza and linseed. The prospects for sunflower could improve, although it may be assumed that any recovery in production will be earmarked in the first instance to meet domestic demand in the countries where this seed is produced.

Lastly, the output of fishmeal has shrunk considerably since 1972 and on the basis of the information currently available there is little hope that Peru, the principal world supplier, will be able to resume regular and intensive fishing operations.

It should be noted that the other protein-containing feedstuffs (meat and grass meals, leguminous seeds, etc.) only represent a rather low proportion of world supplies and that this proportion is not likely to change significantly over the next few years.

We may therefore conclude that, unless appropriate measures are taken, the possibility of meeting world demand for protein feedstuffs over the next few years will depend mainly on the development of soya production.

21. During the last few years the upsurge in world demand for imported oilcake in general has been met almost exclusively by increased soya cake production. In 1966, for instance, the total amount of oilcake available for world export was 16 500 000 metric tons, of which 8 500 000 metric tons was in the form of soyacake. In 1973 the figures are 26 000 000 and 18 000 000 metric tons respectively. This means that those oilcakes other than soya, accounting for 8 000 000 metric tons of world import needs in 1966, have remained at exactly the same level in 1973 as they were in 1966.

In the last few years, however, the production of soyacake has not kept pace with the increased demand, so much so that the United States, the principal producer country, has had to reduce its stocks of soyacake and seeds from 7 200 000 metric tons oilcake equivalent at the end of the 1968/69 marketing year to 1 400 000 metric tons at the end of the 1972/73 marketing year. It is only fair to point out, however, that the 1973 soya crop in the United States is estimated at 43 200 000 metric tons, i.e., 8 300 000 metric tons in excess of the previous year's crop. This production should be sufficient to meet world demand for the 1973/74 marketing year (which is higher than in the previous year) and should enable stocks to be replenished to a certain extent. Nevertheless, even if this level of production were maintained in future harvests, it would not be enough to meet the foreseeable world demand. Furthermore, the record harvest of 1973 was made possible by a number of favourable circumstances, among them the availability of extra land as a result of the bad weather conditions prevailing when other crops were sown. It is difficult to imagine such a situation recurring in the future. On the contrary, according to certain information the acreage earmarked in the United States for the cultivation of soya in 1974 could well be less than that available in 1973.

It should also be pointed out that any increase in soya production in the United States over the years to come would appear to be possible only if additional acreage is made available for this purpose, since the increase in yield per hectare of soya seeds over the

period 1959-72 has only averaged a mere 1.5% (i.e., 0.27 q/ha) per year. According to the information available, there is no reason to believe that this situation will change during the next five years.

22. In Brazil there seems to be a certain possibility of increased soya cultivation. In 1973 the soya seed crop in that country amounted to 4 900 000 metric tons. The question which has to be asked, however, is whether in fact this increased production will not be absorbed over the next few years by a greater domestic demand. It should be noted that the export of Brazilian soya seeds has been suspended since the beginning of October 1973.

23. It may be stated in conclusion that if it transpired that world oilcake requirements over the next few years were increasing at an annual rate of 2 000 000 metric tons, this would necessitate an annual increase in soya acreage of 1 350 000 hectares.

Such an increase could be achieved either by cultivating land hitherto not in use, or by substituting soya for other crops (notably maize and cotton in the United States). In both instances the farmers' final decision will be taken mainly on the basis of the price ratio between soya, on the one hand, and rival crops, on the other.

Chapter 3 : Inventory of the Community's potential resources

24. At present, three species of oilseed are produced in the Community, and all three receive support under the common agricultural policy. The three species in question are colza seed, sunflower seed and linseed. The quantities of oilcake obtained from these seeds are as follows : colza seed 550 000 metric tons, sunflower seed 40 000 tons and linseed 22 000 tons.

