

## Chapter 7

# Adequacy of the production rules

### 7.1 Introduction

#### Evaluation Question 2

*To what extent have the organic production rules been adequate to achieve the global objectives of the Regulation and the general objectives of organic production, as laid down in the Regulation?*

*In answering this question the following aspects need to be examined in particular:*

- *General structure and scope of the organic production rules with respect to promoting a harmonised concept of organic production in the EU.*
- *Adequacy of production rules for plants, livestock, feed and processed food, including their consistency across the sectors covered.*
- *Adequacy and justification of exceptional production rules, particularly on the use of non-organic young poultry, the use of non-organic feed, the use of non-organic seeds and the role of the seed database.*
- *Adequacy and justification of the transitional measures concerning animal housing conditions.*
- *Adequacy of the general rule on prohibition of the use of GMOs to ensure the lowest possible adventitious presence of GMOs in organic products and, at the same time, to avoid undue constraints and additional burden on organic operators.*

Organic production is an integrated farm management system which aims to preserve natural resources, apply high animal welfare standards and produce high quality food. The underlying principles of organic production are made operational by a number of production rules, which provide the legal definition of organic farming in Europe. The production rules provide a basis for achieving the aims of organic agriculture and the global objectives of the Regulation of ensuring consumer confidence and fair competition. However, the extent to which the production rules contribute to these objectives is open to question. In this context, it is worth mentioning that some organic operators in the EU work to private standards which are stricter than the EU rules in certain areas, and while assessing the impact of the rules it is not always possible to clearly differentiate between these private standards and the EU rules.

After a short description of the approach, results are presented in relation to the structure and scope of the production rules, promoting a harmonised perception of the concept of organic farming, establishing a sustainable management system, meeting the consumer related aims of the Regulation, justification for exceptional and transitional production rules, adequacy and consequences of the GMO (genetically modified organism) prohibition, impact on fair competition and consistency of the rules across all sectors. The final section presents the judgement in response to the evaluation question.

## 7.2 Approach

The answer to Evaluation Question 2 is based on several judgement criteria which were deduced from the model of intervention logic and from the background of the evaluation question. Because of the extended number of production rules, sectors and Members States, the application of the Regulation is not described exhaustively, but examples are used to support the arguments. The main data sources and indicators used for the analysis involved an in depth look at the regulatory rules and implementation rules in the 13 case study countries. Consensus in the scientific literature, results from other relevant EU-funded research projects as well as stakeholder/expert opinions on the subject and the results of a consumer survey (3 000 respondents in six of case study countries) were also taken into consideration. In the following, the judgement criteria for the second evaluation question are shortly described:

**(1) The general structure and scope of organic production rules has (or has not) promoted a harmonised concept of organic production in the EU**

The general structure and scope of organic production rules can only promote a harmonised concept of organic production, if they are implemented uniformly in national law and if Member States are not applying a large number of additional rules not covered by the scope of the Regulation. This was explored based on an analysis of the provisions in the Regulations (EC) 834/2007 and (EC) 889/2008 and its implementation in national law.

A common understanding of organic farming across the EU can be facilitated by the objectives and principles of organic farming as laid down in Article 3 – 7. In order to evaluate whether this has been achieved, references to them in national regulations and private reference standards as well as the perception of stakeholders were used.

**(2) The production rules are (or are not) adequate to establish a sustainable management system of agriculture**

As outlined in Chapter 1, the definition of a sustainable management system in the Regulation does not provide a useable concept to evaluate the adequacy of the production rules. For this evaluation, the adequacy was assessed mainly based on the analysis of findings in relevant scientific literature (comparing organic with conventional farming and thus using conventional farming practices as a reference) and examples of implementation in the 13 case study countries.

(3) **The rules are (or are not) adequate for providing varied and high quality products and satisfying consumer demand for a variety of goods**

Similarly to the second criteria, the adequacy of the rules in providing varied and high quality products and satisfying consumer demand for a variety of goods produced by the use of processes that do not harm the environment, human, animal or plant health was analysed based on evidence in the scientific literature, stakeholder views on the implementation and responses to the consumer survey.

(4) **The exceptional rules for the use of non-organic seed, feed and young poultry as well as for transitional measures regarding animal housing are (or are not) justified adequately**

The aim of the exceptional rules is to allow the organic farming sector a transition towards harmonised provisions. Against this background, the evaluation of the adequacy of the justification of the exceptional rules considered the use of exceptions and the availability of organic supplies in the case study countries; and actions still needed or already taken to phase out exceptional rules. Where data were not available, expert judgement was used. A similar approach was used to evaluate the adequacy of the justification for the transitional measures regarding animal housing.

(5) **The rules are (or are not) adequate to exclude the use of GMOs and limit it to adventitious or technically unavoidable presence**

The adequacy of the rules to exclude the use of GMOs and limit it to adventitious (happening by chance rather than by design or as an integral part) or technically unavoidable presence was evaluated based on data of contamination cases in the case study countries, additional restrictions in private provision and other factors (including co-existence measures) and stakeholder views regarding the additional burden arising from those rules.

(6) **The production rules are (or are not) adequate to ensure a fair competition**

Fair competition requires a level playing field for organic operators. This could potentially be impaired a) due to different interpretations of the Regulation (because of lack of clarity or because of issues left to the discretion of the competent authority) and specific national/regional rules or b) due to the harmonised standard not allowing national/regional flexibility (albeit in line with the general concept of organic farming) in response to different climatic or geographic conditions. These aspects were analysed by exploring the impact of examples of distortions (alterations of fair competition) using expert estimates, as well as stakeholder opinions.

(7) **There is (or is not) consistency between the rules for different sectors**

The EU legislation provides a legal framework for different livestock and crop sectors. The consistency of the rules for the different sectors was judged based on documentary analysis of the Regulations (EC) 834/2007 and (EC) 889/2008 and stakeholder views.

## 7.3 Results

### 7.3.1 Promoting a harmonised concept of organic farming

In the following, the structure and scope of the production rules of the Regulation and its implementation in national law is explored. The subsequent section deals with the question of whether the objectives and principles of organic production as laid down in Article 3 – 7 have led to a common understanding of organic farming.

#### 7.3.1.1 Structure and scope of the production rules

##### *Findings from the analysis of provisions*

The legal framework for the production rules is set out by Council Regulation (EC) 834/2007 and Commission Regulation (EC) 889/2008 (see also Chapter 3). The Council Regulation states objectives and principles of organic agriculture (Article 3 and 4), and more specific principles (Article 5-7) and rules for the respective sectors (Article 8-22); details are contained in the Commission Regulation. The link between the main rules and more detailed provisions for implementation in the Commission Regulation is illustrated in Table 7.1.

**Table 7.1:** Link between the production rules in Regulation (EC) 834/2007 and related provisions in Regulation (EC) 889/2008

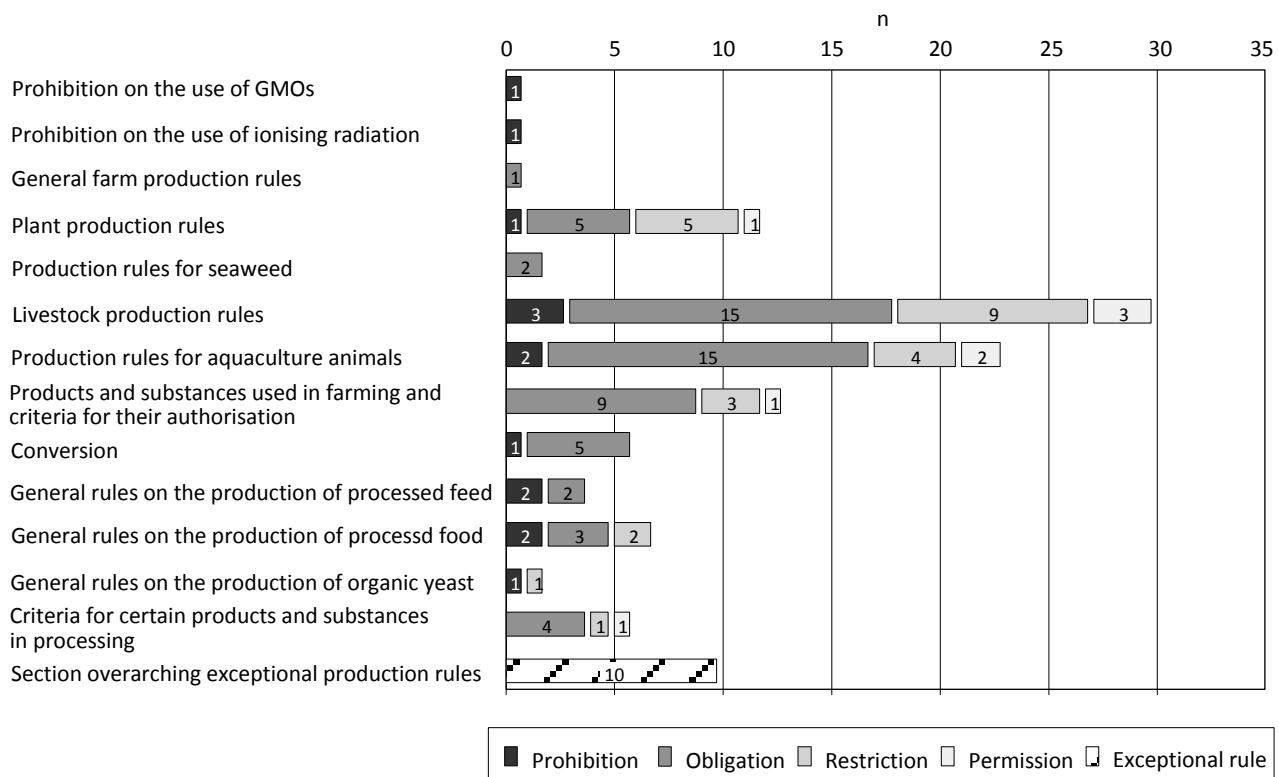
Council Regulation (EC) 834/2007		Commission Regulation (EC) 889/2008
Heading	Article No	Article No
Scope	1	1, 6(a), 7, 25, 59, 95(5)
General production rules	8-10	-
General farm production rules	11	Annex IV
Plant production rules	12	3-6, 48-56 (Seed database), Annex I, II, X
Production rules seaweed	13	6(a) - 6(e), 29(a), 36(a)
Livestock production rules	14	7-25, Annex III, IV, V, VII
Production rules for aquaculture animals	15	25(a)-(t), 38(a), Annex V, VI, VII
Products and substances used and criteria for their authorisation	16	3(1), 5 (1), 6(d)
Conversion	17	36-38, 38, 62
Production of processed feed	18	20-22, 26, 59-60, Annex V &VI
Production of processed food	19	26-29, 29(a) [wine], 30-35, Annex VIII, IX
General rules for production of organic yeast	20	27(a), Annex VIII
Criteria for inputs processing	21	22(g), 24(2), 25(m), 27 (1)(a), 27(a), 28, 29(c)
Flexibility	22	39-56

Source: Regulation (EC) 834/2007 and Regulation (EC) 889/2008.

The EU production rules cover agricultural products (food and feed), seeds and vegetative propagating materials, yeast (for food and feed) and products from aquaculture (Article 1 of Regulation (EC) 834/2007). This scope is further detailed in several articles of Regulation (EC) 889/2008: Articles 1 and 7 for livestock species; Article 6(a) for seaweed; Article 25(a) for aquaculture species; Article 59 for feed products and Article 95(5) for pet food.<sup>1</sup>

Sections of the production rules in Regulation (EC) 834/2007 vary in the number and type of rules (Figure 7.1). The livestock production rules are most detailed, followed by aquaculture. The Council Regulation also contains specific sections on seaweed production/collection, whereas wild collection of plants and mushroom production are only regulated in the Commission Regulation (EC) 889/2008 and not mentioned in the scope. The Council Regulation also contains specific provisions for the production of organic yeast but not for other microorganisms (e.g. algae).

**Figure 7.1:** Number and categorisation of production rules for different sectors in Regulation (EC) 834/2007



Source: Own presentation based on classification of rules in Regulation (EC) 834/2007.

<sup>1</sup> The situation regarding pet food is unclear, as this is not considered as feed in the sense of Regulation (EC) 834/2007, but is referred to in Regulation (EC) 889/2008 (Article 95(5)).

All Member States have implemented the existing EU legislation on organic farming in national law, with Bulgaria having done so very recently. In addition, some Member States apply their own rules for agricultural products not covered by the implementing rules (such as certain animal species, other aquatic plants, and micro-algae, e.g. spirulina). The following additional provisions were identified in national legislation in the 13 case study countries. Pet food is regulated at a national level in four countries (Austria, Denmark, France, and the Netherlands). Other provisions in several Member States refer to specific livestock species: rabbits (Austria, Czech Republic, Estonia, France, Italy, Slovenia); deer (Austria, Denmark, Slovenia); ostriches (France, Italy) and heliculture (production of snails for food) (France, Spain). Further species are only listed in one country: mouflon (Slovenia) and nutria/quail (Estonia).

### 7.3.1.2 Creating a common understanding of organic agriculture through the defined objective and principles of organic production

#### *Findings from the analysis of provisions*

In most case study countries, **national organic farming legislation or guidelines** refer in full to the EU Council Regulation. Specific reference to some, but not necessarily all aspects of the objectives and principles of the organic farming legislation were found in Austria, Denmark, Spain, France, the Netherlands, Poland, and in the United Kingdom implementation guidelines. Principles in **private reference standards** reflect the specific traditions from which the standard develops. For example, the standards of Bio-Austria (Austria) refer to the living, healthy soil as the precondition for healthy plants, animals and human food (humans) as the central point of all rules. Similarly, Bioland (Germany) standards emphasise the importance of a closed organic system. Several private standards also cover additional areas to the Regulation, for example Bioland and Naturland (Germany), Demeter (in several countries), AIAB (Italy), Nature et Progrès and the Soil Association (United Kingdom) refer to social objectives and principles and CAAE (Spain) to rural development goals. Bioland (Germany) and Bio-Austria (Austria) refer to the Animal Needs Index (ANI), which they required to be used to monitor and assess animal health and welfare. The standards of Nature et Progrès (France) favour local production and emphasise that economic, social and environmental aspects are important.

#### *Views of stakeholders*

When asked about a common understanding of organic agriculture, the majority of interviewed stakeholders (across all case study countries and affiliations) in the first instance agreed that there is a common understanding of the objectives and principles in Europe, and that stating them as part of the Regulation is an important way to create this common understanding. However, many answered 'yes, but...', adding several examples of different interpretations of the rules in different EU Member States and by different control bodies (e.g. regarding crop protection agents, fertilisers, limits and thresholds for pesticides/fungicides, grazing requirements, breeds for pigs and poultry and additives in food processing). Interviewees across

all sectors commented on a lack of detail in the Regulation with regard to environmental impact and animal welfare, and felt that the objectives and principles apply mainly to primary production but not to the whole supply chain (e.g. processing, distribution, retail). Stakeholders also commented on the absence of criteria for social and economic sustainability as well as on contradictions between statements in the objectives and principles and the actual rules; e.g. animal welfare aims contrasting with routinely carried out practices of mutilation such as dehorning or tail docking.

Despite general agreement with the overall statement as discussed above, opinions on a common understanding vary in different sectors and Member States. Interviewees in Denmark felt that a common understanding exists for organic milk production but less so in other sectors like organic poultry or pigs. In the case of egg production, interviewees in France and Austria refer to a regional or North-South divide, with regard to free-range access and housing systems. A majority of stakeholders involved in processing felt that a common understanding exists, but some saw the Regulation as weak in sustainability issues like water and energy use; whereas others found the limitations on input-use too strict. There was greater agreement that a common understanding has been achieved in Denmark, Germany and the Czech Republic, whereas stakeholder opinions in France, Italy, Spain, and the Netherlands tended to be more divided; in France and Spain a consistent confusion among consumers regarding organic products was mentioned.

Too wide margins for interpretation were repeatedly emphasised in most countries, especially so in France, Spain, Italy, Denmark, Estonia, Austria and the United Kingdom. Some differences between types of respondents were found. Organisations that work more directly with the Regulation, such as competent authorities and control bodies share the view that a common understanding has been achieved. They confirmed the role of objectives and principles for creating a common understanding of organic farming. Responses indicate however that control bodies are uncertain whether they are legally enforceable or not. In contrast to competent authorities and control bodies, the majority of business groups (e.g. producers, traders, and retailers) do not agree that a common understanding has been achieved.

### 7.3.2 Establishing a sustainable management system of agriculture

This section presents the results related to the adequacy of production rules to achieve the objectives of organic production to establish a sustainable management system of agriculture. Article 3 of Regulation (EC) 834/2007 specifies that this should be achieved by:

- respecting nature's systems and cycles and sustains and enhances the health of soil, water, plants and animals and the balance between them;
- contributing to a high level of biological diversity;

- making responsible use of energy and the natural resources, such as water, soil, organic matter and air; and
- respecting high animal welfare standards and in particular meets animals' species-specific behavioural needs.

