

organic
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D 4.2: Evaluation criteria for including feed materials in Annex II C and dietary supplements in Annex II D of the EC-Regulation 2092/91

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Table of content

1	Executive summary	4
1.1	Introduction	4
1.2	Conflicting aims and inconsistencies in existing derogations	4
1.3	Inconsistencies between different levels of reference.....	6
1.4	A system approach for input evaluation.....	7
1.5	Conclusions	8
1.6	Recommendations.....	9
2	Introduction	11
3	Current regulatory framework and new developments.....	12
3.1	The current regulatory framework	12
3.2	Proposal for a revision of EU-Regulation on organic food.....	13
4	Using a criteria based approach for input evaluation of feed inputs	15
4.1	Introduction of terms and relevant subjects.....	16
4.2	Existing criteria for input evaluation in organic standards.....	17
4.2.1	IFOAM Basic Standards.....	17
4.2.2	FAO/WHO Codex Alimentarius Guidelines from 2004	18
4.2.3	Organic inputs evaluation project	19
4.2.4	National regulations and private standards for organic farming	21
5	Conflicting aims and inconsistencies in existing approaches	22
5.1	Level of reference for inputs and of criteria.....	22
5.2	Unfair competition	25
5.3	Consumer's demands and perceptions	26
5.4	Decision process	27
5.5	Origin of feed materials as inputs	29
5.6	Challenges for the revision of the EU Regulation	30
6	Using a system approach for input evaluation	32
6.1	Systems traditions applied to agriculture	32
6.2	Characteristics of 'closed' and 'open' systems	33
6.3	Different system levels.....	34
6.3.1	Farm animals.....	35
6.3.2	Farm system.....	35
6.3.3	Regional level	36
6.3.4	EU level	36
6.4	Determining nutrient requirements of animals in a systems based approach	37
7	Evaluation criteria resulting from a system approach	39
7.1	Consistency between the theorem of 'open systems' and organic principles	39
7.2	<i>Equifinality</i> of organic production processes and products.....	39
7.3	Use of input is necessary for intended use	40
7.4	Lowest negative impact on animal health and welfare	41
7.5	Lowest negative impact on the environment.....	42
7.6	Availability of approved alternatives in sufficient quantity or quality	42
8	Discussion of system-oriented criteria.....	43
8.1	The importance of the farm level as a level of reference to assess necessity.....	43
8.2	Implementation of feed back mechanisms	43
8.3	Availability of ingredients of organic origin	44
8.4	Criteria to be used with regard to the positive lists in the annex.....	46
9	Conclusions	47
10	Recommendations.....	50
11	References	53
12	Acknowledgement	55

1 Executive summary

1.1 Introduction

Organic livestock farming is intended to contribute to the equilibrium of agricultural production systems; establish and maintaining an interdependence between soils, plants and animals; is land-related ruling out landless productions, and should support the development of a sustainable agriculture. The criteria for the evaluation of feed inputs should be consistent with these principles of organic livestock production. Consequently, the question which non-organic inputs should be permitted for the use in organic farm systems and to what quantity is of high relevance for the integrity of organic production.

Under the current regime organic farm animals must be fed on organically produced feedstuffs (Art 4.2) and should be nourished primarily through home-grown feedstuffs (Art 4.3). In this context, feedstuffs which are not home-grown are defined as external. Only if organic feed (either grown within or outside the farm system) is not available in sufficient quantity and quality (Article 4.8), a set percentage for each species of non-organic components can be used and these have to be listed in Annex II. The proposal for a total revision of 2092/91 envisages no further use of non-organic materials unless special conditions for flexibility apply (Art 16), and states the intention to specify criteria for the inclusion of feed ingredients in the Annexes (currently Annex II C and D).

This report provides an overview of issues to be considered with regard to the inclusion of criteria for non-organic and external feed materials in the further development of the EC-Regulation 2092/91 on organic food. The various implications of a criteria based approach are discussed in relation to the main objectives and principles in organic production. A system approach is recommended to provide a tool for balancing the divergent and ambivalent issues in relation to the inclusion of non-organic and external feed material on the different levels relevant in organic production.

1.2 Conflicting aims and inconsistencies in existing derogations

The aim of organic farming is to establish a production system with a high degree of integrity and to close nutrient cycles as far as possible. This implies that the level of external and non-organic inputs should be reduced to a minimum. On the other hand, the aim is to prevent that health and welfare of farm animals are compromised due to nutrient imbalances. Diets for farm animals should be formulated according to the specific requirements of each species in the various stages of life. The relationship between livestock and the availability of home-grown feedstuffs varies to a high degree between farms and regions and makes it necessary that some external feed material can be used, even if this conflicts with the aim of closing nutrient cycles. Similarly, there is a need to permit the use of some non-organic inputs where those of organic origin are not directly available, although this conflicts with striving for a high integrity of organic production. Whilst these non-organic inputs are essential for some organic farms which could not function reasonably without them, the possibility of using them provides clear economic advantages for others who could produce without non-organic input, but in using have a wider range of often cheaper feed materials to increase productivity

and profitability. This situation conflicts with the objective of the existing EU Regulation 2092/91 on organic food to prevent unfair competition.

Taking the different, partly conflicting objectives of organic farming and various aspects of external and non-organic inputs into account, the principle in relation to the use of external and non-organic input should be: *to use as few inputs as possible and as many as necessary.*

To implement this principle into practice solutions for different questions are required:

- How to determine what inputs are necessary or unnecessary?
- Which frame of reference should be used as a guideline for the decision?
- On which levels are these conflicting aims to be balanced?
- Who should be allowed to decide about the quantity and quality of inputs in a specific situation?

Whether or not external and non-organic feed material is necessary on a given farm can not be regulated at the EU level, because this exceeds the desirable level of detail for EU Regulation 2092/91. Nor can it be left to the farmer alone, due to the various interests involved.

Currently, the decision is left to the farmer who can decide on using all inputs listed in Annex II within the permitted percentages of derogation, provided he can provide some evidence to the certification body that appropriate organic feeds are not available. There is a lack of transparency regarding the way in which the feed restrictions are implemented, and there is suspicion that the restrictions are not implemented equally in different countries and/or by different inspection bodies. Furthermore, with (private) inspection bodies, there can be potential conflicts in relation to commercial interests. The existing derogations allow those who produce on a low cost base and deliver products with a minimum quality level to have access to the same market and the same premium prices as those who strive for a higher product and process quality and encounter higher production costs. To prevent unfair competition between organic farmers in different regions and countries, a concept of implementation is required that is clearly structured and contain clear decision-making rules to be applied.

Feed inputs in organic systems belong to the categories of basic feed materials (crops or animal products, including industrial by-products) that are available from organic and non-organic origin, and mineral feeds and feed additives. External organic feed materials can be fed to 50% of the total feed intake, main risk factors include impact on the environment from transport and nutrient surplus in the system. Non-organic feed materials listed in the Annex can currently be used up to a set percentage. They carry the additional risk of residues (e.g. pesticides) and of GMO contamination and of unfair competition, by providing advantages in relation to the cost and productivity. The origin of basic feed materials inputs, i.e. the distance that feed has to be transported affects the aspect of impacts on the environment. The use of non-organic raw materials, while at the same time organic ones belonging to the same functional group of feedstuffs are widely available within the near region or within Europe, lacks coherence and contradicts the objectives to increase the integrity of the organic system.

Availability of organic cereals in EU could have been sufficient to feed all organic livestock with 100% organic rations between 2002 and 2004. However, the EU Regulation has not yet stimulated increases in the supply of organic pulses. The decreasing non-organic percentages

in the feed rations since August 2005 will lead to increasing demand for organic pulses which is expected also to stimulate increases in supply.

However, the main regions of feed production are not necessarily identical to those that keep organic livestock, which might lead to regional imbalances or the need for transport of feed materials over long distances. The main difficulty in relation to the assessment of 'regional balance' of organic feed material is to agree on a distance that is considered reasonable to make use of organic feedstuffs before allowing non-organic feed materials or external organic feed material from outside of the EU to be used to compensate for deficits.

In contrast to basic feed material, feed materials of mineral origin and feed additives (Annex II D), do not markedly influence productivity and performance of farm animals and therefore do not directly affect the issue of unfair competition, as long as they are used only for the purpose to balance the feed ration according to the requirements of the farm animals. Risk factors relate to the origin, production process, contamination, unbalanced diets (both under and oversupply) and the use of undesirable substances with growth promoting effects.

For the revision of the feed regime in the EU Regulation for organic farming two main challenges arise:

- Restricting further the use of non-organic ingredients whilst ensuring that animal health and welfare is not compromised;
- Increasing flexibility without increasing the risk of unfair competition of products with different levels of organic integrity in the same market.

1.3 Inconsistencies between different levels of reference

Codex Alimentarius Guidelines (2004) proposes that the main criteria for the assessment of feed substances should be that it is 'necessary or essential to maintain animal health and welfare' and 'to contribute to an appropriate diet for the species concerned'. These criteria are formulated so that they apply on the basis of the individual animal, but should not be applied on the farm level or European level for several reasons:

1. The nutrient requirements of an animal are to a high degree a function of the intended performance level, but there is no consensus about the appropriate level of performance on organic farms nor a method to assess this.
2. Calculation of nutrient requirements of individual animals does not provide an answer on how to deal with variation between animals within a herd.
3. For fattening animals, the risk of health and welfare problems due to lack of essential nutrient supply is primarily restricted to young stock in the first weeks of life. In the following stages it is in their nature to deal with nutrient imbalances as long as the genetic development does not stand against it. In later stages the set nutrient requirements do not prevent animals from diseases that derive from the intensification of the production process (e.g. metabolic disorders, locomotion disorders, sudden death) and from the negative side effects of a one-side selection for growth and yield as is described particularly in the case of poultry production (European Commission, 2000).
4. Criteria applied on the basis of the individual animal do not take into account that organic farmers can use a range of measures to compensate for nutrient deficiencies at the farm

level without any or with only a minimum amount of external inputs. Hence, evaluation about the need for external feed input can not be conducted on the basis of the nutrient requirements of farm animals alone but has to take the whole farm system into account.

It can be concluded that in relation to feed materials the criteria 'necessity of input', 'impact on animal health and welfare' have to be assessed on different levels, such as the individual animals, the individual farm, the regional level and finally on the EU level.

1.4 A system approach for input evaluation

Sustainability and multi-functionality of agriculture and food production is particularly well suited to be studied and developed through a system approach. The new draft of the revision of EU Regulation 2092/91 defines organic production as an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, preservation of natural resources, application of high animal health and welfare standards. The principle of organic production of aiming for a balanced relationship between crops and animals, through the use of farm derived and renewable natural resources corresponds with the theory and characteristics of 'open systems' in striving for an equilibrium within the system.

When striving for an equilibrium within a system, there is a need to define the boundaries of the system within the management shall govern the process in foresight of the goal. Feedback and control measures are the base of teleological and purposeful behaviour in 'open systems', and are necessary to monitor sub-systems within systems of a higher level. They ensure the quality of outputs from the system through imposing a number of control measures upon the system. The system approach implies that the organization of a system such as an organism or the whole farm can only be understood and explained when all components, properties, boundaries and internal feedback mechanism are considered.

There is considerable variation between individual farms in relation to the availability of high quality home-grown feedstuffs, the digestibility and utilization of nutrients in the various feedstuffs, the performance capacity and feed intake of the genotypes, and in farm specific housing and feeding conditions. For each farm feeding strategies need to be developed that are closely related to the farm specific situation. In order to assess the necessity for supplementary feed within an organic farm system, farm gate feed balance sheets, the analysis of the home-grown feedstuffs, and the formulation of feed rations according to the requirements of the farm animals in their different stages of life are essential. Implementation of these feed back mechanisms could contribute to:

- improve the efficiency in the use of home-grown feedstuffs,
- ensure an appropriate nutrient supply and feeding strategy for the farm animals,
- ensure that animal health and welfare are not compromised by nutrient imbalances,
- assess if further supplementation with external nutrients are needed and to which extent.

Analogue to the farm system, the general principle to use as few external and non-organic inputs as possible and as many as necessary can be implemented also on the regional level by assessing whether a demand for and the supply of organic feed material is balanced. This, however, requires definition of the boundaries of a region, as well as the availability of regional data about the organic feed production and requirements. Details, on how such

feedback mechanisms could be implemented on different levels will be further elaborated in task 4.4 of the current project on EC-Revision.

While previously the use of external and non-organic feed inputs was regulated by EU wide derogations and a list of permitted feed materials in Annex II, we propose to assess the need for the use of feed material at several different levels of the organic food system. The farm gate feed balances, regional balances as well as a list of permitted non-organic feed materials that can be used under certain specified circumstances.

1.5 Conclusions

- The existing feed derogations favour producers that make use of them through wider choice of feeds and lower costs of production over those who aim for 100% organic rations while both have access to the same markets.
- Any further development of the feed regime including the criteria for the Annexes should be in line with the principles and the system approach of organic production, such as land-based organic livestock production, minimising environmental damage and respecting high animal health and welfare and strengthen the self-regulating properties of organic farms through strengthening feed-back mechanism.
- The following system levels can be identified in relation to external and non-organic feed inputs in organic farming:
 - individual animals;
 - total herd of farm animals;
 - the whole farm system;
 - the regional level;
 - the EU level.
- There is a need to differentiate between following categories of external feed inputs that can be used on an organic farm for which different conditions for use are specified and that carry different risks to the integrity of organic production:
 1. External organic feed materials from plant and animal origin and by-products of organic processing (max 50% of total feed intake);
 2. Non-organic basic feed materials from plant and animal origin and non-organic industrial by-products (set derogations or flexibility rules, Annex II C 1 & 2);
 3. Non-organic feed materials from mineral origin and feed additives (Annex II C 3 and Annex II D).
- The criteria ‘necessity to use non-organic feed inputs’, ‘impact on animal health and welfare’ and ‘impact on the environment’ are related to availability and to the balance of supply and demand of feed materials. To realise the principle ‘to use as few external and non-organic inputs as possible and as many as necessary’ these criteria should be decided at the lowest possible system level.
- In general, it is possible to formulate diets for cattle, pigs and poultry without non-organic basis feed materials (see report 4.1.1 of the EC-Revision project). However, there are problems of availability in many regions and for some ingredients, especially high quality protein sources.