25. The further development of colza cultivation depends on whether certain technical problems can be overcome. The use of colzacake for animal feeding is limited by certain drawbacks, namely its particular odour and bitter taste and the presence of sulphur compounds which are toxic for animals. A relatively high cellulose level also restricts its use as feed for any animals other than ruminants.

Research currently in hand to overcome these problems could improve the situation in the medium term. It should also be noted that colza seed is relatively rich in oil; it contains 41% of oil as against soya beans for example which contain 17%. Certain problems in the marketing of colza oil might also constitute a hindrance to the development of production of this seed.

26. In contrast to colza, the market for sunflower oil seems to be assured and presents no particular problems. Sunflower cake, however, because of its lysin deficiency, has to have lysin added to it if a mixture equivalent to that of soya is to be obtained. Thus **soya**cake could be replaced by the meal of decorticated sunflower seed on the following basis :

1 kg of soya = 1 kg of sunflower + 10–12 g of lysin.

The production of sunflower seed in the Community would need, however, to develop considerably for such a substitution to have any economic significance. Moreover lysin production in the Community is almost non-existent and the price at which it becomes economically attractive to use lysin is still lower than its market price.

27. The use of linseed cake, even though this is of good quality, is limited to cattle feed. As regards cultivation, the development of production of linseed is tied up with the future extent of the cultivation of linseed for oil production. The cultivation of flax, which also provides a certain quantity of linseed as a by-product, depends on the development of demand for the fibre. The low yield of oleaginous linseed (15 quintals/ha) constitutes a major obstacle to the spread of this crop.

28. Soya is the richest in cake of the oilseeds (79%). In addition soyacake has a protein content which can be as much as 50% by weight. These proteins have a high biological value due to their content of essential amino acids. As a result soyacake constitutes the best vegetable source of protein, and is a source which is difficult to replace, especially as far as its use as poultry feed is concerned.

Experiments which have been in progress in France since 1966 have shown that the cultivation of soya beans is technically possible in certain regions of that country.

There are also possibilities for developing this crop in Italy. It is estimated that this cultivation could, if the economic conditions were favourable, amount to 50 000 ha in 1977/78, i.e. a production of approximately 100 000 metric tons of soya beans; this would only represent 1.7% of the Community's cake requirements and less than the annual increase in the demand for proteins in the Community. The cultivation of soya enters into competition in crop rotation schemes primarily with maize, then with other cereals as well as with colza and sunflower. Its development would therefore initially be at the expense of the cultivation of cereals, and this would lead to an increase in cereal imports into the Community. This transfer of the Community's dependence from one product to another might not pose any problems, provided that world supplies of cereals available for export, in particular maize, were in future higher relatively than the supplies of soya available for export. Soya beans could, however, also replace colza seed. In this case the result would be to replace a mediocre source of proteins by an excellent source of proteins.

29. Of the forage crops grown on arable land, lucerne and clover are the most important.

However, the surface area given over to these crops has been declining for some dozen years now (table 7). The surface area of lucerne in the Community of Six, which in the period 1960 to 1963 was 3.8 million hectares, was down to 2.7 million hectares in 1971.

As far as cultivation is concerned, lucerne is a very good rotation head. It is grown throughout the Community (table 8). As far as nutritive value is concerned, lucerne gives by far the greatest protein yield per hectare of all the crops grown in the Community. One can say that the production of crude protein per hectare is approximately 2 000 kg for lucerne as against 500 kg for wheat and for maize, 450 kg for barley, and between 500 and 800 kg for field-beans.

Most lucerne is consumed directly at the farm as forage or in the form of hay or silage. This situation considerably limits the development of the use of this product, for the fresh-cut lucerne is used especially for feeding ruminants, since it cannot be carried far from the farm and its preservation poses certain problems. Dehydrated lucerne on the other hand retains most of the qualities of the green product, and dehydration safeguards the protein content, especially in autumn when adverse weather conditions prevent the lucerne being made into hay. The dehydrated product also has the advantage of a greatly reduced volume and can be incorporated into composite feedingstuffs.