**Table 7.2:** Production rules and organic objectives and principles

Production rules Article numbers refer to Council Regulation (EC) 834/2007 [A] and Commission Regulation (EC) 889/2008 [B]	Respect natures systems/ cycles	Contribute to bio- diversity	Make responsible use of natural resources			
			Energy	Water	Soil	Air & climate
<b>Prohibitions [A: 4 (a) iii and (c)]</b>						
No mineral nitrogen fertilisers [A: 12.1 (e)]	✓	✓	✓	✓	✓	✓
No herbicides, only authorised products can be used [A: 12 (h), B: Annex II]	✓	✓	✓	✓	✓	✓
No landless livestock production [B: 16]	✓		✓			✓
No hydroponic production [B: 4]	✓			✓	✓	
No use of GMOs [A: 9]	✓					
<b>Strict control of external inputs [A: 4 (b)], minimisation of the use of non-renewable resources [A: 5 (b)] and recycling of wastes and by-products [A: 5 (c)]</b>						
Only permitted fertilisers : low-soluble mineral fertiliser [A: 4 (b) iii] and soil conditioners when need proven [B: 3, Annex I]	✓	✓				✓
Only authorised plant protection products when established threat [A: 12.1 (h), B: Annex II]	✓	✓			✓	✓
Feed primarily from holding or same region (with exceptions) [A: 14.1 (d)]	✓		✓			
Stocking density and use of livestock manure restricted to maximum of 170 kg N/ha and year [B: 3 &15.1]	✓	✓	✓	✓	✓	✓
<b>Obligations to use good husbandry practises and prevention [A: 4 (a) iv and 5)</b>						
Multiannual crop rotation including legumes and other green manures [A: 12.1 (b)]	✓	✓	✓	✓	✓	
Tillage and cultivation practices that maintains organic matter, and protects soil [A: 12.1 (a)]	✓	✓	✓	✓	✓	
Maintain crop health through prevention (natural enemies, the choice of species and varieties, crop rotation) cultivation techniques and thermal processes [A: 12.1 (g)]	✓	✓	✓		✓	
Number of livestock limited to minimise overgrazing, poaching, soil erosion or pollution [A: 14.1 (b) iv]	✓	✓		✓	✓	✓
<b>Preference for inputs from organic origin (Art 4b with exceptions (Art 4d))</b>						
Manage entire holding organically (with exceptions) [A: 11]	✓	✓	✓	✓	✓	✓
Only organic seed (with exceptions) [A: 12.1]	✓					
Only organic feed (with 5 % exceptional rule for monogastrics) [A: 14 (d) ii]	✓					

Source: Own analysis based on the Regulations (EC) 834/2007 and (EC) 889/2008 and scientific literature.

A number of rules from the Council Regulation (EC) 834/2007 and the Commission Regulation (EC) 889/2008 have possible (direct and indirect) positive impacts in relation to several of these objectives. These rules are listed in Table 7.2. Detailed evidence regarding the effectiveness of the production rules, as reported in the scientific literature and by stakeholders, is provided in the following sections.

### 7.3.2.1 Respecting nature's systems and cycles

#### *Findings from the analysis of provisions*

Organic farming management relies as much as possible on natural processes and cycles. Thus, respecting both is a primary element of organic farming<sup>2</sup> and is reflected in a number of production rules. There are however three specific issues, raised in the case studies and widely discussed in the Member States, which are not evenly or consistently implemented in the different Member States, and as a result are limiting the positive impact of the Regulation on promoting the respect for natures' systems and cycles. These are:

- **Significant gap in the ‘link to the land (land-based livestock)’ rule:** the share of feed that must come from the farm itself is set at a minimum of at least 60 % for herbivores and 20 % for pigs and poultry (Article 19 of Regulation (EC) 889/2008). In cases where this is not possible, the Regulation requires the feed to be produced “*in co-operation with other organic farms primarily in the same region*”. This is widely interpreted as meaning that 40 % and 80 % of the feed stuff respectively can come from anywhere. In particular, the interpretation of the word ‘region’ varies from being defined as NUTS 2 to EU, or even world level depending on the Member State.<sup>3</sup> In the cases where the definition is EU/world, there is effectively no link to the land at all of the feed stuff. Therefore the Regulation does not prevent organic livestock from developing independently from crop production, even if this is not the case on most farms. Quantitative data on the number of landless organic farms or the current share

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<sup>2</sup> According to Article 5 of Regulation (EC) 834/2007 organic farming shall be based – in addition to the overall principles – among others on the following specific principles:

- a) the maintenance and enhancement of soil life and natural soil fertility, soil stability and soil biodiversity preventing and combating soil compaction and soil erosion, and the nourishing of plants primarily through the soil ecosystem;
- b) the minimisation of the use of non-renewable resources and of farm inputs;
- c) the recycling of wastes and by-products of plant and animal origin as input in plant and livestock production;
- d) taking account of the local or regional ecological balance when taking production decisions;
- e) the maintenance of animal health by encouraging the natural immunological defence of the animal, as well as the selection of appropriate breeds and husbandry practices;
- f) the maintenance of plant health by preventative measures, such as the choice of appropriate species and varieties resistant to pests and diseases, appropriate crop rotations, mechanical and physical methods and the protection of natural enemies of pests;
- g) the practice of site-adapted and land-related livestock production.

<sup>3</sup> **NUTS 2:** France, Italy; **Whole country:** Slovenia, Poland, Estonia, Denmark; **Other:** Czech Republic, Germany; **EU/world:** Austria, Netherlands, Spain, Bulgaria, the United Kingdom.

of feedstuff produced at farm level is not available to assess the actual impact of the interpretation of this rule.

- **Authorisation of crop cultivation in substrate** (e.g. peat, compost, various peat alternatives and their mixtures): In certain countries crop production in substrate (e.g. in raised/demarcated beds) without direct connection to the soil is permitted.<sup>4</sup> This can be considered as not respecting nature's systems because it allows intensive production in greenhouses (for example, the use of soluble, organic fertilisers through irrigation).
- **No common definition or minimum requirements regarding crop rotation:** There is a lack of any specific criteria with which the crop rotation should comply, apart from stating that it should be multi-annual and should include legumes (Article 12(1)). Therefore the actual practices depend on the farmers' individual choice (based on agronomic and economic constraints and aims) and the interpretation of control bodies. In extreme cases, this can lead to very intensive rotations, such as soya/soya/wheat as seen in Southern France; or monocultures of vegetables, such as tomatoes as a main crop every year in greenhouse production. A few private standards have additional requirements: 20 % legumes in arable crop rotations as main crops to maintain a stable humus-content (Naturland, Germany or Bio Austria, Austria).

#### *Scientific evidence*

Bound to strict rules regarding nutrient cycling and restricted use of input, organic agriculture guides farmers to establish agro-ecosystem management and other progressive management practices, and thus implements a system approach to farming (Lampkin, 1990, Niggli et al., 2008). This system approach can induce synergistic environmental effects. Indeed, several authors found that the pest control measures used in organic farming significantly support the provision of ecosystem services (Crowder et al., 2010; Krauss et al., 2011; Zehnder et al., 2007) including pollination (Holzschuh et al., 2008). The promotion of high nature value elements on farms like hedgerows, beetle banks and habitats for other beneficial insects in grass or wildflower strips along field margins becomes ecologically and agronomically much more attractive in combination with a ban on pesticides (Niggli et al., 2008).

### 7.3.2.2 Contributing to high levels of biological diversity

#### *Findings from the analysis of provisions*

The Regulation aims to contribute to high levels of biodiversity (Article 3(a)) but does not elaborate further in the form of a specific set of rules. However, Article 12 of Regulation (EC)

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<sup>4</sup> Denmark (as long as the substrates are comparable to organic soil and premixed substrate contain only peat, clay, stone meal, lime, organic soil or organic produced manure), Sweden (minimum volumes of substrates per plant), Italy and Spain.

834/2007 additionally mentions that organic production shall use cultivation practices that enhance soil biodiversity. Although such practices are not clearly defined, the Regulation provides a list of rules that may indirectly protect or contribute to high levels of biological diversity (see Table 7.2).

### *Scientific evidence*

There is an abundance of scientific evidence on the positive impact of organic production on biodiversity. Many studies have concluded that holdings using fewer inputs play a very important role in preserving biodiversity (The Soil Association, 2000; Bengtsson et al., 2005; Hole et al., 2005, Smith et al., 2011). This is especially the case on organic holdings that combine cultivation of a wide variety of crops, complexity of landscapes and reduced environmental disruption. Bengtsson et al. (2005) analysed 63 studies and concluded that the species diversity is on average 30 % higher on organic than on conventional land. Of the studies analysed by Bengtsson, 84 % found a positive impact of organic farming on the species richness, whereas 16 % did not. Fuller et al. (2005) showed that organic fields can support 68-105 % more plant species, and 74-153 % greater abundance, compared with conventional fields. Roschewitz et al. (2005) concluded that, as organic systems are characterised by diverse seed banks, organic fields could be viewed as self-sufficient ecosystems for plants, therefore not relying on immigration from surrounding habitats to maintain species pools.

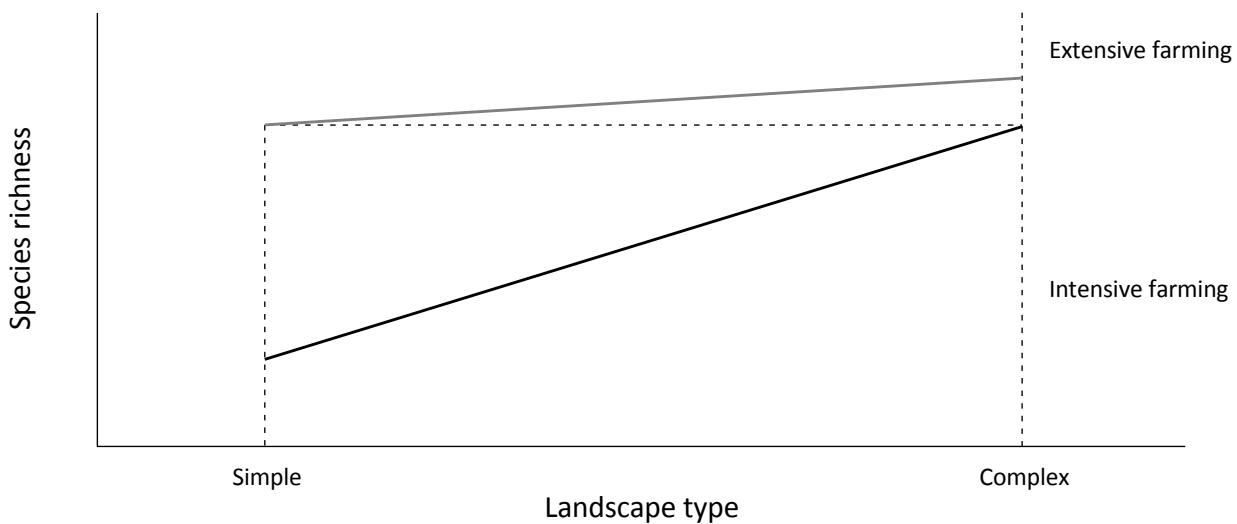
Looking in more detail, organic farming practices are beneficial for some species of birds. Kragten et al. (2008a, 2008b) found the home range density of skylarks and vulnerable lapwings on organic farms to be three times that on conventional farms. Gabriel et al. (2010) recorded higher overall bird diversity on conventional farms, but generalist species and members of the crow family were found in higher densities on organic farms. On organic arable land, the floral diversity (Gabriel et al., 2006; Gabriel et al., 2007) and the diversity of predatory insects (Pfiffner und Luka, 2003) is higher than on conventional arable land. Boutin et al. (2008) identified higher species richness in semi-natural habitats on organic farms compared with conventional farms. The differences in the biodiversity performance between organic and conventional farming systems are more pronounced on arable land than on grassland (Niggli et al., 2008). There is evidence that organic farms can extend their biodiversity benefits beyond the farm boundary into surrounding landscapes and farms (e.g. Gabriel et al., 2010; Hodgson et al., 2010; Rundlöf et al., 2008). The species richness is, however, largely dependent on landscape type (Tscharntke et al., 2005) (see figure below). Whereas in simple landscapes (and mainly in arable cropping) the differences in species richness are mostly significant, in more complex landscapes, in particular when non-organic low-input farming systems are compared with more intensive organic farming systems, only few or no significant differences are found (Gomiero et al., 2011). Similar conclusions were reached in the recently finished EU-funded research project 'Bio-Bio'.<sup>5</sup>

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<sup>5</sup> See website: <http://www.biobio-indicator.org/scientific-publications.php>.

The prevalent high biodiversity generally found on organic farms significantly supports ecosystem services such as natural pest control (Crowder et al., 2010; Krauss et al., 2011; Zehnder et al., 2007) or pollination (Holzschuh et al., 2008). Ulber et al. (2009) observe that the increased plant diversity on organic farms arose from the complexity of the system including crop rotation, absence of herbicides and other synthetic pesticides. Concerning landscape diversity, organic farming may perform better because of more diverse crop rotations (Norton et al., 2009) and higher implementation rates of structural elements such as hedges and fruit trees (Schader et al., 2009). However, landscape effects are very farm and site specific. Therefore, no general trend can be determined (Steiner, 2006).

**Figure 7.2:** Compensation of local land-use intensity by landscape complexity



Source: Tscharntke et al. (2005).

The positive impacts of organic production on biodiversity assessed in the scientific studies (e.g. Bengtsson et al., 2005; Fuller et al., 2005; Hole et al., 2005; Smith et al., 2011a; Schader et al., 2012) derive from:

- directly related aspects from the Regulation: ban of synthetic mineral fertilisers, herbicides and chemical pesticides, use of organic fertilisation, lower stocking density, more diverse rotation; and
- general organic production practices partly required in private production standards or national regulations in non-EU countries: use of cover crops, use of legumes, less tillage, higher presence of semi-natural habitats in total UAA such as hedges, trees or grass strip corridors.

#### *Views of stakeholders*

Many interviewed stakeholders stated that they thought that organic farming generally contributes to a high level of biodiversity, but saw the lack of detail regarding the rules related to

biodiversity as a major shortcoming in the production rules, for example in relation to habitat management or species richness. Producer organisations and environmental NGOs for example argued that farmers, who would like to enhance biodiversity on their land through certain strategies or methods, cannot find any measures or instructions in the Regulation that would directly increase species richness (e.g. regulations regarding habitat management). Stakeholders from environmental NGOs and ministries for the environment also argue that the protection of biodiversity needs to be tied directly into the system of organic agriculture, and clear instructions and measures, as well as suggestions for impact monitoring indicators need to be included in the rules.

### 7.3.2.3 Making responsible use of energy and natural resources

#### Energy

##### *Findings from the analysis of provisions*

The Regulation does not provide explicit rules regarding the responsible use of energy. However, several rules have some possible direct or indirect impacts; particularly limiting the use of chemically synthesised inputs (e.g. N fertiliser) has a significant impact on energy consumption (see Table 7.2). Yet the Regulation does not include any direct provision on the use of fossil energy, transport, packaging, heating, energy saving measures, etc.

##### *Scientific evidence*

The energy use in agriculture essentially consists of direct consumption of fossil energy (e.g. fuel and oil) as well as indirect energy consumption resulting from the production of synthetic fertilisers and pesticides transport of imported feedstuffs and from investment goods such as buildings. Because of the very limited use of synthetic mineral fertilisers (in particular the ban on chemically synthesised nitrogen fertilisers) and pesticides (no use of chemically synthesised pesticides except pheromones and a few products for insect traps), several studies have shown that the energy consumption is lower in organic than in conventional farming (ITC-FiBL, 2007; Stolze et al., 2000; Lampkin, 2007). This is a positive side effect that can thus be attributed to the Regulation. Thomassen et al. (2008) found that the energy efficiency of organic milk production was significantly higher compared to conventional production. They concluded that the use of concentrate feed in particular is a major driver of energy inefficiency and its reduction has the potential for reducing energy use. Nemecek et al. (2005) demonstrated, on the basis of long-term field experiment data, a lower energy use per ha and per product unit overall in organic systems for all major crops in Switzerland. However, for certain crops (e.g. potatoes broccoli, lettuce), organic farming can sometimes offset the reduced usage of man-made chemical inputs by increased mechanical labour, increasing the amount of fuel used compared to conventional farming (Venkat, 2012; Williams et al., 2006; Pimentel et al., 1983). For potatoes, a slightly higher energy use was calculated per ton of organic potatoes (Nemecek et al., 2005). Williams et al. (2006) found higher energy use per kilogram of product within organic tomato production as a

result of reduced yields but similar levels of fossil-fuel inputs. Some other studies have shown that the positive impacts of organic farming resulting from the non-use of synthetic nitrogen/pesticides may be mitigated and might even be reversed, depending on the specific practices and crops involved (De Backer et al., 2009; Azeez and Hewlett, 2008; Gomiero et al., 2011). Therefore, for most crops the energy use, both land related or product-unit related is generally lower, with some exceptions like potatoes or tomatoes, where disease pressure in organic farming is high and organic yields relatively low. While milk and beef production is more efficient on organic farms, as a result of greater energy efficiency in forage production through the use of grass-clover leys, organic poultry production has been shown to have a slightly lower energy efficiency due to higher feed conversion ratios (Schader et al., 2012; Leinonen et al., 2012a, Leinonen et al., 2012b).

### *Views of stakeholders*

Answers to the web-based stakeholder survey refer to the fact that there are no requirements on responsible energy use and resource saving, such as the use of less packaging, waste management or energy efficient management of crop production in greenhouses. Some processors also mentioned the need to include and implement environmental (sustainability) management systems, better adapted to the organic food industry. This need is also reflected in the German research report by Beck et al. (2012). Stakeholders (across all categories) would like to see instructions and measures on the responsible use of energy in organic agriculture along the whole production chain, to improve the coherence of organic production.

## **Water (quality and quantity)**

### *Findings from the analysis of provisions*

Regarding water quality and limiting pollution, there are several direct and indirect effects in organic agriculture resulting from specifications in the rules (Table 7.2). Regarding water use, the Regulation does not provide any direct requirements except for aquaculture, but organic production uses potentially less water because of individual choices and cultivation practices.

