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## An overview of organic pig farming in Romania

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**Abstract.** Consequently to the growth of the organic sector worldwide and at European level, it was necessary to compare and analyze this situation in Romania. Taking into consideration that Romanians are majorly pork consumers, clarifications in this field are needed. This study proposes itself to briefly discuss the major aspects of organic pig farming in Romania, beginning with the regulatory framework and present national policies, continuing with main requirements regarding housing, feeding, health and welfare and ending with details about marketing and merchandising of the organic pork products. Considering the past years' growth of organic products on the European market and that the average pork consumption in Romania is above 50% in comparison to meat provided by other farm animals it is interesting to notice that the national organic pork products production decreased, fact demonstrated by the pigs' herds raised by organic farming regulations. One of the explanations might be the higher costs of the organic products and the present financial situation. Although none of these justifies the decrease because there is commodity market here and abroad and the advantages of organic farming are obvious to the environment as to consumers. So, at the moment Romania is at a crossroad because even though the possibilities are numerous (clean and unfertilized fields, traditional breeds suitable for organic farming, funding for the implementation and development of this sector, demand for such organic products) the organic pork meat production does not follow an ascendant tendency as waited. A series of studies clearly shows the advantages of organic farming and highlights the consumers' preference towards organic food; subsequently we are waiting for a change of perspective from producers, processors, importers, exporters and consumers from Romania towards organic pork products. It is notable as well that data regarding organic activities in Romania are not decisive, although non organic producers are registered under the Council Regulation No. 834/2007, certified and inspected on European and national policies.

**Key Words:** organic pig farming, legislation, organic pork products.

**Introduction.** According to the Food and Agriculture Organization approach (FAO 1998), organic or ecological agriculture is a holistic system of agricultural production management, which promotes and improves the health of agro-ecosystems, including biodiversity, biological cycles and soil biological activity. This type of agriculture emphasizes the use of regional management conditions that require locally adapted systems. Such could be done by using, where possible, cultural, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system.

Regulation (EC) No. 834/2007 defines organic production as a global agricultural and food production management system, which combines best environmental practices, a high level of biodiversity protection, natural resource conservation, applying high standards of animal welfare and a production method in accordance to the preferences of certain consumers for products produced using natural substances and processes.

Codex Alimentarius Commission considers that organic production system is designed to: improve biodiversity in the entire system, increase soil biological activity, maintain long term soil fertility, recycle plant and animal origin waste in order to restore the nutrients to the soil, minimize the use of non-renewable resources, promote the healthy use of the soil, water and air, minimize all forms of pollution that may result from agricultural practices, assure a careful management of agricultural products, with particular emphasis on processing methods to maintain ecological integrity and essential qualities of the product at all stages of processing, establish a conversion period for the farms which are to practice organic farming, period to be determined by specific factors

such as history of agricultural land, crop type and species of animals (FAO 2002).

As well the International Federation of Organic Agriculture Movements (IFOAM) established 4 principles of organic farming (IFOAM 2006): the principle of health, the ecological principle, the principle of fairness and of management.

Organic farming is the opposite of intensive farming and can equally be considered an alternative to traditional farming, as well as for the intensive, industrial farming. This type of farming definitely depends on the ecological factors targeting environment protection, plant health, animal health, food safety and last, but not least, consumers' health (Suteu 2011).

Organic farming involves giving up entirely the use of chemical fertilizers, pesticides and all chemicals administered in agriculture, necessary nutrients being provided through non-conventional means. In terms of agro-technical works, organic farming is against excessive mechanization in order to avoid soil compaction and deterioration of physical, mechanical and biological characteristics of the topsoil layer. As regard of technological and economic terms, organic farming does not require significant financial investment or large-sized farms, but requires a higher workforce. Although organic farming system productivity is quite low, average yields per hectare or per head are half of those obtained in conventional intensive agriculture; the efficiency of this system is justified by higher prices paid for green products, as well as its environmental benefits and consumer health (Constantin 2012). Thus, the same principles and ideas are applied in organic pig farming throughout the world.

**Evolution and Present Situation in the EU and Romania.** The European Commission through the Directorate General for Agriculture and Rural Development report from 2005 aims updating the previous note on organic farming and providing an overview of the development in the organic farming sector over the last years. Based on Eurostat statistical information and other sources, it analyses certified organic and in-conversion area (at EU-25 level in 2003 - 5.7 million (mio) ha and represented 3.6 % of the Utilised Agricultural Area), the number of certified organic and in-conversion holdings (at EU-25 level in 2003 - 149 000 holdings which represent 1.4% of total agricultural holdings), breakdown of crop area, livestock (at EU-25 level in 2003 - about 3 mio LU or 2.3% of the total EU-25 livestock), marketing channels and retail sales of organic products, farm-gate and consumer prices for organic and comparable conventional products and, finally, agri-environmental programmes, which support organic farming.

Another European Commission report from 2010 provides an update of the previous note on organic sector in 2005. It is developing at a fast pace in the EU: at EU-27 level in 2008 the organic sector amounted to 7.6 mio ha, representing 4.3% of UAA and 197 000 holdings which represent 1.4% of all holdings, but at Member State level, it varies between the cases of Bulgaria and Romania where it is below 0.1% and Austria where it stands at 12.2%. For animal production the organic sector tends to develop faster for the species which can be fed on the basis of grassland and roughage (cattle, sheep and goats) whereas for pigs and poultry feeding is a more complicated operation since grain and protein rich feedstuffs are necessary, only 0.5% of the EU pig herd is raised organically. The organic pig herd amounted to 0.9 mio head in 2007, the largest producer being Germany with almost 0.2 mio heads.

Also the report concluded that the weight of the sector is rather heterogeneous among Member States, but the European organic map has extended Eastwards and also Southwards in the past years. More and more, the organic sector has to be reckoned as a common feature of the agricultural sectors of all Member States. Most certainly, it no longer can be characterised as only a niche segment of the agricultural sector.