The protein content of dehydrated lucerne, generally between 17 and 18%, can vary slightly from one dehydrated meal to another according to the vegetative stage of the plant, the proportion of the parts of the plant used (stems and leaves) and the system of preservation chosen.

Dehydrated lucerne, though not reserved exclusively for feeding cattle, has up till now been principally used for that purpose. However, on account of its relatively low protein content compared with soyacake and groundnut cake, the proportions in which it is added to rations has to be high and this reduces the energy concentration of these rations.

It is generally admitted that up to 50% dehydrated lucerne can be incorporated in the feed ration for young cattle without any risk of making the ration deficient in energy. Experiments have shown that dehydrated lucerne, when associated with energy-rich feed, enables good performance figures to be achieved.

As regards feedingstuffs for monogastric animals, dehydrated lucerne has up till now been incorporated in smaller proportions than in feed for bovine animals; this is mainly because of its relatively high cellulose content. The generally accepted limits for the incorporation of dehydrated lucerne are ten percent in the rations for pigs, and five percent in poultry rations. However, these percentages could be increased if techniques were perfected for the separation of the lucerne stems and leaves.

The production of dehydrated lucerne in the enlarged Community has gone up from 500 000 metric tons in 1965 to 1 300 000 tons in 1972 (table 9). Assuming an average yield of 10 tons of lucerne meal per hectare, the 1972 production was produced on 130 000 hectares, which represents only 5% of the total lucerne surface area. As far as the availability of the raw material is concerned, there is not therefore any factor inhibiting a certain development in the Community of the production of dehydrated lucerne. The considerations set out above concerning dehydrated lucerne are also applicable to dehydrated clover and to the other dehydrated herbs which are rich in protein but which seem to be produced in fairly small quantities.

30. Among the leguminous vegetable seeds grown in the Community, it is the field-bean which occupies by far the most important place. Its protein content is approximately 25 to 30% and its uses are very varied. It is either consumed on the farm as forage, or is used for the seeds or is incoporated in animal feedingstuffs. The field-bean is a plant whose dominant need is water. In view of this requirement, its cultivation could be developed preferably in regions where the rainfall is suffficient. As far as its use as feed is concerned, certain limiting factors, for example the presence of tannins in the teguments, can be eliminated by decortication. Thus pre-cooking the field-beans can probably increase their digestibility and increase the proportion in which they can be incorporated in the rations.

Field-bean protein is at least as rich in lysin as soya bean protein. However, field-beans cannot be used in an unlimited way in feedingstuffs for poultry and pigs. In these feeds they can replace at most one quarter of the soyacake. In 1972 the area under field-bean cultivation in the Community of Nine was 381 900 ha (table 10). This crop has, however, declined considerably over the last few years. In the Community of Six, the area given over to field-beans in 1960 was still 632 000 ha; in 1972 it had gone down to 324 000 hectares (table 11). The low yield per hectare of the spring field-bean, which in crop rotation considerations has to compete with the spring cereals, seems to have been the principal factor that caused the decline of this crop. In 1972 the average field-bean yield in the Community was 16 quintals per hectare, i.e. scarcely above the figure for 10 years ago. In the first instance, progress towards an extension of the cultivation of the field-bean could be achieved by the use of seed enabling higher yields to be achieved. In this connection it should be noted that in France for example two thirds of the area given over to field-beans is planted with consumer supply seed. The use of certified seed would in itself enable appreciably higher yields to be obtained, i.e. between 30 and 40 quintals per hectare.

Seed of hybrid winter varieties would give even higher yields. Research work carried out in France with such seed justifies hopes of yields of 50 quintals per hectare.