### *Scientific evidence*

Thanks to the strict limitation of chemically synthesised inputs in plant production, organic farming significantly helps reduce residues of plant protection products and chemical fertilisers in water, thus improving **water quality** (Mahé and Portet, 2012). Rotations including legumes and green manures, the use of farmyard manure as fertiliser and the limitation of stocking densities and total amount of livestock manure reduce the input and availability of rapidly soluble nitrogen, and therefore reduce leaching of nitrates. Several studies show that nitrogen leaching can be reduced by 40–64 % through organic farming (e.g. Edwards et al., 1990; Younie and Watson, 1992; Eltun, 1995; Condron et al., 2000; Goulding, 2000; Haas et al., 2001; Kirchmann and Bergström, 2001; Mäder et al., 2002; Stopes et al., 2002; Auerswald et al., 2003; Pacini et al., 2003; Shepherd et al., 2003; Osterburg and Runge, 2007). Based on a statistical comparison of 12

studies, Mondelaers et al. (2009) conclude that the nitrate leaching rate is on average 9 kg/ha in organic production versus 21 kg/ha in conventional agriculture. Important differences are noted among the studies due to differences in soil, regions, fertilisation practices and measurement. In contrast to the results mentioned above, in some comparative crop rotation experiments nitrate leaching has been reported at the same levels in organic and conventional rotations (Korsaeth and Eltun, 2000), especially if calculated per kilogram of harvest (Mondelaers et al., 2009). Looking at the impact per kg output, Nemecek et al. (2005) found higher eutrophication impacts per output for some organic crops compared to conventional. In some places, these higher nutrient loads on arable land are attributed to the greater use of organic fertilisers in the organic system, because the life cycle assessments used by Nemecek et al. (2005) assume relatively high fertilisation rates for organic farms. Taking the data by Nemecek et al. (2005) and projecting them at sector level, using statistical data and an economic model, Schader (2009) found on average 35 % lower eutrophication rates on organic farms per hectare. The following facts underline the lower eutrophication potential of organic farming found in literature (Schader et al., 2012):

- Organic farming systems have lower nutrient application levels, which reduces the absolute quantity of nutrient loads that can be emitted from the system due to the ban of mineral nitrogen fertilisers, lower stocking rates and restrictions on the use of manure;
- The quantity of directly available nitrogen is much lower in organically managed soils;
- Because nutrients cannot be imported easily into the systems, the opportunity cost of nitrogen losses is higher for organic farms than for conventional farms (Stolze et al., 2000). This implies a need for more efficient nutrient management in organic systems, although this does not eliminate losses. In addition, nitrate leaching can be high at the point of transition from the fertility building phase of the rotation to the cropping phase.

In animal husbandry, outdoor production of pigs and poultry (not specifically organic but with access to pasture) increases the risk of nitrate losses, if excrements are concentrated in certain sectors and vegetation cover is allowed to deteriorate (Eriksen et al., 2002, 2006; Degré et al., 2007; Salomon et al., 2007; Halberg et al., 2010). Also for organic systems the report of the Expert Group for Technical Advice on Organic Production (EGTOP) on poultry pointed out that the minimum outside area for laying hens of 4 m<sup>2</sup> can sometimes lead to a pressure of nitrogen that exceeds 170 kg/ha/year (EGTOP, 2012). For herbivores, the maximum stocking density (related to the limit of 170 kg N/ha) is being implemented at the farm level, but higher stocking rates may occur on specific fields.

There could be a positive impact of organic production practices in relation to **water use**, partly related to production rules. For example, Stanhill (1990) and Lotter (2003) found that organic crops show higher ability to cope with drought than conventional ones, mainly because organic farming practices commonly increase and stabilise soil organic matter. More recently, a French study comparing 151 organic holdings to 281 conventional ones (Caplat, 2006) revealed that only 8 % of the organic areas were irrigated, whereas 33 % of conventional holdings used irrigation.

### *View of stakeholders*

A few stakeholders (primarily processors) mentioned that the issue of water-use and quality should be regulated in the Regulation, whereas the majority of interviewees did not mention this issue.

### **Soil and organic matter**

#### *Findings from the analysis of provisions*

There are certain sets of rules which have a direct, positive impact on soil and its organic matter content (Table 7.2 above). In particular, these include good soil management practices and mandatory rotations including legumes and other green manure crops, and organic fertilisation practices using only products listed in Annex I (especially manure and compost), which contribute to a high level of organic matter.

#### *Scientific evidence*

Organic agriculture encompasses a number of different activities within the system approach, which aim at increasing the organic matter content in the soil. Most important amongst these is the ban on mineral fertilisers, which necessitates meeting the nutrient demand of the crops with organic fertilisers (Mäder et al., 2002). Also, crop rotations that include short-term clover grass leys support the development of fertile soils (Pimentel et al., 2005). Extended crop rotations, incorporating grass-clover and forage legumes, the application of organic fertiliser (e.g. slurries and manure) and avoiding bare soils are all practices that have been shown to have the potential to prevent soil carbon losses and build soil carbon stocks (Freibauer et al., 2004; Smith et al., 2007; Lal, 2008; Smith et al., 2008; Diacono and Montemurro, 2011). These practices, although desirable, are not commonly found in modern agricultural systems, whereas they are a core element of organic production systems (Gattinger, 2012).

There is also clear scientific evidence that soils under organic management have higher biological activity, both in terms of species and general biomass. Results from the Swiss long-term trial show that organic soils contain 20 to 30 % more microbial biomass, 30 to 40 % more earthworms, 90 % more spiders (with high diversity) and 40 % more mycorrhizae (Mäder et al., 2002; Pfiffner and Luka, 2007, Fließbach et al., 2007). Moreover, the content of organic matter improves the soil characteristics. Tuomisto et al. (2012) found in their meta-analysis, a 7 % higher soil organic matter content on organic farms compared to conventional farms. Organic soils thus show improved water retention properties and allow the crops to cope better with drought. Investigation of five plots in Rutzendorf (Weinviertel Lower Austria) differing in soil quality as well as in fertilising methods (cover crops, compost, dung, conventional fertiliser), revealed a significant increase of saturated hydraulic conductivity in organic tilled soils compared to conventional tilled soils. Best effects were obtained with compost, followed by dung and green manure/cover crops (Loner, 2009). The positive effects of organic farming practices on soil structure results in beneficial effects on soil erosion (Siegrist et al., 1998; Shepherd et al., 2002).

Gattinger et al. (2012) carried out a meta-analysis of 74 pairwise comparisons of organic and non-organic farming systems, finding significantly higher soil organic carbon concentrations in soils under organic management.

#### *Views of stakeholders*

Regarding the protection and management of the soil, the views diverged slightly in different countries. Most interviewees across all affiliations and Member States, but particularly in the United Kingdom and Estonia, stated that soil protection and soil fertility management are at the core of organic production systems.

### **Air quality and greenhouse gas (GHG) emissions**

#### *Findings from the analysis of provisions*

There is no direct provision regarding the prevention of air pollution in the Regulation. However, some rules stated in the Regulation can have indirect effects on GHG emissions, e.g. the restrictive use of synthetic chemical inputs and on direct gaseous emissions from pesticides (see Table 7.2).

#### *Scientific evidence*

Air contamination risk by pesticide spray is minimal in organic farming due to the ban of synthetic pesticides (Stolze et al., 2000, Schader et al., 2012). Nevertheless, the application of powdered and fluid substances permitted by organic standards may cause a short-time impairment of air (Stolze et al., 2000).

The objectives of organic production in Article 3 of the Regulation (EC) 834/2007 only refer to the responsible use of air but do not directly mention the impact on climate. Because of the specific mentioning of climate change in the context of the Common Agricultural Policy (CAP) the following section also summarises studies that have investigated the greenhouse gas emissions in relation to organic agriculture.

Due to lower stocking rates, per hectare, organic farming generally performs better with respect to GHG emissions than conventional farming (Schader et al., 2012). Hörtenhuber et al. (2010, 2011) showed that, when considering deforestation due to growing feed concentrates for imports and including the effects of carbon sequestration, the carbon footprints per unit of product may be in favour of organic production for Austrian dairy systems. When considering the impact per unit of product, some studies have highlighted that increasing milk yield, through feeding increased amounts of concentrates can decrease greenhouse gas (GHG) emissions per kg of milk produced (Lovett et al., 2005; Lovett et al., 2006; Garwes, 2009; Zehetmeier et al., 2012). As milk production is estimated to be 20 % lower on organic dairy farms, it is assumed that methane emissions per kg milk will be higher (e.g. Piorr and Werner (1998) in Stolze et al. (2000)). However, Lampkin (2007) highlights that average yield per cow on organic dairy farms is typically

only about 10 % lower than conventional, and there is no significant difference in the meat output per animal, so this effect may be outweighed by other farm or sector level considerations, such as stocking rates and reliance on bought in feeds from off farm. Increased milk yields can also lead to a decrease in animal fertility and health leading to an increase in the overall replacement rate. Increases in herd size, due to a greater number of replacements/young stock on the farm, would result in greater emissions overall (Novak and Fiorelli, 2009). Others have suggested that increasing the roughage content of the diet will result in an increase in methane emissions under organic management (de Boer, 2003), but Cederberg and Mattson (2000) found that the nitrous oxide emissions associated with synthetic fertiliser manufacture more than offsets the greater amounts of methane released by organic dairy cattle.

In addition, organic farms try to maintain a closed production system as far as possible. Assessments of greenhouse gas emissions within beef and dairy production by Schader (2009) and Haas et al. (2001) found that this approach manifests through a reliance on home grown sources of feed for livestock. Lower emissions associated with concentrate feed have also been reported in comparisons of organic and conventional dairy production in Sweden, Denmark and the Netherlands (Cederberg and Mattsson, 2000; Jørgensen et al., 2005; Thomassen et al., 2008). Within an assessment of the environmental impacts of a 1996 'baseline' and a number of 100 % organic conversion scenarios in Denmark, Dalgaard et al. (2001) also found that domestically produced, organic grass/clover has less impact than conventional forage, due to a lack of fertiliser application, with the increased efficiency contributing to lower energy use, and associated emissions, per livestock unit.

A recent literature review also compared the total Global Warming Potential (GWP) of organic products, finding no significant differences overall between the greenhouse gas emissions resulting from the production of conventional and organic products (Knudsen et al., 2011).

Organic systems also avoid the N<sub>2</sub>O emissions associated with mineral nitrogen fertiliser, as the main source of N is biological nitrogen fixation, within the fertility building ley period of the crop rotation. Despite this, there are only a few studies available which compare N<sub>2</sub>O-emissions from organic and conventional farming systems. Chirinda et al. (2010) found no differences in N<sub>2</sub>O-emissions between farming systems. Flessa et al. (2002) and Sehy (2003) found lower N<sub>2</sub>O-emissions in organic farming systems per ha, and calculated N<sub>2</sub>O-emissions per output weight to be equal to Swiss non-organic farming systems. A Life Cycle Assessment by Nemecek et al. (2005) showed lower N<sub>2</sub>O-emissions in organic farming systems for both area and product output (36 or 18 % respectively) than conventional. Gattinger et al. (2010) conclude that organic farming systems have a lower N<sub>2</sub>O-emission potential than conventional farming systems, because in general, there is a linear relationship between N-Input und N<sub>2</sub>O release and in organic farming systems N-supply is up to 50 % lower than conventional. In summary, data uncertainty concerning N<sub>2</sub>O emissions from different fertilisers and from the soil does not allow general conclusions to be drawn on the impact of organic farming.

Since the performance of organic agriculture regarding CO<sub>2</sub> emissions is highly correlated to energy use, the same arguments apply as for the discussion of energy use in the section above. Unlike the energy use though, net emissions of CO<sub>2</sub> (i.e. gross emissions subtracted by the sequestration rate) need to be taken into account. There are indications that organic farming performs better regarding carbon sequestration due to the incorporation of fertility building grass-clover leys and the use of livestock manures within diverse crop rotations (Olesen et al., 2006; Niggli et al., 2009, Smith et al., 2011b). Several long-term trials from the United States, Germany, and Switzerland (Mäder et al., 2002) show that organic farming systems are able to sequester more carbon from the atmosphere than the best performing conventional counterparts. A meta-analysis of 74 studies conducted by Gattinger et al. (2012) confirms higher soil organic carbon concentrations and stocks in top soils under organic farming management compared to conventional. Flessa et al. (2012) argues however that differences in the sequestration potential need to be interpreted with caution, since they depend very much on the conventional management system. A particularly positive effect can be expected if conventional stockless systems are compared, while differences are rather small between organic and conventional farms both using farm manure as an important N-input.

There have been few direct comparisons of methane generation between organic and conventional production (Lampkin, 2007) although Stolze et al. (2000) point out that 80 % of organic farms will have ruminants, compared to 60 % of conventional farms. This could lead to higher CH<sub>4</sub> emissions from organic production overall, although the potential effect is reduced as the stocking density is generally lower in organic systems. The specifications within the Regulations for at least 60 % of the dry matter in daily rations of herbivores to consist of roughage, fresh or dried fodder, or silage has led some authors to conclude that a conversion to organic agriculture will result in higher levels of methane being emitted (de Boer, 2003). Although not specifically about organic farms, a study by DairyCo (2012) found that within a sample of 415 farms in England, Scotland and Wales, increased concentrate feed rates were associated with a higher carbon footprint per litre of milk, questioning these assumptions. Reliance on high cereal diets results in severe difficulties relating to health and longevity of herbivores, which are by their physiology more suited to diets high in roughage (Zollitsch et al., 2004). A high cereal diet would also result in milk and meat produced with concentrates grown on arable land with high inputs of nitrogen fertiliser (Niggli et al., 2009) and directly contributes to land-use change and deforestation overseas from the production of imported feed such as soya and maize (El-Hage Scialabba and Müller-Lindenlauf, 2010).

### 7.3.2.4 Respecting high animal welfare standards, in particular meeting animals' species-specific behavioural needs

#### *Findings from the analysis of provisions*

The Regulation provides very detailed rules in terms of animal health care, feeding and housing (Article 14 of Council Regulation (EC) 834/2007 and Article 7 to 25 of Regulation (EC) 889/2008).

Particularly relevant are specifications of housing design and indoor stocking rates (Article 14(e) with detailed implementing rules in Article 10 to 12 of Regulation (EC) 889/2008). These state that at least half of floor area should be solid floor (no slats), and ban the use of flat decks or cages for piglets and of cages for poultry. Some transitional and exceptional rules existing in Regulation (EC) 889/2008 are also directly linked to animal welfare, such as the allowing of tethering for small holdings. The exceptional rule requires regular exercise, access to bedded areas, good management and additional control visits, but it is not clear to what extent the control visits take the animal welfare outcomes into account. For exceptions related to housing conditions and stocking densities, farmers have to present a plan to the competent authority and control body showing how they will ensure compliance after this period of transition (until the end of 2013).

#### *Scientific evidence*

In the EU-funded research project EconWelfare, organic rules were compared with general animal welfare standards and private non-organic welfare standards for farm animals. The project concluded that animal welfare is already on a high level compared with the requirements of the general EU legislation (Ferrari et al., 2010). Schmid and Knutti (2009) compared the main added requirements of EU organic production rules with other welfare standards, and found differences related to the prohibition of certain housing systems (e.g. fully slatted floors for cattle) and improvements in existing ones (e.g. access to bedding). To develop organic standards to become more adequate to the highest welfare standards, Schmid and Knutti suggested to provide more indoor space for all species of animals and to include measures for transport and slaughter, which are almost entirely missing at present (*ibid*).

Focussing only on organic production rules and their impact on animal health and welfare, Rahmann and Godinho (2012) emphasised that some practices in organic animal husbandry are considered to demonstrate inadequate respect for animal welfare. Some of these practices are directly authorised in the Regulation (mainly under transitional or exceptional rules), such as the temporary tethering of cows. Other examples include the use of conventional breeds that are not robust enough and not adapted to organic farming conditions (e.g. hybrid poultry bred for intensive systems), high mortality rates of piglets, meat quality problems due to non-appropriate feeding, killing of male chicks in poultry flocks due to the lack of multi-purpose lines, large poultry flocks leading to difficulties in ensuring sufficient and adequate outdoor runs, short life expectancy of organic dairy cows in some countries, and high reliance of the milk production on concentrate feeds (cereal and soya) instead of having a strong roughage basis.

Hovi et al. (2003) carried out a detailed assessment of animal welfare in organic farming in the United Kingdom under the previous regulation, but some findings are still relevant. The report concluded that standards can have both positive and negative impact on welfare; training and advice and health planning appear to be the most promising way to promote welfare and there is a need to ensure consistent enforcement of existing standards through certification.

Some other studies investigating health and welfare on different types of farms used a range of indicators. For example, Kilbride et al. (2012) concluded that enterprises participating in organic or farm assurance inspections were more likely to comply with welfare legislation in animal health inspections and that such membership could be included in the risk-based selection of farms for inspection. In contrast, in a study of 40 organic paired with 40 non-organic farms for housing type and herd size, Langford et al. (2008) found no significant differences in building dimensions and in other aspects of cow housing and health between conventional and organic. Referring to the same study of 80 paired dairy farms, Rutherford et al. (2008) found lameness to be less prevalent on organic farms and Haskell et al. (2009) found no difference in somatic cell counts of dairy cows. Similarly, Fall et al. (2009) and Müller et al. (2010) found no difference in udder health in paired farm studies in Sweden and Germany respectively. Ermakov (2012) found no indication of a better health status of organic turkeys, based on a comparison meat inspection data of organic and conventional carcasses in one German slaughter house between 2004 and 2009. No other studies that directly compare health or welfare for other species could be identified.

#### *View of stakeholders*

Generally, interviewed stakeholders think that the production rules allow the achievement of animal welfare in organic livestock production through the mandatory access to open-air areas, the use of organic feed and the rules concerning maximum stocking density. At the same time, they recommend to develop specific provisions to strengthen the animal husbandry guidelines (choice of species, animal flock size, minimum time spent on pasture, transport and slaughter conditions). Stakeholders from Austria and Germany commented on the absence of an appropriate animal welfare assessment system. Many interviewees considered the authorisation of cattle dehorning and tethering as non-compliant with animal welfare standards. Regarding the use of non-organic feed, views vary significantly. Many interview partners were of the opinion that the animal welfare assurance is one of the reasons for consumers to buy organic products, and commented on the fact that there is now less of a distinction between organic and conventional production due to the increasing animal welfare requirements in conventional systems in recent years.