- In the last 3 years the EU has produced sufficient cereals to feed all stock with 100% organic diets (see report 4.1.2 of the EC-Revision project). Currently, there seem to be deficits in the supply of pulses (data uncertain). Derogations have possibly prevented increases in the production of organic pulses in the EU.
- The necessity for supplementation with Annex II C (1 &2) feed materials on any organic livestock farm can be assessed through farm gate feed balance, feed analysis and the calculation of feed rations considering stages of development of the animals and the performance level. Farm gate feed balance sheets would assist farms in developing strategies that improve the efficiency of home-grown feedstuff and to prevent imbalances that may cause harm to the animals or the environment. The implementation of similar feed back mechanisms could also be used to assess the necessity for supplementary feed at the regional level.
- The absence of such feedback mechanism within organic production is likely to be one of the main reasons for the observed problems with product quality and animal health and welfare on some organic farms.
- Further research is needed to assess the availability of and requirements for vitamins under the condition of organic farming.
- Using feedback mechanisms as criteria of balance or necessity of supplementation could contribute to prevent unfair competition and at the same time improve flexibility with regard to the use of external and non-organic inputs. Flexibility requires to treat different situations differently. Achieving a balance within defined systems on different levels could ensure common overall objective of organic production. A balance can be achieved irrespectively of the specific conditions and can be offered to the consumers as a qualitative performance of the organic production method that justifies to claim a common organic label.

1.6 Recommendations

For the further development of the feed regime in the total revision of the EU Regulation we recommend:

1. The current derogations for the use of non-organic feed material should not be extended beyond 2011. The conditions for flexibility envisaged in Art 16 cover most conditions under which we consider the use of non-organic feed ingredients might be necessary in future, but the feeding of monogastric young-stock in the first weeks of life should also be mentioned in Article 16 (e).
2. The land-based character of organic stock farming should be included as a principle of organic farming in Article 5.
3. The principle 'to use as few inputs a possible and as many as necessary' should be stated as a general criteria for the approval of inputs in Article 11.
4. The requirement for farm-gate feed balance sheets should be integrated into the organic certification process and become part of the regular inspection.
5. The balance between supply of and demand for organic feed materials should also be monitored regularly on a regional and on the EU level of organic production.

6. In Article 11 feed material from mineral origin (currently listed under Annex II C 3 of 2092/91 should be mentioned together with the category of feed additives (Annex II D of 2092/91).
7. The following criteria in relation to non-organic feed materials are included in Article 11:
 - c) Non-organic feed materials (previously Annex II C 1 & 2) can only be used if
 - i) they are necessary to maintain animal health and welfare in an appropriate diet fulfilling the physiological and behavioural needs of the species concerned on a particular farm in a certain stage of life;
 - ii) are of plant or animal (only milk and milk products, egg, fish or minor invertebrates) origin;
 - iii) similar organic feed materials are not available within acceptable distance; and
 - iv) they do not encourage high growth rates with negative impact for animal health and welfare; and
 - v) they meet the criteria specified under d).
 - d) Non-organic mineral feed materials and feed additives can only be used if they:
 - vi) are permitted according to national legislation on animal feeding,
 - vii) are primarily of natural plant, animal or mineral origin;
 - viii) are produced or prepared without the use of hexane or other chemical solvents or chemical treatment;
 - ix) do not contain genetically engineered/modified organisms and products thereof;
 - x) do not contain synthetic nitrogen or non-protein nitrogen compounds
 - xi) do not contain antibiotics, coccidiostatics, medicinal substances, growth promoters, hormones or any other substance intended to stimulate growth or production.

2 Introduction

According to the Commission draft of the total revision of EU Regulation 2992/91, organic production is an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, preservation of natural resources, application of high animal health and welfare standards and production in line with the preference of certain consumers for products produced using natural substances and processes.

Following strict rules regarding the use of external inputs is one of the most important characteristics of organic farming, especially when they are of non-organic origin. Under the existing regulation on organic farming in the EU (Regulation 2092/91, CEC, 2004) organic farm animals must be fed on organically produced feedstuffs (Art 4.2), are nourished primarily through home-grown feedstuffs (Art 4.3), feedstuffs from other organic farming systems (Regulation 2092/91) and organically produced ingredients that can be processed by biological, mechanical, and physical means. Only if organic feed is not available in sufficient quantity and quality (Article 4.8), a set percentage of those non-organic components can be used that are listed in Annex II. Article 4.8 further specifies that *by way of derogation... a limited proportion of conventional feeding stuffs is authorised where farmers can show to the satisfaction of the inspection body or authority of the Member state that they are unable to obtain feed exclusively from organic production*. Annex II D further lists the products allowed for use as dietary supplements.

Until the regulation change in August 2005 the derogation was often interpreted as a “blanket” derogation, whereby non-organic feed inputs could be used up to the specified percentage irrespective of availability of organic feeds.

In general, non-organic inputs can have a number of benefits but also some undesirable side effects. External inputs can be necessary to improve the nutrient balance within the feed ration and thereby contribute to provide good conditions for animal health in the different stages of the development. Furthermore, non-organic inputs can increase the profitability of animal production as quantity and quality of available feed strongly affects the level of performance, and yield security.

On the other hand, using non-organic and external inputs conflicts with the leading idea of closing the nutrient cycle within the organic farm system. Non-organic inputs increase the risk of contamination with undesirable substances (GMO-derivates, pesticide residues etc.), which enhances mistrust and concerns of consumers and thereby influencing public perception of organic products. Therefore, the question which non-organic inputs should be permitted by the EU Regulation for the use in organic farm systems and to what quantity is of high relevance for the integrity of organic production (Codex Alimentarius Guidelines, 2004).

The objective of task 4.3 within the Organic Revision Project was to elaborate evaluation criteria for including feed materials in Annex II C and dietary supplements in Annex II D of the EC-Regulation 2092/91 that support the decision on what to include or withdraw from the list in the annexes. This report provides an overview of the current regulatory framework and the previous use of criteria for input evaluation. Conflicting aims and inconsistencies in existing approaches are highlighted. Furthermore, the system approach for input evaluation is explained and discussed with regard to possibilities and limitations for the development of system-oriented criteria for the use of non-organic inputs in organic livestock production.

3 Current regulatory framework and new developments

3.1 The current regulatory framework

General provision

The following general regulations are referred to in the definitions in Art 4 of 2092/91: 'feed' has the meaning given by Article 3, point 4 of Regulation (EC) No 178/2002 'feed additives' means products as defined in Article 2(a) of Regulation (EC) No 1831/2003 of the European Parliament and of the Council,

Summary of provisions in relation to feed Annex II B of EU Regulation 2092/91

- 4.1 Feed is intended to ensure quality rather than maximum production, while meeting the nutritional requirements of each species at various stages
- 4.2 Livestock must be fed on organically produced feedstuffs.
- 4.3 Feed must come from the unit or..., at least 50% of the feed shall come from the farm unit itself or be produced in cooperation with other organic farms,
- 4.4 30 % of the feed formula of rations on average may comprise in-conversion feedstuffs, if from the own holding: up to 60% in dry matter.
- 4.5 The feeding of young mammals must be based on natural milk, preferably maternal milk. All mammals must be fed on natural milk for a minimum period, depending on the species concerned: three months for bovines and equidae, 45 days for sheep and goats and 40 days for pigs.
- 4.6 is related to transhumance
- 4.7 Rearing systems for herbivores are to be based on maximum use of pasture according to the availability of pastures. At least 60% of the dry matter in daily rations is to consist of roughage, fresh or dried fodder, or silage. A reduction to 50% for animals in dairy production for a maximum period of three months in early lactation can be permitted.
- 4.8 Update with current formulation *by way of derogation... a limited proportion of conventional feeding stuffs is authorised where farmers can show to the satisfaction of the inspection body or authority of the Member state that they are unable to obtain feed exclusively from organic production.*
The maximum percentage of conventional feedingstuffs authorised per period of 12 months is:
(a) for herbivores: 5 % during the period from 25 August 2005 to 31 December 2007;
(b) for other species:
— 15 % during the period from 25 August 2005 to 31 December 2007,
— 10 % during the period from 1 January 2008 to 31 December 2009,
— 5 % during the period from 1 January 2010 to 31 December 2011.
These figures shall be calculated annually as a percentage of the dry matter of feedingstuffs from agricultural origin. The maximum percentage authorised of conventional feedingstuffs in the daily ration, except during the period each year when the animals are under transhumance, must be 25 % calculated as a percentage of the dry matter.'
- 4.9 States additional conditions under which member states can authorise further derogation in relation to use of conventional feed (such as weather events etc)
- 4.10 N/A
- 4.11 Roughage, fresh or dried fodder, or silage must be added to the daily ration for pigs and poultry.

Under Annex II C the current derogation in the EC-Regulation allows feed mills to use categories of feed materials: as non-organic inputs and basic feed materials of plant origin, animal or mineral origin. The plant category contains both basic plants and some industrial by-products (maize gluten, potato protein etc.). The animal category contains milk, fish and eggs products.

In Annex II D 'feed additives' a number of trace elements are listed as well as vitamins, provitamins and well defined substances with similar effect. This includes a derogation to use synthetic vitamins in the categories of A, D and E for ruminants if that they are identical to natural vitamins and after authorisation by the member states. In relation to feed materials, Article 7 of the current EU Regulation 2092/91 states that additional feed materials inputs can be included in Annex II provided they are of natural origin.

In summary, under the regulation 2092/91 apart from feed additives two main categories of off-farm feed materials can be used on organic farms. These are:

Non-organic inputs: These are covered by the species specific percentage derogations in Annex IB, and have to be listed in Annex II C. Only products meeting the criteria in Article 7 can be listed. After the ending of the derogation in 2011 there is currently no provision to allow further use of non-organic feed (presumable other than under exceptional circumstances).

Organic feed inputs: In the current regulation and in the new draft up to 50% of all feed materials used on a farm can come from outside the farm itself. This can rise to 100% if the feed is produced through collaboration with other organic farms. Special conditions apply to feed from conversion.

If 50 % of the feed were introduced into a farm with high stocking rates this would introduce a considerable amount of additional nutrients with likely negative environmental impact. It therefore has to be considered that off-farm organic feed materials also could have negative impact of the environment if high amounts are used. Also external organic feed materials have to be transported to the farm.

3.2 Proposal for a revision of EU-Regulation on organic food

Regulation 2092/91 is currently under revision. The European Action Plan (EAP) for Organic Food and Farming proposes to improve and reinforce the Community's organic farming standards and inspection requirements (CEC 2004). In its conclusions of 18 October 2004, the Council called on the Commission to review the Community legal framework with a view to ensuring *simplification* and *overall coherence* and in particular to *establishing principles* encouraging *harmonisation* of standards and, where possible, *reducing the level of detail* in the Regulation and in the implementing rules. The proposal also replaces the current practice of 'legislation by derogation' by a transparent strictly regulated mechanism allowing *less strict rules*. The proposal aims at providing the conditions in which the sector can develop and produce in an *economically viable manner*, in line with production and market developments. To this end it provides for a, certain strictly, *regulated flexibility*.

In response to EAP the Commission published a proposal for the total revision of the EU regulation 2092/91 in December 2005. The proposal intends to : bring together objectives and

- principles, control and production rules in a simpler, clearer, more transparent manner to simplify to current legal framework; reduce details of implementation rules (simplification initiative); replace “legislation by derogation” by a transparent, strictly regulated mechanism allowing less strict rules; provide strictly regulated flexibility to apply less strict production rules and to transform the current multitude of derogations into a general but strictly regulated system; further restrict the use of non-organic ingredients in feed;
- protect consumers’ interests, ensuring consumers confidence and avoiding misleading labelling, the development of organic production while taking account of regional differences in climate, farming conditions and stage of development of organic farming.

In **Article 3** the proposal formulates the following objectives for organic production which includes the following sections that are very relevant to the issue of feeding:

- a (i) minimize negative effects on the environment;
- (iii) preserve as far as possible natural resources;
- (iv) respect high animal welfare standards and meet the species specific needs;

Article 4 sets out overall principles including the following that are relevant to the issue of feeding:

- (b) Natural substances shall be used in preference to chemically synthesized ones;
- (c) *the prohibition of GMOs;*
- (d) *the possibility for adaptation to local conditions;*

Article 5 sets out the principles applicable to farming, many of which have some relevance to the issue of feed.