In Romania, from 2000 to 2010, organic agricultural land area increased 10.5 times (from 17,400 hectares to 182,700 ha) (EUROSTAT 2011). Although in Romania the area cultivated in an organic system has only 1.3% (FiBL 2012) of total agricultural area this is higher (182706 ha) than the surfaces in other Eastern European countries with high shares, such as Estonia 12.5% (112972 ha), Latvia 9.4% (166320 ha), Slovakia 9.0% (174471 ha) and Slovenia 6.3% (30696 ha).

Animal production in Romania has taken a drastic fall over the last 20 years and is

way too low compared to the other EU countries and in relation to its own natural resources and potential (Bogdan et al 2009). Livestock raised under organic production system are significantly reduced between 2006 and 2010, except laying hens, which increased by 400%. Thus, in 2010, compared to 2006, cattle herds are reduced by 52.8%, dairy cow herds are reduced by 71.7%, pigs herds by 80.6% and sheep herds by 78.2% (EUROSTAT 2012). The main causes of livestock decline mentioned above are the lack of organized selling markets for organic products, high costs for breeding and maintenance of animals, inadequate support from the public power for this sectors' development, especially until 2007, but also 2007 onwards.

In 2010, there were a total of 219290 registered organic producers of the EU-27, Italy, Spain, Germany and Austria, each registering over 10% of total EU-27 producers. From 2008 to 2010, the number of organic producers in the EU-27 increased by 11.6%, and during 2006-2010 the growth was of 22.2%. The highest rate of growth in the analysed period was registered in Bulgaria, 225%, Czech Republic, 265%, Poland, 124% and Sweden, 118%. By contrast, there are 4 countries (Denmark, Italy, Latvia and Romania) where the number of producers decreased, ranging from -1.5% in Romania to -12.5% in Latvia (FiBL 2012). The number of MARD registered operators in the organic farming system, in 2010, was of 3155 of which 3080 producers, 75 processors, 16 importers, 6 exporters, 58 other operators (wholesalers and retailers) (MARD 2010). After a platform period from 2006 to 2010, the latest data shows an increase in 2011, reaching 9703 operators (MARD 2012).

**Regulatory and Support Policy for Organic Agriculture.** Regulating and sustaining organic farming includes the legal and institutional framework, financial instruments designed to encourage the application of environmental measures and the practice of organic farming which are found both in the market measures as well as in the rural development within the CAP (Common Agricultural Policy) and the National Action Plans (Petrescu-Mag 2007; Constantin 2012).

**European legislation.** Community regulatory framework regulating the organic farming resulted in the adoption of Regulation (EEC) No. 2092/1991 concerning the way to obtain organic products and their presentation, as well as the presentation of food products, regulation adopted by the European Council on June 24, 1991. This Regulation was amended and supplemented several times, most important changes being made in 1999, when the Council has established Community rules for obtaining organic products of animal origin and has created a concrete framework so that the Community legislation should regulate in the future - Regulation (EC) No. 1804/1999.

In 2004, the European Commission adopted the 'European Action Plan for Ecological Food and Agriculture', when 21 concrete measures were established for achieving the objectives of organic products market development and improving standards by increasing efficiency, transparency and consumer confidence.

In 2007, Regulation (EC) No. 834/2007 on organic production and labelling the organic products repeals Regulation (EEC) No. 2092/91. The main provisions of this Regulation refer to: purpose, scope and definitions of organic farming, objectives and principles for organic production, production rules, ban of genetically modified organisms, the prohibition of ionizing radiation usage, products and substances used in agriculture and criteria for authorizing them, conversion criteria, production of processed feed, exceptional standards of production, labelling, controls, imports and exports of organic products.

Council Regulation (EC) No. 834/2007 on organic production and labelling of organic products regulates 14 specific principles, applicable to organic farming. Among those are: maintenance and enhancement of flora and fauna, as well as natural fertility of the soil; minimizing the use of non-renewable resources and off-farm inputs; recycling wastes from crops and animal productions; maintaining local or regional ecological balance in making decisions about production; maintaining plant and animal health; obtaining livestock green products from animals coming from organic farms; choice of breeds, given animals capacity to adapt to local conditions, resistance to diseases or other health problems; feeding the livestock with organic fodder and non-agricultural

natural substances etc.

Also in 2008 the Commission adopted Regulation (EC) No. 889, establishing the detailed rules for the implementation of Regulation (EC) No. 834/2007 on organic production and control of organic products. In 2009, the Commission adopted Regulation (EC) No. 710, establishing detailed rules for organic aquaculture livestock and seaweed production, which amends Regulation (EC) No. 889/2008 (Constantin 2012).

**National legislation.** In Romania, the concerns for organic farming are relatively recent; they manifested after 2000, by adopting specific legislative framework, adapted and harmonized to EU requirements (Mihai 2008).

During the pre-accession, the efforts of harmonizing Romanian legislation to the EU commenced with the adoption of GEO No. 34/2000 concerning organic foods, approved by Law no. 38/2001 (published in Official Gazette No. 172/21.04.2000) which regulated the scope of organic farming, organic farming authority, rules and general principles of organic production during the conversion period, the inspection system and the certification of organic products in Romania. Then, a number of normative acts followed, that regulated the labelling of organic products, advertising primary organic products and processed products, with references to the ingredients used in their preparation, inspection bodies' conditions for accreditation and certification in organic farming, import and export of organic food (Constantin 2012).

After 2007, the national legislation regulating the organic farming and organic products was materialized in 6 normative acts amended and supplemented (Order of Minister of Agriculture, Government Decision, Emergency Ordinance) which contain provisions on the objectives, principles and standards applied to organic production and processing aspects, labelling, trade, import, inspection and certification of organic production.

**Inspection and Control Bodies.** In Romania, monitoring and certification of organic products is currently provided by private certification and inspection bodies. They are approved by the Ministry of Agriculture, Forestry and Rural Development, based on criteria of independence, impartiality and competence established by Order No. 65/2010, approving the Rules of organizing the inspection and certification system, approval of the certification and inspection bodies, surveillance of control body's activity. MARDs' approval of inspection and certification bodies is preceded mandatory by their accreditation in accordance to European standard EN ISO 45011:1998, issued by a competent body for this purpose.