### **7.3.3 Producing products of high quality and responding to consumer demand**

This section presents the results related to the objectives of organic production aimed at "*producing products of high quality*" and "*producing a wide variety of products in response to consumer demand for foods and products produced by the use of processes that do not harm the environment, human health, plant health or animal health and welfare*" (Article 3(b) and 3(c)) as well as related to the global objective of "*ensuring consumers' confidence and protection of consumers' interests*" (Article 1).

To answer the question as to whether the rules are adequate to produce products of high quality and in response to consumer demand, plant and livestock production rules, the processing rules of the Regulation and the implementation in Member States are considered. Relevant external factors are highlighted and examples from the case studies supporting the arguments are made.

### 7.3.3.1 Producing products of high quality

#### *Analysis of provisions*

The production rules prohibit the use of chemical pesticides (Article 12(1)) and limit allopathic treatment for animals (Article 14(e)) but do not specify maximum thresholds for the residue content in organic products. The number of permitted inputs in food processing<sup>6</sup> is considerably lower than for conventional agriculture. Obligations to use certain practices include the use of slow growing strains of livestock, open-air access, and feed requirements appropriate to the livestock species.<sup>7</sup>

#### *Scientific evidence*

An EU-funded study on quality and safety of organic and low input foods (QLIF, 2009) showed with regard to **food safety** that organic production methods resulted in lower levels of nutritionally undesirable compounds such as heavy metals, mycotoxins, pesticide residues and glycol-alkaloids in a range of crops and milk. A Dutch literature review on food quality, safety and health impact of organic production (Van der Vijver et al., 2009) comes to similar conclusions but expresses some reservations about livestock products.<sup>8</sup> Thus, the food safety of crop-based products is improved mainly thanks to the prohibition of chemical pesticides and the non-use of mineral fertilisers. For animal-based products, the obligation to use roughage in the diet and limitation on allopathic treatment are likely to have a positive effect; however, for monogastrics the obligation to give access to pasture (free-range) and the restrictions on the use of allopathic treatment require good management abilities on the part of the holder (e.g. Vaarst et al., 2008).

<sup>6</sup> Annex VIII of Regulation (EC) 889/2008 with Section A: Food additives including carriers and Section B: Processing aids and other products which may be used for processing.

<sup>7</sup> E.g. appropriate breeds shall be chosen (Article 14(1)(c)(iv) of Regulation (EC) 344/2007; in the choice of breeds or strains, account shall be taken of the capacity of animals to adapt to local conditions, their vitality and their resistance to disease (Article 8 of Regulation (EC) 889/2008); animals must have permanent access to open air (Article 14(1)(b)(iii) of Regulation (EC) 834/2007), prohibition of landless livestock production (Article 16 of Regulation (EC) 889/2008), use of certain products and substances in feed (Article 22 of Regulation (EC) 889/2008).

<sup>8</sup> The literature review leads the author to conclude that a number of well-conducted studies show clear evidence of the following: in the plant sector, organic products contain less rather than more fungal toxins, the nitrate content of organic crops is generally lower than for conventional crops (occasionally some result show the opposite), there are a limited number of comparative studies showing that conventional products contain more pesticides residues than organic; regarding animal production, there are clear indications that eggs from free-range hens contain more dioxins, that the prevalence of antibiotic resistant bacteria in organic pigs and chickens is lower than with conventional breed animals and that the prevalence of Campylobacter is higher in organic broilers.

For several potential food safety risk factors not only direct restrictions in the EU organic rules but also indirect measures can play a potential role (Schmid, 2002; AFFSA, 2003). A recent systematic review concluded that organic food consumption may reduce exposure to pesticide residues and antibiotic resistant bacteria (Smith-Spangler et al., 2012).

There is very little evidence of an impact of organic practices on the **nutritional value** of products and even less regarding health. According to a study conducted in 2003 by the French Food Agency (AFSSA, 2003) the fact that organic crops are often more exposed to environmental stress (due to a usually higher pest and disease pressure) would slightly increase the content of the following micronutrients: iron, magnesium, vitamin C and antioxidants (these molecules intervene in the defence system of plants). According to Raiffaud (2010), promoting grazing for ruminants improves the flavour and the nutritional composition of products like milk or cheese, because of the abundance and the varieties of wildflower meadows. A comparison of conventional and organic dairy products found better nutritional quality of organic milk (Palupi et al., 2012)<sup>9</sup>, probably related to a difference in feeding regime (the higher level of fresh forage encouraged by the Regulation). Similarly, the meta-analysis of results related to organic milk production (Kahl et al., 2011) shows that organic dairy products contain significantly higher levels of protein or total omega-3 fatty acid. The systematic reviews of Dangour et al. (2009) and of Smith-Spangler et al (2012) concluded that there is no strong evidence of the higher nutritional value of organic products compared to conventional ones, but Smith-Spangler et al. pointed to the limitations of such analysis in terms of the number of studies and their heterogeneous nature. In contrast, Brandt et al. (2011) concluded that the content of secondary metabolites is approximately 12 % higher in organic produce resulting from the different fertility management system between both systems. Some studies (QLIF, 2009; van der Vijver et al., 2009) concluded that it was premature to draw conclusions in the field of health.

According to Raiffaud (2010), the numerous scientific studies on the impact of organic practices on the **taste of products** have not shown significant differences to conventional ones. Various production parameters (e.g. varieties and species used, the duration of rearing or the crop conditions) may influence the flavour, making rigorous comparison more difficult. In the EU-funded research project ECROPOLIS, a comparative analysis of relevant sensory related requirements in regulations and standards for mainly processed organic products was made using an impact matrix (Schmid, 2009). The empirical verification of product qualities through consumers and sensory laboratory testing showed significant standards-related impacts for oil and salami, but no impact for apples, biscuits and tomato sauce. These effects were related to processing rules, such as the use of additives (non-use of nitrates/nitrites for meat products) and

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<sup>9</sup> Significantly higher amounts of protein, ALA, n-3, CLA9, VA, EPA and DPA in organic dairy products than in conventional products, as well as a higher ratio of n-3 to n-6 (approximately twofold) and n-9-desaturase index, indicate that the organic dairy product may have a premium nutritional quality.

restrictions on extraction methods and heat treatment of plant oils that are found in some private standards but not in the EU Regulation for organic production (Espig et al., 2011).

### 7.3.3.2 Producing a variety of organic food in response to consumer demand

#### *Results of the consumer survey*

In the survey of 3 000 consumers in 6 countries, carried out as part of this evaluation, consumers were asked to indicate the degree of their personal agreement to a list of statements regarding organic food on a scale from 1.<sup>10</sup> The majority of consumers agreed with the statement that most organic products meet their expectations regarding high quality, and many believe that organic production does protect the environment. As a further indication of whether the variety of products meets the demand, consumers were asked whether they are able to buy all the products they want in organic quality. As shown in Figure 7.3, only about 20 % of questioned consumers agree with this statement, nearly half of them (48 %) stated that, at present, they cannot buy all the organic products they would like.

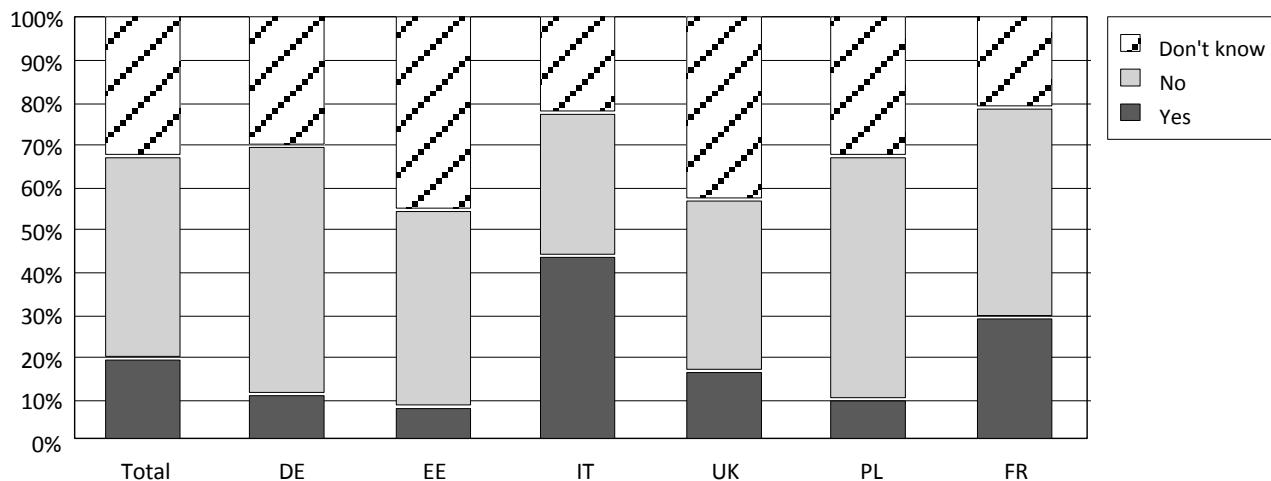
A further question aimed to determine which organic products consumers most feel are lacking. The results show that many see the greatest gaps in the supply of fresh fruit, vegetables, salad and meat (fresh and processed), but also milk and dairy products, bread and fresh fish are not perceived to be available in sufficient quantities.

#### *Views of stakeholders*

The majority of the interviewed stakeholders shared the opinion that the production rules are adequate to satisfy consumer demand. It is likely that stakeholders involved in production (such as farmers' organisations, farm advisors and control bodies) will have answered this question considering the feasibility of producing specific products under the rules rather than considering the availability for consumers. Regarding processing, more than half of them (in particular from competent authorities, ministries and producer organisations) were certain that the processing rules of the Regulation enable the production of a broad range of products. The other half of respondents thinks that consumers have different expectations in relation to quality and packaging and want fewer additives. Some processors would like to have more additives allowed, so they can produce a wider range of products (e.g. they cited specific flavour restrictions for yoghurts or the restricted list of stabilisers for melted cheese as limiting what they could produce). Others questioned whether all food products should be available as organic in the first place and were not convinced that high quality or good taste can be guaranteed by rules.

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<sup>10</sup> For further details of the consumer survey see Chapter 1 and 10.

**Figure 7.3:** Views of consumers regarding the availability of organic products

*Question: Are all the products you would like to buy available in organic quality?*

Source: Own data from consumer survey.

### 7.3.3.3 Ensuring consumer confidence and protecting consumer interests

#### Views of stakeholders

With regard to assessing the adequacy of production rules to contribute to the global objectives of ensuring consumer confidence and protecting consumer interests, mainly the views of stakeholders are considered. The issue will be explored in more detail in response to Evaluation Question 5 in Chapter 10, where further results of the consumer survey are presented. Across all countries and sectors, stakeholders share the opinion that the production rules (as well the respective labelling rules) are strict, clear, detailed and sufficiently integrated to ensure consumer confidence and protect consumer interests. Especially when compared with the alternatives (e.g. integrated or conventional agriculture, regional labels) the organic production system is seen as the most clearly defined and the most strictly controlled sector. The lists of restricted ingredients and additives are considered to help ensure consumer confidence. One of the main expectations is that inputs and the number of additives are very restricted (at present only 50 processing additives are permitted compared with 320 additives for conventional food processing) with some private standards having reduced the number further.

### 7.3.4 Justification for exceptional and transitional rules

This section evaluates the three main exceptional measures providing temporary authorisation to use non-organic inputs (young poultry, feed and seeds) and the transitional rules for animal housing. In order to assess the justification for non-organic input use, the following aspects were considered: a) current availability of organic farm inputs; b) reasons for undersupply; c) actions

taken (or needing to be taken) to develop an appropriate supply; d) evolution of the supply in the past years; e) implications of the exceptional rule, considering the likely impact on developing supplies, and where appropriate on achieving the objectives of organic farming and on consumer confidence. Where quantitative evidence was available it is presented, along with the analysis of provisions, experts' points of view and literature.

### 7.3.4.1 Regulatory justification of exceptional rules

#### *Findings from the analysis of provisions*

Exceptional rules intend to provide flexibility, enabling adaptation of the production rules to specific climatic, geographical and structural constraints or stages of development (Article 22 of Regulation (EC) 834/2007 and Chapter 6 of Regulation (EC) 889/2008). One important area for exceptions are several rules arising from the principle "*restricting the use of external inputs to inputs from organic production*" (Article 4(b) of Regulation (EC) 834/2007). Exceptions can be granted where they are necessary to ensure access to inputs which are not available in an organic form on the market (Article 22). This also states that they should be kept to a minimum and where appropriate limited in time.

Exceptions can be granted by the competent authority of the Member States if inputs are not available in an organic form on the market in the short or medium term (or during catastrophic circumstances where temporary measures are necessary to protect organic production).

#### *Views of stakeholders*

The stakeholders agreed to a large extent that the exceptional rules are adequate, provided that they are transitional and of a temporary nature. This was particularly stressed by stakeholders from Austria, Estonia, Spain, Italy and Poland. The main arguments supporting the exceptional rules underline the need to address the insufficient supply of organic inputs.

### 7.3.4.2 Exceptional rules for using non-organic young poultry

#### *Findings from the analysis of provisions*

Article 42 of Regulation (EC) 889/2008 provides that a) non-organic young poultry up to 3 days old can be introduced when constituting or reconstituting a flock and b) until 31 December 2014 (initially 31 December 2011), non-organic<sup>11</sup> reared pullets for egg production of not more than 18 weeks may be brought into an organic livestock unit, when organically reared pullets are not

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<sup>11</sup> Among producers these pullets are often referred to as part-organic, because the article states that the organic feeding and disease prevention rules must be complied with by the pullet rearing enterprise.

available in sufficient numbers. There are currently no specific EU rules for the production of organic chicks or for the rearing of organic pullets.

#### *Findings from the analysis of other publications and information*

Current availability of organic pullets: Out of the 13 countries studied, exceptions provided by Article 42 apply in all Member States under various conditions, except for Denmark, which has set up national rules for the production of organic young poultry. Here, farmers must be supplied with organic young poultry for laying hens as well as for broiler production. The supply in young organic poultry is thus adequate in Denmark. Also in Germany the use of non-organic poultry is forbidden, but producers can use non-organic eggs for hatching without derogations. Here, some regions like North Rhine-Westphalia are starting to implement stricter rules; for example that from 1<sup>st</sup> March 2013 mixed flocks (organic and non-organic chicks) have to be formed, and unavailability-declarations have to be issued by suppliers. In many other Member States, the production of broilers or laying hens relies on the use of non-organic chicks, fed with organic food since the age of one day. Experts from Austria, Denmark, France and the Netherlands reported that there was no need for exceptional rules for young poultry, while experts from the Czech Republic, Estonia, Italy, Poland and Slovenia stressed that there is no or only a limited supply of organic young poultry in their countries.

Causes of the undersupply of organic young poultry: The lack of an EU standard regulating young organic poultry production constrains the development of the sector, as countries are reluctant to develop national standards on their own to avoid potential disadvantages for their producers. This is referred to in Recital (3) of Commission Regulation (EC) 505/2012 of 14 June 2012, "*the development of harmonised organic production rules for young poultry at Union level is complex; the viewpoints on technical requirements vary widely between the parties concerned.*" As a result, Recital 3 states that "*in order to allow more time to develop detailed rules for the production of organic pullets, the exceptional rule for using non-organic pullets should be prolonged.*"

Actions to develop the supply of organic chicks and pullets have been taken in Denmark, mainly to satisfy issues of organic principle (animal welfare). The Ministerial Order N°1112 of 21 November 2008 of production and marketing of organic pullets sets provisions related to marketing conditions, feeding, welfare demands (physical production demands), prohibitions on trimming of beaks and the use of allopathic veterinary medicinal products and treatments. According to Danish operators and experts interviewed, the provision enforcing the use of organic pullets led to the development of an appropriate production of organic pullets. In France and the United Kingdom producers tend to support the introduction of EU standards for rearing organic pullets, but wish to maintain exceptions on using non-organic chicks for the time being. In France, producers appreciate the great diversity of breeding species that the exceptional rule allows them. When interviewed, the operators also highlighted that introducing organic chicks from organic breeding stocks will a) raise the price of organic pullets (see further below) and b) bring strong technical and sanitary constraints in breeding stock management, particularly

because of the mandatory open-air access areas.<sup>12</sup> A team of researchers<sup>13</sup>, establishing the actions needed to allow organic young poultry supply to develop, mainly recommend:

- The introduction of specific requirements in the Regulation covering the following areas:
  - Standards for the keeping of organic parent flocks and organic hatcheries suitable for use in the organic table bird production system from day old;
  - Standards for the keeping of young poultry for the purpose of egg production.
- The management of a database for organic young poultry and hatching eggs, similar to that which already exists for seeds, to make the supply situation in the EU transparent and the use of organic poultry and organic hatching eggs easier.

Implications of the exceptional rule for using non-organic pullets: The existence of these exceptional rules (one of them with no end date, the other extended recently) has an adverse effect on the development of the organic supply. In case study countries, authorities and/or operators agreed that a 100 % organic supply would be possible if there were no market perturbation such as that caused by the exceptional rule. To postpone the ending date hampers the development of supplies and is seen as being unfair by experts for sectors that have started to adapt to the end of the exception. In Denmark, the use of conventional young poultry has been prohibited for many years which fostered the development of a market for young organic poultry. Differences in supply, whether it is from (non-)organic chicks or part-organic pullets, leads to important differences in costs. In the United Kingdom, experts estimate full organic rearing of pullets to be approximately 40 % more expensive than part-organic pullets and in France the price of organic chicks is estimated to be twice as high as of conventional day-olds.<sup>14</sup>

### 7.3.4.3 Exceptional rules for using non-organic feed

#### *Findings from the analysis of provisions*

For the feeding of pigs and poultry, Article 43 of Regulation (EC) 889/2008 with reference to Article 22(2)(b) of Regulation (EC) 834/2007 authorises the use of a maximum percentage of non-organic high protein feed when organic quality high protein feed is not available.<sup>15</sup> Initially, the

<sup>12</sup> This point would not affect northern countries that require access to open-air areas only if weather conditions permit.