- (a) farming shall maintain and enhance soil fertility, prevent and combat soil erosion, and minimise pollution;
- (b) farming shall aim at producing products of high quality instead of maximising production;
- (c) the use of non-renewable resources and off-farm inputs shall be minimized;
- (d) wastes and by-products of plant and animal origin shall be recycled as input in plant and livestock production and for energy production;
- (e) production decisions take account of the local or regional ecological balance;
- [(f)&(g) are related to plant production only]
- (h) feed for livestock shall come primarily from the holding where the animals are kept or shall be produced in cooperation with other organic farms in the same region;
- (i) the highest level of animal welfare shall be observed;
- (k) breeds shall be chosen favouring slow growing strains and having regard to the capacity of animals to adapt to local conditions, their vitality and their resistance to disease or health problems;
- (l) organic livestock feed shall be composed essentially of agricultural ingredients from organic farming and of natural non-agricultural substances;

The following other articles of the proposal refer to the issue of feed inputs:

Article 9 (d) In addition to the general rules (for farming) laid down in Article 7, the following rules shall apply to livestock production. With regard to feed:

- (i) livestock shall be fed with organic feed, which may include proportions of feed from farm units which are in conversion to organic farming, that meet the animal’s nutritional requirements at the various stages of its development;
- (ii) animals shall have permanent access to pasture or roughage;
- (iii) feed additives may be used only if they have been approved under Article 11;
- (iv) growth promoters and synthetic amino-acids may not be used;
- (v) suckling mammals shall be fed with natural, preferably maternal, milk;

Article 11 sets out the conditions for the use of inputs in farming, i.e. certain products and substances. The commission shall, in accordance with the procedure (Article 31,2) and subject

to the objectives and principles, establish *specific criteria for the approval* of (c) plant, animal and mineral feed material, and (d) feed additives. Greater detail of which criteria should be stated for each category of inputs has been discussed in Working group of the Council of Ministers. **Article 13** sets about the production rules for feed that mainly apply to compound feeders.

1. Production of organic feed shall be kept separate from production of non-organic feed.
2. Organic feed materials, and/or feed materials from production in conversion, shall not enter simultaneously with the same feed materials produced by non organic-means into the composition of the organic feed product.
3. Hexane and other organic solvents may not be used.
4. Feed manufacturers are required not to use GMOs or products produced from GMOs where they should have knowledge of their presence due to information on any label accompanying the product or from other accompanying documents.

Where feed manufacturers use ingredients and additives purchased from third parties to produce feedstuffs for organic livestock, they shall require the vendor to confirm that the products supplied have not been produced by GMOs.

Article 31: Management committee on organic production (2): Where reference is made to this paragraph, Article 4 and 7 of Decision 1999/468/EC shall apply. Council Decision 1999/468/EC specifies rules of procedure for this committee.

Several of the objectives (for example Article 3 a i, iii, iv), principles (Art 4 for example b-d), the specific farming related principles (Article 5, for example c-e, g-l) and rules of livestock production (Article 7) are also relevant to the discussion about the use of non-organic feed and feed additives in organic production.

While the intentions of the current initiative have been welcomed by the organic sector and its stakeholders, the detail of the proposal is currently under discussion by a working group of the Council of Ministers.

In relation to feed the proposal maintains the currently existing situation that two categories of off-farm feeds can be used on organic farms, but it continues with the intention of the changes that were introduced in August 2005 in placing further restrictions on the use of non-organic feed inputs. If the new regime comes into force in 2009, non-organic feed materials can only be used if any of the conditions for flexibility in Article 16 apply. If any of the conditions for less strict rules are met, the same procedure as for feed additives that only approved feed ingredients can be used continues to apply. In addition, the new draft aims to establish specific criteria to aid the decision which feed materials and additives should be listed on positive lists in the Annexes.

As in the existing regulation, the only restriction on the use of organic feed materials is that this should not exceed 50% of the total feed intake, unless produced through close collaboration between farms.

4 Using a criteria based approach for input evaluation of feed inputs

Because of the multi-factorial aspects and the complexity of the interactions there is need to structure the debate with regard to the elaboration of evaluation criteria for external inputs in general and for feed in particular. In this section, some of the most relevant terms and aspects are addressed.

4.1 Introduction of terms and relevant subjects

Organic livestock farming is intended to contribute to the equilibrium of agricultural production systems; establish and maintaining an interdependence between soils, plants and animals; it is land-related ruling out landless productions, and should support the development of a sustainable agriculture. The criteria for the evaluation of feed inputs should be consistent with these principles of organic livestock production. Consequently, the question which non-organic inputs should be permitted for the use in organic farm systems and to what quantity is of high relevance for the integrity of organic production.

Inputs in form of feed material and feed additives are used to achieve certain goals. In themselves they cannot be judged as good or bad, as suited or unsuited inputs. This decision can only be taken in the context of the production systems and the aims, objectives and values of the system in which they are used.

Organic production methods constitute a specific form of production at farm level (CEC, 2004). Under the current regime organic farm animals must be fed on organically produced feedstuffs (Art 4.2) and should be nourished primarily through home-grown feedstuffs (Art 4.3). Regarding the whole farm as a coherent unit and system, feed material which has not been produced on the farm or within an organic system (that could also include a cooperation between several more or less specialised organic farms) can be defined as 'external' in relation to the farm system.

For the purpose of the EU Regulation, feed material is regarded as bearing indications referring to the organic production method, where feed materials are described by the indication in use in each Member State, suggesting that they have been obtained in accordance with the rules of production laid down in Article 6. Consequently, indications referring to organic production methods are related to the ingredients obtained by such methods. Feed material is defined as organic or non-organic, depending on whether or not it is produced according to the rules specified in the regulation.

Only if organic feed (either grown within or outside the farm system) is not available in sufficient quantity and quality (Article 4.8), a set percentage of non-organic components can be used and these have to be listed in Annex II. The proposal for a total revision of 2092/91 states the intention to specify criteria for the inclusion of feed ingredients in the Annexes (currently Annex II C and D). The list in Annex II C encompass feed material from plant, animal and mineral origin, and Annex II D contains a list of feed additives used in animal nutrition such as trace elements, vitamins, enzymes etc.). Whilst most feed material from plant and animal origin, listed in Annex II C is widely produced organically, feed material form mineral origin and feed additives, listed in Annex II D are seldom available from an organic production unit and therefore diets are mostly supplemented with non-organic material.

Similar to the IFOAM Basic Standards (2005) and Codex Alimentarius Guidelines (2005) the proposal for a new EU regulation on organic food advocates a criteria based approach to take decisions whether or not external and non-organic inputs can be used in organic systems. Existing criteria based approaches are summarised in section 4.3.1.

Using criteria to support decisions is a common approach. Criteria relate to the aims and objectives of the system and like objectives they should be SMART, in the sense of being Simple Measurable Accessible Relevant and Time-bound. Criteria work exceptionally well, if they are based on quantifiable dimensions and on direct measurements and if the information required can be easily obtained. Problems with a criteria based approach can arise, if objectives are unclear or not easily quantifiable. A criteria based approach becomes even more complex, if several and potentially conflicting objectives have to be considered.

The choice of criteria for the evaluation of input in organic farming should correspond to the objectives and principles of the organic system in which the inputs are to be used. In the context of organic farming, the main problem arises, because there are number of relevant objectives of organic farming that affect the inclusion of inputs. Some of them cannot be easily quantified and require a more indirect approach. Describing or categorizing properties in a semi-quantitative or qualitative manner can help to make criteria-based approach feasible even if no measurable criteria for a certain objective can be identified.

If all chosen criteria are coherent in relation to the reference system they will without doubt strengthen the decision. If the criteria, however, cover divergent and conflicting objectives, the question arises which objective and therefore which criteria are of higher priority and should have more weight in the decision-making. Without a clear prioritising of the objectives, the weighting of different criteria remains subjective, based on the view of the decision-makers and their specific perspectives.

In summary, the question, whether specific inputs are acceptable or not for use in a specific system, depends not only on the chemical composition of the input but should include a variety of aspects including purpose and quantity of its use and correspond to the context and the objectives of the system in which they are used.

4.2 Existing criteria for input evaluation in organic standards

A criteria based input evaluation for organic standards is mentioned in the two international standards of IFOAM Basic Standards and the FAO/WHO Codex Alimentarius Guidelines and has been further developed in the Organic Input project. The three initiatives made reference to each other and are presented here in chronological order.

4.2.1 IFOAM Basic Standards

In appendix 1 the IFOAM Basic Standards (2005) state that inputs used in organic production should be consistent with the principles of organic farming outlined in the basic standards IBS, and are evaluated against criteria based upon the Precautionary Principle:

‘When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof.’

‘The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action (p 69, IFOAM Book of Norms, Version 2005)’.

Detailed criteria to evaluate organic production inputs are based on the following principles:

Necessity and alternatives: Any input used is necessary for sustainable production, is essential to maintain quantity and quality of the product, and is the best available technology.

Source and manufacturing process: Organic production is based on the use of natural, biological, and renewable resources.

Environment: Organic production and processing is sustainable for the environment.

Human health: Organic techniques promote human health and food safety.

Quality: Organic methods improve or maintain product quality.

Social, Economic, and Ethical: Inputs used in organic production meet consumer perceptions and expectations without resistance or opposition. Organic production is socially just and economically sustainable, and organic methods respect cultural diversity and protect animal welfare.

Further details on how the decisions about inputs should be taken are provided in the Appendixes I, III und VI of the IFOAM Basic Norms.

4.2.2 FAO/WHO Codex Alimentarius Guidelines from 2004

The Codex Alimentarius Guidelines set out general criteria for the inclusion of inputs and includes also criteria for feed materials and additives:

Section 5 of the Codex Alimentarius Guidelines (2004) is entitled with ‘Requirements for inclusion of substances in Annex 2 and criteria for the development of lists of substances by countries’. According to this section, any proposals for the inclusion in Annex 2 of new substances must meet the following general criteria:

- i) they are **consistent with principles** of organic production as outlined in these guidelines;
- ii) use of the substance is **necessary/essential** for its intended use;
- iii) manufacture, use and disposal of the substance does not result in, or contribute to, harmful **effects on the environment**;
- iv) they have the lowest negative **impact on human or animal health** and quality of life; and
- v) **approved alternatives** are not available in sufficient quantity and/or quality.

The above criteria are intended to be evaluated as a whole in order to protect the integrity of organic production.

Annex 1 of the Codex Alimentarius Guidelines: Principles of organic production

No 18. If substances are used as feedstuffs, nutritional elements, feed additives or processing aids in the preparation of feedstuffs, the competent authority shall establish a positive list/s of substances in compliance with the following criteria:

General Criteria

- a) substances are permitted according to national legislation on animal feeding;
- b) substances are necessary/essential to maintain animal health, animal welfare and vitality; and
- c) such substances:
 - contribute to an appropriate diet fulfilling the physiological and behavioural needs of the species concerned; and
 - do not contain genetically engineered/modified organisms and products thereof; and
 - are primarily of plant, mineral or animal origin.

Specific Criteria for Feedstuffs and Nutritional Elements

- d) feedstuffs of plant origin from non-organic sources can only be used, under the conditions of paragraphs 14 and 15, if they are produced or prepared without the use of chemical solvents or chemical treatment;
- e) feedstuffs of mineral origin, trace elements, vitamins, or pro-vitamins can only be used if they are of natural origin. In case of shortage of these substances, or in exceptional circumstances, chemically well-defined analogical substances may be used;
- f) feedstuffs of animal origin, with the exception of milk and milk products, fish, other marine animals and products derived there from should generally not be used or, as provided by national legislation. In any case, the feeding of mammalian material to ruminants is not permitted with the exception of milk and milk products;
- g) synthetic nitrogen or non-protein nitrogen compounds shall not be used.

Specific Criteria for Additives and Processing Aids:

- h) binders, anti-caking agents, emulsifiers, stabilizers, thickeners, surfactants, coagulants: only natural sources are allowed;
- i) antioxidants: only natural sources are allowed;
- j) preservatives: only natural acids are allowed;
- k) colouring agents (including pigments), flavours and appetite stimulants: only natural sources are allowed;
- l) probiotics, enzymes and micro-organisms are allowed;
- m) antibiotics, coccidiostatics, medicinal substances, growth promoters or any other substance intended to stimulate growth or production shall not be used in animal feeding.

No 19. Silage additives and processing aids may not be derived from genetically engineered/modified organisms or products thereof, and may be comprised of only:

- sea salt;
- coarse rock salt;
- yeasts;
- enzymes;
- whey;
- sugar; or sugar products such as molasses;
- honey;
- lactic, acetic, formic and propionic bacteria, or their natural acid product when the weather conditions do not allow for adequate fermentation, and with approval of the competent authority.

4.2.3 Organic inputs evaluation project

Under Key Action 5 of the Fifth Framework Programme for Research and Technological Development (QLK5-CT-2002-02565) the project ‘ORGANIC INPUTS EVALUATION’ has been carried out (Speiser et al., 2005). The project dealt with the question of inputs in organic systems, focussing mainly on fertilisers and soil conditioners and plant protection products (as listed in Annex II A and B).

To improve the current situation, the project proposes a number of changes to the current EU regulation. This includes the change of Article 7 of EU Regulation 2092/91 in order to establish better evaluation criteria and facilitate the listing of new products, while safeguarding the principles of organic farming.

The project suggests to establish an expert panel, to assist a more straightforward and transparent process. Furthermore, it offers a spreadsheet based criteria matrix as a tool in the proposed procedures, which facilitates the use of the criteria of Article 7 in practice. The matrix is intended to provide detailed guidance for all steps of the procedure, and ensure transparency and consistency.

In the absence of clear objectives and principles of organic farming in the EU Regulation 2092/91 the project based its proposed criteria for inputs on the principles aims of organic farming as stated in the IFOAM Basis Standards and in Codex Alimentarius Guidelines. In addition to IFOAM Basis Standards the project suggested the criteria to ensure that a product under evaluation is clearly identifiable, and that its use is legal. Additionally, the requirements on “nature and mode of production” were split up into two separate criteria: “origin” and “manufacturing”.

