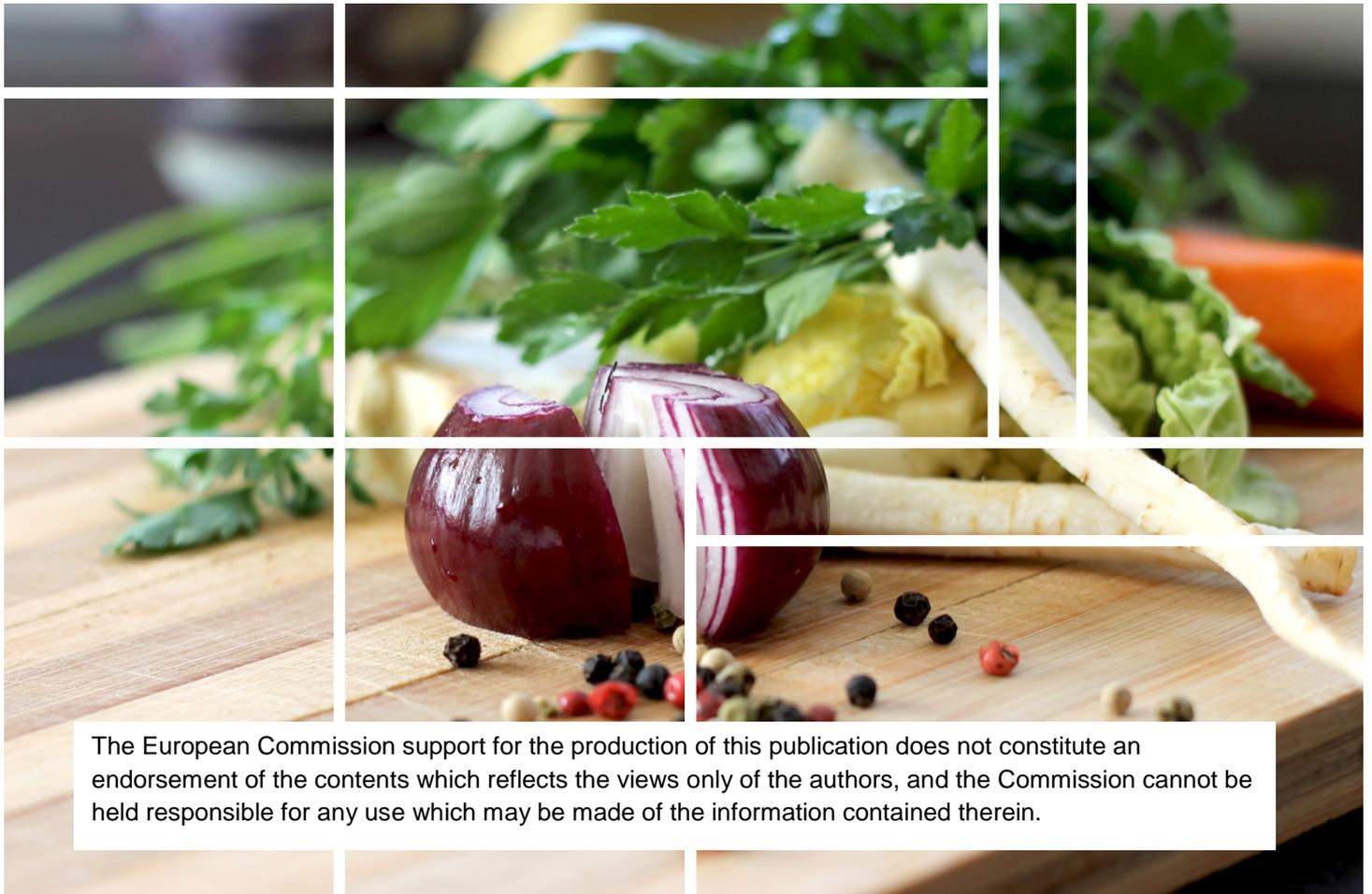




PROJEKT REKUK

Vocation Training for Chefs and Executive Chefs of Large-Scale Kitchens in Sustainable Food and Kitchen Management

Foods Use Handbook



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1. Glossary

1.1 General Glossary

Chef: professional cook who often manages the kitchen, e.g. in restaurants, large-scale kitchens, hotels.

Communal catering/public catering: Large-scale catering facilities in the public sector. These include patient catering in hospitals and elderly residences, catering in educational institutions and businesses. In contrast to gastronomy the focus here is to provide well-balanced meals and maintaining cost efficiency, providing qualitative meals outside the home.

Executive Chef: Chef who has an overall responsibility for the kitchen: purchase, staff, menu, sometimes manager of several kitchens / restaurants. Sometimes referred to as kitchen manager.

Large-scale kitchen: Large-scale kitchen is a term for a kitchen that is used for commercial purposes and in which meals for numerous consumers get cooked, namely gastronomy and communal feeding (hospital, company canteen, nursing homes, halls of residence, student halls etc.).

Organic foods/produce: These products are produced within the scope of organic farming and has a certification marks which are regulated by law.

Regional food/ products: Regional food is food that is produced there where it is consumed. A common definition for regional or national products is that they are produced within a radius of 150 km around the processing commercial kitchen. In fact, what is considered regional varies by country. In Italy the regions are geographically defined and it is common to use those definitions when referring to regionality. In other countries a max. distance of 150 km is determined. This distance was chosen because if the distance is greater the return benefits of sourcing produce locally diminish. In Germany and Austria, the word “regional food” is not regulated by law.

Seasonal foods: Foods available only at a certain time of the year from outdoor production (meaning available from local sources), typical fruits and vegetables. Some produce is available year-round as fresh or stock goods like onions, potatoes and apples.

Stakeholder: Member of an interest group.

1.2. Module specific Glossary

Conventional agriculture: System of farming characterized by a higher intensity of farming and by the use of larger energy and material inputs to maximize the production

Organic farming: System based on sustainable development principles and the holistic world approach.

Integrated agriculture: Transitional system between conventional and organic farming. Agrochemical inputs are based on diagnosed methods of nutritional state of plants and immediate stock of nutrients in the soil.

Sustainable nutrition: give priority of organic, regional and seasonal foods, increase the quantity of freshly prepared meals and optimise the consumption of meat and meat products.

Organic foods is produced within the scope of organic farming and has certification marks.

Conventional foods : In all countries, the overwhelming majority of foods is conventional, they are produced in a conventional (intensive, classical) farming system

Food from alternative crops are those crops that extend the existing range; they can be both newly bred and old forgotten varieties. A common case may be buckwheat, millet, old varieties of apples etc.

