

**Preliminary report sub-work package 4.2 in the EU-
project: Research to support the EU-regulation on Organic
Agriculture (www.organic-revision.org)**

**Overview of supply and demand for concentrated organic
feed in the EU in 2002 and 2003 with a particular focus on
protein sources for mono-gastric animals**

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Introduction

The task 4.2 of the project Organic Revision is concerned with the evaluation of the situation concerning the availability of limiting amino acids for pigs and poultry in the EU and different member states and candidate countries and with assessing the different strategies used to compensate for restricted nutrient supply. This preliminary report presents an overview of supply and demand in the EU summarising the situation of supply and demand in 2002 and 2003. This follows on from a short overview of the situation that was presented at the Project Workshop at BIOFACH 2005. A similar preliminary report on the possibilities of feeding monogastrics on 100 % organic diets has been prepared by Sundrum et al. (2005). For further information about this and other reports in the project see www.organic-revision.org.

Further aim of this preliminary report is to set out the data sources, assumptions and procedures that were used to assess the availability of protein sources for 100% organic diets for pigs and poultry. We are publishing this section of the preliminary report now in order to get feedback and receive further input to the final version, and in order to contribute to the current ongoing debate in relation to the changes to the relevant articles in the EU regulation on organic agriculture. This preliminary report will be included in the deliverable 4.1 of Organic Revision which is due in August 2005.

Data on number of organic livestock and production of organic feed at EU-level are very limited. Feedback and comments on this draft are very welcome in particular related to additional data sources and literature that should be considered for individual countries or the EU as whole. We are also intending also illustrate the situation at national or regional level will and would welcome feedback on particular regions.

In the following section, some background material in to the current situation both at EU level and in some member states is set out, followed by an overview of the data sources and methodology for the calculations including the assumed rations that were used for the calculations. The results section presents an overview of organic stock numbers in the EU in key categories of all animals including non-monogastric categories, the organic production of concentrated feed stuff broken down in cereals and protein sources and balancing calculations, followed by some tentative conclusions.

The situation at the moment

EU level

Annex I B 4 of the Regulation (EEC) 2092/91 sets out that organic livestock should be fed on organic diets, but allows for some derogations, for example that up to 30% of the diet can come from in-conversion holdings. Article 4.8, in particular, permits the limited used of conventional feed (10% for herbivores, 20% for non-herbivore species) for a transitional period ending in August 2005, i.e. five years after the regulation had to be implemented in all member states.

A review of the Annex II part C (Feeding stuffs) was carried out in 2003 with the aim of deleting those conventional feed materials that were no longer needed from the Annex. With Regulation (EEC) 2277/2003 these were incorporated into the main regulation alongside other changes (e.g. 50% of feeds should be home-grown for herbivores).

The following preamble to the regulation (EEC) 2277/2003 illustrates the difficulty that member states anticipate in following the timetable laid down in the EU 1804/1999 (livestock regulation):

“Most of the conventional feed materials and in particular protein crops are still indispensable, at least in some Member States. Moreover, conventional milk by-products are still necessary in organic farming and further minerals are required to ensure the welfare of organically-reared livestock.”

On the other hand, the recently published EU Organic Action Plan calls for maintaining integrity in organic agriculture, in particular by maintaining the end dates of the transitional periods laid down, including the non-organic feed allowances.

Sectors strategies to meet the challenge

Strategies to cope with the pending changes vary between the types of animal (herbivores or monogastrics), certification bodies and countries.

Herbivores

Some countries and/or certification bodies have introduced 100% diets for organic ruminants ahead on schedule. In Denmark, the organic cattle industry has adopted 100% organic feed as the voluntary code of practice and in Germany, two producer organisations (BIOLAND and DEMETER) have introduced 100% organic diets for ruminants in their standards. Others have reduced the number of permitted conventional components further than at EU level (Naturland, BIOSUISSE).