The authors of the project propose the following changes to Article 7 of Regulation 2092/91, where products not authorised may be included in the Annex, when the following conditions are satisfied:

(a) for all products:

- they are of plant, animal, microbial (only from micro-organisms which are not GMOs) or mineral origin; if products from such sources are not available in sufficient quantities or qualities, additional sources for these products may exceptionally be included provided that they are in the same form, and
- they may only undergo the following processes: physical treatments such as milling, heating and purification; microbial and enzymatic treatments such as fermentation, composting or hydrolysis (providing that no GMOs and products derived from GMOs are used); exceptionally they may also undergo simple chemical treatment, and
- manufacture, use and disposal of the substance do not result in, or contribute to, harmful effects on the environment, and
- they have the lowest negative impact on human or animal health and quality of life, and – their use has no negative social impacts such as economic effects, effects on rural development or unfavourable public perception, and
- their use is consistent with the principles of organic farming;

(c) *besides*, if they are used for the purpose of plant pest or disease control, for *animal nutrition or cleaning and disinfecting livestock buildings and installations or for other purposes related to crop production*, they are essential for the control of a harmful organism or a particular disease, *or to achieve the intended purpose for which breeding alternatives or management practices are not available or less effective, and alternative substances are not included in Annex II.*

(e) With regard to minerals and trace elements used in animal nutrition, additional sources for these products may be included in Annex II provided that they are of natural origin or failing that, synthetic in the same form as natural products.

2. If need be, the following may be specified for any product included in Annex II:

– the detailed description of the product, its origin, its composition or other relevant characteristics.

The criteria that are proposed by the project and used in the matrix for input evaluation can be summarised as follows:

- **Necessity:** Each input must be necessary.
- **Origin of the input** should usually be (in order of preference): Organic other plants; animal microbial; mineral.
- The ingredients of the inputs may undergo the following **production processes:** (i) mechanical; (ii) physical; (iii) enzymatic; (iv) action of micro-organisms; (v) chemical (as an exception and restricted).
- **Environment:** The input shall not be harmful or have a lasting negative impact on the environment.
- **Human health:** Inputs shall not be harmful to human health.

4.2.4 National regulations and private standards for organic farming

In some EU Member States, national legislation on organic farming may restrict the use and application of certain feedstuffs and feed additives beyond the limits set by EU Regulation 2092/91, but these cases are rare. In May 2006 only six entries of difference in the organic rules database developed by the Organic Revision Project referred to feed components and five differences in relation to feed additives were recorded. None of them contain specific criteria for feed input. The entries describe standards that differ from the current EU in terms of the feed components and in some case percentages that can be used.

5 Conflicting aims and inconsistencies in existing approaches

The use of non-organic feedstuffs and feed additives in organic systems remains a controversial issue. In relation to the aim of almost closed nutrient cycles, being at the heart of organic agriculture, it can be argued, that the lower the level of non-organic inputs into the farm system the better. On the other hand, in many cases non-organic inputs may be necessary to correct unbearable deficiencies and imbalances in the nutrient supply and to prevent disturbances for animal health and welfare.

The impact of existing derogations for the use of non-organic feed material is ambivalent. Any derogations conflicts with the concept of closing nutrient cycles. Relying to a high degree on external conventional inputs makes the production of animal products cheaper and easier, while at the same time preventing the development of a more integer, and input independent system. On the other hand, derogations support the goals of organic agriculture to formulate diets according to the requirements of the farm animals in their various stages of development by providing a wider range of feed ingredients and supplements that are not or not yet available organically.

Taking the different, partly conflicting objectives of organic farming and the various aspects of external and non-organic inputs into account, the principle in relation to the use of external and non-organic input should be: *to use as few inputs as possible and as many as necessary*. To implement this principle in practice requires to determine what inputs are necessary, and which reference can be used as a guideline for this decision.

5.1 Level of reference for inputs and of criteria

The existing approach to regulate the use of external inputs and the implementation of derogations in the EU Regulation is based on the assumption that the positive lists and derogations apply equally in the whole of the EU. The frame of reference is the European organic production method in general, i.e. includes all farms that produce according to the Regulation 2092/91.

Inputs, once listed in the annexes, are allowed in all member states and by all farms, even if the need for specific inputs may not be given in all countries, regions, or for all farms to the same degree. The currently permitted percentages vary between different types of animals, between herbivores and non-herbivores.

While inputs are essential for some organic farms who could not function efficiently without them, the possibility of using these inputs provides clear advantages for others who can use additional and often cheaper nutrient resource to increase productivity and profitability.

This form of generalisation stands in contrast to the idea that '*organic production methods constitute a specific form of production at farm level*' (CEC, 2004). Climate, soils, cropping systems, stocking density, and the level of performance vary to a high degree between farms across Europe, and between countries and regions. This is reflected in the variability in nutrient requirements and creates very different needs in relation to external inputs. So that such differences can be taken into account, many products have been listed in the Annexes with the restriction '*need recognized by the inspection body or inspection authority*'. The

restrictions were included with the intention to stimulate a flexible implementation of Annex II, so that it can be adapted to local or exceptional conditions. However, the EU Regulation 2092/91 did not provide further instructions on how certification bodies should handle these restrictions and how to balance the conflicting aims of the inherent generalisation of rules and the farm specific needs for a derogation.

The system character of organic farming implies that the use of farm inputs should be minimised. The Codex Alimentarius Guidelines (2004) emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. The importance to farming of using the system's own resources, recycling and closing nutrient cycles is also recognised in the Commission Proposal for a new organic food regulation, for example in referring to the need of minimising off-farm inputs (Art. 5.c) and the use of prevention to maintain crop and animal health (Art. 5.g). This principles of organic production is of relevance to all operators including livestock producers (Alroe and Padel, 2006).

One objective of organic agriculture should be to use as few non-organic inputs as possible and only as a last resort, thus demonstrating that it intends to solve problems through the system approach. A short list of non-organic inputs and further restrictions in the use of inputs would also allow to more clearly distinguish organic farming form conventional production. However, this does not address the question whether a similar principle should also apply to organic inputs.

On the other hand, one could argue that the annexes should contain as many inputs as possible, to allow organic farmers to select those inputs that are best adapted to their individual situation, and that allow to meet the animals' species specific needs to a high degree. It remains an open question how to deal with this crucial and for the future of organic production highly relevant questions.

The 2004 edition of the Codex Alimentarius Guidelines and the Organic Inputs Evaluation project (Speiser et al., 2005) dealt with this conflict by suggesting to integrate a criteria of 'necessity'. Each input must be necessary" (IFOAM, 2002; Speiser et al., 2005), or the criteria 'substance is necessary/essential for its intended use' (Codex Alimentarius Guidelines, 2004).

The Codex Alimentarius Guidelines specifies further some general criteria on how to assess 'necessity' in relation to feed substances in Annex 1 No 18:

- substances are necessary/essential to maintain animal health, animal welfare and vitality;
- such substances contribute to an appropriate diet fulfilling the physiological and behavioural needs of the species concerned.

The Codex Alimentarius Guidelines thereby sets the level of the animal as the frame of reference to decide what inputs should be permitted at the farm level, but it does not provide a clear definition what 'essential to maintain animal health...' means or what 'an appropriate diet fulfilling the physiological and behavioural needs of the species' is.

Agricultural science has elaborated a considerable amount of data and knowledge on how to assess nutrient requirements of species in the various stages of their development. Requirements for each species are precise in relation to what is needed to obtain a certain performance level (e.g. NRC, 1994; 1998). They are, however, very vague in relation to what

is needed to maintain animal health and welfare and how this can be assessed. Consequently, deciding on what feed inputs are needed for animal health and welfare depends on how to define and to assess animal health and welfare. So far the Scientific Community has not agreed on a common definition of animal health and a methodology for its assessment.

Furthermore, the nutrient requirements of an animal are to a high degree a function of the performance level that is expected. There is, however, no consensus about the appropriate level of performance on organic farms, nor a methodology to assess what might be appropriate. Studies comparing the performance of organic livestock systems report production levels commonly lower than in conventional systems, but considerable variation between farms (see Nicholas et al. (2004) for dairy cows, Sundrum and Ebke (2004) for fattening pigs, and Rose et al. (2004) for laying hens.)

This illustrates that the general criteria in the Codex Alimentarius Guidelines do not solve the problem on how to deal with the variation in performance between farms or even within a herd of farm animals, as the calculation of ration requirements are based on the individual animal. Finally, the general criteria do not take into account that organic farmers can use a range of measures to compensate for nutrient deficiencies at the farm level without any or with only a minimum amount of external inputs (see Sundrum et al. (2005) for further details).

It can be concluded that it is not possible to come to a well-founded decision about the necessity for external feed inputs, without considering the specific nutrient requirements at the farm level.

Speiser et al. (2005) suggested that the 'need recognised' restriction should ensure that inputs are only used if they are necessary or 'needed' at the farm level, i.e. if a production problem cannot be solved with methods other than the use of the input. This intention is highlighted as a fundamental principle of organic farming. According to the authors, whether or not a product is needed also depends on whether alternative methods or alternative inputs are available. Therefore, need should not be evaluated for individual products alone, but rather for 'functional groups' of inputs. The order of preference within each functional group should be established by making a distinction between high and low priority inputs. The main aim should be to prevent 'unnecessary' use of inputs, and to stimulate locally adapted production strategies which serve this aim.

Farmers may consider all the inputs they use or ask for as 'necessary' and argue that they cannot produce without them. Although it is necessary to take the nutrient requirements of the farm and even the individual animal into account, the farmers cannot be left alone to decide about the necessity of the use of non-organic inputs without providing conflicts between different interests.

Further suggestions of Speiser et al. (2005) to use terms like 'only to be used in the case of documented deficiencies', may be useful but need further in-depth elaboration before they can be implemented in practice. Particularly, there is need to define a common procedure on how and by whom should deficiencies be documented and how the availability of suitable alternatives is assessed.

5.2 Unfair competition

According to its preamble, the EU Regulation 2092/91, provides 'a framework of Community rules which should enable organic farming to be protected in so far as it will ensure conditions of fair competition between the producers of products bearing such indications and give the market for organic products a more distinctive profile by ensuring transparency at all stages of production and processing, thereby improving the credibility of such products in the eyes of the consumers' (CEC, 2004).

The current derogation (II B 4.8) leaves the decision, which of the non-organic feed materials listed in the annexes are allowed to be used on a particular farm primarily to the communication between the farmer and the inspection body. Firstly, this provides an unsatisfactory situation in relation to the subjectivity of the decision-making and the different interests involved. Secondly, placing the decision in the responsibility of the inspection bodies is also likely to lead to a situation of unfair competition between organic farmers certified by bodies in the different regions and countries. Those producers who aim for a high integrity of their organic products using mainly home-grown and organic feedstuffs and very little feed additives compete with their products on the same markets as those who widely make use of the derogations.

Producers experiencing restrictions in the availability of feed materials will benefit from the derogations that allow the input of non-organic feedstuffs in two ways:

- a wider range of feed materials is available from conventional sources, and
- the lower prices of conventional feed materials relative to organic reduces their costs of production and gives them a competitive advantage.

In contrast, producers that follow the organic principles strictly and aim to make improvements to sustainability as well as product and process quality by using only organic inputs are at a disadvantage, due to the restricted availability of some inputs and higher costs for organic feedstuffs, and from increased competition from those producers that make use of the derogations.

The existing derogations allow those who produce on a low cost base and deliver products with a minimum quality level to have access to the same market and the same premium prices as those who strive for a higher product and process quality and encounter higher production costs.

Guthmann (2004) describes how increased pressure on the prices could manifest itself in a process where standard requirements in organic agriculture are reduced and organic could cease to be substantially differentiated from conventional agriculture. Under this scenario the imperative of agricultural intensification poses the largest threat to organic farming.

European organic producers have on average lower crop yields and lower stocking rates. For some farm types, variable costs of production can be substantially reduced whilst the costs for labour tend to be higher on organic farms. Resulting costs of production for most farm types are higher than for conventional systems, so that price premiums are needed to achieve an appropriate income (Offerman and Nieberg 2000; Jackson and Lampkin, 2005).

Existing derogations allows the organic producers to respond to a fall in price premiums by reducing their costs through increasing the use of non-organic ingredients. Furthermore, there is reason to assume that the possibility for the use of a high amount of non-organic inputs does not only decrease production costs but in addition provides the possibility for a clearly higher performance level in those herds that make widely use of the derogations. The derogations in relation to feed material organic livestock systems would allow a process of intensification similar to conventional livestock production to take place in organic systems. Organic systems would then also experience the undesirable side effects of intensification in relation to animal health, product quality and environmental impacts. This aspect is outlined in more detail by Sundrum et al. (2005).

It can be concluded that the current feed derogations contribute to a situation in which the potential for product and process quality in organic agriculture is not fully realised and the further development of quality production is hampered. There is a need to take the aspects of unfair competition and undesirable intensification of organic livestock systems into account when thinking about evaluation criteria for feed materials.

5.3 Consumer's demands and perceptions

According to the objectives of the previous and even more of the new draft of the EU Regulation 2092/91, 'the protection of consumers' interest, ensuring consumer confidence and avoiding misleading labelling' are of high importance in regulating organic production. Various surveys of consumers attitudes show that regular consumers of organic products expect organic livestock products to be safer, have a high sensorial quality, less additives, natural and healthy fodder, less drugs and hormones, as well as a higher level of animal welfare on the farms (Zanoli, 2004; McEachern and Willock, 2004).

There is some indication in the literature that existing organic standards have failed to improve some of these aspects of product and process quality in organic livestock production and that in many cases consumer expectations have not been met to an acceptable level (Sundrum, 2001; Hovi et al., 2003; Olsson et al., 2003). The reasons for the discrepancy between expectations and the current performance are complex and are likely to vary to a high degree between different sectors.

Standards mainly regulate the use of non-organic inputs, such as feed material and additives as well as veterinary treatment. However, converting to organic farming and following the rules does not automatically lead to a high eating quality or a higher animal health status. Many product and process qualities are primarily the outcome of complex interactions within a system and emerge from the very specific farm systems and are not only related to the use of non-organic inputs in the production method (Sundrum, 2006).