2. Sustainable communal catering

2.1 Food Production and the Environment

Until the 19th century, the majority of the population was engaged in agriculture. Most of the food and also other products came from local production. The trade also had predominantly local or regional character. With the onset of the Industrial Revolution, movement of people from rural to urban areas has begun in Europe and later elsewhere in the world. In order to ensure their subsistence, it was necessary to increase both labour productivity in agriculture and the quantity of food produced. Instead of horses, tractors dependent on fuel from coal and crude oil are already beginning to appear in the developed countries in the first half of the last century. Farmers are starting to use industrial fertilizers, whose production is very energy-consuming, instead of using farmyard manure to feed the plants. Cultivation produces more profitable varieties of field crops, but they also have greater nutritional requirements. Livestock productivity also increases together with the consumption of livestock feed. The standard of living increases not only by providing enough food, but there is also change in its structure. Consumption of meat and milk, white bread, sugar and other foods significantly increases.

After World War II, the so-called Green Plans to promote the intensification of agriculture were set up in Europe to ensure enough of food as fast as possible. Their effect was considerable. Industry has begun to deliver increasingly powerful machines and more industrial fertilizers, as well as pesticides and other chemicals against diseases and pests of cultivated plants and weed. Common livestock feed is no longer sufficient for high livestock productivity, it is necessary to increase the amounts of energy-rich feed (soya, forage cake, fish meal, etc.). Greater labour productivity is achieved not only by using larger and more powerful machines, but also by increasing fields and stables, animal and crop concentrations. This brings a greater risk of disease, the need for medication increases, often served as a prevention. Supporting production quantity gradually, inconspicuously, brings deterioration in food quality and the environment.

Common name for the farming system prevalent in industrially developed countries is conventional farming. It is characterized by higher intensity of farming and using higher energy and material inputs in order to maximize production, or current economic effect. In real-life working, the intensification is achieved in many ways which are often combined. Primarily, production is highly specialized. Intensive agricultural systems are heavily dependent on external inputs, energy and resource consumption increases, especially regarding the non-renewable resources. Preference of quantity has led to farms focusing mainly on the most profitable plant species and varieties, and there is a significant reduction in the genetic diversity of crops. Of the vast number of crops available for nutrition, there are only about 150 commercially important species and only 4 kinds of crops (rice, wheat, corn, soya) provide 70 % of the caloric consumption of the population. But the reduction of biodiversity does not concern only the species. Losses in diversity of varieties over the past 150 years reach up to 90 %. For example, in the USA, the number of apple varieties fell by

86 % (of the original more than 7,000 varieties) and the pear varieties by 88 % (of the original 2 683 varieties). Problems of homogeneous varieties bring increased risk of pest and disease attacks and their higher vulnerability, the need for intensive protection with chemical agents, which have an impact on positive insects, fungi, microorganisms, etc., increases. Similarly, the number of animal species decreases, especially traditional regional breeds. As for the bred animals, the specialization goes up to the level of breeding of individual categories without any relation to the soil, or plant production.

Excessive intensification of agriculture, on the one hand, increases the production of food and other raw materials, but at the same time it significantly burdens and damages natural resources. The main production means of agriculture is soil. In Europe, between 1945 and 1990, 38 % of agricultural land was damaged by agricultural activities, and this trend continues. The main damage is caused by erosion. In the Czech Republic, the proportion of agricultural areas damaged by erosion is c. 40 %. Taking into account the fact that the soil is generated at speed of about 1 t/ha per year, soil removal loss (according to the normative in the Czech Republic) should not be bigger than 1 t/ha per year for shallow soils and 4 t/ha for medium-deep soils. Unfortunately, due to inappropriate crop cultivation, in extreme cases, up to 40 tons of land/ha/year are lost. The use of heavy mechanization causes the air and water regime of the soil to be disturbed, limitation of soil rooting, destruction of biological activity of the soil, damage to soil absorption capacity. In Europe, c. 33,000,000 ha are damaged by soil compaction; in the Czech Republic, 45 % of the agricultural land is damaged by soil compaction.

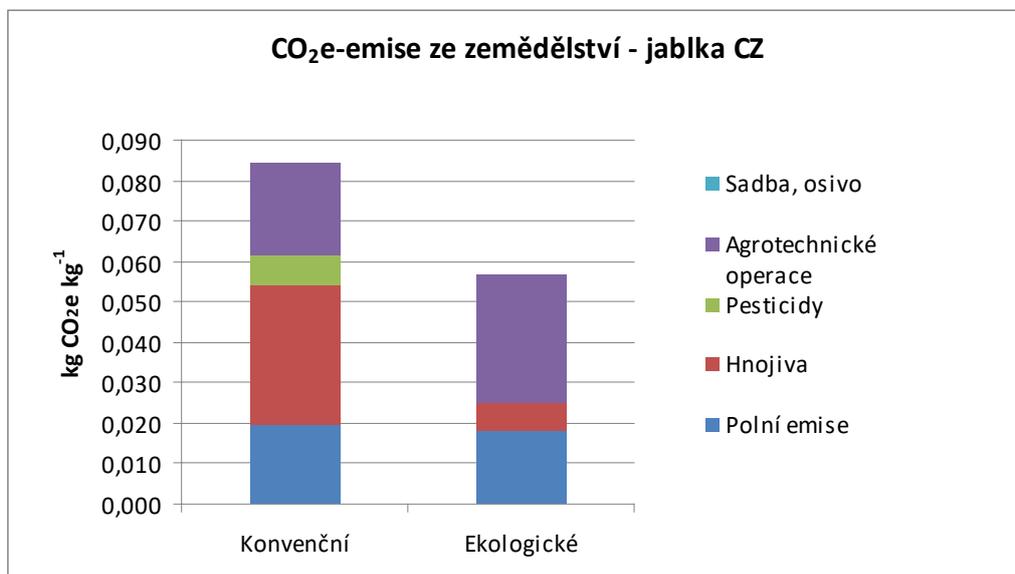
Using high doses of nitrogen when fertilizing plants, nitrogen remains in the soil, there is pollution of underground and surface waters and nitrogen release into the air. The use of pesticides, regulators, desiccants and other agrochemicals leads to the gradual accumulation of residues of the active substances in the soil, the destruction of useful microorganisms, antagonists and other organisms in the soil, the development of pesticide resistance, the decrease of the number of fauna and flora species and the pollution of underground and surface water as well as air pollution. Intensive soil treatment leads to a reduction in soil structure formation, increased erosion, humus degradation. High energy consumption (mostly fossil sources) leads to considerable consumption of non-renewable resources and to increased air pollution, greenhouse effect and climate change. Due to the general impact, agriculture is among the largest producers of greenhouse gas emissions after industry, mining and transport. The most significant proportion of emissions is from livestock production, mainly from cattle breeding. Emissions from plant production, or from the soil, have impact due to a large area extent.