However, there is some indication that the introduction of higher organic percentages ahead of schedule has led to increases in the use of imported protein from developing countries (e.g. Soya from Brazil) to replace the non-organic waste products from the food industry that were used as protein sources before hand (e.g. potato protein).

Monogastric animals

In France, it is already prohibited to use more than 10% of conventional products in organic animal feed for pigs and poultry and according to our French contact no problem of availability was experienced within this limit.

To my knowledge no certification body has yet introduced the requirement for 100% organic diets ahead of schedule, but some feeding experts and consultants have provided examples for 100% organic diets and in Denmark, Germany and the UK research looking into the impact of such diets on animal performance are currently underway.

Based on review of available literature, Sundrum et al. (2005) concluded that it is clearly possible to formulate 100 % organic diets without the use of non-organic feedstuffs, although it is more difficult to accurately meet the requirements of the animals in organic than in conventional systems. It is important to consider the main objectives of organic animal production as a land based system, avoiding the use of external inputs and giving priority to high quality rather than maximum production. Due to the restricted availability of limited amino acids in organic poultry and pig production, protein accretion capacity is lower compared to conventional production. To adapt to this situation the feeding of organic pigs and poultry should be more closely adapted to the growth process in various stages. However, the preferable use of home-grown feedstuffs and limitations in the choice of bought-in feedstuffs can be the cause of considerable variation in the composition of the diets, and increases the need for analysis of the ingredients and the calculation of rations. For more detailed recommendations in relation to formulating diets see the preliminary report by Sundrum et al. (2005).

Data sources and methodology

The demand and supply of organic concentrate feeds (both cereals and protein sources) was calculated using statistical data from other sources (EU-CEE-OF, Eurostat, OMIARD market survey), supplemented by the opinion of a number of experts on feeding organic stock.

Data sources for numbers of organic animals

A complete set of data on the number of organic livestock in the EU has not been published so far. The most complete data set for broad categories of organic livestock exists for 2002 in two reports in the EUCEEOPF project: Olmos (2005) and Praznan et al., (2004), in the case of Olmos and Lampkin (2005) unpublished data were made available for this overview. The report from Olmos and Lampkin (2005) provides data for members of EU 15 and Switzerland and Norway for 2002 and 2003, but livestock data are missing for the UK and Spain. For the UK Soil Association (SA, various years) and DEFRA (2004) data were used after crosschecking with industry experts. For Spain Garcia (2005) provides estimates for 2004, on which 2002 and 2003 data could be estimated.

The report by Praznan et al. (2004) provides data for 2002 for the new member states, apart from Poland, Malta and Cyprus. An existing but unpublished draft for 2003 data for most new member states countries has been used to calculate an estimate for the total EU figures for 2003. The missing countries were not considered in the calculation. The calculation of the feed balance in the EU 25 was carried out for two years, 2002 and 2003 data, using estimates for 2003, where no other data were available. Based on more detailed data from some countries and expert assessment the broad categories of livestock were broken into the following sub-categories for which demand figures for concentrate feeds exist in the literature.

Bovine: dairy cows, suckler cows, other cattle

Sheep: ewes with lamb

Pigs: sows and finishing pigs

Chicken: layers and table chickens.

No other category of poultry was considered.

Assumed annual feed requirements for animal categories

Annual feed requirements were based on standard demand figures used for farm and ration planning and expert advice from Austria, Germany, Denmark and the UK (see Table 1).