Yields of that order could enable field-bean cultivation to pick up again and to return at least to the surface area of 1960, i.e. 300 000 hectares more than at present. This crop would replace cereals in particular in crop rotation schemes. An extension of field-bean planting over an additional 300 000 hectares would make possible an import saving of 600 000 metric tons of soyacake but would lead to a supplementary demand for 600 000 tons of cereals which would have to be imported.

31. The green pea (Pisum sativum) grown for its seeds (which must be distinguished from field peas grown for the production of forage from the harvesting of the whole plant) is similar, as far as nutritive value is concerned, to the field-bean, and its protein content and the composition of these proteins in amino acids are close to those of the field-bean.

At the present time, however, the green pea is relatively little used in animal feeding. This is because it has only been cultivated up till now for human consumption, and as a result its genetic selection has for a number of years been directed towards providing peas which are suitable for preservation.

32. The protein content of cereals, leaving aside environmental conditions (climate, salt, aid of nitrogenous fertilizers, etc), can also be influenced by genetic improvement. Some selection on the basis of the protein content has already been achieved but unfortunately there is a negative correlation between the yield per hectare and the protein content. In addition the new varieties seem less resistant to the various pests. In these circumstances further research appears to be necessary before the new higher protein content cereal varieties can replace the varieties currently used.

33. A greater use of urea instead of cake or animal meals in animal feed can represent a certain saving of proteinic substance. However, as was stated in paragraph 17, the use of urea is fairly limited, since it can only be introduced partially and then only for adult cattle and sheep. Taking these limitations into account, the savings to be achieved can be determined from the following substitution equation:

6 kg of soyacake = 5 kg of maize + 1 kg of urea

The use of one kilogramme of urea (with five kilogrammes of maize) thus enables six kilogrammes of cake to be saved.

Although exact figures for the use of urea in animal feeding in the Community are difficult to obtain by reason of the twofold use of urea (fertilizer and animal feed), estimates suggest a figure of 50 000 metric tons, i.e. the equivalent of approximately 300 000 tons of soyacake. The urea used for animal feeding in the United States in 1972 amounted to almost 750 000 tons, which corresponds to the protein contribution of 4.5 million tons of soyacake. This high consumption in the United States is due to the great numbers of cattle in that country and to the large scale availability of cereals at low prices.

Because it is rather difficult to use urea and because of certain risks this use entails, it would be necessary to specify the conditions of use and to make these widely known; this ought to be done at the Community level.

34. The possibility of growing protein rich micro-organisms (fermentation proteins) on an industrial scale on substrata based on hydrocarbons or other chemical products has recently been under consideration by a number of industrial groups. The fermentation proteins are very rich natural sources of proteinic nitrogen and offer an extremely wide range of amino acids. On average 1 kg of fermentation proteins can replace between 1.4 and 1.8 kg of soyacake. These proteins also have other advantages, e.g. consistency of quality, ease of storage, regularity of supply.

The research work which has been in progress for a number of years now has led to the development of various manufacturing processes. Some of these processes are still at the experimental stage, others have reached the pre-industrial stage, and some have gone beyond this latter stage. There are already two small factories operating in the Community with a total production of 20 000 metric tons per annum. These are pilot factories and the optimum size per unit of production will probably be around 100 000 tons per annum. A number of studies that have been made suggest that the investment necessary to establish such a unit would amount to approximately 40 million units of account. The marketing of fermentation proteins is subject to different conditions in the various Member States.

According to the information available it can be estimated that the factories planned to come into operation between now and 1978 represent a production capacity of approximately 850 000 tons. It should be said, however, that implementation of all the planned projects within the scheduled times will to a large extent depend on the market response to the products in question and on the price which can be obtained on the market in relation to the cost price.