Table 1: Overview of significant consequences of intensive plant cultivation

Measures	Consequences - Effects
High nitrogen fertilization (in industrial and organic fertilizers)	<ul style="list-style-type: none"> - nitrogen residues in soil - pollution of underground and surface water - the release of nitrogen into the air
Using pesticides, regulators, Desiccants and other agrochemicals	<ul style="list-style-type: none"> - accumulation of residues of active substances in soil - destruction of useful microorganisms, antagonists and other organisms in the soil - development of resistance to pesticides - decrease in the number of species of fauna and flora - pollution of underground and surface water - air pollution
Use of heavy mechanization	<ul style="list-style-type: none"> - disturbance of the air and water regime of the soil - limitation of soil rooting - destruction of soil biological activity - damage to soil absorption capacity - increase in soil erosion
Intensive soil treatment	<ul style="list-style-type: none"> - limitation of soil structure formation - increase in erosion - degradation of humus
High energy consumption (mostly fossil sources)	<ul style="list-style-type: none"> - consumption of non-renewable resources - increase in air pollution

(according to Aufhammer, 1989)

Graph 1: CO₂e-emissions from organic and conventional cultivation of apples (CZ)



The global share of agriculture in greenhouse gas emissions is 22 %, in Europe this share is 9 %. Increasing food needs and greater feed demand lead globally to over-exploitation of water and land resources. In developing countries, the behaviour of the catering participants is changing nowadays. Following the pattern of Western countries, demand for meat is rising. By 2050, meat consumption in industrialized countries should increase by 25 % and even 150 % in developing countries. Only the livestock sector annually causes 18 % of the world's anthropogenic greenhouse gas emissions. The production (including transport, cooling, processing and trade) of 1 kg of beef produces 13.3 kg of CO_{2-eqv}, 1 kg of pork produces 3.2 kg of CO_{2-eqv} and the production of 1 kg of chicken meat produces 3.5 kg of CO_{2-eqv} / 1kg of food.

Changes in the attitudes of part of the society allow the fragmentation of a unified global model of agricultural market and production. With growing awareness of some consumers, a new trend, which is rejecting or restricting industrial global farming and preferring friendly and regional production, is being defined. Friendly farming systems will create a certain environmental potential over these intense ones by limiting this burden. Promoting sustainable agriculture at the same time aims at protecting national agriculture. Agriculture is a typical rural sector and a priority cultivation factor of rural space. Also for the future, the size of agriculture is determined by landscape care and the requirement for sustainable rural development.

2.2 Sustainable farming systems

“Sustainable farming systems” are alternatives to intensive agriculture and a globalized agricultural market. They are systems protecting the countryside, biodiversity and agrobiodiversity, reducing the need for external inputs. Organic farming and Integrated production are established systems of sustainable production.

The main goals of organic farming include:

1. Permanent maintenance and improvement of soil fertility.
2. Protection of genofond and maintaining biodiversity.
- 3.
4. Preservation of landscape features and their harmonization.
5. Water management, maintaining water in the countryside, protection of surface and underground waters against pollution.
6. Effective use of energy, focus on renewable sources.
7. Efforts to maximize the recirculation of nutrients and prevention from intake of foreign substances into the agroecosystem.
8. Production of quality food and raw materials.
9. Optimization of living conditions for all organisms including humans.

The priority objectives of organic farming are the production of food on the basis of ecological principles, the production of healthy and safe food and the promotion of environmental and other non-productive functions of the landscape. When compared to the conventional farming systems, one of the most important weaknesses of contemporary organic farming is a lower production capability. In countries with established organic farming, yields of field crops reach 45-100 % in comparison with conventional farming. Under experimental conditions, the differences are on average less than 10 %. This shows the reserves to improve the production capacity of organic farming by adequate intensification of production in relation to the natural fertility of the habitat. The aim is to increase food production without reducing the quality of the environment, the quality of food or the life of farmers or endangering the well-being of livestock. Organic production systems are highly adaptable to environmental changes. The systemic approach is to strive for a balance between economic, environmental and social aspects and links both at global and local levels. Agricultural activity itself is perceived as a process of adequate exploitation of the ecosystem, respecting its stability and persistence.

Organic farming focuses on soil quality. **Soil protection** against erosion consists in cultivation of cover crops, mulching, reduced cultivation, planting windbreaks, the use of smaller and lighter mechanization, maintenance of soil in loose and structural condition. Sufficient nutrient cycle, soil supply with organic matter is ensured to optimize biological activity and soil fertility.

In organic farming, farming methods ensure the **protection of water resources** and conserve soil moisture, protect surface and underground water sources from pollutants and sediments. Water protection is a priority; terraces, filter strips, peripheral zones and other methods of protection are used.

Protection of biodiversity is one of the basic objectives of organic farming. It uses crop species and varieties or livestock species and breeds more adapted to specific habitat conditions, varied sowing techniques, mixes of varieties and species, chooses technical and organizational solutions that do not harm organisms or their environment.

Organic farming contributes to the **air protection** by producing less emissions in g CO_{2-eqv} ./kg of production regarding plant cultivation than in conventional farming, where the production of synthetic nitrogen fertilizers is the main factor causing this environmental burden. Their replacement by the inclusion of legumes significantly reduces the CO₂ emission burden. Primary agricultural production is not the main air polluter. This is the transport, processing of primary production to finished products, their long-term storage and preparation of meals. A sustainable economic system must therefore promote, above all, environmentally friendly regional production and consumption of fresh natural foods. Comparison of greenhouse gas emissions of conventional and organic foods in Austria showed an average savings potential of 10-35 % for organic food. The benefits of organic production lie, among other things, in low energy needs and low greenhouse gas emissions by the decomposition of mineral (nitrogenous) fertilizers, plant protection chemicals and imported feed (soya). Overall, the average greenhouse gas potential of livestock products is higher than for plant products.

The basis of livestock production in organic farming is the natural systems of livestock breeding. An organic farmer is required to keep only the species and breeds of listed animals adapted to local conditions, to protect animals from suffering, pain and harm to health.