<sup>13</sup> See BÖLW (2012) for details.

<sup>14</sup> Example of costs of production difference in the United Kingdom (exchange rate EUR/ GBP = 1.19):

- Costs of organic chicks for broilers: GBP 0.70/per bird (0.83 EUR) whereas non-organic chicks likely at GBP 0.40/per bird (0.47 EUR)
- Fully organic reared pullets for layers (using non-organic chicks): GBP 6.00 to 6.95/ per bird (7.12 to 8.25 EUR) whereas part-reared (free range using only organic feed): GBP 4.40 to 4.70 (5.22 to 5.58 EUR).

ITAVI (2010) compared in France the price of conventional chicks of slow growing strains of 29.61 EUR for 100 heads to the price of organic chicks of intermediary growing strains of 65 EUR for 100 head.

<sup>15</sup> This rule does not apply to herbivores.

exception was in force between 2009 and 2010. In 2012, the 5 % rate was extended until the end of 2014.

#### *Findings from the analysis of other publications and information*

Current availability of organic high protein feed: Typical feeds with high protein content for monogastrics are usually various soya products, corn gluten or potato protein; containing specific amino acids such as lysine and methionine. It is not possible to estimate the availability of organically sourced protein feed in the EU, official data on feedstuff demand and availability do not exist. The ICOPP project (Improved contribution of local feed to support 100 % organic feed supply to pigs and poultry - CORE Organic II funded) will assess available feed resources and the current demand in selected Member States. A survey on feed resources is now in progress in 12 countries, making use of national information to provide best estimates. A report is due at the end of the project in October 2014.<sup>16</sup>

Interviewed experts declared that these types of protein crops are not available in sufficient quantities from organic sources at EU level, and that the majority of pig and poultry farmers rely on the exceptions of the 5 % non-organic high protein feed rule. Insufficient supply of organic feed was specifically mentioned by experts from Austria, Czech Republic, Germany, Denmark, Estonia, France<sup>17</sup> and Slovenia. They are concerned about the threat represented by imports of organic feedstuff from third countries (mostly China and India); with little guarantee on control and large carbon footprints. The recent cases of melamine contamination in organic soya imported from China and fake organic soya traded from Italy have had an impact on the demand for locally produced protein feedstuffs, which the market is unable to meet.

Causes of the systematic use of the 5 % of non-organic protein exceptional rule: Interviewed experts stated that a 100 % diet from available organic feedstuff could hardly meet animal requirements (mostly with high performance breeds), and supplementation with non-organic high protein feed (as well as amino acids) is a necessity to reach a balanced supply of methionine and lysine for the high performance standards. Natural amino-acids are provided by corn gluten or potato protein incorporated in the 5 % of non-organic authorised ingredients, and by increasing the share of soya in feed. The obligation of 100 % organic feed would force farmers to find new sources of natural amino-acids, since corn gluten or potato protein are not available organically (EGTOP, 2011). A number of potential high protein feed sources (rapeseed, peas and beans but also micro-algae) could be developed as alternatives, but some require further research. As part of the EU-funded EEC (organic) 2092/91 Revision Project, Sundrum et al. (2005)

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<sup>16</sup> The report will present estimates of organic stock numbers of all animals (including herbivores) and of organic production of concentrated feedstuffs including protein, broken down by crop/type in 12 countries as well as balancing calculations and tentative conclusions.

<sup>17</sup> For example in France, according to expert estimates, the need for organic soya for animal feed is around 55 000 tons, and national production is 5 000 tons, which means that 90 % of organic soya for feed is imported (mainly from third countries).

carried out a meta-analysis of the available literature to evaluate whether restrictions in protein supply can be compensated for by other measures that are more in line with organic objectives and principles. The report concluded that due to the restricted availability of feedstuffs with a high content of limiting amino acids, growth rates and protein accretion of organic pigs and poultry are clearly lower in organic compared to conventional production. However, it claimed that there is sound scientific proof that both poultry and pigs can compensate to a high degree for imbalanced feed rations without the onset of specific health and welfare problems, with the exception of the animal's first weeks of life. Strains with a high genetic yield capacity seem to be more sensitive to suboptimal feed rations than slow growing strains or robust breeds. There also are numerous studies that describe the undesirable side effects of breeding for high protein accretion, especially in poultry production, making the lower intensity of feeding potentially an asset of organic production and suggesting that organic production of pigs and poultry needs to be protected from unwanted intensification through feed ingredients (Sundrum et al., 2005). It is worthwhile noting that the ICOPP project will determine new approaches of ration formulation.

Implications of the exceptional rule for using non-organic high protein feed: In the current situation, the financial implications of the phasing-out of this exceptional rule would represent an increase of the total feeding costs<sup>18</sup> to reach the required level of 100 % organic feed, because of the higher price for organic protein feed.<sup>19</sup> Another impact would come from the change of the feeding content. Since some high value protein feedstuffs (e.g. potatoes protein, maize gluten, soya meal) used to balance rations are not (or not fully) available from organic sources, farmers will increase the overall protein content when increasing the share of organic raw materials to achieve a diet that provides adequate amounts of the limiting amino acids.

Consumers perceive organic husbandry as a production method based on natural/healthy feed (e.g. Zanoli et al. 2004). They are not aware of the details of production standards and might expect livestock used for organic meat to have been fed 100 % organic feed. However, it can be assumed that they would prefer local feed sources, if asked to choose between imported organic and local conventional feedstuff. A preference for local food is often seen in consumer surveys. Also the organic principles for farming oblige to farmers to practice land-related livestock production and the feeding rule also express a preference for feed from the farm or region.

As an immediate and transitional measure, the use of synthetic amino acids for organic monogastric feed production is discussed in some Member States (for example Germany). The argument is made that in this case animal needs and species-specific feeding should have higher priority than the principles to use 100 % organic inputs. However, some representatives of the

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<sup>18</sup> According to United Kingdom expert interviewed, to move from 95 % to 100 % will cost producer + GBP 15/t in increased feed cost and +3p/doz in production cost.

<sup>19</sup> This assumption does not take into account potential adjustments (adaptation of breeds, authorization of synthetic amino-acids, etc.).

organic farming movement, e.g. in Germany, strongly dismissed this suggestion as not being in line with organic principles and stated that instead the search for alternative solutions needs to be intensified. Promising alternatives are already developed: methods to produce methionine via enzymatic fermentation based on organic raw materials, or the use of insect larvae or algae as a protein source for feed (method in development). These new techniques are considered by interviewed experts as very promising, but not ready for a broad practical use yet.

### 7.3.4.4 Exceptional rules for using non-organic seed

#### *Findings from the analysis of provisions*

Article 45 of Regulation (EC) 889/2008 authorises the use of non-treated, non-organic seeds and vegetative propagation materials when organic ones are not available on the market (Article 22 of Regulation (EC) 834/2007). This provision is supported through the establishment of a seed database in each Member State, listing the varieties for which organic seeds or seed potatoes are available (Article 48 of Regulation (EC) 889/2008). It allows the competent authority to grant individual exceptions to farmer requests to use non-organic seeds with adequate justification.<sup>20</sup> The Commission Regulation also provides for an Annex (Annex X of Regulation (EC) 889/2008) to register species for which organic seeds are available in sufficient quantities and for a significant number of varieties. However, this Annex remains empty.

Further, the Regulation lacks a **definition of organic seed** in general. Except the exclusion of GMOs, it does not specifically identify which breeding techniques are suitable for organic production. Controversial breeding methods are heavily discussed in the sector and several national standards take clearer stands on which techniques are allowed for organic plant breeding than the EU Regulation. The main critical issue is the use of CMS-hybrids (cytoplasmic male sterility) in organic agriculture; a method that uses cell fusion techniques to combine species that under normal conditions cannot be crossbred. Most stakeholders argue that this breeding method is little different from genetic engineering and should not be allowed for organic seed production. In Germany for example, private standards forbid the use of CMS-hybrids: Demeter since 2005, Naturland since 2008 and Bioland since 2009 (Organic Market Info, 2013).

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<sup>20</sup> The Regulation provides for 4 possible justifications:

- a) No variety of the species is registered in the database;
- b) No supplier is able to deliver the seed or seed potatoes before sowing or planting in situations where the user has ordered the seed or seed potatoes in reasonable time;
- c) The variety is not registered in the database and the user is able to demonstrate that none of the registered alternatives of the same species are appropriate and that the authorization therefore is significant for his production;
- d) It is justified for use in research, test in small-scale field trials or for variety conservation purposes agreed by the competent authority of the Member State.

### *Findings from the analysis of other publications and information*

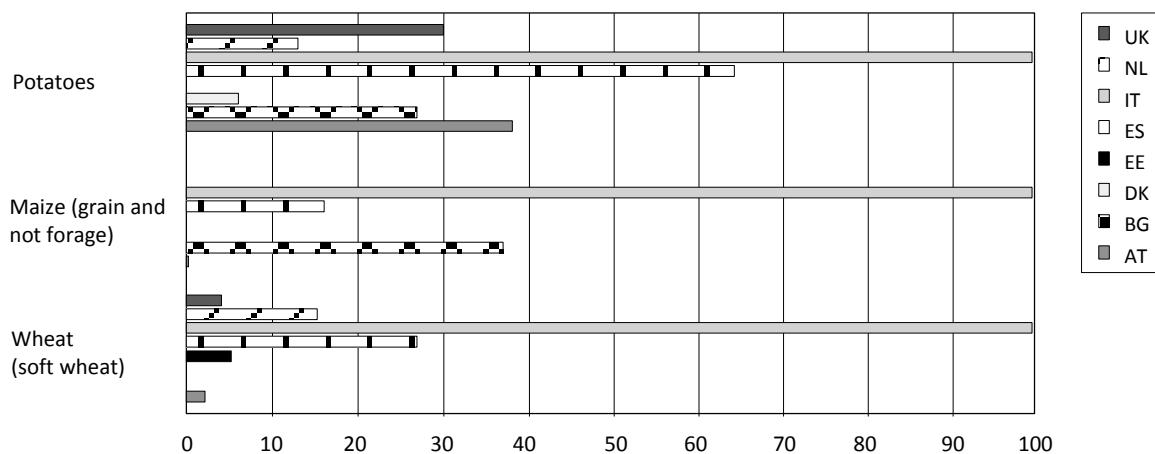
Current availability of organic seeds and propagation material: The organic seed market is growing, but levels of supply vary between Member States and crops. In Austria, Germany, Denmark and France the organic seed supply is reaching satisfactory levels overall, according to interviews with authorities and professionals (see also Figure 7.4), exceptions for seeds were reported to be necessary in Bulgaria (although farmers usually use their own seeds), the Czech Republic, Spain, Italy, Poland and the United Kingdom. The sectors that mostly rely on exception requests are fruit and vegetable producers, as they use a wide range of species and varieties. To assess the degree of use of the exceptional rule system, the share of the organic area grown with conventional non-treated seeds (exceptional seeds) has been compared with total organic area, for three different crops in eight Member States. The data are presented as an index, the highest proportion for each crop being given an index of 100.

Among the countries observed, supply of organic varieties of wheat, maize and potatoes seems to be limited in Italy (the highest rate of use of non-organic seeds). This might also be the case in Denmark and Estonia, where the use of species or varieties classified in Category 3 with general exception (see definition of categories below) means that there is no record-keeping of non-organic seeds used. This may lead, in turn, to farmers favouring cheaper non-organic seeds, even when adequate organic supply is available for specific varieties. However, very high levels of organic supply for soft wheat have been achieved in Austria and the United Kingdom. For maize, the share of organic areas cultivated from organic seed is close to 100 % in the Netherlands, Austria and Spain. Organic supply for seed potatoes is adequate in Austria, Bulgaria, Denmark, the Netherlands and the United Kingdom (index below 30 %).<sup>21</sup>

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<sup>21</sup> Stakeholders in the United Kingdom mentioned that supply of organic seed potatoes has fallen dramatically in the last two years, because one major supplier withdrew from the organic market.

**Figure 7.4:** Share of area grown with exceptional rule non-organic seeds of total organic area, 2011 (ha)



Note: The index is calculated from the quantitative data registered in the statutory annual report of 2011 for each Member State (Article 54 of Regulation (EC) 889/2008). The amount of non-treated conventional seeds granted through derogations were converted in areas, using the following seeding rate - soft wheat (kg/ha): 175; grain maize (kg/ha): 30; potatoes (kg/ha): 2000. (This does not cover all the non-organic seeds use, because some non-treated seed can be used without requiring derogation when there is permanent derogation: In Denmark, general derogations are granted on soft wheat and grain maize species, whereas in Estonia, general derogations are granted on soft wheat and potatoes varieties). Then the corresponding area were divided by the total organic area, and indexed so that the max rate was equalled to 100. In United Kingdom, data concerning maize are not available but organic maize cultivation is very limited.

Source: Own calculation.

The system of national seed databases encourages the use of the available organic seed supply nationally by making it easier to find information about availability. The management of the exceptional rule system is done on Member State level based on three categories: 1) where organic seed availability for species/varieties is sufficient, exceptions are no longer granted; 2) species or varieties with partial availability of organic seed, so exceptions apply and 3) species or varieties where there is no organic seed available, so a general authorisation to use non-organic material is given. Table 7.3 provides an overview of the level of use of the database in selected EU Member States.

Of the twelve countries studied<sup>22</sup>, only France and the Netherlands developed a list of species for which organic seed supply is sufficient in quantity and diversity (Category 1).<sup>23</sup> The majority of countries operate a regime where exceptions have to be justified for each species on a case by case basis (see category 2 in Table 7.3). Requested exceptions vary significantly and can reach up to 4 000 varieties of around 600 species (United Kingdom). The third category, a list of species and varieties under permanent exception, is active in six Member States.

<sup>22</sup> Data from Czech Republic could not be analysed.

<sup>23</sup> No conventional seeds can be used by the operators for these crops, except for exceptional cases under appropriate justifications (e.g. specific use such as pop-corn).

**Causes for undersupply:** The reasons for the low level of organic seed use are twofold:

- According to ITAB (French Organic Farming Technical Institute) very few producers are compliant with organic breeding principles. To further develop organic seed supply and quality, research studies are launched by multi-actor partnerships ITAB and ECO-PB (European Consortium for Organic Plant Breeding) and are addressed in some research projects (e.g. SOLIBAM).<sup>24</sup>
- Organic seeds are more expensive than non-treated conventional ones, which is an adverse incentive at individual and collective level to use or develop organic seed production. Odefey et al. (2011) compared the production costs of some organic enterprises with conventional in five countries. Based on FADN data, they showed that seeds represent an important share of variable production costs in organic crop production (from 21 % in Sweden to 35 % in France for wheat; from 18 % in Germany to 25 % in Sweden for potatoes). Indeed, the average costs for organic seeds are higher than for conventional seeds (two to four times higher in Sweden and Germany for wheat; two to five times higher in Sweden and Austria for potatoes). As a result, the potential to use non-treated conventional seeds under the exceptional rule leads to financial advantages.

Reporting of the 6<sup>th</sup> ECO-PB meeting on Organic Seed Regulation in 2011 Döring et al. (2012) suggested several ways to reduce farmers' disincentive of paying higher prices for organic seeds:

- compare conventional non-treated seed price with organic seed price and put the price difference in a fund to develop organic seed supply for certain crops (e.g. potatoes) in smaller countries;
- compensate farmers through their membership to organic farmer associations or by government subsidies;
- make traders pay a premium for crops produced from organic seeds (seen as the most feasible solution).

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<sup>24</sup> <http://www.solibam.eu/>.

**Table 7.3:** Management of the non-organic seed exceptional rule in 2011 in EU Member States where case studies were carried out

<b>Category 1</b>		<b>Category 2</b>	<b>Category 3</b>
Out of derogation		Number of species and varieties concerned by derogation	General authorization to use non organic material
AT	None	55 sp. 522 var.	13 sp.
BG	None	56 sp. 152 var.	None
DE	None	124 sp. 173 var.	180 sp.
DK		546 sp. 99 var.	~ 170 sp.
EE	None	17 sp. 84 var. (incl. 28 tomato var.)	All species not available in the database
ES	None	70 sp.	yes <sup>c</sup>
FR	YES (~13 sp.) <sup>a</sup>	3 000 var., belonging to 149 sp. are registered in the data base  Alert screen: var. that will soon be included in Category 1 <sup>b</sup>	8 sp. and 7 var. of vegetables  15 sp. and 3 var. of field crop
NL	YES (>70 sp.)	159 sp. >1064 var.	Arable: 8 sp. Vegetable: 9 sp. Covered: 5 sp.
PL	None	201 sp. 1 629 var.  As long as organic seed material is available, no derogation is granted	None
SI	None	Ca. 99 sp. Ca. 346 var.  Var. database prepared by the Ministry	None
UK	None	Ca. 598 sp. Ca. 4 000 var.	None

var. = varieties, sp. = species

a) Exceptional cases of derogation for these species have been granted.

b) In 2010: carotte nantaise, chicorée frisée, oignon jaune hybride, triticale.

c) The national report does not mention category 3 as such but states that, in Spain there is no offer of organic seed for many species, including : maíz, chickpeas, lentils, bitter vetch, canola, garlic, asparagus.

Source: Own data from on case studies and annual national reports.

**Implications of the exceptional rules for using non-organic seeds:** Generally, exceptions have increased over the past years. The overview (Table 7.4) shows that there is only a limited number of cases where the quantity of seed under the exceptional rule has decreased with regard to the respective organic area: for potatoes in Italy, for wheat and spelt in Denmark and for carrots in Italy and the Netherlands (of the thirteen Member States considered, complete data was only available for Denmark, Spain, Italy, the Netherlands, Poland and the United Kingdom).<sup>25</sup> The diversity of the varieties managed through the databases has increased in most cases. This data and the previous information on the use of the seed management database, shows generally an extensive and increasing use of the exceptional rule system at EU level. Accordingly, Annex X of the Regulation has remained empty, showing the limited progress made towards supply of organic seeds and propagating material at EU level.