Table 1 : Products used for animal feeding in the countries of the Community.
Crop year 1971/72 (*)

(1000 ton)

	Germany	France	Italy	Netherland	Benelux	Ireland	United Kdm.	Denmark	EUR - 9
1. Cereals	15 295	15 474	10 661	2 690	2 782	1 392	13 492	5 882	67 668
2. leguminous vegetable seeds (field beans, etc...)	93	39	485	172	11	-	69	21	890
3. Cake	4 216	2 301	1 714 (1)	2 510	989	122	1 293	1 086	14 231
incl. soya	2 203	1 346	994	1 054	503	97	532	594	7 323
4. Fish and meat meals(2)	654	284	96	199	168	42	605	178	2 226
5. Grass meals (lucerne, etc.....)	262	408	70	305	73	15	109	105 (3)	1 347
6. Milk powder	199	378	246	279	61	6	28	24	1 221

Source : Forage statistics. Statistical office of the EC Luxembourg

(*) For Ireland : Calendar year 1971.

(1) Not including olive oilcake

(2) Source: trade organizations and DG VI estimates

(3) Source : Danish Ministry of Agriculture

Table 2 : Origin of the products used for animal feeding in the enlarged Community and degree of self-sufficiency during the 1971/72 crop year.

(1.000 tons)

	Origin : EEC (a)	Non-member countries (b)	Total (c) (= a + b)	Degree of self-sufficiency (%) (d) (= a : c)
1. Cereals	50 975	16 693	67 668	75.3
2. leguminous vegetable seeds (field beans, etc...)	890	-	890	100
3. Cake	612	13 619	14 231	4.3
incl. soya	-	7 323	7 323	0
4. a) Fish meal	423	966	1.389	30.5
b) Meat meal	837	-	837	100
5. Grass meal (lucerne, etc....)	1 347	-	1.347	100
6. Milk powder	1 221	-	1 221	100

Source : DG VI Estimate

Table 3 : Degree of self-sufficiency in proteinic concentrates for cattle feeding in the enlarged Community in 1971/72.

(Weight of crude proteins) (1 000 t)

	Origin : EEC	Origin : Non-member countries	TOTAL
Cake (incl. soya)	211 (-)	6 369 (3 295)	6 580 (3 295)
Fish meal	275	628	903
Meat meal	477	-	477
Leguminous vegetable seeds	208	-	208
Grass meal	234	-	234
Milk powder	409	-	409
Total	1 814	6 997	8 811
%	20.6	79.4	100

Source : DG VI Estimate

Table 4 : Community of Six. Recent trends in a number of factors relating to feeding and animal production over a period of ten years.

	Average 1960-1961 and 1961-1962 (1000 t)	Average 1970-1971 and 1971-1972 (1000 t)	Index 1970-1972 (1960-1962 = 100)	Average annual rate of increase (+) or decrease (-) (%)
1. Animal production				
- meat : all categories	8 218	12 054	147	+ 3.9
incl.- beef and veal	3 327	4 157	125	+ 2.3
- pigmeat	3 470	5 067	146	+ 3.9
- poultrymeat	892	2 133	239	+ 9.1
- cow's milk	63 899	71 772	112	+ 1.2
- eggs	1 839 (1)	2 678 (1)	146	+ 3.8
2. Production of composite feedingstuffs [a]				
- Total,	13 109 (1)	36 440 (1)	278	+ 9.7
for - cattle and calves	3 119 (1)	7 932 (1)	254	+ 8.9
- pigs	4 345 (1)	14 154 (1)	326	+11.3
- poultry	5 315 (1)	11 443 (1)	215	+ 7.2
3. Products used in animal feeding :				
- Cereals, total	33 765	46 658	138	+ 3.3
incl. - on the farm	19 871	24 131	121	+ 2.0
- market	13 895	22 527	162	+ 5.0
- Cake [b]	3 778 (1)	11 352 (1)	300	+10.5
- Animal meat (fish and meat)	979	1 401	143	+ 3.7
- Broadbeans and field beans	514 (1)	439 (1)	85	- 1.4
- Grass meal (lucerne etc....) (production)	228 (1)	858 (1)	376	+12.8

Source: Calculation on the basis of data supplied by the SOEC, Luxembourg, except for the figures under (a) (Source: FEFAC) and (b)(Source: FEDIOL).
(1) Averages of the calendar years 1960 and 1961, and 1971 and 1972.