In particular, when housing, there must be sufficient room for movement, the possibility of natural ventilation and lighting, natural way of resting, care for own body and bedding made of natural materials. Permanent housing in enclosed areas without access to the enclosure or grazing, permanent bonding housing of cattle and caged breeding and the use of grates are prohibited. Animal nutrition is provided primarily by own feed; as for ruminants, it is provided from perennial fodder and permanent grassland of the ecofarm. For adult ruminants, bulky feed must represent at least 60 % of the total daily intake of dry matter. In the summer period, grazing or access to green forage must be ensured. Health protection is primarily ensured by natural breeding methods, eliminating the negative effects of the environment. The basic principle of organic livestock breeding is prevention of disease. In case of a disease, natural products are preferred. The use of allopathic medicines is possible on the basis of a diagnosis made by a veterinarian. Upon termination of using the medicine, the protection periods are doubled. The use of additives (growth stimulants, anticoccidics and chemotherapeutics) in healthy animals is prohibited. For other than health reasons, procedures that change the appearance or function of organs of animals, in particular dehorning, castration and beak burning, must not be performed. The Notice also defines how animals should be transported and slaughtered so as to minimize their stress.

Principles and values of organic farming and food production based on these principles combine sustainable farming methods, sustainable eating and healthy lifestyle. Our eating habits are created especially in the context of public communal catering. High-quality and healthy foods in communal catering facilities show not only the value chain of diners but also an environmental responsibility. A sustainable economic system must support especially environmental-friendly regional production and consumption of fresh natural foods. Food production uses an increasing amount of energy with a corresponding negative impact on the environment. An important factor is the origin of foods, resp. transport distance from a producer to a consumer. A reduction in the proportion of meat on the menus and consumption of regional vegetable products allows caterers to reduce the impact on the environment. The negative impacts of the use of ready-to-cook foods or ready-to-eat meals, processed products and products stored for a long time outweigh their benefits due to the heating and cooling of foods, special packaging and transport costs. Research shows that the use of local, seasonal and organic foods and the preparation of fresh meals of them may significantly reduce the proportion of greenhouse gas emissions (GHG) in communal catering facilities.

The measurement of the socio-environmental performance are defined as: carbon, water e social footprint. Carbon footprint finds its match in the ISO 14067 standard, it is suitable for companies that aim to assess and reduce greenhouse gas emissions (GHG) associated with their product/service.

The reference standard for water footprint is the ISO 14046 standard, dedicated to quantifying water footprint of a product or an organization. Finally, the Social Footprint - *Product Social Identity*, is the first certification that evaluates the social footprint of a product or service, enhancing the organization, people, manufacturing and the supply chain.

Large enterprises use the recent FSCC 22000 certification, recognized by the GFSI scheme (Global Food Safety Initiative) which helps to achieve the food safety standards in production processes along the supply chain.

Regarding the fishing industry the root reference is the MSC - Marine Stewardship Council. It provides a guarantee of good fishing practices and respect the marine ecosystem by fishermen, and the entire chain of players of the sector. The same applies to the Global Aquaculture Gap covering the entire production process: from the production of animal feed, eggs and fry up to fish husbandry, fishing and processing of fish and shellfish to ensure the monitoring and the hygiene of the product in all stages of production.

The support of communal catering facilities, while optimizing diets that account of local, seasonal, fresh and organic foods, will enhance regional economic structures, potential energy savings in communal catering facilities and offer healthier boarding.

3. Regional food

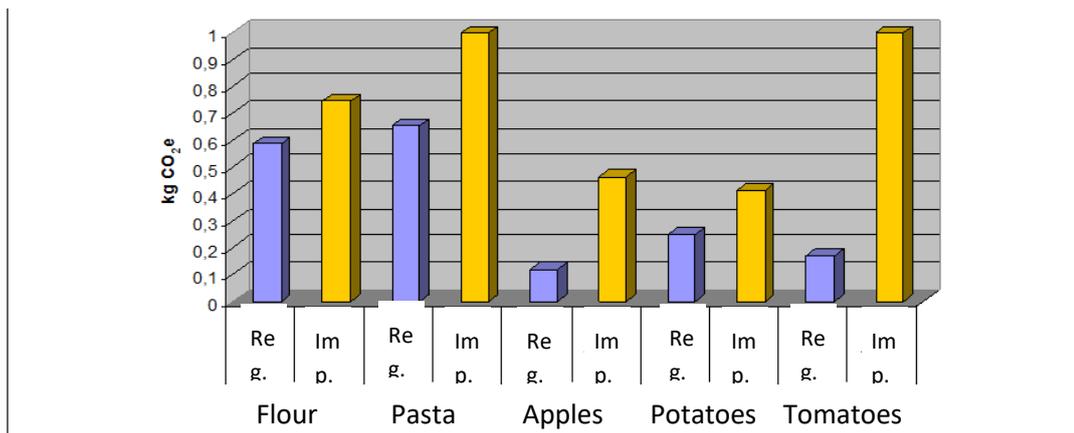
3.1 Aspects of regional Food

The reason for the preference of local foods is that these foods are much fresher due to short distribution routes than the foods that take long-distance routes. Therefore, fresher local foods generally tend to taste better and more valuable nutritional parameters. The fact that the closer the food is to the consumer, the lesser burden on the environment during their transport is also important. Reduction in the proportion of meat on the menus and consumption of local vegetable products allow caterers to significantly reduce environmental impacts, as well as take into account the financial aspect. An extension of the path that an agricultural product takes from the producer to the consumer may lead to a loss of authenticity. Consumers and also control bodies may supervise the foods produced in local conditions better and thus there is an indirect pressure on producers to maintain the quality of their products at a high level. Another reason for the preference of local foods is that these foods are much fresher due to short distribution routes than the foods that take long-distance routes. Therefore, fresher local foods generally tend to taste better and more valuable nutritional parameters. The fact that the closer the food is to the consumer, the lesser burden on the environment during their transport is also important.

Although food transport accounts for only 3 % of global emissions in the field of nutrition, the transport of individual products shows an overall high climate burden. Regional transport by trucks in Bavaria generates 0.060-0.076 kg of emissions CO_{2-eqv} /kg of cereal grain, while transport from EU (Poland, Spain) to Bavaria produces 0.253, or 0.359 kg CO_{2-eqv} /kg, thus the same as the whole field production. The biggest burden is air transport, which releases up to 200 times more greenhouse gases per tonne-kilometer than ship transportation. Air transport of strawberries from South Africa emits 12 kg of CO_{2-eqv} /kg of strawberries. It is clear that the environmental quality (measured by CO_{2-eqv} emissions) of any production is rapidly decreasing with the increasing transport distance. Depending on the production conditions, however, from the point of view of greenhouse gas emissions, imported food may

be more advantageous, provided that the long transport distances are in some way balanced. Thus, the lettuce produced in the winter months in the south of Europe (from the point of view of CO₂) may be more advantageous than the Central European lettuce from the heated greenhouse. In this case, heating - compared to other modes (cultivation, transport, packaging, purchasing) - leads to higher energy needs and higher greenhouse gas emissions.