**Table 7.4:** Analysis of the evolution of the exceptions granted (volume and diversity) compared to the development of organic areas between 2007 and 2011<sup>26</sup>

		Den-mark	Spain	Italy	Nether-lands	Poland	UK
<b>Potatoes</b>	Organic area	38%	n. a.	-8%	9%	56%	-30%
	Seeds under exception (quantity)	1523%	118%	-95%	217%	284%	-29%
	Diversity (Number of varieties effected by the exceptions)	88%	26%	33%	132%	85%	13%
	Organic area	52%	n. a.	-13%	-26%	n. a.	-11%
<b>Wheat &amp; Spelt</b>	Seeds under exception (quantity)	-79%	733%	14%	-75%	834%	120%
	Diversity (Number of varieties effected by the exceptions)	-71%	6%	-9%	100%	8%	-5%
	Organic area	41%	n. a.	-25%	50%	n. a.	n. a.
<b>Carrots</b>	Seeds under exception (quantity)	113%	174%	-95%	44%	21%	-92%
	Diversity (Number of varieties effected by the exception)	-13%	0%	n. a.	23%	100%	-2%

2007 data is the average 2006-2007, and the 2011 data is the average of 2010 and 2011 (except for DK where only the 2006 data were available).

Calculation is based on Eurostat data for organic areas (except for Germany, based on data of FiBL-AMI surveys) and national seeds reports. When registered in seed units, the derogations were changed into kg using the following coefficient: potatoes (0.05); wheat and spelt (0.000045) and carrot (0.0000012). Then, the rate of change was calculated : [(average of 2011 and 2010) - (average of 2006-07)] / (average of 2006-07).

Source: Own calculation based on national reports and Eurostat.

<sup>25</sup> Decreased in greater proportion than the area or increased in smaller proportion.

<sup>26</sup> Sufficient data allowing the analysis of both a) exceptions granted and b) organic areas for the selected species (potatoes, wheat and spelt, carrots) were available only in 5 countries. One of the limiting criteria was the different units used to specify the volume of exceptions, which prevented a clear view of the total amount granted.

Mandatory use of organic seeds would reduce the risk of contamination with pesticides and GMOs from using conventional seeds and propagation material. However, organic principles also require the use of locally adapted varieties, of which seeds are less likely to be available in organic quality. Allowing the use of non-organic seeds can thus be seen as a necessity for the sector to develop, even though it impedes or slows down the development of organic seed production.

**Database management:** The interviewed experts see the seed database as such as a good tool to manage the exceptional rules for seeds. Yet the use differs among Member States. Some countries (e.g. Italy, Estonia, Slovenia) do not use it as an interactive tool and the information available is in certain cases limited to a list of species established once a year; the use of the three categories is uneven; the reporting format is not harmonised, all of which limits the analysis of the valuable data gathered annually at national level.

### 7.3.4.5 Transitional measures concerning animal housing

#### *Findings from the analysis of provisions*

Transitional measures were designed to allow progressive adaptation to the production rules required by the EU organic specifications. Regarding animal housing conditions (stocking density, Article 95(2)) and cattle tethering in buildings existing before August 2000 (Article 9(1)), transitional measures were intended to end on 31 December 2010, but have been extended in a significant number of Member States until the 31 December 2013.<sup>27</sup> The transitional measure concerning tethering of animals still applies in ten of the thirteen studied countries (Austria, Bulgaria, Czech Republic, Germany, Denmark, Estonia, France, the Netherlands, Poland and Slovenia); and the measure regarding stocking density in nine of the thirteen studied Member States (as above but not in Slovenia). In countries which have extended these measures operators had a thirteen year transition period from 2000 to 2013. Given the cost of a building and the depreciation period, which is generally twenty years, the thirteen year transition period provided by the Regulation<sup>28</sup> does not cover all buildings requiring renewal according to the requirements. To support the transition, specific aid is offered under rural development programmes, which enables farmers to invest in new buildings corresponding to the standards. However, this aid is offered/implemented with specific provisions for organic farming only in very few countries (e.g. Austria, parts of Germany).<sup>29</sup>

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<sup>27</sup> There also is a permanent exception rule related to structural constraints, the tethering exemption for small holders in Article 39 of Regulation (EC) 889/2008.

<sup>28</sup> Buildings that were built just before the rules were introduced in 2000 will 13 years old at the end of 2013.

<sup>29</sup> See information about Measure 121: Modernisation of agricultural holdings in Sanders et al. (2011).

### *View of stakeholders*

Most interviewees think that transitional measures concerning animal housing are adequate. Without a transition period there would have been the risk that a large number of farmers quit organic farming. Furthermore, it has helped to maintain supply on the market. However, when asked whether the transitional rules should continue or stop after 2013, views differ. On one hand, some interview partners in Germany, Estonia, Italy and the Netherlands think that tethering is not in line with the current Regulation's principles and that the sector has had sufficient time to adapt and reorganise. On the other hand, some interviewees suggested that tethering of cattle, when done in conditions that respect animal welfare (regular exercise provided, access to outdoor pasture, spacious stables with sufficient bedding, etc.), could be allowed permanently (Czech Republic, Poland, Netherlands).

## **7.3.5 Implementation of the rule on prohibition of GMO and consequences**

This section addresses the adequacy of the rule that prohibits of the use of GMOs to ensure their lowest possible adventitious presence in organic products and, at the same time, to avoid undue constraints and additional burden on organic operators.

### **7.3.5.1 Threshold levels for and reported cases of GMO contamination**

#### *Findings from the analysis of provisions*

According to Article 4 of Regulation (EC) 834/2007 Genetically Modified Organisms (GMOs) and products produced from or by GMOs are incompatible with the concept of organic production and consumers' perception of organic products. They should therefore not be used in organic farming or in the processing of organic products. The provisions aim for lowest possible presence of GMOs in organic products. The existing labelling thresholds represent ceilings which are exclusively linked to the adventitious and technically unavoidable presence of GMOs (Recitals 9 and 10 and Article 9 of Regulation (EC) 834/2007).<sup>30</sup>

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<sup>30</sup> GMOs and products produced from or by GMOs shall not be used as food, feed, processing aids, plant protection products, fertilisers, soil conditioners, seeds, vegetative propagating material, micro-organisms and animals in organic production. For the purpose of the prohibition referred to in paragraph 1 concerning GMOs or products produced from GMOs for food and feed, operators may rely on the labels accompanying a product or any other accompanying document, affixed or provided pursuant to Directive 2001/18/EC, Regulation (EC) 1829/2003 or Regulation (EC) 1830/2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms. Operators may assume that no GMOs or products produced from GMOs have been used in the manufacture of purchased food and feed products when the latter are not labelled, or accompanied by a document, pursuant to those Regulations, unless they have obtained other information indicating that labelling of the products in question is not in conformity with those Regulations (Article 9 of Regulation 834/2007).

Most case study countries do not have **additional national implementation rules**; however, a few countries and regions have set additional restrictions in their national regulations or directives. Examples are Catalonia in Spain, where given the extended distribution of GM crops (particularly GM maize for animal feeding) the control authority (CCPAE) does no longer accept non-organic maize and soya. In France, the principle of non-dilution is followed where the threshold of 0.9 % applies for each ingredient taken separately. For example, if a product containing 0.5 % maize gluten, which contains more than 0.9 % GM maize, then these ingredients have to be labelled as GMO.<sup>31</sup> In the United Kingdom, it is the shared interpretation of control bodies and the competent authority not to permit any inputs that have tested positive for GMOs, even if the result is below the threshold of 0.9 %.

Only very few **private standards in the case study countries have additional GMO-related restrictions**. Bio-Austria (Austria) tolerates mixed feed with GMO contamination up to a threshold of maximal 0.1 %. Certified mixed feedstuffs have to be listed separately in the infoXgen database and can only be produced with 100 % organic compound feed plants. In France the private standard of Biocohérence requires a threshold maximal 0.1 %, but only a few organic cereals, oil- and protein-rich crop processors are involved in this standard. Also the French umbrella organisation FNAB aims for a specific label for organic products with a threshold of 0.1 % in order to assure consumers that the products are indeed GMO-free.

#### *Findings from the analysis of cases of GMO contamination of organic products*

In order to verify if the general rule prohibiting the use of GMOs is adequate to ensure the lowest possible adventitious presence in organic products, cases of GMO contamination in the case study countries, which led to the loss of the organic status of products (between 2011 and 2012), were investigated. In most of the countries, no GMO contamination of organic products was reported. The following cases were reported by competent authorities or control bodies: In Spain, one case of contaminated maize in 2011 and two cases in 2012; in Italy one case of contaminated feed in 2011 and four cases in 2012; in Poland one case of fishmeal mixed with soya meal. Available statistics (e.g. from AGES about GMO-contamination of soya in Austria<sup>32</sup>) reveal that cases of GMO contamination of more than 0.9 % in organic products are extremely rare and mainly concern extra-EU imports. This is due to the shortfall in organic proteins for animal feed on the EU market (especially soya for monogastrics), that leads to imports of high protein content raw materials. These imports increase the risk of GMO contamination (lack of traceability, limited organic supply and high prices leading to fraud). In the opinion of some stakeholders (mainly producers), the production rules should therefore ensure the development of plant-based protein production in the EU (e.g. peas, faba beans and other legumes as well as clover and alfalfa) to avoid the GMO contamination risk of extra-EU imports of soya.

<sup>31</sup> According to the French guideline 2012 of the Regulations (EC) 834/2007 and (EC) 889/2008.

<sup>32</sup> See: <http://www.ages.at/ages/ernaehrungssicherheit/schwerpunktaktionen/untersuchung-von-gvo-in-lebensmitteln-soja>.

### *Scientific evidence*

In the scientific literature only a few figures could be found for Europe, regarding the additional costs a further lowering of the threshold would raise. In a Canadian study by Huygen et al. (2003) the costs of lowering thresholds from 1 % to 0.1 % for export GM wheat doubled, depending on the type of segregation and transport system in the supply chain. In Europe these costs might differ strongly between countries and type of products. Regarding seeds, Then & Stolze (2006) estimated the costs for lowering GMO thresholds and showed that the current safety margin of 0.9 % for the labelling of adventitious or technically unavoidable presence of GM components in food and feed leads to significant investments and higher annual costs for organic food production in Europe. Total yearly co-existence costs for EU food and feed processors in the case study countries range from about 50 000 EUR to 880 000 EUR. Lower thresholds like 0.1 % for adventitious presence of GM seed in non-GM batches are likely to increase these costs and the associated constraints on farmers, processors, traders and retailers. No further targeted studies are available identifying exact costs and measures necessary to establish seed purity at low ('zero') thresholds. Such detailed and targeted studies would be a basic condition for the EU decision making process.

### *Views of stakeholders*

The large majority of the stakeholders were of the opinion that the prohibition of GMOs in organic food and farming is a basic principle and is necessary for the consumer perception of organic products. Only two stakeholders wanted the position of GMOs to be discussed, revised and considered in organic production (processors in Germany and Denmark). Also there is a general agreement of the large majority of stakeholders that the limit of 0.9 % for labelling is sufficient. A few stakeholders, however, think that there should be a zero GMO tolerance for seeds and feed (in Spain, France and Slovenia).

Looking at the feedback of a few industry stakeholders in countries with lower thresholds (Italy, France and Spain), opinions varied if such a measure would reduce the likelihood of product contamination, or only increase the costs for the farmer/processor. Some retailers saw it as risky to require a 0 % GMO content. They argued that, if under such a regime cases of contamination would be found, consumer confidence towards the products might decrease and the whole organic sector might be considered as 'not reliable'.

The competent authority as well as some producers and processors in the United Kingdom and Spain mentioned some difficulties with the interpretation of the 0.9 % GMO threshold. Some control bodies and competent authorities see this as an acceptable threshold for organic food, whereas others do not accept GMO contamination in organic food above 0.1 %, and decertify these products (one certifier in the United Kingdom). The EOCC guide (European Organic Certifiers Council, representing 28 of the 250 EU control bodies) also suggests to harmonise the practices and processes in case of contamination > 0.1 %.

### 7.3.5.2 Other factors

#### Coexistence legislation

##### *Findings from the analysis of provisions*

Coexistence aims to achieve a sufficient segregation between GM and non-GM crops, including organic production in compliance with the legal obligation for labelling defined in the legislation. In 2003, the Commission had issued guidelines to allow the co-existence of GM and non-GM crops through buffer zones (GMO-free) (European Commission, 2003). In 2010 the EU co-existence guidelines were adapted and published (European Commission, 2010). The current situation can be summarised as follows: Co-existence is regulated by individual countries and vary widely in size (e.g. from 15 metres in Sweden, 150-300 metres in Germany for maize, to 800 metres in Luxembourg (Davison, 2010)). The guidance also provides the possibility to designate GMO-free zones, effectively allowing EU Member States to ban the cultivation of GM crops in their territory without invoking the safeguard clause.<sup>33</sup> However these rules are introduced and implemented in a patchwork fashion in the European Union.<sup>34</sup> Austria (with regional variations), Denmark and the Netherlands have introduced and implemented coexistence legislation for GMOs, including specific guidance for organic production; whereas Bulgaria, Czech Republic, Germany (with regional variations) and Estonia, have coexistence legislation but without specific rules for organic production. The other case study countries (Spain, Italy, Poland, Slovenia and the United Kingdom) have not introduced such legislation.

##### *Scientific evidence*

Winter et al. (2011) question the effectiveness of GM-coexistence measures in Germany, as risk mitigation measures are not separated from coexistence measures in the legislation. They argue that the measures aim at solving the conflicts between the individual landowners and thus fail to recognise the systemic character of the conflict between agricultural systems. The systemic conflict can, according to the authors, better be solved by non-binding landscape planning or a legally binding land-use plan, yet to be developed. Binding agricultural planning should therefore be introduced, e.g. establishing GMO-free zones. Such measures are considered compatible with constitutional guarantees and with EU law.

##### *Views of stakeholders*

There are diverging opinions if national coexistence legislation is helpful in protecting organic farming from GMO contamination. The main problems mentioned are:

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<sup>33</sup> The safeguard clause allows Member States under certain circumstances to provisionally restrict or prohibit the use and/or sale of that GMO as or in a product on its territory (Directive 2001/18/EC (see Article 23)).

<sup>34</sup> <http://www.gmo-safety.eu/coexistence/449.european-patchwork.html> (10 May 2013).

- Often coexistence legislation operates on the national level of Member States or administrative regions, which leads to strong variations of implementation;
- Only a few regions have a strict legislation, e.g. the 'genetic engineering precaution law' in Austria;
- Criteria for a safe distance between organic and GM crops are variable and highly difficult to establish.

In Slovenia and Austria, different stakeholders argue for the establishment of GMO-free zones with specific GMO-free labelling. There are also debates at national levels and in the European Parliament, e.g. on GMO-free labelling of food products or GMO-free regions.<sup>35,36</sup> Several national operators in different countries mentioned that they are still missing guidelines concerning the coexistence rules for both producers and processors, whereas in countries like Denmark or Austria such guidelines for GM and non-GM producers exist (e.g. distance rules between fields or rules on shared use of machinery and transport equipment).

## **Availability of critical ingredients**

### *Findings from the review of relevant publications*

An Austrian study investigated the feasibility of GMO-free labelling (AGES, 2006). In the case of Vitamins B2, B12 and C (ascorbic acid) the production is already mainly GMO-based, but it is claimed that after ultrafiltration, no traces of GMOs are found in the final product. Furthermore, inspections at the place of production (Asia, China) can rarely be done, making the verification of the information on the certificates problematic. Another study about vitamin producers in China showed similar results (Bioconnect, 2008). Based on these studies as well as additional information provided by the database of infoXgene<sup>37</sup>, the current situation can be described as follows:

- Vitamin B2: There is only one provider listed in the infoXgen-database and this provider does not guarantee GMO-free supply since February 2010.
- Vitamin B12: the European producer (France) uses GMO and the Chinese producers do not provide relevant information;
- Vitamin C (ascorbic acid): There is no information from Chinese producers. One European producer delivers from chemical synthesis, the other from GMO-production, but the

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<sup>35</sup> See: <http://www.greens-efa.eu/gmo-free-labelling-of-food-products-8459.html>.

<sup>36</sup> See: <http://www.gmo-free-regions.org>.

<sup>37</sup> InfoXgen is an association that was founded in 2001 by several organic inspection bodies from Austria, Germany and Switzerland. The association aims to provide information about the production of food without the use of genetically modified organisms. For this purpose, an online public database has been established.

See: <http://www.infoxgen.com/en/>.

- information could not be verified. Thus the availability of GMO-free production cannot be supposed as secure;
- Vitamin E: Three producers gave the information to produce from chemical synthesis without GMO. One producer gave the information to produce from extraction of GMO raw material.

In view of the current situation, the Austrian public agency AGES (2012) concluded that, since February 2010, Vitamin B2 from GMO-free production is no longer available.

#### *Views of stakeholders*

Stakeholders (mainly producers, processors and certifiers) in several case study countries (Austria, Germany, Denmark, France, Poland, Slovenia and the United Kingdom) raised concerns, mainly about the availability of Vitamin B2 and B12 for feed, and in particular with regard to the reliability of the GMO-free vendor declaration. In some countries (Austria, Germany) the products with ‘proved specification’ (meaning: with GMO-free-declaration) are listed in the infoXgen database of specified, authorised production means for the use in organic farming and processing. Several stakeholders (mostly certifiers in Italy, Slovenia and Poland) mentioned that a big problem is the reliability of the GMO-free vendor declaration provided by the producers of ingredients. The declarations differ substantially in the formulation, and it is not defined in the EU Regulation what they should include. Special efforts might be needed now to initiate GMO-free production of these ingredients in Europe (e.g. through an SME-supported research and development project).