Table 5 : The three new Member States.

Recent trends in a number of factors relating to feeding and animal production, over a period of ten years.

	Average 1960/61 and 1961/62 (1 000 t)	Average 1970/71 and 1971/72 (1 000 t)	Index 1970/72 (1960-62 = 100)	Average annual rate of increase (+) or decrease (-) %
1. Animal production :				
- Meat all categories	3 444	4 312	125	+ 2.3
incl: - beef and veal	1 329	1 527	115	+ 1.4
- pigmeat	1 410	1 811	128	+ 2.5
- poultrymeat	389	688	177	+ 5.9
- Milk	20 697	21 227	102.6	+ 0.3
- Eggs	964	1 043	108	+ 0.9
2. Production of composite feeding :	10 130 (1)	14 417 (1)	142	+ 3.3
- incl. United Kingdom	8 950	10.725	120	+ 1.7
3. Products used in animal feeding :				
- Cereals	15 899	20 472	129	+ 2.6
incl. United Kingdom	10 529	13 427	128	+ 2.5
- Cake (2)	2 753 (1)	2 263 (1)	82	- 1.7
incl. United Kingdom	1 841 (1)	1 210 (1)	66	- 3.7
- Grass meal (production)	228 (3)	508 (1)	223	+14.3

Sources : SOEC, FEDIOL and FEFAC

(1) Averages of the calendar years 1960 and 1961, and 1971 and 1972

(2) Not including Ireland, where the consumption of cake in 1971 was 122 000 tons

(3) Average of the calendar years 1965 and 1966

Table 6 : Imports from non-member countries of raw proteinic materials for animal feeding (Community of Six)

(1.000 t)

	1956	1971	1972
I. **Oilseeds and oleaginous fruit[1] and oilcake**			
1. Soya (in cake equivalent)			
Total non-member countries[2]	4 008	7 014	7 315
incl. - United States	3 684	6 270	5 940
- Brazil	229	618	1 264
2. Colza (in cake equivalent)			
Total non-member countries	172	322	236
incl. - Canada	68	278	188
-- United States	-	9	-
3. Sunflower (in cake equivalent)			
Total non-member countries	400	311	346
incl. - Argentina	236	239	202
- United States	3	2	33
4. Linseed (in cake equivalent)			
Total non-member countries	707	918	755
incl. - Canada	78	219	217
- United States	216	123	262
- Argentina	327	508	225
5. Groundnut (in cake equivalent)			
Total non-member countries	869	644	766
incl. - AAMS	339	201	327
- Nigeria	192	50	23
- Brazil	103	153	140
- United States	23	52	79
6. Copra and palm nut (in cake equivalent)			
Total non-member countries	967	1 013	1 184
incl. - Philippines	319	371	479
- Indonesia	147	230	256
- Nigeria	133	125	135
- AAMS	92	118	102
- United States	19	58	73

Table 6 : (cont)

	1966	1971	1972
7. Maize (residues from the manufacture of starch)			
Total non-member countries	388	560	703
incl. - United States	339	497	625
Subtotal I (1 to 7)			
Total non-member countries	7 511	10 782	11 305
incl. - United States	4 284	7 011	7 012
II. Animal meal			
1. Fish meal			
Total non-member countries	758	821	863
incl.. Peru	453	554	580
_ Norway	80	110	131
2. Meat meal			
Total non-member countries	29	9	7
III. Lucerne meal			
non-member countries	158	66	46
incl. - United States	87	20	0

Source : External trade. NIMEXE. SOEC, Luxembourg

(1) For the purposes of this table, oilseeds and oleaginous fruit imported in their natural state were converted to cake at the following rates : soya 79%, colza 53%, sunflower 41%, linseed 61%, groundnut 53%, copra 34%, palm nut 51%.