Graph 2: Environmental burden of transport of plant production



A significant aspect to prioritize local foods is that it promotes employment in the region. Then prosperous farmers, processors and vendors represent a guarantee of maintaining or even expanding the number of jobs.

Our analysis shows that the communal catering facilities in bigger cities use less local products than the communal catering facilities in smaller towns, logically, the reason for that is a larger food market and offer in bigger cities. From the local production, meat, dairy products, cereal products, fruit and vegetables prevail. Most ready-to-cook and frozen products have their origins outside the region. It is very important to document the origin of products according to the surveyed suppliers. About 74% of interviewed producers expect that the regionality becomes a sales argument in the future. The amount depends primarily on the size and trade tendency of the producer. Smaller producers try to show the quality of their products using the regionality. The current problem is too many regional brands, which people may find confusing, as well as selling products under a foreign brand and a lack of awareness about the quality of local foods. According to a EU Commission survey and to the ecolabelindex.com catalog, in Europe 129 different public and private certification schemes on food sustainability have been identified. These are voluntary schemes on food labelling aimed at communicate the "sustainability" policy for production. More than a half of respondents think that the regional origin does not affect the price. It is gratifying to note that most local producers have an increasing interest in their products and that the society slowly begins to realize the true quality and value of local products.

3.2 Distribution of regional food

Distribution is all activities associated with the movement of goods from the manufacturer to the final consumer at the place of delivery. It represents a summary of the activities of all entities involved in making final products available to end users via so-called distribution channels. The distribution channel is a set of specifically arranged, interdependent organizations that are involved in the process of making products and services available to customers. Individuals and organizations are involved in the process of securing the transfer of products from their place of origin to place of final consumption or use. Final consumer is the customer. Building a well-functioning distribution system can take several years. At the beginning of the entire decision-making process, a decision is made as to whether a firm uses a direct distribution channel, i.e. direct delivery of products from a manufacturing company to a customer, or an indirect channel, when using the intermediary services, i.e. intermediaries and mediators (traders).

Distribution intermediaries are mediators, intermediaries, sales representatives, and support intermediaries. Mediators buy and then sell the goods. They are independent subjects. These include companies that provide comprehensive wholesale services and entities providing selected services, such as wholesale stores, cooperative wholesale companies, mail wholesale companies. These intermediaries help to increase the efficiency of the distribution process, often allowing cost savings, time savings, etc.

Benefits of indirect distribution channels:

- The manufacturer passes part of the operations to the distribution intermediaries
- Utilization of experience, specialization and contacts of distribution intermediaries in contact with the customer
- Wider range, bigger offer,
- Shared delivery of goods - reduction of distribution channel costs

Disadvantages of indirect distribution channels:

- Loss of control over the authenticity of the goods
- Required periodic motivation of distribution intermediaries
- Dependence on a small number of suppliers

In a direct distribution channel, the producer sells the product or the goods to the consumer. In direct sales, the main advantage is that the farmer is not sharing sales with processors, hauliers and traders and can gain the full price range for himself. The disadvantage is the large increase in work and other costs associated with processing, packaging, transport to the customer and sale.

Mail services (organic boxes), internet shops

This way of selling can take a number of forms linked to the ordering system (mail order sales), delivery to the house or to a designated place, etc. It is a very interesting way of direct

sale especially with a lesser extent of particularly interesting production (prices for postage or other means of transport are high in our country). Depending on the type of goods, price ranges, customers, it is possible to ensure the delivery of goods by post or by personal delivery.

Benefits of direct distribution channels:

- Direct contact with the consumer
- Effective feedback between manufacturer and consumer
- Lower costs due to no participation of an intermediarie

Disadvantages of direct distribution channels:

- Need to establish a large number of contacts with partners
- Difficulties in presenting the product

- The diseconomy of direct deliveries in cases of goods of mass or wide use as well as for customers who are located far from each other. Short supply chain concept as main response to address issues related to sustainability that threaten food safety. In fact, the short supply chain promotes the conservation of natural resources by reducing packaging, waste and food miles, as well as promoting a more equitable redistribution of profits. It can undoubtedly be an important way to connect producers and consumers - for example, a better planning of logistics facilities and agricultural production in urban and peri-urban areas.

3.3 SWOT Analysis - Extending regional products to communal catering

This analysis serves us to identify the weaknesses and strengths of an intention or intended action, and shows what the threats and opportunities are. Strengths identify the positive aspects of the intention, the reasons for the intention to be carried out, the weaknesses identify the opposite. Threats identify what might endanger the strengths. Opportunities identify ways to make the strengths out of the weaknesses; there is an example in the work assignment table. The SWOT analysis compares external threats and opportunities with internal strengths and weaknesses of the evaluated entity. At the same time, it is possible to create a strategy with the help of individual results and using the extended SWOT analysis to make our intention (project) more successful. We proceed from the fact that we can influence the most the internal aspects. To a great extent, opportunities can help us with that. This clearly means that the most appropriate strategy is the SWOT strategy that aims to overcome weaknesses so that the opportunities can be taken.

S - Strengths

Ability to produce food in price ranges acceptable for communal catering

Potential for the formation of eating habits

Large volumes of production (selected commodities - beef and mutton, grains)

Communal catering capacities are "big" customers

W - Weaknesses

Insufficient processing capacities (high costs of building new ones)

Relative uniformity of production

Undeveloped distribution network

Insufficient awareness of executives in communal catering and the public

Missing targeted concept of support of regional products in communal catering

Limited communication between the consumer and the canteens

Limited use of seasonal food in communal catering

O - Opportunities

Demand from catering participants - lifestyle trends

A large proportion of raw materials (selected commodities) sold outside the region (export)

Communal catering - space for sale of seasonal overproduction

T - Threats

Stagnation of the financial normative for canteens with current increase in raw material prices

Efforts of processors and sellers to keep higher prices

Invoking "negative moods" towards regional and organic products

Restrictions on public finances

Division of responsibilities among several sectors (MoA - producers, MEYS - school canteens, MH - hospital canteens)

4. Seasonal and Fresh Food

4.1 Seasonal food

Seasonal foods are an established term in a temperate zone, where the seasons alternate, and the different types of crops mature into consuming maturity. Regular alternation of the harvest periods of individual crops gave rise to traditional, local dishes typical for a particular season. If long-term food preservation technologies were not available in the past, it was necessary to consume fresh ripening crops. The freshness of foods is

directly proportional to their taste, nutritional and health quality. Fresh foods contain far more vitamins than if they were stored for a long time. Vitamins are very beneficial to the human organism, especially in times of increased environmental and work load and stress. Thus, it is possible to strengthen the immune system, to regulate many biochemical processes in the organism, to provide antioxidant effect by using fresh foods, etc. With longer shelf life, the vitamins disappear, for example, vitamins of A, D, E and B type. Fresh vegetables help eliminate the negative properties and effects of fat and contain few calories.