Table 1: Standards assumption for the annual concentrated feed intake and percentages of cereals, EU pulses and other protein sources

Animal category	Total concentrate requirements per head and year	% Cereal	% Pulses (EU grown)	% high quality protein sources
Bovine Dairy	<i>t/hd/a</i>			
Suckler	1.00	65%	35%	0%
Other	0.20	85%	15%	0%
	0.15	85%	15%	0%
Sheep	<i>t/hd/a</i>			
Ewes with lambs	0.02	85%	15%	0%
Pigs	<i>t/hd/a</i>			
Sows	1.5	71%	22%	7%
Fattening pigs	0.30	65%	15%	20%
Chicken	<i>t/1000 head/a</i>			
Layers	45.00	50%	25%	25%
Table birds	6.0	55%	25%	20%

Source: Lampkin et al., 2004 and expert survey

Where national demand figures varied considerably, the estimates consider the proportion of total animals, giving a higher weighting to expert recommendations from those countries where a high proportion of the organic animals are kept. For example, the assumed average concentrate feed for dairy varied between countries from 0.8 to 1.2 t/head and year, but individual producers are likely to feed higher or lower amounts. In a second step, the total annual feed requirements for each sub-category were broken down into cereals, home grown pulses (that could be grown in most parts of the EU such as beans, peas and lupins) and high quality protein sources. For ruminants the experts' opinion for total protein requirements content varied considerable ranging from 5% to 40%, which may be a reflection of variations in the use of clover or clover-grass silage in the ruminant rations that can minimize the need for protein supplement. It is assumed that all concentrated protein for ruminant diets can be grown in the EU, as protein quality is not considered a limiting factor in organic cattle and sheep production. For pigs and poultry the protein requirement were determined on the basis of current standard organic rations.

Separate calculations were carried out to see the impact of modifications to the rations for pigs and poultry to meet the challenge of 100% organic. Table 2 shows the assumptions for these modified rations and the changes to the standard assumption in Table 1. For example for organic laying hens a reduced energy content in the diet can be used to stimulate a higher feed intake and thus higher intake of limiting amino acids. For pigs the issue of adapting the supply of amino acids to the growth period and increasing the proportion of roughage in the diet are considered. Variation in the protein content of ruminant diets based was also considered, because of the indirect effect this could have on availability of protein

sources for pigs and poultry. The assumptions for the modified rations are based on published ration examples for 100% organic that are reviewed in detail in the other preliminary report related to the 100% organic diets in this project by Sundrum et al. (2005).

Table 2: Modified rations to meet 100% organic diets: Assumption for annual concentrated feed intake and percentages of cereals, EU pulses and high quality protein sources

Animal category	Total concentrate requirements per head and year	% Cereal	% Pulses (EU grown)	% high quality protein sources
		<i>(percentage in brackets indicates change to assumption in Table 1)</i>		
<i>Bovine</i> Dairy Suckler Other	<i>t/hd/a</i> 1.00 Unchanged Unchanged	50% (-15%)	50% (+15%)	0%
<i>Sheep</i> Ewes with lambs	<i>t/hd/a</i> Unchanged			
<i>Pigs</i> Sows Fattening pigs	<i>t/hd/a</i> 1.0 (-0.5) 0.30	65% (-6%) 64% (-1%)	30% (+8%) 29% (+14%)	5% (-2%) 7% (-13%)
<i>Chicken</i> Layers Table birds	<i>t/1000 head/a</i> 45.0 6.0	53% (+3%) 63% (+8%)	38% (+13%) 15% (-10%)	9% (-16%) 22% (+2%)

Source: Sundrum et al. (2005) and personal communication

Data sources for organic feed availability

This was calculated on the basis of land use data for 2002 and 2003 from the EU-CEE-OFP project using the same data sources as for stock numbers and the most update figures that were available at the time. Land-use data could be obtained for most countries for 2002 and 2003, broken down into categories of arable, grassland and permanent crops (with some uncertainty whether short term clover in arable rotations is included as arable or grassland). For most countries the area of cereal crops is also available, but not all countries report on protein crops. Uncertainty arises, because livestock producers may grow pulses for use on farms that are not sold to the market and not included in the statistics and for ruminants the distinction between forage and concentrate feeds is in some cases problematic, for example where cereals are grown for whole crop silages.

No attempt has been made to consider feed from conventional sources currently used in organic rations, the use of animal proteins (such as derived from organic milk or fishmeal), or to estimate the imports of organic feed into the EU, as no statistical for this have been identified.