(2) "non-member countries" means countries outside the Community of Nine (World - Intra EEC - imports from the UK, Denmark and Ireland).

Table 7 : Lucerne and clovers. Area planted in the Community of Six.

('1.000 ha)

Year	Lucerne EUR - 6	Clovers EUR - 6
1960	3 572.7	2 402.5
1961	3 861.1	2 488.9
1962	3 797.3	2 337.9
1963	3 800.1	2 281.2
1964	3 707	2 181
1965	3 709	2.028
1966	3 692	2.049
1967	3 577	1 919
1968	3 411	1 816
1969	3 256	1 714
1970	3 111	1 705
1971	2 683	1 447

Source : SOEC, Luxembourg

Table 8 : Lucerne and clovers. Area planted in the Community in 1971.

(1 000 ha)

	Lucerne	Clovers
Germany	90	273
France	992	464
Italy	1 593	695
Netherlands	4	0
Belgium	6	6
Luxembourg	1	9
EUR - 6	2 683	1 447
Ireland	0	
United Kingdom	. (1)	
Denmark	21	
EUR - 9	2 704	(1 447)

Source : SOEC, Luxembourg.

(1) 15.000 ha in 1967.

Table 9 : Production of lucerne meal in the Community

(1.000 t)

	Germany	France	Italy	Netherlands	Belgium	Lux.	EUR-6	Ireland	United Kingd.	Denmark	EUR - 9
1960	40	63	25	90	10	•	228	•	•	•	•
1965	35	100	80	120	20	•	355	18	83	120	576
1966	40	230	70	115	20	•	475	19	75	140	709
1967	35	320	100	135	25	•	615	19	71	180	885
1968	30	450	90	135	25	•	730	20	72	250	1 072
1969	30	425	85	120	15	•	675	21	66	200	962
1970	27	505	75	119	11	•	737	21	87	275	1.120
1971	25	600	80	120	13	•	838	22	98	345	1 303
1972	27	628	90	118	15	•	878	19	131	400	1 428

Source : Commission Intersyndicale des Déshydrateurs Européens.

(Note : In the figures for the new Member States, the quantities of other dehydrated grasses are also included).

Table 10 : Broad beans and field beans. Surface areas, yield and production in the Community in 1972

	Surface area (1 000 ha)	Yield (q/ha)	Production (1 000 t)
Germany	14.2	31	44
France	14.2	21	29.8
Italy	294.5	11,8	348.4
Netherlands	0	•	0
Belgium	1	31,5	3.2
Luxembourg	0.2	20	0.4
EUR - 6	324.1	13.1	425.8
Ireland	•	•	•
United Kingdom	52.8	31.5	166
Denmark	5.0	33.8	17
EUR - 9	381.9	15.9	608.8

Source : SOEC, Luxembourg.

Table 11 : Broad beans and field beans. Trend in surface areas, yields and production in the Community.

Year	Area (1 000 ha)		Yield (q/ha)		Production (1000 t)	
	EUR-6	EUR-9	EUR-6	EUR-9	EUR-6	EUR-9
1960	632.0	.	8.4	.	533.8	.
1961	593.2	.	8.3	.	594.6	.
1962	585,2	.	9,5	.	554.7	.
1963	552,0	.	11.0	.	606.6	.
1964	509.9	.	9.8	.	505.5	.
1965	462.3	.	11.8	.	546,5	.
1966	450.9	.	11.3	.	510.5	.
1967	436.9	.	12.3	.	536,2	.
1968	423.3	.	10,5	.	446,4	.
1969	414,5	.	12.7	.	526.6	.
1970	395,4	487.9	12.0	14.2	472.6	692.0
1971	359.4	434,5	12,6	14.4	452.3	624.7
1972	324.1	381.9	13.1	15.9	425,8	608.8

Source : SOEC, Luxembourg.