In Romania, 13 inspection and the certification bodies are operating, approved by MARD to conduct the inspection and certification of organic products, according to the provisions of the Ministerial Order no. 65/2010 (MARD 2012a).

Following the controls carried out by the inspection and certification bodies, the operators that have complied with the rules of production will receive a certificate of organic product, and they will be able to label their products with the specification 'ecological'. The following are required on the organic label applied on a product: the reference to the organic production, logos, names and code of the inspection and certification body that carried out the inspection and issued its organic product certificate (Constantin 2012).

**Financing in the Market Share and the CAP Rural Development Framework.** In the context of rural development, the schemes and support measures implemented in the 2011 campaign also include Agri-environment payments, Measure 214, 5th package Organic agriculture. Agri-environment payments are granted to farmers who take, on a voluntary basis, agri-environmental commitments for a period of 5 years from the date of signing the commitment. Rural development measures are measures included in the Axis II of the National Rural Development Plan (PNDR 2007-2013).

Another financial instrument was established by Decision no. 759 of July 21<sup>st</sup>, 2010, on granting specific aids in order to improve the agricultural products quality in the organic farming sector, as amended by Decision No. 1095/2010 and Decision No. 1303 of 15 December 2010 and Decision No. 590 of June 8, 2011. Specific aid for the quality

improvement of agricultural products in organic farming sector is given, in the form of additional annual payments, to vegetal and livestock production holdings that are registered in the organic farming system and are, also, in the conversion period from conventional to organic farming. Funding of specific support is provided from the European Agricultural Guarantee Fund (EAGF), and temporarily granted from the state budget through MARD budget, the total budget limit (ceiling) rises to 3,098,000 Euros or 2,373,000 Euros for plant production and 725,000 Euros for animal production (MARD 2011).

**Conversion to an Organic Farm.** From a technical point of view, conversion is the period when a farm managed with conventional methods lays the foundations for a correct and profitable application of organic farming methods. Therefore, we can define it as a 'bureaucratic conversion' that doesn't allow products to be marketed as organically farmed, and we can define 'agronomic conversion' the one aiming at optimizing organic methods on the farm, from a technical point of view (Forecologia 2010). The Community rules governing organic farming require any farm wishing to adopt organic methods to comply with a conversion phase of at least 6 months in the case of organic pigs. The Inspection Body can lengthen or shorten this period, based on the history of the farm supported by documentation. In no case may conversion be done in less than one year. All the farm plans must be approved in advance by the Control Body, beginning with conversion planning.

Organic farming is a method and not the simple action of just replacing the chemical fertilizers and active principles with natural substances. Converting a farm to organic farming means above all to improve the organic fertility of the soil and the equilibrium of the ecosystem on the farm. The purpose of a conversion plan is to guide the operators during the conversion period and to help them to achieve their goals. A conversion plan conveys a 'picture' of the holding, analysing and cross-examining all acquired data, with the objective of defining all technical solutions. In a conversion plan the following items have to be carefully evaluated: chronology of the field, state of the soil, social-environmental situation, operators' awareness and know-how, equipment present on the farm and willingness to invest and certain constraints (environmental and political restraints, motorways or pollution sources in the vicinity, no services available in the area)

All the information gathered, after due consideration, will help the operator define a conversion plan that will include the technical solutions considered more appropriate for the holding. A conversion plan is also useful to highlight the fact that in organic farming no action is an end in itself, but always serves multifarious purposes. The actions will be effective only if the equilibrium of the soil and eco-system is respected (Forecologia 2010).

**Breeding Organic Pigs.** The guidelines of EU regulation (EC) 1804/1999 address the issue of sourcing the (breeding) stock. Moreover, only activities such as the use of genetically modified organisms (GMOs) and embryo transfer are excluded, and few provisions are included that concern breeding. A number of breeds used in conventional farming could be considered as 'high maintenance' animals requiring regular, prophylactic veterinary treatments and high-energy concentrated feeds to meet their potential. Such breeds may be unable to fulfil their potential performance under an organic system (Van Diepen et al 2007). Some breeds adapt well to these systems; especially local/native breeds since they utilise lower quality feed, are more resilient to climatic stress, and are more resistant to local parasites and diseases.

Although breeding has to focus on what the market wants (mass or niche market), other factors also have to be taken into account. The choice of breeds/breeding used in the organic livestock sector needs to ensure the profitability of the farm, safeguard animal health and welfare, focus on conserving genetic diversity, and promote human health. 'Genotype x environment' interactions are important, especially when animals are reared under specific environmental conditions (such as organic production or conservation use). When animals are genetically adapted to specific/extreme

conditions, they will be more productive and production costs will be lower (Van Diepen et al 2007). It is important to conserve, develop and utilise local breeds that are genetically adapted to their environment.

A number of breeding strategies were outlined briefly, including traits that are important for organic production systems. The International technical conference from Interlaken, which was held in September 2007, established a plan that recommends the governments of countries participating to demonstrate political will to maintain and mobilize resources for rapid action to identify and protect zoogenetic resources that each country has (Matiuti et al 2011).

Three main strategies used to improve breeds are: selection between breeds, crossbreeding and selection within breed. Genetic improvement within a breed is the most difficult and slowest strategy but it is likely to have the best long-term potential. Organic livestock production requires the use of a number of breeds, with selection within breed and crossbreeding being the main strategies for improving product quality. Traditional breeds are able to contribute to the intensification, diversification and environmental conservation objectives now required by both organic producers and rural development policy (Van Diepen et al 2007). These rustic breeds are well adapted to the areas and they have genes that endow them with particular disease-resistance: Bazna and Mangalitzza (Matiuti et al 2011).

**Housing Organic Pigs.** Based on national histories of organic pig production, diverse climatic conditions and national organic farming regulations, different housing systems are used for keeping pregnant and lactating sows in organic farms in European countries. In some countries sows are at pasture throughout all stages of pregnancy and lactation. In other countries most lactating sows are housed indoors during this time. Mixed indoor and outdoor housing systems can also be found. Consumers and farmers expect organic farming to ensure high standards of animal health and welfare. Consumers expect pigs to be kept in natural surroundings, such as provided by outdoor systems. Related to the housing systems and management routines in the herds, organic farmers face a number of challenges in prevention of diseases and maintenance of animal welfare (FiBL 2011).