Furthermore, a major issue for many different supply-chain actors in the majority of countries is also the availability of GMO-free and organic protein feed.

### **7.3.5.3 Constraints and additional burden on organic operators through the prohibition of GMOs**

#### *Scientific evidence*

In the scientific literature only a few figures could be found on what additional costs coexistence implies for organic producers and other supply chain actors. In the US, a fast-growing market for organic food and higher use of GM-varieties of several major crops exist simultaneously. Coexistence between those differentiated products relies on interventions, such as physical distancing and product segregation.

The costs and feasibility of coexistence along the supply chain were investigated in the EU-funded project Co-Extra. Coleno (2008) found the following strategies for segregation in various region of France: defining GM and non-GM silos and production zones which resulted in 70 % increase in transportation costs; specifying the timing of GM and non-GM crops delivery at silos and/or using local management rules at each stage of the supply chain (both cost-neutral).

Because organic products already have to be segregated from conventional crops, it is difficult to assess the additional costs coming from the coexistence situation. Many companies were found to use a prevention threshold which is lower than the labelling threshold (generally 0.1 %) which was found to be easy to implement, as long as the GM pressure is very weak. The Co-Extra project found that all Member States of the EU that have legally defined GMO-free products are using the threshold of 0.1 %.

Greene and Smith (2010) point out in a study about coexistence in the USA that the costs required to support the coexistence in all markets are carried disproportionately by producers and consumers of organic food.

Data to assess the costs for a lower threshold in organic production are incomplete. The purity and availability of non-GM seeds is crucial to keep organic farming GMO free. Lower thresholds of 0.1 % for adventitious presence of GM seed in non-GM batches are likely to increase these costs and the associated constraints on farmers, food and feed processors, traders and retailers (Then and Stolze, 2009). Segregation of GM and organic products results in additional costs but might also generate consumer choice and thus creation of niche markets for non-GM labelled products.

#### *Views of stakeholders*

For the large majority of stakeholders it is clear that the prohibition of the use of GMOs leads to constraints and additional burdens on organic operators. Only a minority of stakeholders mentioned no additional burden. The burden for producers is lower in countries like Italy or France, where the cultivation of GMOs is not allowed. Here the burden concerns mainly processors of feed (soya and maize). The main problems are higher costs and difficulties related to the availability of specific ingredients free from GMOs. With regard to GMO contamination risks in food processing, a clear majority of respondents (mainly from the industry) consider this prohibition as a strong burden. Higher costs are mentioned in particular for feed processors and seed companies for expensive threshing and separating seeds or in processing feed. However, there seem to be differences between countries due to different implementation. Stakeholders argued that it is difficult for organic operators to bear the costs of GMO contamination, while they are the only operators to guarantee GMO-free products. Operators that are trying to implement internal management procedures to safeguard against contamination feel penalised by an increase in costs. One middle size processor in Germany explained: "*Protecting organic products from genetically modified impurities costs me one worker plus 40 000 EUR each year*".

A number of other problems were mentioned by the interviewed stakeholders:

- Higher costs for analysis, administrative work and control as well as costs for separation in processing and logistics, particularly for feed (soya, linseed and maize); which increases costs for organic feed (processors and farmer organisations in several countries).

- Several stakeholders mentioned that the organic production rules alone cannot guarantee the full exclusion of GMOs. The responsibility should lie on GMO growers/processors using GMO ingredients, and not on the organic sector: ‘the polluter pays principle’.
- In Estonia, stakeholders (producers, processors) reported that feed manufacturers cannot have organic and conventional production at the same time, because the contamination risk is high. This requirement for full separation implies that organic feed processing is not economically viable, and as a consequence there are no organic compound feed processors in Estonia.
- Producers and processors in several countries stated that farmers/operators that can prove that they have done everything they can to guard against possible contamination, should not be penalised for accidental presence of GMOs under the limit of 0.9 %.
- Doubts were raised, whether sufficient control, supervision and accurate analysis is really useful if the presence is technically avoidable (which is also hard to define) or adventitious (Czech Republic, Italy, Slovenia).
- Also the risk of contamination through the use of manure from GMO farms was mentioned.
- It was mentioned that the EU Regulation is not strict enough regarding the provision of evidence on inputs produced from, or with GMOs. Currently, the GMO-free vendor declaration is sufficient, but it is rarely possible for the control body to estimate the reliability of the declaration or of the company issuing it.

### 7.3.6 Impact of the production rules on fair competition

Ensuring fair competition is one global objectives of the Regulation (Article 1 Regulation (EC) 834/2007). A key question is to what extent this is possible for two main reasons: a) implementing rules differ between Member States Rules, and b) rules are harmonised at EU level but different geographic, climatic and economic conditions could lead to different costs of production. In this section, both aspects are addressed. Where quantitative evidence could be gathered, it is presented below; where not, proxies and theoretical reasoning are used to judge whether the distortion is likely to be significant. The assessment of the contribution of the control system and the import rules to fair competition is covered in Chapters 8 and 9.

#### 7.3.6.1 Cases of different interpretation of the Regulation

##### *Findings from the analysis of provisions and other information*

Some of the rules laid down in Regulation (EC) 834/2007 and 889/2008 are not precisely defined and leave room for different interpretation through the enforcing bodies. The following areas with room for interpretation, possibly leading to unfair competition, were identified:

- **Greenhouse production** (substrate and CO<sub>2</sub>): The Regulation does not provide any specific requirements or relevant production rules regarding greenhouse crops. As a result, there are different applications in the EU, mostly for a) the cultivation in a **substrate**, which is authorised in some Member States for the cultivation of all plants<sup>38</sup> (Denmark, Italy, Poland, Slovenia), and in other Member States limited to plants grown and sold in pots, mostly for ornamental plants, herbs and aromatic plants (Austria, France, the Netherlands and the United Kingdom); and b) for **fertilisation practices** (such as fertigation (see Section 7.3.3.1) or the use of CO<sub>2</sub> enrichment to enhance photosynthesis<sup>39</sup>). A definitive judgement on this issue is not possible due to lack of data. It can be assumed however, that these differences have an impact on yields and production costs (fertilisation) and therewith on competition. In this context also the use of energy (see Section 7.3.2.3) which is at present not regulated, is most likely having an impact.
- **Definition of region in relation to the origin of feed materials:** Feed is an important production cost, which suffers from high volatility in price and insufficient production, particularly protein crops. Regulation (EC) 834/2007 states that with regard to feed, the rule is to “primarily obtain feed for livestock from the holding where the animals are kept, or from other organic holdings in the same region” but does not define ‘region’. Article 19(2) of Regulation (EC) 889/2008 specifies thresholds for home or regionally produced feedstuff for monogastrics at 20 % and for herbivores at 60 %. The potential distortion of competition from differences in the interpretation of the term ‘region’ thus only applies to the 20 % of feed for monogastrics. Depending on the price difference between sources (local, EU Member States or third countries), the definition of ‘region’ can significantly impact feed prices, working against growers from areas where the rule is more strictly applied<sup>40</sup>. However, at present organic producers of monogastrics animals in the EU have no restrictions regarding the origin of the other 80 %. If it is assumed that the price difference between local and internationally sourced feed (including transport) is around 15 % (Magdelaine and Riffard, 2010), and that feed makes up 60 % of the variable production costs (Nayet, 2012), then the difference between local and international supply would be only approximately 2 % of the total variable costs. For herbivores, the impact can be more important since it concerns 60 % of the feedstuff, but a majority of their diet consists of forage, which usually comes from the farm or region and is not commonly transported over long distances. Therefore, particularly for herbivores but also for monogastrics, the impact of different definitions of ‘region’ solely on fair competition is limited.

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<sup>38</sup> With possible varied condition on the quality or the quantity of the substrate.

<sup>39</sup> The use of CO<sub>2</sub> as fertiliser is authorised in most countries (for example the United Kingdom, Denmark, Italy, the Netherlands, Lithuania, Sweden, Latvia, Portugal – even though it is not always used) and forbidden in only a few (France, Poland). CO<sub>2</sub> is not included in the list of authorized fertilizers, soil conditioners and nutrients in Annex I to Regulation (EC) 889/2008.

<sup>40</sup> In the case study countries the following definitions of region were used: NUTS 2 (France, Italy); whole country (Slovenia, Poland, Estonia, Denmark); other (Czech Republic, Germany); EU/world (Austria, Netherlands, Spain, Bulgaria, the United Kingdom).

- **Housing conditions for poultry** (Article 10 and Article 12 Regulation (EC) 889/2008): For laying hens, the indoor maximum density is 6 animals per m<sup>2</sup>, but the application of this maximum density in multilevel systems varies in the case study countries. Multilevel/-tier systems are forbidden in Spain and not used in France, but widely applied in Austria, Germany, and the Netherlands which influences production costs. Intra-EU trade data on organic poultry are not available. Magdelaine and Riffard (2010) compared a French system (ground level 6 animals/m<sup>2</sup>) with a Dutch one using multilevel systems (9 or 15 animals/m<sup>2</sup>). The difference found in production costs was mainly due to the difference in cost of feedstuff and not the investment costs. However, the investment costs in the multilevel systems can be much lower than the ground level system. According to Magdelaine and Riffard (2010) housing costs represent just 5 % of the total production costs. The potential distortion of competition related to the housing conditions is therefore likely to be low, but organic egg production is characterised by relatively low profit margins and the need to tightly control costs of production.
- **Definition of 'factory farming' for the use of non-organic fertilisers** (Article 3 Regulation (EC) 889/2008): The Regulation states, where the nutritional needs of plants cannot be met by good cultivation practices and crop rotation, farmyard manure<sup>41</sup> may be used, as long as it is not sourced from 'factory farming origin'. Yet, factory farming is not defined and therefore different interpretations exist throughout the EU, either on national or control body level. Factory farming is often defined as land-less livestock production (Czech Republic, Denmark, Estonia, France, Italy and Poland); by a maximum stocking rate (e.g. Austria: 2 livestock units (LU)/ha; Germany 2.5 LU/ha; Czech Republic: 3 LU/ha) or by a total number of livestock units (max. 150 LU in the Czech Republic). These definitions also consider other criteria such as the dependence on external inputs or the lack of respect for the basic principles of animal welfare to qualify for 'factory farming'. Other Member States prefer to give positive lists of what is authorised as non-organic manure (Bulgaria and the Netherlands) or a combination of both (e.g. France). A wide consensus exists to favour manure from extensive farming, yet the rule is applied in such varied ways that access to fertiliser material differs depending on the Member States and this could potentially lead to unfair competition (yet quantitative analysis is not possible).

### 7.3.6.2 Issues left to the discretion of national competent authorities

*Findings from the analysis of provisions and other information*

The Regulation provides a list of issues to be implemented according to the principle of subsidiarity: EU Member States can define their own criteria with regard to their national context

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<sup>41</sup> Farmyard manure, dried farmyard manure and dehydrated poultry manure, composted animal excrements, including poultry manure and composted farmyard manure included and liquid animal excrements (Annex I Reg. (EC) 889/2008).

and priorities. Whereas it is sometimes necessary to leave room to adapt the rules to their climatic, geographic and/or social conditions, the rules mentioned in this section are examples of potential distortions of the competition within the EU. The following areas were identified:

- **Definition of slow growing strains and minimum slaughter age:** The Regulation states that broilers should either a) not be slaughtered before the age of 81 days, or b) belong to slow growing strains; and here EU Member States have the responsibility to define slow growing strains. In the countries where poultry product case studies were conducted, the definitions are a mixture of specified strains and/or maximum daily weight growth, ranging from 35 g/day (e.g. in France, Denmark) to 45g/day (e.g. in Poland and the United Kingdom). In Czech Republic, Bulgaria and Spain, the definition is set exclusively through a list of slow growing strains and Estonia applies only the 81 days rule. These varied definitions induce differences in production costs: for example, a 3 kg chicken grown at 35 g/day is slaughtered approximately at the age of 86 days; grown at 45 g/day, it is already slaughtered at 66 days. As there is no access to trade data for organic broilers, it just can only be assumed that a different definition potentially creates unfair market conditions.
- **Time during which poultry runs must be left empty between batches** (EC 889/2008 Article 23(5)): Member States were expected to define the minimum time during which poultry runs must be left empty for vegetation to recover/regrow. The times implemented vary significantly: 14 days (Bulgaria), 28 days (Austria, Poland), 40 days (Spain, Italy), 56 days (France), 60 days (in Denmark, the United Kingdom or the Netherlands for laying hens).<sup>42</sup> As a result, the required open-air areas may vary significantly to satisfy the rule and ensure continuous production, therefore potentially creating distortion in competition. This has been particularly reported in the case of Denmark, which implemented a rather strict rule (60 days) compared to other countries.
- **The use of conventional seeds:** Flexibility under Article 45(1)(b) of Regulation (EC) 889/2008 allows Member States to authorise the use of non-organic seeds. Yet, the national implementation of the seed-database system appears to be uneven according to the Member States (see Section 7.3.4.4 above). Authorisations for the use of non-organic seeds mean a financial benefit for the respective farmer. Deleuran (2011) states that a major obstacle for an increased use of organic seeds is the higher price compared to conventionally produced and non-treated seeds. However, the importance of this price difference seems to be dependent on the crop species and seed sourcing decisions also depend on the size of the farm: in several countries (e.g. United Kingdom, France) smaller producers usually use a higher percentage of organic seeds than larger ones. A thorough analysis of seed costs (organic and non-treated conventional) in the different Member States would be necessary to assess whether the impact of the seed market on competition is significant. Producers in countries with low availability are likely to have a competitive advantage.

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<sup>42</sup> In other countries there are no specifications: Germany, Estonia, Czech Republic, and Slovenia.

### 7.3.6.3 Issues arising from national regulations applying to general agriculture

#### *Findings from the analysis of provisions and other information*

Like all farmers, organic farmers are subject to their national legal system, which in some countries may increase the level of constraints and possibly costs of production for organic producers. The main issue causing distortion of competition in this area is the access to pesticides. The EU Regulation provides a positive list of authorised plant protection products.<sup>43</sup> The use of these products depends on national market authorisation schemes, which are not harmonised and cause some significant differences. For example, the United Kingdom has accepted most of the products listed in the Annex, whereas in France, Denmark and Poland a wide range of products is not authorised (e.g. Pyrethrins, extracted from 'Chrysanthemum cinerariaefolium' are not permitted in Denmark and Poland). Even without taking climatic differences into account, this impacts production conditions and productivity of horticultural producers in the different Member States.

### 7.3.6.4 Issues arising because of lack of flexibility to respond to different regional conditions

Fair competition could potentially also be impaired due to the harmonized standard not allowing national/regional flexibility to respond to different climatic or geographic conditions that exist throughout EU.

#### *Views of stakeholders*

Stakeholders in Austria, Denmark, France, Germany, the Netherlands and in Spain were concerned that setting a level playing field with common rules is difficult, because the conditions vary between different Member States. Beside general concerns, the following examples were mentioned in the case studies countries, but due to a lack of additional information no further exploration of the potential distortion was possible:

- **Thresholds for the application of plant protection products:** The thresholds set for the application of the authorized plant protection products of sulphur and copper (in Annex II of Regulation (EC) 889/2008) do not allow farmers to respond adequately in areas that have a high disease pressure for fungal diseases. This was mentioned by an organic producer organisation in Austria in relation to the use of sulphur for wine growers and by a farm advisor

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<sup>43</sup> To be used if plants cannot be adequately protected from pests and diseases by the use of adequate varieties, rotation and cultivation techniques (Annex II of Regulation (EC) 889/2008).

(of the organic farming department of a federal chamber of agriculture) in Germany in relation to use of copper for potato growers.

- **Regional differences in how mandatory outdoor access for poultry is implemented:** The representative of an organic egg business group in France and the control body of a federal state in Spain were concerned that the climatic conditions in the North allow poultry producers not to have to offer mandatory outdoor access for poultry and thus also not have to struggle with the build-up of disease pressure in the outdoor run.
- **Climatic conditions in the South:** The competent authority of a federal state in Spain was particularly concerned that the constraints they face in producing forage because high temperature and shortage of water are not sufficiently recognized.

### 7.3.7 Consistency of the production rules across sectors

Evaluation Question 2 asks to consider also the consistency of provision across the sectors for which rule have been developed. Previous sections of this report have illustrated differences in the implementation of the rules with respect to crops and livestock production. This section looks at the provisions and highlights additional examples mentioned by stakeholders.

#### *Findings from the analysis of provisions*

Table 7.5 shows the number of exceptional rules foreseen in Article 22 of Regulation (EC) 834/2007 that are at present implemented according to Regulation (EC) 889/ 2008 and compares the numbers between different sectors. It shows that a higher number of rules are in force for livestock as for crop production, whereas two exceptions foreseen (Use of food and feed additives produced by GMOs or required by other EC law) are not implemented.

**Table 7.5:** Number of exceptional rules that are in use for specific sectors based on Regulation (EC) 834/2007 and (EC) 889/2008

Exceptional rules in Regulation (EC) 834/2007 and Regulation (EC) 889/2008 used for specific sectors	Whole farm	Crops	Livestock	Processing
Climatic, geographical or structural constrains (Article 22 (2)a)	1	1	2	
Non-availability of organic farm inputs (Article 22 (2)b)		1	3	
Access to ingredients of non-agricultural origin (Article 22 (2)c)				1
Specific management in organic livestock (Article 22 (2)d)			1	
Use of specific processing substances (Article 22 (2)e)				1
Catastrophic circumstances (Article 22 (2)f)	1			3
Use of food and feed additives produced by GMOs (Article 22 (2)g)				
Use of feed and feed additives required by other EC law (Article 22 (2)h)				
<b>Total</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>2</b>

Source: Own allocation of exceptional rules to specific sectors.