Results

Numbers of organic animals

Table 3 shows the numbers of organic animals in the EU in 2002 and 2003. In general terms it appears as if livestock numbers increased between 2002 and 2003 in the new member states. However, this has limited impact on the overall balance as for most categories of livestock the total numbers of stock in the new member states is less than 10% of the overall total. Among EU15 members, increases in the number of cattle occurred in Greece and Portugal, whereas numbers appear to have declined in Denmark. Sheep numbers declined considerable in Italy and the Netherlands, but increased in Portugal and Greece. Numbers of pigs declined between 2002 and 2003 in most of the main pig production countries. The numbers of organic chicken appear to have increased in most old member states with the exception of the Netherlands and Denmark.

Table 3: Numbers of organic animals in the EU 25 in 2002 and 2003

Animal category	2002	2003	Major producing countries
Bovine	1.4million	1.5million	Austria, Germany, Italy and Denmark
Sheep	1.71 million	1.63 million	Italy, UK, Germany and France
Pigs	553,000	472,000	Germany, Denmark, France and UK.
Chicken (layers and broilers)*	16.1 million	17.3 million	France, UK, Germany and Denmark.

*Other categories of poultry were ignored because of the very limited amount of data available.

Source: Own data

Production of organic feed-stuffs

Land use shows considerable variation between the EU member states. The western and mountainous regions have a very high proportion of area in organic grassland. Table 4 shows the production of organic cereals and pulses in 2002 and 2003, including the main producing countries. The table also shows the assumed production in tonnes. To convert area grown into a production value for cereals and pulses an average yield estimate of 3 t/ha was used. Because of the limited data availability there is considerable uncertainty in the estimates, so sensitivity of the calculation to variation in yields was tested. It is assumed that 55 % of the total cereal production is for feed, the rest for human consumption and for seed production. This figure is based on data for the organic market in 2001 of Hamm and Gronefeld (2004).

It is further assumed that the majority of organic pulses grown (90%) are used for animal feed, the rest for seed and human consumption. Based on the available data it appears as if the total area for pulses in the EU declined in 2003, as a result of a decline in Italy. However, given the requirement for 100% organic diets in 2005, it

could be expected that the area of organic protein crops may have increased again in 2004, but data are not yet available. The decision of individual producers to grow organic pulses will, however, be influenced not only by knowledge about changing conditions, but also by the prices that are offered.

Table 4: Production of organic cereals and pulses in the EU 25 in 2002 and 2003

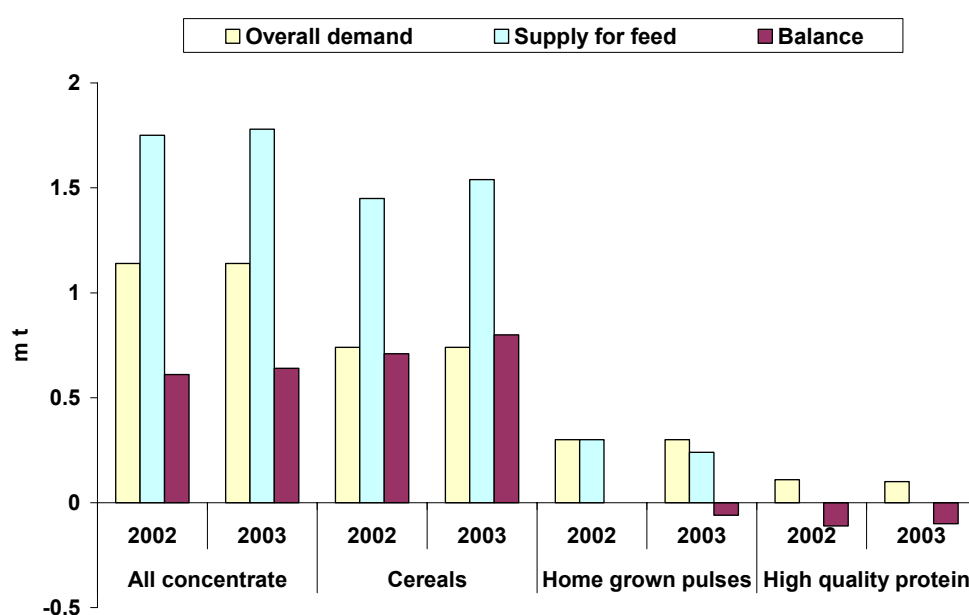
Land use	2002 (ha)	2003 (ha)	2002 (t)	2003 (t)	Major producing countries
Cereals	882,000 ha	933,000	2.65 million	2.8 million	Italy, Germany, Spain and France
Pulses	109,000	88,000	328,000	265,000	Italy, Germany, France and Austria