The question arises on how to protect consumer's interests, to ensure consumer confidence and to avoid misleading labelling as is intended by the revision of the EU Regulation 2092/1991. Different consumers show different preferences and subjective perceptions in relation to the different features (Andersen et al., 2005). Food quality has very different meanings to different people, and people in different countries rank quality criteria differently (Grunert et al., 2004). Therefore, the interests of one particular group may conflict with those of others.

Consumers' interests are very important for organic production and on average they appear to favour organic livestock production with few external inputs but of a high welfare status. However, they cannot be used directly as an objective decision criteria. The main focus of interest varies to a high degree between groups and individuals, in particular between regular and more occasional consumers. Consumers are neither a unified group covering common interests nor are they experts who can decide on quality items and the needs of production processes. Consumers' interest can therefore not provide the only criterion for decision-making in relation to inputs. Providing transparency seems to be one of the very first measures to strengthen and ensure consumer confidence.

5.4 Decision process

Currently, the final decision about the inclusion of new products in the annexes, and withdrawal of products, is taken by the Commission, assisted by the Standing Committee on Organic Farming, set up according to Art. 14 of Reg. 2092/91. Thus, the final decision on what inputs are permitted is in the first place a political one, balancing the interests of the different member states.

The authors of the Organic Input project argue that the political process between member states should be supported by scientific reasoning and that there should be a clear distinction between aspects that are evaluated on a scientific basis and those which are decided politically (Speiser et al., 2005). Because of the political nature of the process, all stakeholders affected should have some involvement. This gives considerably weight to the Member States.

During evaluation by Member States, the broad inclusion of stakeholders at the national level is expected. The major stakeholder groups are (i) consumers; (ii) farmers, (iii) environmentalists; (iv) groups concerned about animal health and welfare; and (v) groups concerned about social issues, particularly fair trade. Each of these stakeholder groups has their specific topics of interests, which may extend beyond their immediate concerns. For instance, many consumers will care not only about issues related to consumption, but also about other issues, e.g. price, animal welfare or food safety. The same is true for all other stakeholders. The opinions of stakeholder groups, being itself a compromise of the various opinions of individuals, does not necessarily improve the coherence of decision-making. Increasing the number of persons involved in the decision-making does not necessarily ensure that the decision will be more appropriate.

When the question, which modification of standards might provide disadvantages for some stakeholders or countries to the advantage of others, dominates the political debate it is likely that the decisions will be reduced to the lowest common denominator, and this may contradict efforts for improvements in relation to quality production. Negotiations about finding a consensus are quite different from those intended to find the most appropriate decision. According to Bawden (1991), the approach to finding a common ground between opposites is both endemic to Western thinking and its greatest weakness. The common ground invariably turns out to be the preferred ground of the most powerful contestant while the conflict between the differences often remains unaddressed, let alone unresolved. Consensus is not necessarily the best basis for decision about inputs constituent with the leading ideas and principles of organic agriculture.

In action 11 of the EU Action Plan for Organic Food and Farming an expert panel is suggested which should cover all the expertise needed. Building on this suggesting the authors of the Organic Input project propose that the primary responsibility of the expert panel will be to review the requests for amendments on the instructions of the Commission and provide the basis for a more informed political decision. To structure the technical evaluation of inputs they suggest the use of a decision matrix that they developed for plant cultivation inputs (Speiser et al., 2005). According to the authors, the primary responsibility of the expert panel will be to review the requests for amendments on the instructions of the Commission. The Expert Panel would take the major work-load of the technical evaluation of inputs, so that SCOF could concentrate on advising the Commission on the political aspects.

Case studies developed within the Organic input project showed that the completed matrix gave an adequate and complete picture of the key issues associated with the inputs under consideration. While the matrix can work out precisely what the controversial issues are, it cannot, however, help to solve controversies. In the case studies, controversies occurred especially between experts in assessing the possible consequences. The widest disagreement occurred in the field of public perception. It was quite clear which issues are relevant for public perception, but the significance of the issues was judged very differently. The group concluded that criteria based on input evaluation couldn't replace but only assist the political process to be taken in the SCOF.

Hence, the main task of the expert panel is providing a structured collection of arguments in favour and against the specific input.

It is likely that the procedure suggested by Speiser et al. (2005) for the evaluation process in the cases of fertilisers, soil conditioners (Annex II A) and plant protection products, would also be suitable for the positive lists of feed additives (Annex II D) and of feed material from mineral origin (Annex II C). For the positive lists a more general decision is required which non-organic substances can be allowed or not allowed on the EU level for the general use of all farms that produce according to the EU Regulation. However, in the case of feed materials from plant and animal origin (Annex II C) these substances can only be used if criteria of 'necessity' and conditions for flexibility as set out in Art 16 of the new draft will apply.

The decision whether or not non-organic feed material from plant and animal origin (Annex II C) is necessary on a given farm can not be taken at EU, or even national or regional level, because this exceeds the desirable level of detail for Regulation 2092/91 and the decision-making structure, nor it can it be left to the farmer alone, due to the various interests involved. Hence, this decision should be taken at an intermediate level.

Currently, this is the level of the inspection body or inspection authority. However, there is a lack of transparency regarding the way in which restrictions are implemented, and the suspicion that the restrictions are not implemented equally in different countries and/or by different inspection bodies (Speiser et al., 2005). Furthermore, with (private) inspection bodies, there are potential conflicts with commercial interests. Consequently, a concept of implementation which is clearly structured and contain clear decision-making rules to be applied at the farm level is required.

5.5 Origin of feed materials as inputs

The organic inputs project proposes to use the 'origin of the input' as one criterion for the inclusions in the Annexes. Under Annex II C the current derogation in the EC-Regulation allows feed mills to use two categories of feed materials as non-organic input:

- 1) basic feed materials of agricultural origin (cereals, pulses etc.) and
- 2) industrial by-products (maize gluten, potato protein etc.).

Annex II D lists under the category of 'feed additives' a number of trace elements, vitamins, pro-vitamins and well defined substances with similar effect.

External feed materials in particular of non-organic origin carry the risk of residue contamination, as was illustrated by the dioxin scandal, and increasingly they also carry the risk of GMO contamination. However, the use of external feed material regardless of whether it is organic or non-organic is associated with environmental pollution caused by the transport of feed material in relevant magnitude often over long distances and with social imbalances if countries that do not succeed feeding their own people produce feed crops for export to the developing world.

Also feed additives, often used only in minor proportions in the diet, carry the risk of contamination of product with residues, esp. with GMO's and derivatives via permitted non-organic ingredients which might have negative impact on the confidence of the consumer in relation to organic products. There is concern about the use of substances that have been produced artificially.

In relation to feed materials, Article 7 of the current EU Regulation states that additional inputs can be included in Annex II provided they are of 'natural origin' or failing that synthetic in the same form as natural products. 'Natural' in this context means 'non-chemically synthesised' such is the case with mineral nitrogen or synthetic amino acids. However, in other case it is more difficult to draw the line between 'natural' and 'non-natural' inputs, because the term natural cannot be defined easily.

Organic feedstuffs of plant origin are produced widely in Europe (Padel, 2005). They are, however, not always available in the close distance of the specific organic farm which has a need for supplementation with organic feedstuffs. In contrast, industrial by-products - conventionally widely used in animal nutrition - are not likely to be available organically in sufficient quantities in the foreseeable future.

Concerning the use of non-organic feed material from agricultural origin there is a lack of coherency when non-organic raw materials are used while at the same time organic ones are widely available within Europe. Feed material from non-organic origin bears the risk of unrelated nutrient import and advantages in relation to productivity which contradicts the objective to prevent unfair competition and to increase integrity of the system.

Thus, the use of external inputs provides a conflict of aim between the goal to establish a system with a high integrity by using only organic feed material and/or feed material that is to the lowest degree loaded with the negative side effects of transport on the one hand, and the goal to strive for lower production costs by using the cheaper non-organic feed material. Hence, origin of external inputs touches the issue of environmental pollution by the feed material itself and by the transport as well as the issue of unfair competition (see chapter 6.2).

The issue of unfair competition is, however, mainly restricted to the use of feed material from plant origin (Annex II C), due to their relevant impact on nutrient import, on productivity and production costs. In contrast, feed additives (Annex II D), as long as they are used only for the purpose to balance the feed ration according to the requirements of the farm animals, do not markedly influence productivity and performance of farm animals.

We therefore believe it necessary to differentiate the following categories of the origin of external feed materials that can be used on organic farms, because different risk factors need to be considered in their assessment.

1. Basic feed materials from organic origin

This would including feed materials from organic plant and animal original and by-products of organic food processing. Main risks associated are related to the overloading of farm systems with nutrients and the distance of transport. Feed materials from this category can currently be fed to a maximum of 50% of the dry matter intake, unless produced in direct collaboration with other organic farms.

2. Plant and animal raw materials from non-organic origin

In addition to the risk factors listed under 1 these carry additional risk of contamination of residues (e.g. pesticides) and GMOs and that of unfair competition and of undesired intensification of the livestock production processes. Currently these can be used under the derogation 4.8 up to the specified percentages. Under the conditions of the new draft of the EU Regulation these feed materials can only be used if a condition for less restrictive rules (Art 16) applies.

3. Industrial by-products from non-organic origin

In addition to those specified above 1 and 2 risks factors for this category of feed materials also arises from the production process, e.g. solvent extraction etc. The conditions for use are the same as for category 2.

4. Feed materials from mineral origin

In general, these substances are used in small amounts which reduces risk for the environment and transport. Risk factors that arise from this category related to contamination, the production process and feeding unbalanced diets to the animals (including oversupply with certain minerals). These feed materials can be used if listed on the positive list in Annex II C. In the current regulation Article 7 states that these feed materials can be included in Annex II, if they are of natural origin or failing that of similar form.

5. Feed additives

Risk factors and conditions for use are very similar to the category 7. Article 7 stipulates that natural here means ‘ non-chemically’ synthesised N, which excludes synthetic amino acids. Growth promoting substances and medicinal feed additives should not be used.

5.6 Challenges for the revision of the EU Regulation

Regulation 2092/91 is currently under revision with a view to ensuring simplification and overall coherence and in particular to establishing principles encouraging harmonisation of standards and, where possible, a reducing the level of detail in the Regulation and of the implementing rules. The new Regulation should also replace the current practice of

‘legislation by derogation’ by a transparent strictly regulated mechanism allowing less strict rules.

These aims of a revised Regulation are highly appreciable and will find agreement by the majority of the stakeholders. However, there appear to be a number of contradictions in the aims.

Striving to increase flexibility could mean that there is need for more derogations to be able to adapt to the very specific situation of a farm or region without losing the profile of organic production and consumers confidence.

The goal of the revised Regulation to further restrict the use of non-organic ingredients in feed will require corresponding measures to ensure that animal health and welfare are not compromised. On the other hand, striving for a nutrient supply that meets the nutrient requirements of the farm animals in the different stages to a high degree increases the demand in relation to quality and quantity of external feed ingredients as all those required to formulate a balanced diet are seldom available from home-grown feed materials alone.

While strict regulations are expected to lead to a higher credibility of organic farming and its products and is therefore in the interest of consumers, they are expected to simultaneously restrict the flexibility in adapting to different regional or farm specific conditions.

It can be concluded that the previous feed regime in the EU Regulation did not sufficiently related to the principles of organic agriculture, and did not adapted closely enough to the system approach of organic farming. Therefore, the question arises on how the standards and the compliance with standards can be so that better correspondence with the main principles (including high quality of the product and high animal welfare) is encouraged and the expectations of consumers are met.

We believe that a systemic concept can help to balance the various conflicts of aims and the previous incoherencies within the EU Regulation. In the following chapter, we suggest to use a system approach to assist with formulating criteria for strictly regulated flexibility in the use of inputs so that strict production rules can apply under certain circumstances. This could transform the current multitude of derogations about input use into a general but strictly regulated system while solving at the same time some of the most relevant inconsistencies described above.

In order to explain and understand the possibilities of a system approach in relation to evaluation criteria, there is need for more background information about the characteristics of systems and the potential of a system approach.

6 Using a system approach for input evaluation

6.1 Systems traditions applied to agriculture

Recognising the sustainability and multi-functionality of agriculture and food production has led to a growing importance of systems perspectives in order to explain the dynamics of farming and its further development (Bawden, 1991). To define the farm as an agricultural system has become commonplace especially in organic farming (Lockeretz and Boehncke, 2000).

A system is a complex entity. The organised whole consists of parts that are related together, which generates emergent properties, and has some purpose (Hodson, 2002). In general, systems are a human conceptualisation as they do not exist independently of the observer, but depend on an inter-subjective consensus about the definition of the system. Bawden (1991) refers to farming as a human activity system, in which people actively manage some natural resources, the farm, for the purpose of producing output. Like other so-called soft systems (Checkland, 1999) farming is influenced by the subjective values and attitudes and such conceptual boundaries should be considered.

Early ideas of systems thinking can be seen as a reaction against the reductionism inherent in the scientific method. The term 'systems approach' is often used since the first comprehensive concept of system theory was developed by Bertalanffy (1968). He saw in a general system theory the opportunity to promote collaboration between separate disciplines and to discover regularities which are beyond the scope of individual science. Furthermore, he emphasised the openness of biological systems to influences from their environment and the principles of self-regulation (*homeostasis*) and of *equilibrium*.

According to Hodson (2002) teleology is an important part of systems thinking. The defined purpose of systems will normally determine how we intend to measure the performance of a system. Systems have emergent properties which emerge from the relationships or interactions of its constituent parts.

In thinking about a system we necessarily define a **boundary** that separates those elements, which are part of the system from those outside the system. Those things outside the system constitute the system's environment. A system communicates with its environment in terms of **inputs** and **outputs** from the system and it transforms inputs into outputs. Systems generally can be seen as being composed of sub-systems while hierarchy seems to be an inherent property of most systems.

