Organic farming is based on a set of principles that are related to nature, environment, food production, farming and society. These principles are to be implemented in practice by standards and regulations. European countries implemented EU Organic Farming Regulations (EC) No 834/2007 and (EC) No 889/2008 that provide common minimum standards for housing conditions, animal feeding, use of veterinary medicine and animal care, etc. However, to a certain degree these common EU regulations provide flexibility in some areas of livestock production. This flexibility in the rules allows organic principles to be implemented in different EU countries that have huge variation in local agro-ecological, cultural, social, economic and technical conditions. Differences in the regulations reflect differences in local conditions such as climate and culture, as well as the level of development of organic agriculture and the standards themselves. Size, structure, productivity, profitability and policy environment surrounding typical organic farms differ widely between countries. Some countries have more stringent organic standards than those specified under common EU regulations, which may lead to higher production costs and lower competitive ability. The principles and level of subsidies being paid to organic farmers in the EU also vary to a great extent (Stolze and Lampkin, 2006).

In organic farming, animal husbandry is often understood in terms of natural living (Lund, 2006). That includes the possibility for the animal to perform natural behaviour, getting feed adapted to its physiology and living in an environment similar to that to which the animal is evolutionarily adapted. One of the main and basic principles of organic farming is that animals are kept as part of the whole production system and their nutrition should be based on locally grown organic feedstuffs. Aiming for a high level of self sufficiency, the feed should preferably be obtained from the same holding where the animals are kept. In countries with well-established organic production, it is possible to purchase feed so that animals can be fed 100% organically, but the feed is not always locally grown.

General Livestock Production Standards Affecting Feeding Strategy

As a general rule, all natural (non-synthetic) feed substances are allowed in organic production and all synthetic substances are prohibited. Organic farming standards are to a large extent devised around the concept that animals should be able to live their lives as naturally as possible,
meeting their biological and ethological needs. Feeding synthetic amino acids is forbidden not only because they are synthetic but also because the production of these feed additives involves the use of several chemicals and energy. For instance, synthetic production of DL-methionine involves a number of toxic source chemicals and intermediates (West Virginia University, 2009). Each of the several manufacturing processes used to produce DL-methionine creates an additional load to the environment. The methionine production process is listed by the U.S. Environmental Protection Agency as a hazardous air pollutant. The approach of natural living in organic farming is not just avoiding chemicals, it is also about respecting ecological principles and the integrity of living nature as a whole.

Feed is intended to ensure high quality of the products rather than maximising production, while meeting the nutritional requirements of the livestock at various stages of their development. The probability of feeding-, health- and welfare-related problems increases with higher levels of production. Fattening practices are authorised in so far as they are reversible at any stage of the rearing process. Force-feeding is forbidden. Positive measures such as minimisation of veterinary medicines, free-range outdoor systems, grazing, feeding natural and organic feed with no synthetic additives should be practised to secure high quality of animal products.

Organic animal health management should be based on prevention of diseases. Adequate diets and breeds, good housing conditions and sound management practices should provide the right environment for organic animals to maintain good health. Preference should be given to indigenous breeds and strains of animals. Basically all high-yielding and fast-growing modern animal breeds have certain health problems that are caused by selective breeding and therefore are not recommended for organic conditions. Animal breeds with very high productivity levels also have high nutrient requirements that are difficult to meet using 100% locally grown organic feed. Choice of animals for an organic farm should be based on their vitality, long productive life and resistance to disease (Pryce et al., 2004).

All animals must have access to pasture or an open-air exercise area (Figure 39.1) which may be partially covered, and they must be able to use this area whenever the physiological condition of the animal, the weather conditions and the state of the ground permit.

From an ethological point of view, regular access to outdoor areas is seen as an essential requirement for livestock. Another reason is that permanent outdoor access is considered better for animal health. Outdoor pasture must be of sufficiently low stocking density to prevent poaching and overgrazing. EU regulations restrict the maximum stocking rate to an equivalent of 170 kg N/ha. Minimum indoor and outdoor surface area and other characteristics of keeping in the different species and types of production are defined in EU regulations. Periodic changing or switching the outdoor area is recommended since it reduces the risks of parasite infections. The final fattening phase of animals for meat production may take place indoors, provided that this indoor period does not exceed one-fifth of their lifetime and in any case for a maximum period of three months.

All young animals (mammals) must be fed on natural milk, preferably maternal milk for a minimum period, depending on the species concerned:

- 3 months for cattle
- 45 days for sheep and goats
- 40 days for pigs

Roughage, fresh or dried fodder or silage must be added to the daily ration for pigs (Figure 39.2) and poultry. Pigs
and poultry are omnivores, like human beings, and grass is a very natural part of their diet. Omnivorous animals have a single stomach and cannot digest cellulose well. Forages for pigs need to be young and leafy, with less stems and straws. Older pigs can eat and utilise all forages sufficiently, but young pigs need more of the high quality grain and protein.

Rotational grazing on high quality pasture, supplemented with local grains and legumes can be recommended on organic pig farms. Forage species, maturity, growing conditions and grazing habits of pigs all influence the nutritional value of the forage consumed. Animals on pasture may grow more slowly and require more feed per unit weight gain due to high fibre intake and increased exercise compared with conventional animals. Insufficient amino acid supply in feeding pigs and poultry with locally grown feed is one of the biggest challenges in organic farms where monogastric animals are raised.