Source: Own data

Calculated balances for concentrate feed

Figure 1 and Table 5 show the results of the balance calculations for 2002 and 2003. The total supply was calculated based on land use data, average yields and an assumed percentage of the supply used for feed. In 2002 and 2003 the EU 25 grew approximately 3 million tonnes of organic cereals and pulses, 1.75 million of that are likely to have been used as concentrated animal feed. Over 80% of this would have been cereals; between 13 and 17 % would have been pulses.

Figure 1: Calculated balance of demand and supply of organic concentrate feed in the EU 25 for 2002 and 2003 (million tonnes)



Source: Own data

The total demand is calculated by multiplying livestock numbers with assumed rations. The results show that over 55 to 60% of the total demand for concentrate feed is required to feed ruminants, over 25% to feed poultry and 15 to 18 % for organic pigs. For home-grown pulses, this percentage is even higher with over 64 % for ruminants, approx. 25% for poultry and 10% for pigs. Because of the high proportion in demand, ruminant numbers will influence organic feed availability.

Balance A in Table 5 and Figure 1 shows the difference between supply and demand, the total of concentrated feeds and for the categories of cereals, EU grown pulses, and high quality protein sources. In 2002 the EU 25 would have produced enough organic cereals and peas and beans to feed all its organic livestock. Small changes in stock numbers and a reduction in the area for organic pulses appear to have lead to an undersupply for home-grown pulses in 2003. In both years the calculation shows an under supply of high quality protein, some of which would have been covered by fishmeal, used in the Nordic countries, but no data used were available.

Table 5: Balance of organic concentrate feeds in 2002 and 2003 (million t)

	All concentrate		Cereals		Home grown pulses		High quality protein	
	2002	2003	2002	2003	2002	2003	2002	2003
Supply								
Production (3t/ha)	2.97	3.06	2.65	2.80	0.33	0.26		
% Animal feed			55%	55%	90%	90%		
Supply for feed	1.75	1.78	1.45	1.54	0.30	0.24	-	-
Demand								
Ruminants	0.64	0.67	0.45	0.47	0.19	0.19	-	-
Pigs	0.20	0.17	0.13	0.12	0.03	0.03	0.03	0.03
Poultry	0.30	0.30	0.15	0.15	0.08	0.07	0.07	0.07
Overall demand	1.14	1.14	0.74	0.74	0.30	0.30	0.11	0.10
Balance A	0.61	0.64	0.71	0.80	-	- 0.06	- 0.11	- 0.10
Area equivalent (1000 ha)	202.5	213.2	238.3	265.8	0	-19.3	-35.7	-33.3
Balance with higher yield assumption								
Production (3.5 t/ha)	3.47	3.57	3.09	3.27	0.38	0.30	-	-
Supply for feed	2.04	2.07	1.70	1.80	0.34	0.27	0	0
Balance B	0.90	0.93	0.96	1.06	0.04	- 0.03	- 0.11	- 0.10
Change to Balance A (m tonnes)	0.29	0.29	0.25	0.26	0.04	0.03	-	-
Balance with modified rations for pigs and poultry								
Demand modified pigs and poultry only	1.13	1.13	0.74	0.74	0.34	0.33	0.05	0.05
Balance C	0.62	0.65	0.71	0.80	- 0.04	- 0.09	- 0.05	- 0.05
Change to Balance A (m tonnes)	0.01	0.01	0.00	- 0.00	- 0.04	- 0.03	0.06	0.05
Balance with modified rations all animals								
Demand with modified rations all species	1.13	1.13	0.67	0.67	0.41	0.40	0.05	0.05
Balance D	0.62	0.65	0.78	0.87	- 0.11	- 0.16	- 0.05	- 0.05
Change to Balance A (m tonnes)	0.01	0.01	0.07	0.07	- 0.11	- 0.10	0.06	0.05