Most of the food is delivered from the primary agricultural production year-round (Milk and dairy products, cereals and dry products ...). Meat is available year-round, even though it can be seasonal as well (lamb meat, venison ...). Fruit and vegetable production depends on the season the most. Therefore, seasonal calendars of fruits and vegetables, as well as recipes for seasonal dishes, are available to chefs in countries of the temperate zone.

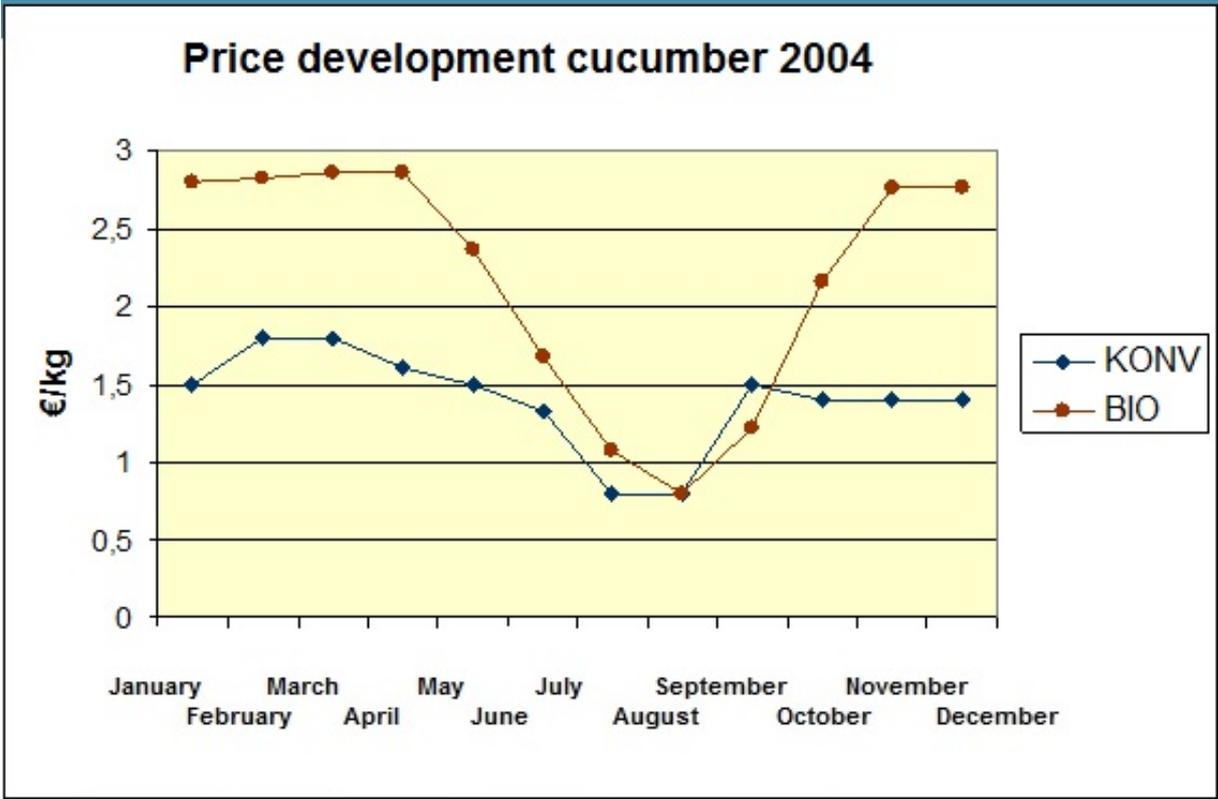
Tab.2: Vegetable and Fruits seasonal Calender (CZ)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Vegetable	www.vitalia.cz											
Asparagus					■	■						
Bean pods						■	■	■	■			
Beetroot	■	■	■	■	■	■	■	■	■	■	■	■
Bell pepper							■	■	■	■		
Broccoli						■	■	■	■	■	■	
Brussels sprout	■	■	■	■				■	■	■	■	■
Cabbage white and red	■	■	■	■			■	■	■	■	■	■
Carrot	■	■	■	■	■	■	■	■	■	■	■	■
Cauliflower						■	■	■	■	■		
Celery	■	■	■	■	■	■	■	■	■	■	■	■
Cucumbers						■	■	■	■			
Garlic	■	■	■	■	■	■	■	■	■	■	■	■
Hokkaido pumpkin	■	■	■					■	■	■	■	■
Chicory									■	■	■	■
Chinese cabbage	■	■	■	■						■	■	■
Kale	■	■	■	■		■	■	■	■	■	■	■
Kohlrabi	■	■	■	■	■	■	■	■	■	■	■	■
Leek	■	■	■	■	■						■	■
Onion				■	■	■	■	■	■	■	■	■
Parsnip									■	■	■	■
Pattypan squash								■	■	■	■	■
Pea						■	■	■	■			
Radish	■							■	■	■	■	■
Radishes				■	■	■	■	■	■	■		
Root parsley	■	■	■	■	■					■	■	■
Salad					■	■	■	■	■	■		
Spaghetti squash								■	■	■		
Tomatoes						■	■	■	■	■		
Zucchini						■	■	■	■	■	■	■

In addition to the nutritional and health effects, the protection of the environment is also a benefit of using seasonal, as well as fresh and usually local or regional food. With environmentally friendly production and use of regional, fresh and seasonal foods, the greenhouse gas emission burden significantly decreases (by tens of % but also even more), soil degradation and indirect water degradation decreases. The use of fresh and seasonal foods indirectly reduces losses during technological adjustments and storage. Reduction of storage saves energy for cooling, freezing, but also for pre-storage and post-storage adjustments. Fruit and vegetable production is climatically significantly more advantageous in the season than off season, when fruits and vegetables are grown in greenhouses and foilhouses. Organic tomato from the unheated foil tunnel causes 11 to 14 times less CO₂ emissions than “conventional tomatoes” from the heated greenhouse.