The system approach proceeds from the basic idea that many real phenomena and processes can not be explained adequately by searching only for classical mono-causal relationships. There is a growing understanding within the scientific community that it is necessary to develop more comprehensive concepts which simultaneously consider a larger number of causal relationships. The isolated view under *ceteris paribus* assumptions is replaced by the holistic or system approach (DFG, 2005).

The key feature of the system approach is that it captures the dynamics and interactions between the various elements of the system. To gain more understanding of the system

approach and to make it feasible for the use in the current context there is need to make a distinction between ‘closed’ and ‘open systems’, marking an essential difference between traditional (conventional) way of thinking and a new approach in science.

6.2 Characteristics of ‘closed’ and ‘open’ systems

To deal with “closed systems” is a domain of conventional physics or chemistry, where systems are considered to be isolated from their environment. Thus, physical chemistry tells us about the reactions, their rates, and the chemical equilibrium eventually established in a closed vessel where a number of reactants is brought together. In any closed system, the final state is unequivocally determined by the initial conditions, e.g. in a chemical equilibrium, the final concentration of the reactants naturally depends on the initial concentrations. If either the initial conditions or the process is altered, the final state will also be changed (Bertalanffy, 1968). In other words, the input has a more or less defined effect on the output, and to achieve a certain output (goal) it consequently needs a specific input.

The theory of open systems is an important generalization of physical theory, kinetics and thermodynamics. It has led to new principles and insight, such as the principle of *equifinality*, the generalization of the second thermodynamic principle, the possible increase of order in open systems, the occurrence of periodic phenomena, of overshoot and false start, etc. (Bertalanffy, 1968).

Open systems are based upon dynamic interactions striving for attaining a steady state. This tendency towards a characteristic final state (*equifinality*) from different initial states and in different ways is a main characteristic of open systems. It is an essential precondition that enables open systems to adapt to changes in their external environments.

The purposeful behaviour of open systems strive for a homeostatic maintenance of a characteristic state or the seeking of a goal, based upon circular causal chains and mechanisms monitoring feed-back information on deviations from the state to be maintained or the goal to be reached. In order to reach the purpose a vital factor is needed which governs the process in foresight of the goal. The discipline of ecology utilises the concept of open systems to explain the adaptations that animals and plants makes to changes in the physical environment (Hodson, 2002). Systems generally exhibit some form of control which enables the system to adapt to changes in its environment. Control can be viewed in term of monitoring sub-system that regulates the behaviour of other sub-systems. This monitoring ensures defined levels of performance for the system through imposing a number of control inputs upon the system. Such control inputs will normally be in the form of decision rules. The rules are used to steer a system in a desired direction by supplying control signals to the process of the system.

Agricultural systems are by their very nature open and not closed systems. They maintain themselves by a continuous inflow and outflow, a building up and breaking down of components, and by transforming inputs into outputs (products). While the openness is a characteristic feature of biological systems, there are huge differences between the degree of openness between systems.

The leading idea of organic farming is to strive for closing the farm system to a nearly complete nutrient cycle, whereby the inputs are reduced and waste products are as far as possible recycled to achieve acceptable levels of output or product. However, unless systems

can recycle fully all nutrient consumed by humans it remains open in the sense that some inputs and outputs are exchanged with the environment.

Although the production system is open for nutrient exchange, it is not indifferent towards the specific property and the origin of the input. In order to establish a steady state within the system and to produce emergent properties concerning organic products, quantity and quality of inputs have to be strictly regulated. Hence, the openness of organic systems is clearly restricted and in the ideal form more or less 'closed' that means the quantity of inputs into the farm system should not markedly exceed the nutrient outputs.

In contrast, intensification of conventional production has considerably increased the quantity of nutrient import into the farm. Traditional or conventional agriculture uses a range of chemical and other inputs to produce outputs (or products) as well as waste. They are to a large extent indifferent towards the properties of the inputs. What is not forbidden by the legislative framework is allowed. A high nutrient import into the conventional farm provides advantages in terms of the productivity of the production, but has disadvantages in relation to animal health and welfare and the environment which are often neglected.

Conventional systems are very open to inputs, and few regulations cover the quantity and quality of inputs. The openness of intensified agricultural systems stands to some degree in contrast to the characteristics of an 'open systems' in systems theory. Due to comparable high amounts of nutrient inputs, conventional farm systems often are not in the slightest able to maintain an equilibrium between input and output of nutrients nor are the different parts of an intensified farm system (plant production, crop rotation, animal production etc.) well connected and in tune with each other. In intensified livestock production systems the procedures and measures used to achieve a certain product are to a high degree standardised in order to obtain a more or less uniform and interchangeable product. This includes the use of comparable genotypes, feeding strategies, and the use of standardised housing conditions, often defined by the minimal standards required by the corresponding EU legislation.

In contrast, organic production strives for a final state of the process and the products by making use of the heterogeneity of the different resources available and the different measures traditionally used on the farms. The *modus operandi* to achieve a common goal is analogous to what Bertalanffy (1968) described as 'equifinality' when starting from different initial states and as the purposeful behaviour of 'open systems'. Hence, the leading ideas of organic agriculture are closely linked to the idea of 'open systems' while the procedure in intensified production units seems to be - although very open for external inputs - more or less based on the idea of 'closed systems' and on the results and conclusions that derived from studies designed under the assumptions of *ceteris paribus* conditions. There is reason to assume that these different approaches provide various implications, which cannot be discussed here in detail, which, however, should be taken into account when reflecting on evaluation criteria.

6.3 Different system levels

In thinking about systems there is need to define a boundary that separates elements that are part of a system from those outside the system. Simultaneously, it has to be taken into account that within a complex system different levels of integration (system levels) exists. On each level, entities of defined size and structure are combined and built up to a new entity on a

higher level. In entities (systems) of higher levels properties emerge which do not belong to any of its constituent parts (sub-systems), but emerge from the relationships or interaction of its constituent parts (Jacob, 1973). This is particularly relevant, when properties such as animal health and welfare or sustainability are addressed.

Within the comprehensive system of organic production, several sub-systems can be separated: e.g. individual animals, total herd of farm animals, the whole farm system, farms that follow the same rules of production, regional level, and the EU level.

6.3.1 Farm animals

Farm animals are self-organizing organisms within a herd of farm animals and within a complex of heterogeneous environmental conditions of the farm. They maintain and reproduce themselves by using the nutrient sources offered by the farmer. Each individual animal is characterised by a specific nutrient requirement. There is considerable variation in relation to nutrient requirements between individual animals, which is among other factors due to differences in body mass, age, sex and particularly due to the performance level.

What feed is needed and whether external feed material and feed additives for farm animals are required depends to a large extent on the intended performance level. This provokes the question which performance level is appropriate for any species in an organic system? Should criteria refer to the nutrient requirements of high yielding animals, those with a medium or low performance, or even the requirements of the individual animal?

6.3.2 Farm system

Analogue to farm animals, also the whole farm can be defined as a system. Noe and Alroe (2003) proposed a theoretical framework for observing and analysing a farm as an entity. They pursued the idea of a farm as a self-organizing system in a complex of heterogeneous socio-technical networks of natural resources, food, supply, knowledge, technology, etc. that must produce and reproduce itself through demarcation from the surrounding world by selection of joint meaning. The organizational closure of a farm and the relational openness of the farming process needs a framework. Thereby, boundaries of self-organising systems are not dependent on the choices of the farmer or the external observer, but on the self-reference of the system. This means that it is the internal process of the system that defines its own input for operation.

The nutrient flow in an organic farm is characterised to a high degree by the soil and climatic conditions determining the yield potential of arable and grass land, the proportion of feed crops grown in the crop rotation, manure management, the stock numbers and stocking rates and the performance level of the farm animals.

There is considerable variation between individual farms across Europe concerning stocking density, husbandry and feeding practices, and the quantity and quality of the nutrient flows. This is not only influenced by the specific soil and climatic local conditions of each farm but also by structure and by the organisation of the farm system. Thus, it is the management, acting with more or less appropriate skills within the economic framework, which determines:

- whether there is a balance between supply and demand in the system
- whether there is need for external input to make sure that possible imbalances do not compromise animal health and welfare or,
- whether there is an oversupply of nutrients in the system which is likely to have a negative impact on the environment.

Hence, with regard to the objective of a nearly complete nutrient cycle within organic production, there is a need to take the farm management into account, when striving for a decision in relation to external inputs.

Furthermore, the system approach implies that the organization of a farm can only be understood and explained when taking all the system components and properties into account. This is analogous to a living organism, some aspects of which can only be understood if the whole of cells, organs, and communication lines is considered. The identity of each farm system is specified in a network of dynamic processes which produces its own operations and reproduces them in its network of recursive progresses and regresses.

6.3.3 Regional level

The regional level is the level of shared conditions between organic farms. In this context, regions or landscapes can be defined by common characteristic in relation to the soil and climatic conditions as well as farm structures which enable certain cropping systems and therewith a specific nutrient potential for home-grown feedstuffs, creating very different opportunities and needs in relation to resources and external inputs.

Substantial differences between regions also exist in the state of the economy and in the markets for organic livestock products, in terms of consumer demand, access to processing facilities, producer and consumer prices and quality expectations. Hence, the role of livestock as an integrated part of the organic production systems and its importance for future development differs considerably between regions in the EU and in candidate countries.

Due to the huge variation in relation to the need for non-organic inputs between regions and farms, the proposal for total revision envisages some regional flexibility in relation to the less restrictive rules. The specific situation in a certain region might require the need for different balancing of objectives, i.e. a compromise between the different stakeholders involved without compromising the main principles leading ideas of organic agriculture.

6.3.4 EU level

All organic units that produce according to the EU Regulation 2092/91 belong to the overall organic production system. The meaning of the organic system is expressed through the goals, values, as well as the internal logic and purpose of the farming process. To characterise what kind of entity organic agriculture is and what makes it move, Noe and Alroe (2005) find it useful to regard it as a logo-poietic system. The term 'logo-poietic' is based on the notions of 'autopoiesis', the self-organisation and self-creation of cells and living organisms. Logo-poiesis describes *meaning* as a self-organising principle. The basic distinction is the one between system and environment, between self and not-self. This distinction is established by the system's self-reference (Luhmann, 1995). In the logo-poietic perspective, organic

agriculture is a system that creates itself and holds itself together by the continuous reproduction of a common meaning, expressed in shared worldviews, core principles or networks organised by related, but not quite similar, meanings such as organic agriculture.

Each production unit sharing the common meaning, i.e. producing according to the same rules is allowed to label the products as organic and to exchange goods, feed material and food within the overall organic system almost without restrictions. For feed the regulation requires that preference should be given to home-grown feed materials and that not more than 50% of feed materials should come from external sources.

The question whether non-organic inputs should be allowed as an exception from the rule has so far been regulated at the EU level for all farms keeping livestock of a certain species by means of derogations, the new rules envisage to replace by specifying conditions under which less restrictive rules can apply.

There is a difference when dealing with feed material from different origins (see 5.5 Origin of feed materials as inputs). Feed materials from mineral origin and feed additives are not produced on farms and therefore mainly of non-organic origin are used in much smaller proportions than feed material from plant and animal origin, which are likely to be available from organic origin as well as non-organic organic farms.

In the case of feed material from mineral origin and feed additives it makes sense to decide at EU level on a positive list of which non-organic substances should be allowed for the use on all farms that produce according to the EU Regulation.

In contrast, the requirements for external non-organic feed material from plant and animal origin on a specific farm is system-variant and cannot be generalised for all production units at EU level without providing severe disadvantages in relation to the issue of unfair competition and the objective of integrity. Components from such a positive list should only be allowed to be used if certain conditions apply, and the assessment whether certain condition applies for a specific farm or for a specific region cannot be made at EU level.

The decision-making process for the system-dependent necessity of external non-organic inputs should nevertheless be made as transparent as possible, in order to build confidence in the decision process. Moreover it should be made clear, who is allowed to decide which inputs are permitted to be used in which quantity, by referring to which level of reference and by using which criteria.

6.4 Determining nutrient requirements of animals in a systems based approach

Research under *ceteris paribus* assumptions is the predominant scientific approach in agricultural science. Results obtained under *ceteris paribus* assumptions are, strictly speaking, restricted to the system in which they have been investigated. Consequently, due to emergent effects of any system, the results lack validity when transferred from one farm system to another with different emergent properties or from single farm animals to level of a farm system (Sundrum, 2006). This is also true for research in animal nutrition, for example the assessment of specific nutrient requirements for farm animals. Experiments to determine amino acid requirements are based on the assumption that there is an optimal dietary pattern

among essential amino acids that corresponds to the needs of the animal (NRC, 1998). This optimal dietary pattern is called “ideal protein”, which is defined by the composition of essential amino acids relative to the requirement for crude protein. The estimated value of this ideal protein is based on a considerable number of experiments under *ceteris paribus* conditions, which should allow a high predictability of which nutrients are needed in which quantity and quality for various species of different age and performance to obtain a certain result (Wang & Fuller, 1990; NRC, 1998; Gramzow, 2001).

However, while the recommendations show a high accuracy on the level of an individual organism, predictability is clearly reduced when the recommendations are transformed to the farm level as a system of a higher order. Different variables (such as feed intake, genetic capacity for protein accretion, nutrient and energy need for immune defence etc.), providing itself a huge variation show an even bigger variation when interacting with each other. This makes a prediction very complex and difficult as digestibility of organic matter can vary considerably between and within farms also when using the same diet. Studies of Elbers et al. (1989) and Schinckel et al. (2002) have shown that the variation in digestibility, live weight growth and rates of protein and lipid accretion is much more associated with the differences between the farms than with the genetic background of the farm animals, resulting in considerable different amino acid requirements. Hence, a system-oriented operation will demand farm-specific nutrient recommendations, which is driven by the specific information derived from and the experience made on the specific farm (Schinckel et al., 2002).