Some inconsistencies were found regarding the level of detail in which specific production sectors are regulated, particularly the livestock rules, which are more detailed and prescriptive compared to the crop production rules (see also Figure 7.1). Whereas severe restrictions are in place regarding the use of inputs for disease control in crop production, the livestock sector has a comparably long list of allowed inputs if they are considered justified to avoid any suffering of the animal. Whilst there are restrictions for the use of inputs in farming, the processing rules do not contain much detail regarding how to ensure that the quality of raw materials is preserved throughout the whole supply chain. Since the main focus of the general principles of organic agriculture is aimed at farming, food processing may not be sufficiently addressed.

A further potential inconsistency is the fact that food products can be labelled as organic if 95 % of the ingredients are organic, whereas for feed products 100 % organic is the stated aim (with exceptions until 2014 in place).

There is also inconsistency in access to market because of the conversion rules. Second-year in-conversion products from arable and forage production can be used as organic animal feed, whereas in orchard production a three-year conversion period applies and there is no possibility to sell in-conversion products on the organic market.

## 7.4 Judgement and conclusions

Based on the results presented in the section above, **it is concluded that the production rules are generally adequate in terms of achieving the global objectives of the Regulation and the objectives of organic production**, as laid down in Council Regulation (EC) 834/2007, taking the following into account:

- There is sound scientific evidence that the Regulation has established a framework which guides farmers to adopt practices supporting the aims of organic agriculture of contributing to higher levels of biodiversity, increased soil fertility and minimizing water and air pollution. Some of these effects can be directly linked to the rules laid down in the Regulation, and some are derived from stricter national and private standards of certain Member States.
- However, the production rules do not fully limit the intensification of some production sectors, such as housing conditions for poultry (despite the existence of detailed rules) or greenhouse production (with no common implementing rules at EU level). Also, some objectives stated in the Regulation addressing the whole sector (e.g. responsible use of natural resources) and some terms (e.g. ‘sustainable development’, ‘respect for natures systems and cycles’, ‘sustainable use’, ‘region’ or ‘factory farming’ in relation to input use), which could have a potential impact on intensification, are not further defined.
- The production rules form a good basis for producing products of high quality and satisfying consumer demand for a variety of food products.

- The system of exceptional rules, established to allow regional differences in climate, stage of sector development and specific husbandry practices to be taken into account, seems to be not fully adequate. A definitive judgement is difficult because of a lack of reliable data on the availability of organic supplies, but for some sectors the present system appears to hinder rather than support development and increased use of organic supplies.
- The GMO provisions are adequate to ensure the lowest possible adventitious presence of GMOs in organic products. Very few cases of contamination were reported over the past years. However, stakeholders are concerned about the constraints and additional burdens if the labelling thresholds were to be lowered further (mainly due to higher costs for separating and analysis). There are concerns about future availability of GMO-free ingredients (in particular some enzymes and vitamins B2, B12 and ascorbic acid), as well as the reliability of GMO-free vendor declarations.
- The common framework of production rules appears to provide generally a good basis for fair competition among producers. The analysis of provisions and other information indicates however for some areas (such as definition of 'region' in relation to feed use or 'factory farming' for manure use) the absence of precise definitions has a potential negative impact on fair competition, but the lack of data does not allow firm conclusions to be drawn. Further market analysis and the collection of comparative data of costs of production in different Member States would be necessary to carry out an objective assessment.

### Detailed considerations

Organic production is an integrated farm management system which aims to contribute to high levels of biodiversity, preserve natural resources (energy, soil, water, climate and air), respect high animal welfare standards and produce high quality food in response to consumer demand. The underlying principles of organic production are operationalized by production rules which provide the legal definition of organic farming in the EU. This evaluation question examines whether the production rules are adequate to achieve the objectives of organic agriculture, as well as to ensure fair competition among producers and consumer confidence.

The judgement is based on several criteria which were deduced from the model of intervention logic and the background of the evaluation question. The most frequently used indicators were the provisions in the Regulations (EC) 834/2007 and 889/2008, specific provisions in the national rules and selected private standards in 13 case study countries, consensus in scientific literature and results from relevant EU projects, as well as responses to the consumer survey and stakeholder/expert opinions on the subject.

#### *General structure and scope of the production rules for farming and processing of food and feed*

The general structure and scope of the production rules has mainly generated a harmonised concept of organic production in the EU.

The scope of the production rules is covered in different articles of both Regulations (EC) 834/2007 and 889/2008. The rules cover agricultural products (food and feed), vegetative propagating materials and seeds, yeast (for food and feed) and products from aquaculture (Article 1 of Regulation (EC) 834/2007). All Member States have implemented the existing EU legislation on organic farming in national law. For agricultural products not covered by the implementing rules (such as additional animal species, other aquatic plants or micro-algae) Member States are free to apply their own rules, but the number of additional provisions identified in the case study countries is limited. Thus, a basic precondition for promoting a harmonised concept of organic production is fulfilled.

Stakeholders who work more closely with the Regulation (e.g. control bodies or competent authorities) feel that stating objectives and principles in the Council Regulation has contributed to creating a common understanding of the core concept of organic farming, but this opinion is less widespread among producers or organic business groups (e.g. traders or retailers). Some of the private standards state additional aims and objectives of organic farming, for example related to social and economic sustainability, which are at present not part of the Regulation, indicating that there are differing expectations as to what organic farming can and should deliver. Some control bodies are uncertain as to whether objectives and principles are legally binding. Producers, traders or retailers have no direct contact with the EU Regulation, and rely on the interpretation of the rules through their control bodies and farmers' associations. This indicates that objectives and principles are not communicated directly to all involved parties. There is no guidance for operators in areas where different interpretation is possible.

The objectives of organic farming stated in the Regulation use some terms that are not very well defined and therefore challenging to operationalize in control procedures. Such terms include 'sustainable development', 'respect for nature's systems and cycles', 'sustainable use' and 'product quality'. In some cases, the lack of precise definitions creates challenges for a harmonised implementation of the organic principles in the translation into rules. Also lack of specific provisions for the management of natural resources (water, air or energy) implies that the producers' individual choices are crucial in ensuring that the objectives of the Regulation are met.

#### *Establishing a sustainable management system of agriculture*

The production rules are adequate to establish a sustainable management system of agriculture. It is worth noting that organic practices are also influenced by national and private standards in force (which might be stricter in some areas than the EU Regulation); an isolated analysis of the EU Regulation alone is not always possible.

The EU Regulation and national organic legislation have established a framework that guides producers to establish an agro-ecosystem management that induces synergistic environmental effects, but rules that have particular impact on each of the stated objectives are in several places and their link to the objectives is not always clearly evident.

The Regulation thus has contributed to its objective of **respecting nature's systems and cycles**. However, differences in interpretation of some unclear provisions can lead to variable application, hindering the full potential of the impact of the Regulation. For example, the Regulation does not guarantee the link between livestock production and the land, by requiring only a limited part of the feed to be produced on the farm itself or in the same region (where 'region' ranges from NUTS 2 to EU-level in the different countries). This enables organic livestock production to develop independently from crop production. Other examples of issues lacking clarity/definition are sustainable crop rotations (which ensure diversity over time and thus maintain soil fertility, humus content and reduce pest, disease and weed pressure), the authorisation of growing plants in substrate, without direct connection to the soil or defining substrate requirements. Examples of very intensive rotations (e.g. soya/soya/wheat) or monocultures of vegetables (tomatoes as main crop every year in greenhouse production) being certified were reported in the case studies.

There is sound scientific evidence that organic production practices have a positive impact on **biodiversity**. Some can be directly related to rules (e.g. ban of synthetic N fertilisers, herbicides, strict limitation on other fertilisers and crop protection products, use of multi-annual crop rotations including legumes, limited stocking density) whereas others are the result of frequently used production practices or stricter private standards (e.g. shallow tillage, higher presence of hedges, trees or grass strip corridors, higher prevalence of spring sown crops). Together they significantly contribute to increases in the abundance of plant, bird and predatory insect species. Further improvements could be made by providing further guidance as to what biodiversity attributes are aimed at and which practices have a positive impact on reaching higher levels of biodiversity or addressing rare and endangered species.

Several studies have shown that the prohibition of some and strict limitation of other, chemically synthesised inputs and the incentive to use forage rather than concentrated feed for livestock have a direct impact on the **use of energy**. However, there are no further rules that directly address the sustainable use of energy (e.g. for greenhouse production, processing, packaging or transport). Scientific literature also shows that the restrictions applied by the production rules have some positive impact on limiting **water and air pollution** (like decreasing nitrogen leaching, eutrophication and CO<sub>2</sub> emissions) which derive from rules restricting the use of synthetic inputs and requiring good management practices. Furthermore, there are no rules directly addressing **water use** except for aquaculture. The objectives or the rules do not directly address climate change, but the literature reveals potentials with regard to lower greenhouse gas emissions per hectare and higher organic carbon concentrations. The obligation to use organic fertilisers and manure contributes directly to **soil health** and **quality**, even though the amount of legumes to be used and the diversity of the rotation are not further specified. The review of scientific literature reveals further that individual management decisions at farm level influence the impact of the rotation and the use of machines (e.g. cultivation for weed control) on soil structure.

The review of scientific literature reveals that **animal welfare** on organic farms is already on a high level compared to requirements of the general EU legislation. However, some provisions of the Regulation are discussed critically in the literature and among stakeholders, such as the stocking densities in houses which are less restrictive than some private standards, a requirement for more animal-specific feeding requirements, and the need for specific transport and slaughtering rules. Some tools for monitoring welfare outcomes for self-evaluations of farmers, as well as part of control visits and introducing minimum requirements have been proposed in the literature and by stakeholders to improve animal welfare conditions on organic farms. The analysis identified some areas where greater clarity or guidance on how the objectives are to be translated into operational rules would increase the coherence of organic production practices with the principles: land-based livestock production, crop rotation, biodiversity and animal welfare, greenhouse production, energy use, water management and social aspects. This might also allow for a more consistent application of the rules across all Member States.

#### *Producing products of high quality in response to consumer demand*

The production rules are adequate for providing varied and high quality products and satisfying consumer demand for a variety of goods. Regarding **food safety**, the rules restricting the use of pesticides and synthetic fertilisers result in lower residues in organic products and contribute directly to this objective. There is no strong scientific evidence of an impact of organic practices on the **nutritional** and **organoleptic value** of products. Nevertheless, a clear majority of consumers in six countries surveyed and stakeholders in the 13 case study countries share the opinion that the production rules contribute to delivering products of high quality and in response to consumer demand. Nevertheless, nearly half of the consumers surveyed stated that at present they can buy many, but not all, the products they would like in organic quality.

#### *Justification for exceptional and transitional rules*

The justification for exceptional and transitional rules is not fully adequate. The Regulation justifies the use of exceptional rules on the use of non-organic inputs (young poultry, feed and seeds) with a need to address problems of limited supply of organic inputs. Such rules should be time limited. They could be justified if there is no negative impact on the development of organic supplies, if they do not disadvantage some producers or go against consumers' expectations. Because of lack of data on these issues, the impact of the exceptional rules could not be assessed in sufficient detail to come to a well-founded judgement. The following judgement is therefore largely based on expert and stakeholder views in the case study countries, and data from the national seed databases. All exceptional rules for the use of non-organic inputs contradict the principle of preference for organic inputs (Article 4(b)), and there is no evidence that the present system has helped to develop the organic supplies. However, removing exceptions would potentially contradict the objectives of organic production to use adapted local varieties if such varieties are only available in conventional quality.

Apart from Denmark, the exceptional rule for the use of **non-organic young poultry** (currently not time limited), and for the use of 18 week-old **part-organic pullets** for egg production (due to

expire 31 December 2014) are both extensively used in the case study countries; only Denmark has already abandoned this option. Elsewhere the sector uses non-organic chicks and relies on pullets (for layers) that have been fed with organic feed since the first day of life. The level of undersupply and progress made over the past years could not be assessed because of a lack of data. According to stakeholders, the existence of the exceptional rule itself and the lack of an EU standard for pullet-rearing hamper the development of organic supplies for organic pullets.

There is not sufficient data available on the scale of use of **non-organic feed** in organic agriculture or the availability of organic supply to carry out a quantitative analysis of the extent of use of this rule. There is a general consensus among many organic producer organisations, processors and traders, that organic protein crop production (at EU level) is insufficient to meet the demand; and that most monogastrics-breeders make use of the exceptional rule that allows 5 % of the feed to come from conventional high protein crops or industrial by-products (such as potato or maize protein). Transition to 100 % organic diets would require the development of organic supply chains at EU level. If this is not the case, it is likely to lead to increased reliance on extra EU-imports in the short and medium term, which would contradict the aim of local sourcing of feed. Alternative protein supplies are already being developed: methods to produce methionine via enzymatic fermentation based on organic raw materials, or the use of insect larvae or algae as protein source for feed. These new techniques seem to be very promising, but they are not ready for broad practical use yet.

The exceptional rule for **non-organic seeds** remains necessary to provide varieties adapted to the local conditions as required by the crop production rules, even in Member States (e.g. Austria, Germany, Denmark, France) where the organic seed supply is reaching overall satisfactory levels (in particular, but not only, for fruit and vegetables and forage production with many different species and varieties). The current system did not lead to significant improvements in the supply of organic seeds at EU level. France and Denmark made significant efforts to push organic seed use forward and were able to develop (for some species) an organic supply that meets national needs. In order to increase the use of organic seeds, financial incentives (or constraints) in favour of organic seed production and use could play an important role. The seed database and the national reports appear to be useful tools to manage the exceptional rule system, but have some shortcomings mainly in relation to a lack of regular updates of lists of available species and varieties. Additionally, further guidance could be provided on organic seed production, and organic plant breeding methods/techniques could be described which are suitable for organic production and are in line with the objectives and principles.

Interviewed stakeholders have contrasting views and only little scientific evidence has been found on whether certain livestock rules such as tethering are in coherence with the animal welfare objective of organic husbandry systems. Thus, the evaluation results do not provide a robust basis for firm judgement of the adequacy of the **transitional measures** concerning animal housing. As far as the length of the transition period is concerned, this period is judged to be adequate taking into account a 20-year depreciation period and the fact that organic farmers

were able to apply for investment grants for reconstructions of livestock housings under rural development programmes.

#### *Impact of the GMO provisions*

The rules are adequate to exclude the use of GMOs and limit it to adventitious or technically unavoidable presence. The analysis of the consequences of the prohibition of GMOs in the 13 case study countries showed that very few cases of contamination with GMOs were reported in 2011 and 2012. There is some evidence in the literature that lower thresholds, as implemented, e.g. in Austria and France, would lead to higher costs and difficulties related to the availability of specific GMO-free ingredients. GM-co-existence rules and requirements play an important role in protecting organic products from possible contamination with GMOs. Mainly due to subsidiarity issues, there is however strong variation in implementation regarding GM coexistence rules and requirements at national/regional level. Some countries have not implemented these rules (like Poland, Slovenia, the United Kingdom), whereas for example Austria and Denmark have elaborated genetic engineering precaution laws and guidelines for operators. Because of the global increase of GM crops, it is likely that more sectors will be faced with the challenge of an increased risk of GMO-contamination. This will lead to increasing costs to further realise the 'prevention-strategy' which is currently adopted by most companies of the (organic) food industry in the EU even if very few (or no) GM crops are cultivated in the EU. In general, the rules were seen by many stakeholders as adequate, but a significant number of stakeholders express concerns regarding additional burdens arising from higher costs for analysis and control, separation in processing and logistics, seed production and handling, as well as concerns about the availability of certain critical ingredients (additives, enzymes and vitamins).

#### *Impact of the production rules on fair competition*

The production rules are mostly adequate to ensure fair competition by providing a broad and solid common ground of harmonised rules that apply to all producers. Distortion of competition may however occur if different implementations of the Regulation affect production costs, giving competitive advantages to operators in some countries. These arise from a) the lack of detail in the rules (e.g. no rules for greenhouse production); b) lack of definition of certain terms at EU level (e.g. 'region' in the origin of feed, stocking densities in housing for poultry, use of non-organic manure from factory farming); c) issues that are left to the discretion of EU Member States (e.g. definition of slow-growing strains of poultry) and d) issues arising from national rules, namely licensing of plant protection agents. Impact is probably limited in some cases, but due to the lack of production cost and market data, assessing the actual level of potential distortion was not possible. The same applies also to the question whether setting a level playing field with common rules sufficiently respects different climatic or geographic conditions without negatively affecting the fair competition among organic farmers. If sufficient data were available, it would be relevant to also consider the cumulative impact of the whole regulatory framework (e.g. for vegetables: greenhouse production rules, seed availability, fertilisation and pesticide regulations); this could be more significant when accumulated, even if the impact of each individual rule appears to be limited.

The most prominent example of distortion because of differences in the general legal framework for agriculture impacting on organic producers is access to plant protection products. This varies between countries because the marketing of these products is managed through national market authorisation schemes that are not harmonised at EU level. Significant discrepancies have been identified at a national level in several countries. Some have not authorised the use of many pesticides which are allowed in the annex of Regulation (EC) 889/2008 (e.g. copper salts, pyrethrins, neem extracts). This has a significant impact on the production conditions in the different Member States, particularly in horticulture and fruit/wine production.

*Consistency of the rules across the different sectors*

The rules are largely consistent across the different sectors, but some inconsistencies were found in the Regulation regarding the level of detail in which specific production sectors are addressed, with the livestock rules being much more detailed compared to the crop production rules. Crop production also has severe restrictions regarding the use of inputs for plant protection (disease control). For livestock, the desire to avoid any suffering of the animal has resulted in several treatments being permitted. The stated principles of organic production are mainly aimed at farming. The processing principles and rules contain very limited detail to ensure that the quality of raw materials is preserved throughout the supply chain, or that responsible use is made of natural resources (such as energy). Further, the Regulation does not fully succeed in limiting the intensity of some specialist production systems, such as poultry or greenhouse production. Different labelling requirements exist for organic food products (<95 % for food) but aiming for 100 % for organic feed.