Significant benefits of seasonal production are lower prices. Given that in the short period of ripening of field crops, there is surplus of production on the market, prices fall by tens of % and even more. Low prices of fresh, seasonal raw production compensate for higher labour costs for food preparation in communal catering facility. Thus, the economic benefits are also included in the above mentioned benefits. The bonus can be sacrificed for the purchase of organic products, which are usually more expensive, but similarly to conventional products, their prices are also the lowest in the season. Since it is usually a local production, seasonal food combines regional, organic and fresh product characteristics with all the benefits.

Graph 3.: Seasonal variability of Prices of Cucumber



With transition to sustainable food, food prices should be continuously monitored and seasonal foods should be preferred. With a measure package, it is possible to reach up to 50 % proportion of organic food (30-50 %). The use of semi-finished products should be gradually reduced and, instead, preparation of fresh dishes should be more and more frequent.

4.2 Fresh products vs. semi-finished products and ready meals.

Globalization trends have brought an increase in the use of ready-to-cook foods, convenience foods and ready-to-eat meals, which always have a higher degree of processing than the raw material, in a number of countries. These dishes or foods, convenient for immediate consumption, are in most cases frozen, canned or dehydrated and therefore they must be somehow processed before consumption.

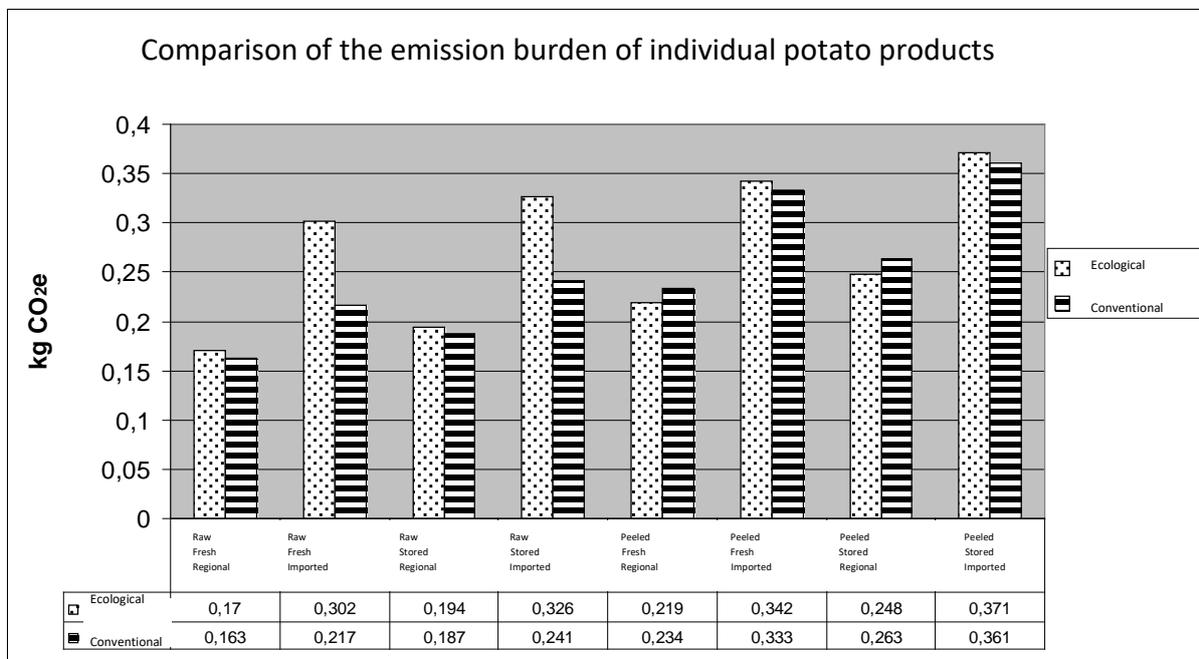
In case of production of semi-finished products, the higher the degree of processing, the lower the durability and the higher the price of the product. At higher levels of modifications, measures are needed to extend the shelf-life: drying, cooling, freezing, sterilization, etc. Many of these supplementary measures affect the color and taste of the food and reduce its nutritional value - especially the loss of some vitamins. For foods with a high degree of convention, we are more likely to encounter higher proportions of less suitable fats, higher salt or sugar content, or sweeteners, and also added dyes, and aromatic substances. Higher fat and sugar content concerns some prepared desserts or their pre-prepared ingredients (pasta, creams, soups). Especially beverage concentrates and instant tea blends are rich in sugar, sweeteners and dyes. High content of salt, aroma, and flavour enhancers is common in broths, soya sauces, instant soups, but also in some pre-prepared instant side dish mixes. Pre-fried semi-finished products and instant porridge usually have a higher glycemic index. Instant drinks that contain many additional and defective ingredients are also problematic.

The importance of using ready-to-cook foods has its benefits, especially in terms of time savings needed to prepare, workforce and costs, they extend the range of dishes, which would be difficult to prepare in ordinary kitchens, support the creativity of a chef. It is worth being aware, however, when the use of ready-to-cook foods is appropriate and in what cases we may do without them. According to her, communal catering facilities tend to use these products partly because the market offers an increasingly greater choice, as well as due to reduction of staff, when public communal catering facilities must provide the preparation of meals with fewer employees than before. Fresh foods, especially in school canteens, should be preferred. Convenience of higher level of processing is not suitable for school meals. Convenience of higher level of processing does not require nor allow creative approach, that is why professional chefs choose semi-finished products very carefully to be able to apply their innovative approach and talent.

4.3 Product processing and food production

In addition to primary agricultural production, the environmental emission burden of food production is also affected by storage processes and food processing technology. The degree of processing and the way of processing play a significant role in terms of emissions. More processed animal and plant products (e.g. cheese, salami, butter, whipped cream, canned vegetables, deep-frozen vegetables) cause higher emissions due to a higher degree of processing than of raw products (poultry and pork, eggs, milk, fresh vegetables). In the production of food, primary production, processing and transport make about 45 % of emissions, the rest is storing and preparing meals. To prepare 1 kg of conventional potato fries, 5.738 kg of CO_{2-eqv} are released into the air, and to prepare 1 kg of organic potato fries, 5.568 kg of CO_{2-eqv} are released into the air.