In contrast to conventional systems, organic standards require that animals are kept with outdoor access. According to national rules and based on national interpretation of the EU-regulations for organic farming (Council Directives 2007/834/ EC and 2008/889/EC), outdoor runs in European countries vary from concrete and slatted floors to deep litter and from open to fully covered by a roof (FiBL 2011).

When animals are raised in groups, the size of the groups must be in line with the developmental stages of the animals or breeds in question and their ethological needs. The total amount of animal manure applied on the farm, as defined by Directive 91/676/EC, cannot exceed 170 kg of nitrogen/year/hectare of agricultural land used. This amount is stipulated in Appendix III of the same directive, and the total number of animals is reduced if necessary so as not to exceed that limit. To determine the appropriate head count the units of animals equivalent to 170 kg of nitrogen/year/hectare of agricultural land used will be fixed by the competent authorities of the Member States, guided by the following values in the case of the organic production of pigs: piglets – 74, sows for breeding – 6.5, pigs for fattening – 14, other pigs – 14 (units equivalent to 170 kg of nitrogen/year/hectare) (Forecologia 2010).

Organic pig husbandry systems can basically be divided into three major categories: indoor housing, outdoor housing and mixed housing.

In the indoor system pigs are housed mainly indoors with access to a concrete outside run. Barn types range from heated buildings with artificial ventilation to un-insulated barns with an open front. The main challenge related to this housing system is to provide a pen that allows sows and piglets to express natural behaviour (FiBL 2011). The separation of the lying, defecation and activity areas is the prerequisite to avoid health problems, economic losses and extra work. Another challenge concerns provision of the individual temperature for sows, piglets, weaners and fatteners depending on their individual requirements.

In the outdoor system pigs are housed outdoors all year round with huts or

natural shelter. The main challenges related to this system are the organisation of a pasture rotation to maintain vegetation cover, ensure bio-security and identify and treat health problems. Another challenge is to organise in a way to keep the amount of work low. Pregnant sows have to be on pasture for a minimum of 150 days. Most weaning and fattening pigs are kept indoors with concrete outdoor runs. However, in order to prevent diarrhoea, some farmers keep the pigs on pasture for a certain period after weaning and then they take them indoors when they reach a weight of 30 kg (FiBL 2011). The most common outdoor systems for pigs used in organic production have an important drawback in relation to environmental impacts, which is the risk of nitrogen leaching and ammonia volatilization (Hermansen 2005).

In some countries different combinations of the indoor and outdoor housing systems are used. These systems allow combining the advantages of both housing systems. The practicability of these systems depends on climatic conditions or/and historic or farm specific development. Mixed housing systems enable sows to be kept on pasture during different stages of their life, as during pregnancy or during group suckling. In some farms, sows are kept indoors in individual pens for farrowing and within 10 days are moved to a group pen in a barn or to a group on pasture with huts. Weaners and fatteners are usually kept in a barn in large group pens with concrete outdoor run. During summer weaners and fatteners are given access to a pasture or are moved to huts on pasture (FiBL 2011).

According to the EU-Regulation, the area per lactating sow with her litter should be at least 10 m<sup>2</sup>, including at least 2.5 m<sup>2</sup> outdoors (Forecologia 2010). Lactating sows must be kept in free farrowing systems. However, in some indoor systems, movements of sows may be restricted in crates around farrowing. In outdoor systems, sows are usually penned in individual paddocks, but suckling piglets can circulate between paddocks. In some farms (in both indoor and outdoor systems) lactating sows are kept in groups, a few days or weeks after parturition (FiBL 2011).

Organic standards define longer lactation periods (at least 40 days, and in some countries 8 weeks) than are normally used in conventional production systems (3–5 weeks). Weaning after 7 weeks can improve piglet health and can save barn space (weaning pen) but can also reduce reproductive performance if sows have low body condition at weaning. Milk production varies during lactation: maximum level is reached around the 3rd and 4th weeks of lactation. Thereafter, milk production is probably not sufficient to cover the nutrient needs for maintenance and growth of piglets. Therefore, suckling piglets should have access to creep feeding adapted to their nutritional needs and digestive abilities from first week of age (FiBL 2011). It can be calculated that creep feeding can supply between less than 1 % to more than 50 % of the metabolic energy intake of piglets between 21 and 40 days of age. Water supply for suckling piglets is necessary from the beginning of life and should be offered in troughs or bowls so that normal drinking behaviour is possible.

Organic weaners must be housed with bedding and with outdoor access. The number and design of the pens should allow an all-in-all-out system. The more space the weaners have, the less aggressive encounters and stress will be; generous space promotes exercise and general health and reduces risk of infectious diseases (FiBL 2011). If possible, comparable size piglets should be grouped and offered a bedded and draught-free nest, which is as far away from the defecating area as possible.

**Feeding Organic Pigs.** In 2000, EU regulations for organic animal production set new guidelines for organic pig feeding requiring that this be based on mainly home-grown organic feedstuffs. Doubts were however raised whether these feeding regimes can maintain good growth performance and carcass quality of pigs (Partanen et al 2006).

In the feeding of pigs, the main objective is to produce piglets from breeding animals, and subsequently meat from those piglets, with the maximum efficiency and profitability. Since feed accounts for 70-80% of the cost of pig meat production, the correct formulation and rationing of feed is critical to this process. Organic farming requires an integrated, whole-farm approach to food production which takes due account of sustainability, environmental and animal welfare considerations (Edwards 2002). Thus,

whilst much of the knowledge gained from conventional pig production can be applied in the organic context, the feeding of organic pigs will differ from that of conventional pigs in a number of significant ways.

Feed is intended to ensure quality production rather than maximizing production. All pigs must have access to pasturage or an open-air exercise area or an open-air run which may be partially covered, and they must be able to use those areas whenever the physiological condition of the animal, the weather conditions and the state of the ground permit. The final fattening phase of pigs for meat production may take place indoors, provided that this indoors period does not exceed one-fifth of their lifetime and in any case for a maximum period of three months (Edwards 2002). Exercise areas must permit dunging and rooting by the pigs. For the purposes of rooting, different substrates can be used. All pigs must be fed on natural milk for a minimum period of 40 days. Roughage, fresh or dried fodder, or silage must be added to the daily ration for pigs.