Under the conditions of organic farming also the nutrient provided by home-grown feedstuffs and the stocking density need to be considered as the basis for the farm-specific nutrient requirements. Thus, conventional and organic production methods follow quite different system theories with different starting points, and different implications in relation to solving and optimisation strategies. As systems are self-referential, measures or strategies that have been developed and validated in one system are not directly transferable to an other system. General conclusions inductively drawn from investigations under standardised conventional conditions are not directly valid for organic systems.

7 Evaluation criteria resulting from a system approach

The system approach provides a relevant option to reduce the complexity in agricultural processes to a level where operational applications may be possible and appropriate.

7.1 Consistency between the theorem of ‘open systems’ and organic principles

According to the Codex Alimentarius Guidelines (2004), organic agriculture is a ‘**holistic production management system**’ which promotes and enhances agro-ecosystem health, including biodiversity, and biological cycles. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, cultural, biological and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system.

The basis for organic livestock production is the development of a harmonious relationship between land, plants and livestock, and the respect for the physiological and behavioural needs of livestock. This is achieved by a combination of providing good quality organically grown feedstuffs, appropriate stocking rates, livestock systems appropriate to behavioural needs, and animal management practices that minimize stress and seek to promote animal health and welfare, prevent disease and avoid the use of chemical allopathic veterinary drugs (including antibiotics) (Codex Alimentarius Guidelines, 2004). The new draft of the EU Regulation 2992/91 (CEC, 2005) defines organic production as an ‘**overall system of farm management and food production**’ that combines best environmental practices, a high level of biodiversity, preservation of natural resources, application of high animal health and welfare standards and production in line with the preference of certain consumers for products produced using natural substances and processes. Organic livestock farming must contribute to the equilibrium of agricultural production systems and should contribute to the development of sustainable agriculture.

According to the main characteristics of open system (see chapter 7.2), the principles of organic production are in correspondence with the principles of open systems, especially in relation to the teleological and purposeful behaviour of and the striving for a state of balance.

7.2 *Equifinality* of organic production processes and products

One of the main goals of organic agriculture is the qualitative optimisation of crop and animal production and socio-economic processes. The implementation of these goals are going along with performances respective emergent properties of the whole farm system that can be addressed as process qualities (e.g. a high status of animal health and welfare, environmentally friendly production), and these are of high relevance for an increasing number of consumers.

While in any closed system, the final state is unequivocally determined by the initial conditions, the final state in open systems may be reached from different initial conditions and in different ways. This is what Bertalanffy (1968) defined as ‘*equifinality*’. *Equifinality* can be accomplished only by management factors which govern the process in foresight of the goal.

The aspect of *equifinality* has a close relationship to the purpose and objective of the EC-Regulations itself. The starting point of standards for organic agriculture in 1954 was that the trademark legislation that required clear criteria to identify organically produced goods in order to allow organic labels to be registered (Schaumann, 2002). Because the variety of production sites and the resultant product properties did not allow the identification to be linked to the quality of the end-product in a way that could be described exactly and understood analytically, the production method itself became the identifying criterion.

This fundamental principle has been kept to the present day in private standards and has also been adopted by the legislators in the EU Regulation 2092/91 to harmonise the rules of organic livestock production across member states setting a minimum standard for all organic systems across EU member states. An essential purpose of the Regulation is:

- to protect the consumers from unjustified claims,
- to avoid unfair competition between those who label their products as organic, and
- to ensure equal conditions for all operators.

The approach to take the production method as the identifying criterion of organic products is at least to some degree based on the assumption that a defined production method, although used in very different situations and under different local conditions, can be expected to produce an output (products) that includes common but not analytically equal features and that the quality of the products and the production processes emerges from the processes within the farm system. Emergent effects on the farm level capture the dynamics and interactions between the various elements of the system, with particular emphasis on the non-linear relationships which are typical for biological systems and which result in extraordinarily complex interactions. Thus, the labelling of organic products is - although not reflected in the Regulation- based on the assumption of *equifinality*, which simultaneously is an essential feature of open systems.

Consequently, the aspect of *equifinality* derived from the theorem of 'open systems' covers both the aspect of consumer's expectations and perception in relation to quality. However, a problem arises if the end products no longer can be considered as equal, as could be argued to be the case if producer using different amounts of non-organic inputs compete on the same market (see 5.2 Unfair competition). Consequently, there is a need for further progress to reduce variability of quality features within the organic production.

7.3 Use of input is necessary for intended use

It has been shown in a previous report of the EC-Revision project that it is possible to formulate diets for organic poultry and pig production almost without the use of non-organic ingredients, and that farmers can use a range of different measures to compensate for possible deficits (Sundrum et al., 2005). This general statement is valid for a large number of organic farms, but it might not be accurate for all organic farms. For example, for farms in less favourable areas it is difficult to obtain a range of different organic feed ingredients or farms may be disadvantaged due to other local or farm specific conditions. The specific need for supplementation with external inputs depends on the one hand on the nutrient potential of the home-grown fodder crops, using a crop rotation that should to be closely adapted to the requirements of the farm animals, and on the other hand to the species specific stock number

and performance levels that influence the nutrient requirements at the different stages. Hence, the requirement for supplementary feed material is a function of the specific farm system and cannot be calculated by using only the recommendations for species specific nutrient requirements on the basis of demand tables.

In an open system, control and feed back mechanisms of subsystems should be an inherent tool to assess the specific needs within the farm system by implementing feed balance sheets, and ration calculations.

The potential need in relation to the quantity and quality of external feed material interacts with the availability of feed material from organic origin outside the farm. The objective of a high integrity of organic production system implies that the only valid reason for the use of non-organic feed inputs is when not enough organic ingredients are available. The main difficulty in relation to the assessment of 'availability' is, however, to agree on a distance that might be reasonable to make use of organic feedstuffs before being allowed to buy non-organic feed material as a measure to compensate for deficits.

7.4 Lowest negative impact on animal health and welfare

According to the recent study of Sundrum et al. (2005), the risks for the occurrence of diseases and welfare problems in organic livestock production due to suboptimal nutrient supply are comparable low and primarily restricted to young stock. In general, they can be handled by a proper management, as various measures are at the organic farmers' disposal to deal with the deficits of home-grown feedstuffs.

Consequently, the animal health status is not in the first place depending on the availability of feed material and nutrients in quantity and quality but on the skills of the management to deal with possible deficits and to implement compensatory measures. In accordance with the system approach it can be ensured that animal health is not compromised by deficits in the availability of nutrients by control and monitoring mechanisms such as an animal health plan.

From the animal health and welfare point of view, it is of high importance that organic production is protected towards the negative side effects of an intensified meat production (European Commission, 2000; Sundrum et al., 2005) by setting limits with respect to the intensification process. The uncontrolled use of non-organic feedstuffs is expected to have a damaging effect on animal health and welfare and on the confidence of those consumers who expect that organic products of animal's origin derive from healthy animals. As the availability of high quality protein is the most relevant precondition for a high protein accretion, the limitation in protein feed availability seems to be a suited and system-inherent measure to limit the imperative of agricultural intensification and to prevent the negative side effect in relation to animal health and welfare.

Due to the considerable variation in relation to the availability of high quality feedstuffs between regions, to the digestibility and utilization of nutrients between the various feedstuffs, and to the performance capacity and feed intake between genotypes and farm specific housing and feeding conditions there is need for the development of feeding strategies that are more closely related to the farm specific situation. The implementation of feed back mechanisms like farm specific feed balance sheets could provide several benefits:

- to improve the efficiency in the use of home-grown feedstuffs,
- to ensure an appropriate nutrient supply and feeding strategy for the farm animals, and
- to assess whether further supplementation with nutrients from outside of the system is needed.

7.5 Lowest negative impact on the environment

External feed input (irrespective of whether or not this is from organic or not-organic origin) can have a negative impact on the environment. If the input of nutrients into the farm substantially exceeds nutrient exports through the products, the farm system will be overloaded with nutrients the surplus of some major nutrients is available for leaching into the environment.

The other area of negative impact on the environment of feed materials on the farm arises because of the transport, which is influenced both by the distance over which feed materials (and manures) are transported as well as volume of material.

7.6 Availability of approved alternatives in sufficient quantity or quality

Padel (2005) concluded that in 2002/2003 the EU would have produced enough cereal crops to feed all organic stock with 100% organic diets. This was similar in 2004 and there appeared to be a surplus of organic cereals which would allow for further increases in stock numbers also to be fed with organic cereals. However, the main cereals producing countries are not necessarily those that also keep most organic livestock, so regional imbalances might well occur (Padel and Lowman, 2005) making it obvious how necessary it is to consider distance in the assessment of the availability.

The situation concerning the protein supply still remains problematic. The supply of home-grown pulses appeared to be been sufficient in 2002, but small shortages would have occurred in 2003. The area of organic pulses declined further in 2004, whereas stock number increased by between 4 % (pigs) and 9 % (sheep) leading to a further potential shortage of organic pulses. It appears that with the derogation regime that was in place until August 2005 had not stimulated increases in the supply of organic pulses in the EU and feed manufacturers' appeared reluctant to purchase home grown organic protein sources.

It remains to be seen whether the changes to the feed regime in August 2005 with the clear intention for 100% organic rations and with step-wise reductions in the proportions will lead to increases in the area of organic protein crops grown in the EU in the future.

Deficits also occur in the area of high quality protein sources. It appears therefore necessary to identify other supplies of organic high quality protein sources that can be grown and utilised in Europe, including by-products of oil seeds (e.g. oil seed rape) and explore the supply of acceptable sources of animal protein (for further detail see report 4.1. of the EC-Revision project).

8 Discussion of system-oriented criteria

The EU regulation in its current version sets out the following key principles for organic livestock production in the Annex I B in the sections 1.1. to 1.5. These are important for the development of criteria for non-organic feed. These principles state that organic livestock farming:

- must contribute to the equilibrium of agricultural production systems,
- must establish and maintaining an interdependence between soils, plants and animals,
- is land-related ruling out landless productions,
- should contribute to the development of sustainable agriculture.

Based on the system approach and the theorem of ‘open systems’ the following measures are recommended, to deal with the issue of non-organic inputs in organic production.

8.1 The importance of the farm level as a level of reference to assess necessity

Whether or not and to what degree non-organic inputs in form of feed material should be permitted to be used in organic production depends in the first place on the specific needs of the farm system. Only at the farm level it is possible to assess the need for supplementary inputs properly and to assess the lowest negative impact on animal health and welfare and on the environment. In relation to feed the input criteria ‘necessity’, impact on animal health and welfare, impact on the environment can only be judged at the farm level.

In order to assess these criteria within an organic farm system, farm gate feed balance sheets, extended by the analysis of the home-grown feedstuffs, and the formulation of feed rations according to the requirements of the farm animals in their different stages of life are essential. Based on feed balance sheets, farm-specific feeding strategies should be developed to increase the use of home-grown feed and to improve the efficiency in their use and prevent imbalances that may cause harm to the animals. The task for assessing whether external and non-organic inputs are needed within the farm system lies in the first place in the responsibility of the farmer. It should therefore be the farmer who should ask for permission to import feed material into the system via an application form that contains relevant data of the farm system and feed-back data, such as feed balance and diet calculations. On this basis it should be comparable easy for the inspection bodies to examine plausibility of the case in relation to the need for further nutrient import and whether the management is aiming to minimize the use of external inputs.

8.2 Implementation of feed back mechanisms

The development of equilibrium within the organic production system by utilising farm derived and renewable natural resources, and by avoiding any detrimental effects on animal health and welfare and on the environment is in accordance with the principles of open systems. To strive for equilibrium, a proper management is required which governs the process in foresight of the goal. Feedback and control measures represent a way of monitoring and regulating the behaviour of other sub-systems, and are therefore the basis of teleological

and purposeful behaviour of open systems. They ensure defined levels of performance for the system through imposing a number of control points upon the system.

The way feed is regulated in the current EU Regulation lacks any mechanisms of feedback towards achieving the goal of further reduction of non-organic inputs. This lack of feedback mechanism is likely to be one of the main reasons for the unsatisfying situation in relation to product qualities and to the process quality of animal health in organic livestock production.

Feedback mechanism that have the potential to improve system related quality traits could be integrated into the Regulation through the demand for:

- Farm gate nutrient balance sheets to improve nutrient management and reduce nutrient losses,
- Farm specific feed balance sheets to improve the amount and the efficiency in the use of home-grown feedstuffs and to assess the necessities for supplementation,
- Animal health plans to strengthen the efficiency of a range of preventive measures and to reduce morbidity and mortality of farm animals (SAFO, 2005).

The implementation of feed back mechanisms is expected to clearly improve the efficiency of processes (process quality) within the production system. Particularly, the nutrient flow and the level of animal health will benefit from the feed back mechanisms. The need for quality and quantity of external inputs can be identified more clearly, possible alternatives will be more obvious. Although it is an open question whether the amount of inputs will be reduced, it can, however, be expected that the efficiency and the appropriateness of the external inputs will be clearly improved.

The suggested feedback mechanism are suited to simultaneously cover different criteria for the use of external inputs as they address the issue of necessity of inputs, and the impact on the environment and on animal health and welfare. Finally, the implementation of feedback mechanisms is expected to contribute to the prevention of unfair competition and a higher level of equifinality of organic production, and to support the development of a quality oriented production system.