Source: Own data

The balance calculations can provide no more than an estimate of the situation and carry considerable uncertainty, because very broad livestock categories were used and uniform rations assumed throughout the whole of the EU 25, ignoring likely regional and breed related variation in diets and feed intake. To compensate for this uncertainty a number of calculations with changed assumptions were carried out. Balance B shows that if a higher yield of 3.5t/ha for all crops (cereals and pulses) is assumed, the supply of organic feed cereals would be even greater than the demand and the deficit for home-grown pulses in 2003 would have been reduced.

In Balance C it is assumed that pigs and poultry are fed with modified rations as set out in Table 2. Under these assumptions the deficit in home grown pulses could be reduced to approx. 50,000 tonnes (16,000 ha). However, such changes would lead to an increase in the demand for organic feed cereals and for home grown pulses.

Balance D shows the impact of changes in the rations for all animals, including ruminants on the overall balance.

Tentative conclusions

In response to the question of the balance between supply and demand for organic concentrate feed 100% organic diets for all organic animals the following tentative conclusion can be drawn.

- Organic livestock in the EU would require a total of approximately 1.1 million tonnes of concentrate feeds. 65% of that is cereals, 26 % pulses that could be grown in most regions of the EU and 9% high quality protein sources.
- It appears that in 2002 and 2003 the EU would have grown sufficient organic cereals to feed the organic livestock on a 100% organic diet.
- In 2002 there was sufficient supply of home-grown pulses for the calculated demand, but a small deficit occurred in 2003.
- In both years there would have remained a calculated under-supply of high quality protein sources needed for pigs and poultry of approx. 100,000 tonnes (33,000 ha). This equivalent to 9% of the total calculated demand for concentrated feeds. In the past regime this would have been supplied by protein from conventional sources and by fishmeal in the Nordic countries.
- Through the use of modified rations for pigs and poultry this deficit for high quality protein could be reduced by about 50% to approx. 50,000 tonnes (16,000 ha).
- However, such changes would lead to an increase in the demand for organic feed cereals and for home grown pulses. For cereals the supplies are sufficient to cover such change, but this would increase the deficit for home grown pulses.
- Because of their high overall proportion of feed demand, changes in the ration for organic ruminants (for example increased protein content) could have an impact on the overall protein availability.
- It appears necessary to identify which alternative organic sources of high quality protein could be utilised in the EU, both from plant origin (pulses with better protein quality) and also from animal origin (e.g. from milk, fish). In the light of calculated surplus in the availability of organic cereals in the EU, producers could be encourage to modify crop rotations with the aim to produce more pulses or oil seeds. Crops like oil seed rape would provide a high quality protein source and hence increase the supply in protein rich feedstuffs for organic livestock

production. It can be expected that an increase in the price for organic feedstuffs will stimulate such changes to the land use.

It is important to note that the calculated overall balance is influenced by the assumed yield for cereals and pulses, the production area of such crops, changes in livestock numbers, and the diet composition of all species and does not consider feed sources from animal origin. The value of such calculations would improve with up-to-date statistics of the land use and animal numbers in organic farming.

The organic revision project aims to consider 2004 data, provide some breakdown of feed sources if data can be obtained and carry out calculations to illustrate the impact on selected regions.

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