Livestock must be reared preferably using feed from the unit or, when this is not possible, using feed from other units subject to the provisions of the EU Regulation. Up to 30% of the feed formula of rations on average may comprise 'in conversion' feedingstuffs, but when the 'in conversion' feedingstuffs come from a unit of the own holding, this percentage can be increased to 60% (Edwards 2002).

Feedingstuffs, feed materials, compound feedingstuffs, feed additives, processing aids for feedingstuffs and certain products used in animal nutrition must not have been produced with the aid of genetically modified organisms or products derived there from. Conventional feed materials of plant origin can be used only if listed in the Regulation (Annex II C1), subject to the quantitative restrictions imposed in this Annex, and only if they are produced or prepared without the use of chemical solvents. Feed materials of animal origin, whether conventionally or organically produced, can only be used if listed in the Regulation (Annex II C2) and subject to the quantitative restrictions imposed in this Annex. Feed materials of mineral origin, trace elements and vitamins can only be used if listed in the Regulation (Annex II C3 and D). Additives such as enzymes, micro-organisms, binders, processing aids can only be used if listed in the Regulation (Annex II D). Antibiotics, coccidiostatics, medicinal substances, growth promoters or any substance intended to stimulate growth or production may not be used in animal feeding.

The essential components of a pigs' daily nutrient requirements fall into the following categories: energy (needed for maintaining all the vital processes, exercise, thermoregulation, growth and reproduction and lactation), protein (needed to repair and replace body tissues, grow lean tissue, reproduce and lactate), minerals (needed for the growth of different tissues, especially bone, and also for reproduction and lactation), vitamins and trace elements (essential for a multitude of different processes in the functioning of the body) (Forecologia 2010).

It is possible to calculate the daily needs of a pig for each of the above categories of nutrient if the appropriate information is available. This is done by adding together the needs for all the different functions performed by that nutrient. The basic daily needs are: maintenance, growth (meat production), reproduction and lactation.

**General Considerations in Feeding Different Categories of Pigs.** In the case of dry sows and boars the most important objective in feeding is to maintain the ideal body condition. The amount of feed needed to achieve and maintain the recommended condition will depend on the breed (and size) of animal, its age and need for growth, how cold the weather is and whether the pig must regain body condition after earlier losses (Edwards 2002). For cereal-based diets of typical energy and protein content, maintaining condition will require an allowance of 2-2½ kg of meal per day in summer and 3-3½ kg per day in winter.

On the other hand, in the case of sows in lactation the nutrient demands for milk production are very high and the appetite of the sows is often insufficient to allow these needs to be met. Milk yield gradually increases over the first two weeks after farrowing, reaches a peak at about 3 weeks and declines gradually thereafter. The amount of feed sows need, will depend on the stage of lactation, the number of piglets they are suckling and weather conditions. The quality of feed is normally higher than for dry sows, and

feed allowance should be increased gradually from the day of farrowing. Too rapid an increase in feed in the first days can cause health problems and poor milk yield (Edwards 2002). For cereal-based diets (of typical energy and protein content), a typical feeding regime might be to feed 2-3 kg feed on the day of farrowing and increase the allowance by ½kg each day until appetite level is reached. Sows should be fed at least twice daily during lactation, and it can be beneficial to feed them *ad libitum* from a specially designed trough once lactation is established.

After weaning, neither food nor water should be withheld – contrary to traditional opinion, this does not help in ‘drying off’ the sows. A high quality diet, such as used in lactation, should continue to be fed generously (not less than 3kg/day) until the sow has been rebred, as this can help increase the size of the next litter. After mating, the food allowance should be reduced to the typical pregnancy level, but not more than 3kg/day for the first three weeks of pregnancy unless the sow is in very poor condition. Giving too much food in the period immediately after mating can reduce the size of the next litter (Edwards 2002).

Under organic standards, piglets cannot be weaned at less than 6 weeks of age. For the first 2-3 weeks of life, the mother’s milk will be adequate to supply all the needs of the piglets. However, after this time, the needs of the piglets continue to increase while the milk production of the sow gradually declines, and extra food is needed by the piglets. Whilst the piglets will often start to share the food of the sow, because they still have an immature digestion they will benefit by being given access to a better quality and highly palatable diet (often referred to as a creep feed). This can be supplied *ad libitum* in a special feed hopper, replenished each day to ensure the feed stays fresh, which cannot be accessed by the sow but to which the piglets have access through a barrier. Their intake of this creep feed will gradually increase according to their needs, so that they are fully adapted to eating solid food by the time of weaning (Edwards 2002). In the period immediately after weaning, while their digestion adapts to the fact that they no longer receive sows’ milk, they should continue to receive this easily digested diet *ad libitum*.

It is normal to allow young growing pigs to feed *ad libitum* from a specially designed feed hopper. This allows each pig to eat according to its own requirements, and minimises aggression arising from competition for food. With *ad libitum* feeding, enough trough space should be provided for 25% of the pigs to eat at the same time. If preferred, pigs can be fed once or twice daily to appetite, but in this case the trough must be long enough for all pigs, including timid ones, to eat happily at the same time (Edwards 2002).

As the pigs get older and their appetite increases, the quality of the diet given can be further reduced. Older pigs require diets with a lower protein/energy ratio than younger pigs, because an increasing proportion of the food is used for maintenance and fat deposition, and a decreasing proportion for lean meat deposition. Beyond a certain age and weight, which differs for each genetic strain of pig, the intake of the animal becomes so high that, unless the feed is restricted, it will deposit too much fat and the quality of the carcass will be reduced. For modern, improved genotypes, which have been bred for greater capacity for lean growth and lower appetite, this stage is not reached until after the time when they are normally slaughtered (90 kg liveweight), and they can be fed *ad libitum* throughout their life. For less improved genotypes, feed may need to be restricted from as early as 50-60kg liveweight. This will reduce the growth rate but maintain carcass quality. Since these pigs will be hungry and compete for feed when it is given, provision of adequate feeding space is essential. The degree of restriction necessary will depend on the breed of the pig (Edwards 2002). As a general rule, restriction of feed of typical energy and protein content by about 0.3 kg/day (10-12% of *ad libitum* intake) for a period of 5-6 weeks is required to reduce backfat thickness at slaughter by 1mm, and will be associated with a reduction in growth rate of about 100 g/day.