Sources of Feedstuffs

EU regulations require that 50% of the feed for herbivores be obtained from the farm itself or, if that is not possible, produced in cooperation with other (local) organic farms. The meaning of this principle is to conserve energy resources by reducing feed transport and to encourage producers to design their organic holdings or groups of holdings as whole farm systems with relatively closed production cycles, minimising inputs and so conserving resources for sustainable best practice. Therefore, crop rotations must be well planned considering animal needs, soil quality, climatic conditions and technical requirements of the farm.

Up to 30% of the feed formula of rations on average may comprise ‘in conversion’ feedstuffs. When the ‘in conversion’ feedstuffs come from an on-farm unit, this percentage can be increased to 60%. Although all animals should be fed organic feed, this has not been possible for many years due to shortage of supplies. Therefore, a limited proportion of conventionally grown feed has been permitted. For a transitional period, the use of a limited proportion of conventional feedstuffs is authorised when the farmer is unable to obtain food exclusively of organic origin. The maximum percentage of conventional feedstuffs authorised per year for pigs and poultry is 5%, calculated annually as a percentage of the dry matter of feedstuffs of agricultural origin. In the near future this proportion will be gradually reduced until total removal. The maximum percentage of conventional feed in the daily ration must not be more than 25%, calculated as a percentage of the dry matter. Since 1 January 2008, all ruminants (cattle, sheep and goats) and herbivores in EU must be fed 100% organic feed as consumers expect that animals used for organic food production are fed 100% organic feed products.

Rearing systems for herbivores are to be based on maximum use of pasturage according to the availability of pastures in the different period of the year. At least 60% of the dry matter in daily rations is to consist of roughage, fresh or dried fodder, or silage. In dairy cows the risk of nutrient undersupply is higher during the 2-3 months of lactation, when energy intake is lower than is needed for daily milk production. As a result, body reserves are used to compensate for this energy deficiency and animals lose body weight. When the energy content of the feed is low then using body reserves will exceed physiological limits, resulting in an increased risk of metabolic and fertility problems (Zollitsch et al., 2004). To avoid or reduce these problems on organic farms, according to EU regulations the roughage proportion in the diets can be lowered to 50% during the first 3 months of the lactation, so
the amount of energy-rich concentrates can be increased. However, problems related to the feeding in early lactation are still very common in organic dairy farms where high yielding animals are used. Ensuring high quality and nutritional value of roughage has extremely high importance in organic dairy farms. Diets based on early harvested, high quality roughage are primary inputs for high milk yield, limited use of concentrates and higher economic returns.

**Limitations on raw materials**

Feedstuffs, feed materials, compound feedstuffs, feed additives, processing aids for feedstuffs and certain products used in animal nutrition must not have been produced with the aid of genetically modified organisms or products derived therefrom. Genetically modified organisms are prohibited from use in organic farming because of the unpredictable nature of the technology and the risks to health and the environment. GMOs are incompatible with the concept of organic production, as well as consumers’ perception of organic products.

Conventional feed materials of plant origin can be used only if listed in EU regulations and only if they are produced or prepared without the use of chemical solvents. For instance, soybean meal, the most popular protein feed in the world, is not listed in the regulations since during its production process chemical solvents are used. The list of permitted conventional feedstuffs in the regulations will be reviewed at certain intervals with the aim of removing, in particular, conventional feed materials of agricultural origin produced organically in sufficient quantities in the EU.

Feed materials of animal origin, whether conventionally or organically produced, can only be used if listed in the regulations and quantitative restrictions must be considered. There is a limited list of feeds of animal origin (dairy and fish products) permitted for feeding to livestock. Certain items on this list are permitted to be fed only to non-herbivores.

Feed materials of mineral origin, trace elements and vitamins can only be used if listed in the regulations. Organically grown feedstuffs may contain higher levels of some minerals and trace elements, but their variability is high and data are still relatively scarce. Monogastric animals like pigs and poultry at pasture can also consume significant amounts of soil, which provides minerals and trace elements. The use of synthetic vitamins is only permitted for monogastric animals. The use of synthetic vitamins of types A, D and E for ruminants is allowed under limited conditions.

Additives such as enzymes, micro-organisms, binders, processing aids can also be used if listed in EU regulations. In a case of essential need or for a particular nutritional purpose there is a list of feed additives and processing aids that are permitted for use in organic farming.

To ensure high quality of the products, additives such as antibiotics, coccidiostatics, medicinal substances, growth promoters or any substance intended to stimulate growth or production may not be used in organic animal feeding.

**Conclusions**

The way feed production and feeding takes place is a key element in organic livestock farming. The principle aim of organic production is that a harmonious balance between crop production and animal husbandry be established and that the biological cycles within the farming system be encouraged. Many organic farmers still rely on external sources of feed for their animals, particularly cereals and protein crops. Since the introduction of the 100% organic feeding rule for ruminants in EU and the rise in fuel and feed prices seen in recent years, the need and costs of purchasing organic feed have risen significantly, requiring farmers to reassess their feeding systems.


Chapter 39


Chapter 40


Chapter 41