8.3 Availability of ingredients of organic origin

In accordance with the objective of a high level of integrity, a stepwise procedure for the assessment of availability by using distance circles could be a possibility to deal with the question of availability. This would allow relating the farm specific needs to local conditions (localness) and to the principles of organic agriculture. In the first instance, it should be assessed, if there is any need for supplementation with nutrients and feed resources that can not be covered by alternatives within the farm. This question could reasonably be answered through a farm specific feed balance sheet, that would include the nutrient supply on the farm and the requirements of the animal flock, and thus identify what substances are needed. Such as farm feed balance sheet could be part of the annual inspection process.

If the need for further supplementation is obvious, a second step should be implemented, which requires to consider feed material of organic origin that are available in the surroundings of the farm in a stepwise procedure from a geographical point of view.

While this procedure is not relevant for feed materials of mineral origins and feed additives, it makes sense for non-organic feedstuffs. It is recommended to choose clear distances for the assessment of availability, as terms like regional or local are not clearly defined and therefore open to interpretation.

For example, the farm level could represent the 1st category of availability. A concentric circle of 20 km could stand for a 2nd category, covering a distance in which intensive exchange of feedstuffs between organic farms is possible, because the transport is easy to perform and it is easy to get an overview of the availability. In this distance it is also more likely that farm yard manure and slurry would be returned to the holding from where feed has been obtained, minimising the environmental impact of livestock production systems.

An enlarged circle of approximately 100 km as a 3rd category would appear to be tolerable in relation to the impacts of transport, and on the other hand could stimulate the cultivation of organic feedstuffs in the surrounding. The 4th category would be national and the final 5th category the EU wide availability.

If supplementation is needed and alternatives are not available in the 1st category, availability in the next category needs to be assessed by the certification bodies.

If availability is not given in any of the categories, than non-organic alternatives included in the reworked Annex II C or organic ingredients from outside of Europe can be used. Again, preference in relation to non-organic feedstuffs should be given to local sources rather than alternatives that have to be transported over a long distance.

Such a procedure would offer flexible response to varying need, and would be consistent with the principles of open systems. It would strengthen the aspect of land based organic livestock production by:

- strengthening the connection between production and availability of nutrients, and thus
- reducing the use of feed material that are produced at considerable distance from the farm and avoiding the negative side effects of transport on the environment.
- stimulate the cultivation of organic feedstuffs in the regions to cover the regional needs,
- stimulate the development of integrated production systems within a region, which would be expected to improve efficiency in the use of nutrients.

Following this procedure it is likely that availability at EU level will improve and that there would be no need to allow the use of non-organic feed materials in animal nutrition in organic farming in the long term.

Padel (2005) has shown that at EU level there are sufficient organic cereals for all organic livestock available. However, the author identified some shortages in the area of protein, especially in relation to high quality protein. By implementing the suggested procedure it could be expected that at least the need for grain legumes of non-organic origin could be reduced to almost zero because the cultivation of such crops in Europe would be stimulated by the development of a regional or a national or a European market to cover the needs of organic reared farm animals in Europe.

The specific suggestions, however, leave a lot of open questions, for instance:

- Who judges availability on what basis?
- Does the attempt of the producer to sources organic from one or two traders count as proof of non-availability?
- Can the certification bodies enable themselves to estimate the availability of feedstuffs in a region?

Details, how such feedback mechanisms could be implemented on the farm and the regional level will be elaborated in task 4.4 of the current project on EC-Revision.

8.4 Criteria to be used with regard to the positive lists in the annex

Criteria to support decisions whether to allow or withdraw inputs from the list in the Annexes of the EU Regulation for feed material and feed additives should be in accordance with system-governed rules. While the previous considerations on how to deal with non-organic inputs was primarily based on inclusion criteria and procedures for the integration into the organic production system, it is recommended that the list of feed material from mineral origin (Annex II C 3) and the list of feed additives (Annex II D) should only be decided by the use of exclusion criteria.

Criteria should focus primarily on the specific characteristics of the external inputs in question and assess whether or not the specific attributes of the material conflict with objectives of organic production (e.g. GMO's or synthetic amino acids). In accordance with the suggestions of the Codex Alimentarius Guidelines (2004), it is suggested that those substances should be banned from the list of annexes that:

- are not permitted according to national legislation on animal feeding;do contain genetically engineered/modified organisms and products thereof;
- contain synthetic nitrogen or non-protein nitrogen compounds; are not primarily of plant, mineral or animal origin;are produced or prepared with the use of chemical solvents or chemical treatment.

9 Conclusions

- The existing feed derogations lead to unfair competition in the market place by favouring those producers that make use of the derogation over those that aim for 100% organic rations, because the former will benefit of the wider choice of feed ingredients available conventionally and of the lower costs for such feed material, while both have access to the same markets for their end products.
- Any further development of the feed regime including the criteria which feed ingredients should be listed in Annex II should be in line with the principles and the system approach of organic production. Of particular relevance are the land-based character of organic livestock production, minimising environmental damage and respecting high animal health and welfare. The rules for feed should aim to provide an incentive for the further development of the product and process quality of organic livestock production and strengthen the self-regulating properties of organic farms as self-referencing systems.
- In general, it is possible to formulate diets for pigs and poultry without conventional ingredients (see report 4.1.1 of the EC-Revision project). This implies that non-organic inputs are no longer necessary. However, there are problems of availability for some organic ingredients, especially high quality protein sources, and in some regions and countries. The important question in relation to feed ingredients is at what level and how necessity for supplementation with external and non-organic inputs should be judged.
- According to the system approach and to the principles of open systems, the need for external and non-organic feed material is system-variant. Hence, it is the internal process within a system that defines its own input for operation.
- The primary regulation within systems is based upon mechanism monitoring information on deviations from the state to be maintained or the goal to be reached. These feedback mechanisms are the basis of purposeful behaviour of any open systems and should therefore be the starting point of any decisions in relation to the necessity of inputs.
- Observed problems with the quality of organic livestock products and problems in relation to animal health and welfare are expected to be primarily related to the absence of effective feed back mechanisms.
- In order to effectively evaluate the need for external inputs in organic systems it is necessary to establish the level of reference for the evaluation. The following reference levels can be identified in relation to external and non-organic feed inputs:
 - individual animals;
 - total herd of farm animals;
 - the whole farm system;
 - the regional level;
 - the EU level.
- There is a need to differentiate between following categories of external feed inputs that can be used on an organic farm for which different conditions for use are specified and that carry different risks to the integrity of organic production:

- Organic feed materials from plant and animal origin and by-products of organic processing (max 50% of feed intake);
 - Non-organic basic feed materials from plant and animal origin and non-organic industrial by-products (Annex II C 1 & 2);
 - Non-organic feed materials from mineral origin and feed additives (Annex II C 3 and Annex II D).
- Feed material from mineral origin (Annex II C3) and feed additives (listed in Annex II D) are commonly of non-organic origin and both are used in relatively small amounts. In the case of feed material from mineral origin and feed additives the only decision required is whether or not a non-organic substances should be allowed on the EU level for the general use of all farms that produce according to the EU Regulation, i.e. whether a substances is included in the positive lists.
 - Basic feed material from plant and animal origin are primarily produced on farms and can be available both in organic and non-organic form. The requirements for external or non-organic feed material from plant and animal origin depends on the total herd of farm animals, the specific farm system and on regional availability of organic feed material. Whether diets on the farm meet the species specific requirements of the farm animals in the various stages and do not compromise animal health and welfare can be evaluated only on the level of individual animals or the herd. The availability of farm feed materials is farm specific. Whether the need for external feed material can be covered by organic feed material produced within a the region or whether there is need for non-organic feed material can be decided only on the regional level.
 - The criteria ‘necessity to use non-organic feed inputs’, ‘impact on animal health and welfare’ and ‘impact on the environment’ are related to availability and to balance of supply and demand of feed materials. To realise the principle ‘to use as few external and non-organic inputs as possible and as many as necessary’ these criteria should be decided at the lowest possible systems level.
 - To assess the necessity for supplementation with Annex II C (1 & 2) feed materials on any organic livestock farm it is necessary to calculate the feed value of the feed rations considering stages of development and performance level.
 - Based on the farm gate feed balance sheets each farm needs to develop strategies that improve the efficiency in the use of home-grown feedstuffs and that prevent imbalances that may cause harm to the animals and/or to the environment.
 - In general, the risk of diseases and welfare problems due to suboptimal nutrient supply occur mainly in the animal’s first weeks of life and can be handled by a proper management. Organic farming can offer clear advantages for animal health and welfare by setting limits to the intensification process of animal production, in particular by limiting growth rates. As the availability of limiting AA is the most relevant precondition for a high protein accretion, the limitation in the availability of high protein feed seems to be a suitable tool to restrict intensification and related undesirable side effects for animal health and welfare.

- In the last 3 years the EU has produced sufficient cereals to feed all stock with 100% organic diets. Currently, there seem to be deficits with regard to the supply of pulses, (relevant data uncertainty). Derogations have possibly prevented increases in the production of organic pulses in the EU, as obviously organic arable land is available to a sufficient extend.
- There is need for studies to assess the availability of organic feedstuffs (esp. cereals and pulses) in relation to different regions and countries of the EU.
- Further research is needed to assess the availability of and requirements for vitamins under the condition of organic farming.
- Finally, it is likely that through implementing the system approach and the feed back mechanism the need for using non-organic feed materials can be substantially reduced, and the need for specific derogations might be superfluous.

10 Recommendations

1) We recommend that the current derogations for the use of non-organic feed material should not be extended beyond 2011. The conditions for flexibility envisaged in Art 16 cover most events under which we consider the use of non-organic feed ingredients might be necessary in future. However, we would like to recommend that the special consideration should be given to the feeding of monogastric young-stock in the first weeks of life and that this should be mentioned in Article 16 (e).

It is possible to avoid feed and protein sources of non-organic origin in the production of organic poultry and pigs without compromising animal health and welfare. Any future less restrictive application of the obligation to use only organic feed materials should be restricted to the young stock of pigs and poultry in the first weeks of live, to proven lack of availability of suitable organic feed materials in certain regions and to emergencies.

Strictly limited flexibility in relation to the use of non-organic feed would strengthen the distinction between organic and conventional livestock production, and aid the development of the separate market for organic feed as well as food.

2) We recommend that the land –based character of organic stock farming should be included as a principle of organic farming in Article 5.

The land based character of organic livestock production (as stated in Annex IB, 1.4) has high relevance to the feeding of organic livestock and is directly related to several of the objectives of organic farming stated in Article 3:

- To '*minimise impact on the environment*' for example through nutrient oversupply available for leaching into the environment.
- To '*preserving natural resources*' through the balancing of crops and livestock with impact for feeding
- To '*respect for animal welfare*' through providing access to pasture and therefore freedom to natural feeding behaviour.

We believe this is an important principle of organic farming that should be stated clearly in Article 5.

3) We recommend that the principle 'to use as few inputs a possible and as many as necessary' is also stated as a general criteria for the approval of inputs in Article 11.

The principle 'to use as few external and non-organic inputs as possible and as many as necessary' is an overall principle of organic production. It should be clearly identifiable in the new regulation in relation to input use and to input approval. In relation to farming the point is addressed to some extent in Article 5 c) '*minimise the use of non-renewable resources and off-farm inputs*', but we feel this should be stated also as one important criterion for the approval of inputs.

4) We recommend that the requirement for farm-gate feed balance sheets should be integrated into the organic certification process and become part of the regular inspection

Farm gate feed balance sheets would provide regular monitoring of the balance between supply and demand for feed materials, act as a feed-back mechanism and thereby strengthen the self-regulation in the organic farming system. Farm-gate feed balances would further allow the monitoring of:

- the percentages of on-farm feed resources (in line with in Article 5f)
- risk to the environment from nutrient pollution (in line with Article 5a).

They would also provide some assessment of the necessity of certain non-organic feed inputs on a particular holding (for example as envisaged under farm specific flexibility in Article 16b). This measure is also expected to strengthen the confidence of the consumers in organic products. The project will develop a procedure to assist certification bodies in the implementation of farm-gate feed balance sheets.

5) We recommend that the balance between supply of and demand for organic feed materials should also be monitored regularly on a regional and on the EU level of organic production.

With the greater availability of statistical data for individual crops and livestock categories the regularly monitor availability of organic feed at regional and also at European level will become possible. This should enable future decision about necessity of non-organic inputs under Article 16 to become more transparent.

6) We recommend that in Article 11 feed material from mineral origin (currently listed under Annex II C 3 of 2092/91) should be mentioned together with the category of feed additives (Annex II D of 2092/91).

Unlike basic feed materials from plant and animal origin, these substances are not available from organic production and therefore mainly of non-organic origin. Requirements for their use and criteria for their evaluation are very identical to feed additives and they should therefore be included in the same positive list.

7) We recommend that the following criteria in relation to non-organic feed materials are included in Article 11.

- c) Non-organic feed materials previously Annex II C 1 & 2) can only be used if
 - xii) they are necessary to maintain animal health and welfare in a appropriate diet fulfilling the physiological and behavioural needs of the species concerned on a particular farm in a certain stage of life; and
 - xiii) are of plant or animal (only milk and milk products, egg, or fish origin
 - xiv) similar organic feed materials are not available within acceptable distance; and
 - xv) they do not encourage high growth rates with negative impact for animal health and welfare; and
 - xvi) they meet the criteria specified under b).
- d) Non-organic mineral feed materials and feed additives can only be used if they:
 - xvii) are permitted according to national legislation on animal feeding,
 - xviii) are primarily of natural plant, animal or mineral origin;
 - xix) are produced or prepared without the use of hexane or other chemical solvents or chemical treatment;
 - xx) do not contain genetically engineered/modified organisms and products thereof;
 - xxi) do not contain synthetic nitrogen or non-protein nitrogen compounds
 - xxii) do not contain antibiotics, coccidiostatics, medicinal substances, growth promoters, hormones or any other substance intended to stimulate growth or production;

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