Young breeding stock should be selected as early as possible in the growing phase. They should be allowed to grow steadily (500-700 g/day depending on genetic type), which can be achieved by feeding them *ad libitum* up to 60-70kg liveweight and

restricting them in amount or energy content of diet thereafter. The correct level of minerals, vitamins and trace elements in the diet is important for good bone strength and reproductive development. For one cycle (three weeks) before planned mating, gilts should be fed *ad libitum* or to appetite, since this increases ovulation rate and litter size. Once they have been mated, feed level should be reduced to about 2 kg/day of a cereal-based diet of typical energy and protein content, since overfeeding in the first month of pregnancy can reduce litter size. After this, they should be fed to achieve the correct condition score at farrowing, as for all other breeding animals (Edwards 2002).

Organic standards require that pigs receive forage in their diet. This can be achieved by allowing animals to graze at pasture, by incorporating dried forage in their compound diet, by allowing them *ad libitum* or restricted daily access to products such as silage or root crops with supplementary concentrate, or by feeding a complete mixed diet of forage and concentrate in long troughs (Edwards 2002).

If the meat is going to be made into a smoked product, is important to take notice that soft fat liquefies at room temperature. A great deal of fat will be lost in processing and storage. A diet heavy in corn and soy, or low in saturated fat, will increase soft fat. One way to reduce soft fat is to feed more barley as the grain. Feeding peas with other seeds, such as flax or sunflower, for protein is ideal. This is especially important during the last few weeks before slaughter. The less pasture the animals are eating, the more carefully their diet must be balanced (Schivera 2009; Tefan et al 2005).

In the matter of water, the demand can be considerable, especially during hot periods when wallows must be provided to protect pigs from heat stress and sunburn (note that dark skinned pigs may be less susceptible). All pigs should have unlimited access to water and you should provide a back up supply in case the main supply should ever fail. An example of this could be bowser supply of water when pipes freeze in the winter (Soil Association 2009).

**Major Pathology and Welfare Hazards.** Mainly, the productivity growth in organic pig farms can be increased by improving the living conditions of animals and the implementation of preventive measures (vaccination programs, treatments with phototherapeutics) that reduce mortality rates (especially during the winter months). Disease prevention is a key point in organic livestock production and for this reason the application of a health management program in organic pig farming is suggested (Jensen et al 2006). Furthermore, to ensure food safety of organic products, monitoring risk factors for diseases and to control these risks factors as a means to prevent diseases, are suggested the implementation of health management based on Hazard Analysis Critical Control Point (HACCP) (Papatsiros 2011).

Interventions in animals, such as cutting their tails or teeth, cannot be carried out systematically in organic farming. Nevertheless, some can be authorized by the control authority or body for safety reasons or if it is necessary for better animal health, hygiene or well-being. Such operations must be carried out at the most appropriate age of the animals by a qualified professional and with the least suffering of the animals (Soil Association 2009).

In order to maintain the quality of the products and the traditional practices of production, physical castration is allowed, but only when animals from non-organic farms that were raised for breeding are introduced into the herd, and as long as they are later always raised and fed according to organic farming rules (Soil Association 2009).

The reproduction of animals raised should, in principle, be based on natural methods although artificial insemination can be authorised. Other types of artificial or assisted reproduction (transfer of embryos) are forbidden (Forecologia 2010).

Vaccines can be used where there is a known disease risk on a farm – or neighbouring farm - which cannot be controlled by any other means. A vaccination programme should be developed as part of the animal health plan, following advice from a veterinarian (Soil Association 2009). Single vaccines are preferred, unless a multiple problem exists. The development of natural immunity should never be discouraged.

**General Considerations for Different Categories of Pigs.** The health and welfare of sows in organic systems will depend on: the general level of endemic health challenge within a country or region, the extent to which organic standards influence health and welfare risks and individual unit factors such as herd size, exact system of production, quality of the management and stockmanship (Edwards 2011).

The basis for estimation of the nature and prevalence of sow health and welfare problems on organic units is extremely limited. The major issues that can appear are: health problems associated with farrowing and reproduction (vulval discharge, mastitis, mastitis-metritis-agalactia syndrome, *Actynomycosis* of the udder, delayed return to oestrus, lack of oestrus synchronization, poor conception rate and abortion), parasites (*Oesophagostomum spp.*, *Hyostrogylus rubidus*, *Eimeria spp.*, *Isospora suis*, *Ascaris suum*, *Trichuris suis*, and *Sarcoptes scabiei*), locomotory problems (lameness, hoof injuries, abscesses and osteoporosis), infectious diseases (PRRS, *Parvovirus* and *Leptospira spp.*), welfare problems associated with nutrition (hunger and thirst), welfare problems associated with physical or social environment (aggression between sows and social competition).

There is very limited information on the health and welfare of sows in organic production systems. They have more behavioural freedom, but may be exposed to greater climatic challenges, parasite infestation and risk of body condition loss. General risk factors for health and welfare conditions can be extrapolated from knowledge gained in conventional systems (Edwards 2011).

The organic systems for keeping lactating sows and their litters vary between European countries. Their specificities compared to conventional farms concern the housing, the management, the diet, the treatments and the breeds that are used. Taking into account the accumulated knowledge, it is likely that genotype is a key factor for determining litter size at birth, that housing and management are of main importance for piglet survival and health and that diet is very important for controlling growth of piglets during lactation. In addition, organic pig farming is usually characterized by a low level of management intervention around parturition, with nearly no assistance of the animals by the farmer during farrowing, and by difficulties to formulate diets balanced for amino acids due to the low availability of organic feedstuffs with high quality proteins and to the ban of synthetic amino acids in organic diets (Council Directives 1999/1804/EC and 2008/889/EC). Finally, allopathic treatments are highly restricted in both sows and piglets from organic herds due to the regulations (Prunier 2011).

The main problems that can affect the welfare and health of suckling piglets are: congenital defects (splay legs, scrotal and umbilical hernia), mortality (majorly due to crushing), hunger and thirst, cold stress, diarrhoea, arthritis, skin, joint and claw lesions, anaemia, parasites (*Isospora suis*, *Strongyloides ransomi*, *Oesophagostomum spp.*, *Ascaris suum*, *Trichuris suis*), low growth rate, predation and pain and health consequences of castration.

In semi-natural conditions, weaning of piglets is a gradual process involving a reduction in suckling frequency, a concomitant increase in foraging activity and the ingestion of solid feed. Among others, separation of piglets and sows provides a change in the piglets' diet not only in relation to the nutritional composition but also a change from fluid to solid feed. The piglets are no longer protected by the sows' milk with respect to passive immunity or in terms of the sows' body heat when resting. Further stressors include challenges through changes in the microbial flora in the environment, changes in climatic conditions, challenges by new physical and social environments associated with possible moving and mixing (Edwards 2011a).

The various weaning procedures applied across European organic pig farms predispose the weaners for different health and welfare problems. In combination with the occurrence of epidemic diseases, the prevalence of diseases related to the weaning process is expected to differ considerably within and between countries. So far, only a few studies have dealt with the prevalence of disease or welfare problems in organic weaners, showing that the major health problems are: post weaning diarrhoea (PWD - multifactorial disease, coming into existence by a combination of a challenged digestive system, a challenged immune system and various stressors during the weaning process),

cold stress, skin lesions, respiratory diseases, arthritis, endoparasites (*Ascaris suum*, *Trichuris suis*), post weaning multisystemic wasting syndrome (PMWS), distress and frustration (due to separation from mother, new environment or mixing) and fear of humans.

When a problem is recognised, the first step in controlling it is to make an accurate diagnosis. Diseases around weaning are multifactorial in nature. In general, not one but several factors are in place, simultaneously imposing stressors at weaning. There is a need for improved diagnostic measures on a farm level and for preventive and curative measures that are closely related to the farm specific situation. Within a system approach, animal health precaution plans can be developed as a suitable frame for feedback mechanisms. Consequently, there is a need for a change in the paradigm from a standard-oriented to an output-oriented approach (Edwards 2011a).

Although the EU Regulation (EC 834/2007) on organic agriculture provides a clear framework for the housing of fattening pigs, the practical implementation varies to a high degree between countries (Lindgren 2011).

The following are the potential health and welfare problems identified: endoparasites and ectoparasites (*Ascaris suum*, *Trichuris suis*, *Oesophagostomum spp.*, *Sarcoptes scabiei*), respiratory problems (such as swine enzootic pneumonia - SEP), joint lesions and other leg disorders, skin problems, abscess, diarrhoea, welfare problems associated with cannibalism and tail biting, with cold, heat stress or sun burn and fear of humans.

The use of antibiotics in herds with organic fattening pigs was lower compared to herds with conventional pigs. This was probably a result of the alternative system leading to a lower infection level, since no difference in mortality or untreated pigs could be discovered. The most important health concern among organic farmers seemed to relate to endo- and ectoparasites. The best strategy known so far is good hygiene and to rotate the animals outdoor areas with as long intervals as possible (Lindgren 2011).

A veterinary health management program in organic pig farms, including use of alternatives to antibiotics (prebiotics, probiotics and phytogenics), antiparasitics, appropriate vaccinations (against *E. coli*, PRRSV) and the appropriate disinfection program (rodent management with rodenticides) could be an useful tool for prevention and control diseases as well as for improvement of growth performance (Lindgren 2011).

Whatever the definition of animal welfare is, an even more important question is how to measure and to monitor it. This is relevant not only to consumers, who want to be informed about the origin and the welfare of the animals producing meat, milk and eggs, but also as a marketing claim for farmers investing in higher welfare systems. Once health and welfare is measured, strategies can be found for how to improve it, and how to manage potential problems. This can be done by various approaches, such as HACCP, herd health planning or self evaluation. Most of those strategies include identification of potential problem areas, risk factors related to them and potential solutions or codes of (best) practice. The final goal is to be able to improve health, welfare and productivity continuously. In general there are many different methods, parameters and data to measure and to monitor (Leeb 2011). The challenge is for most countries to combine and link different sources in order to make good use of available information. Abattoir data are very often not fed back to farmers and very few veterinarians review medicine records, which could be used for monitoring and improvement strategies. This is the case not only for organic pig farms, but for livestock farming in general, with exceptions for some countries. Also there are many challenges related with monitoring systems, in order to reflect the 'real' situation (Leeb 2011).

**Transport and Slaughtering.** Quiet, purposeful, humane handling is important for livestock. Pigs in particular have a problem called Porcine Stress Syndrome (PSS) resulting in Pale Soft Exudative (PSE) pork. If poor management stresses pigs too often, especially close to slaughter time, then PSE is the result. It is important to find a butcher you trust before dropping off your pigs. If they are going to be rotated through the pasture, they should be moved frequently in the beginning so they are accustomed to moving to new spaces. Otherwise, they will be afraid of where the fence was and won't

go to the next paddock. The best way to load pigs onto a truck or trailer is to place the truck in the pigs' pasture for a couple of days and feed them inside. By doing so, they will adjust to the trailer and they can be closed when they should be moved (Schivera 2009). Animals should be transported in such way they don't suffer stress, according to the national and EU regulations. Prior to, and during, slaughter the animals should be treated in a way that stress is reduced to a minimum because this influences the quality of the final product (Forecologia 2010).

**Marketing and Merchandising of Organic Products.** In the last few years the organic market showed an ascendant tendency, due to losing the trust in non-organic food products after a long line of food scares, desire to avoid pesticide residues in food, desire to eat food produced without the use of Genetically Modified Organisms (GMOs), demand for the highest possible standards of animal welfare, demand for environmental protection and enhancement, desire to protect the environment from GMO contamination, confidence in the external inspection programme and legal standards for production covering all organic production, processing, health and safety of farm and food workers worldwide (Forecologia 2010).

The European Action Plan for Organic Food and Farming sets out initiatives to achieve the objectives of developing the market for organic food and improving standards by increasing efficacy, transparency and consumer confidence. The plan aims to achieve measures such as improving information about organic farming, streamlining public support via rural development, improving production standards or strengthening research. It follows the rapid increase in the number of farmers producing organically and strong demand from consumers during the past few years (Constantin 2012).

Traceability and transparency are fundamental marketing strategies for organic production. The need for product 'traceability' has increased as consumers demand higher food safety and food quality standards. For example, a firm that wishes to merchandise organic pork must be able to trace the product back to its production source to verify the environment in which it is grown. This may be accomplished through third party certification of the environment or may require direct monitoring or ownership of the production facility. Either method implies strengthening the relationship along the supply chain to get the final product to market (Raper 1999).

It is assumed that in the next 5 years Romania will have one of the highest growth potential on the organic European market ([www.bio-romania.org](http://www.bio-romania.org)) and the demand for organic products is considered to increase.

The basic merchandising chain components are the producers (farmers), the processors (almost lacking from the Romanian chain), the exporters, the importers and the operators.

The low price of products and high costs of distribution, even in organic agriculture, determine the farmers to seek and find new solutions to maintain their economical viability. In the light of these facts, the direct contact between producer (farmer) and consumer represents a great advantage for both sides and it regards the price and the mutual exchange of knowledge (Forecologia 2010). One of the best ways to do so is to participate to fairs (such as BIOFACH in Germany, SANA in Italy, IndAgra Food&Drink and IndAgra Farm and AGRARIA in Romania), which are essential for producers because they can advertise and sell as well.

Producers have to be aware of the importance of distribution channels before merchandising. This importance differs from country to country: on one hand countries where the organic sector is represented by direct merchandising and specialized stores (Belgium, Germany, Greece, France, Ireland, Holland, Spain) and on the other hand countries where merchandising is centred in supermarkets (Denmark, Finland, Sweden, United Kingdom, Hungary).

Organic products are generally more expensive than conventional products mainly because of the longer obtaining procedure, the higher costs and strict requirements of production. The main distribution channels in Romania are: direct sale in local markets, traditional retailing (specialized stores), modern retailing (hypermarkets and supermarkets), on-line shops and network marketing.

The direct sale, in all its forms, is the most important organic food sale channel, both for the consumer and for the farmer. The advantages for the consumer are the following: reduction of prices, respect of seasonality and freshness of product, knowledge of products and origin territory. Advantage for the producer: increasing the profit, direct relation with consumers, new farmers' role and distribution of local products/varieties. There are different options for direct sale: 'farmers in town': local markets, purchase groups, promotional events or 'citizens in farms': farm gate market, holiday farm (Forecologia 2010). Direct marketing and farmers markets are very important in rural areas, particularly in conjunction with tourism on farms and local restaurants.

**Conclusions.** Organic farming has an increasing importance in the agricultural sector of many countries, regardless of their stage of development (Constantin 2012) and the organic animal production has increased rapidly in recent years to keep up with the increasing consumer demand for organic meats (Blair 2007).

Summing up, the organic animal breeding and the products manufactured under organic conditions can promote the development of the whole animal breeding in a given region. Organic products can also contribute to the increase of healthy human nutrition. The meat covers less than 20% of the calories from food, contains easily digestible proteins and high amounts of vitamins B1-12 and iron. For all these reasons the production of traditional animals is beneficial (Seregi et al 2008). The increase of their production can contribute to the regional development, self subsistence and direct marketing, to the increase of the employee number in the agriculture and to the rural development. Seregi et al (2008) demonstrated that the organoleptic characteristics of the organic products are also very talkative. The sensory properties of almost every tested organic product were of higher quality than those of conventional products. The human nutritional value of organic products is also superior (omega-3 fatty acid and CLA content).

On the other hand Hansen et al (2006) carried out a study to establish the main characteristics of organic pork meat in contrast to the conventional pork meat. Their work have shown that conventional pork is often more tender than pork from organic pork production systems. Moreover, the amount of intramuscular fat in organic pork has been reported to be higher, and the fatty acid composition to be more unsaturated compared to meat from traditionally reared pigs. The vitamin E content has been shown to be higher in pork from outdoor-reared organic pigs with access to grass compared to indoor-reared pigs. However, the difference is not expected to be high enough to compensate for the higher level of polyunsaturated fatty acids in relation to the oxidative stability of the meat. In contrast to these non-superior quality traits, meat from organically reared pigs has been reported to have an increased lean yield and higher wholesale carcass value due to heavier loins and hams compared with pork from pigs in a confinement system.

A more emphasized international collaboration and research in this field is needed.

Increasing awareness of the importance of product quality on human health has contributed to the development of opinion trends in favour of organic farming practice and to the development of markets for these products, given their specific characteristics (high prices of the products and low market share). Increased demand for organic products has led to the development of organic farming in the last years, and, increasingly, this sector has been in the attention of agricultural specialists, policy makers and the public (Constantin 2012).

The protection of origin is usually assured by the food safety and quality control processes. It is believed that the protection of origin is highly important for the indigenous species that are traditional (Van Diepen 2007). Central and Eastern European countries possess a large scale of indigenous animals; their special qualities can be confirmed and proven with DNA analyses, such as in the case of Mangalitza breed.

Also the necessity of introducing a non-polluting type of agriculture appeared immediately after starting the process of industrialization of agriculture, when criticism of the industrial development emerged, pleading for healthy food for the population.

One of the best examples on the Romanian market is Romsuintest Periş S.A. with

an experience of more than 50 years in pigs' farming and 20 years in research. At the beginning of 2012 they opened their own 100% organic store. For the next few years they plan to implement a process of modernization, restructuring and expansion of their own merchandising network.

All scientific trends that promote organic farming are considering organic farming an update of traditional farming methods and their blending with modern agricultural methods, which give this type of farming the status of scientifically based agriculture, with well-established methods, principles and techniques.

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