Graph 4: Comparison of the emission burden of individual potato products



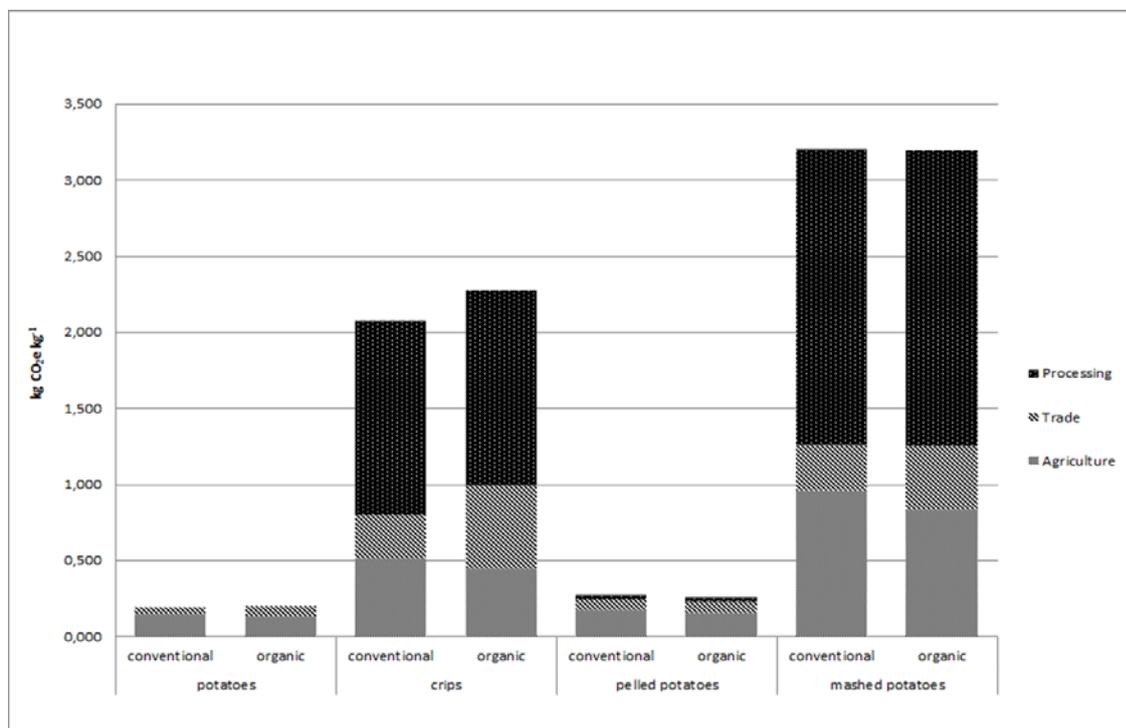
Energy that comes from foods, their production, processing and trade, constitutes up to 63% of total GHG emissions in communal catering facilities. The largest amount of GHG comes from meat in communal catering facilities. The use of meat and meat products in Austrian communal catering facilities makes up 14% of the total amount of the foods, therefore 63% share of GHG emissions in the indirect energy consumption is very high.

The implementation of sustainable diets and thus optimized meat portions and increases of the share of vegetarian dishes have also saving potentials within GHG emissions. Vegetarian dishes produce up to 99% less GHG emissions in comparison with meat dishes. Also the use of regional and seasonal foods and organic foods makes emissions savings. Local foods have the potential to save up to 50%. Using foods from an organic production can reach up to 40% savings. A level of food processing plays an important role in addition to the criteria of

regionality, seasonality and organic farming with regard to the GHG emission topics. Each step represents a further production of GHG. One kilogram of fresh conventional potatoes produces 0.31 kg CO₂eq, but one kilogram of potato chips produces 4.36 kg of CO₂. The trend of an increased use of ready-to-cook foods in communal catering facilities has primarily economic reasons (e.g. less staff needed). However, this is often compensated by a greater need for goods. Constant heating and cooling, special packaging and food miles (mileage when transporting food to the kitchen) and often questionable additives as well have negative effects on the environment.

Communal catering facilities can save greenhouse gas emissions by using regional, seasonal and organic foods. Differences between emissions of organic and conventional foods, or of regional and international foods, may seem to be minimal at first sight, however, large number of used foods can save large amount of emissions.

Graph 5: Emission burden in terms of processing in organic and conventional system



Proposals for CO₂ emission reduction regarding communal catering facilities:

- Increased use of vegetables, fruits and cereal products instead of meat
 - Meat causes up to 90 % of total amount of emissions in the food sector (for the groups of goods surveyed)
 - Especially beef takes a lot of energy. Reason: fermentation in the stomach
- Preparing fresh meals instead of semi-finished products, or replacing semi-finished products with other side dishes
 - The higher the degree of processing, the higher the amount of CO₂ emissions
 - French fries cause by up to 93 % more CO₂ emissions compared to fresh potatoes.

- The decision of a communal catering facility to prepare fresh potato mash means decreasing emissions by up to 88 %.

5. Foods from alternative crops

5.1 Advantages of introducing alternative crops

One way of maintaining agriculture in marginal conditions and at the same time expanding the diversity of cultural crops and nutrition enrichment of our diet is to grow and use alternative crops. The term “alternative” is used, because they replace, extend and complement the existing, very narrow range of crops and contribute to the widening of the spectrum of plant production. There are a number of traditional, formerly commonly grown species (e.g. buckwheat, millet, chicory, topinambour), but also species successfully used in other parts of the world (e.g. amaranthus, quinoa, jakon). The inclusion of a particular species among alternative crops can change in terms of place and time. According to position and meaning, the concept of alternative can also collide with the concept of: new, minority, complementary, marginal or special. In Czechoslovakia, oats and rye were the main cereals in 1920, and currently, oat takes only 3.6 % and rye only 2.1 % of the total area of cereals. We can include them among marginal or minority crops, since they now occupy a smaller area in the Czech Republic than the former minority or complementary crop - poppy.

Environmental benefits

Most alternative crops usually do not reach high yields but are also less demanding regarding intensification inputs. They can be directed to production areas and limited-access growing systems (organic farming, water protection zones ...) and to areas less favourable for common market crops in terms of soil and climate or other factors. Extending the diversity of cultivated crops contributes to meeting the function of sowing techniques with their many positive impacts. Correct rotation of crops disturbs disease and pest cycles, reduces weeds, helps enrich the soil with nutrients needed for subsequent crops, improves its structure, reduces erosion, preserves soil moisture and contributes to overall increase in soil fertility and generally supports extension of the agroecosystem biodiversity.

Benefits to nutrition and health of consumers

Extending the diet of alternative production leads to enrichment of its nutritional and health as well as sensory value. Most alternative crops are characterized by specific qualitative properties (composition of proteins, fats, higher content of some minerals, vitamins, flavonoids and others) and are therefore part of rational nutrition, therapeutic diets and functional foods, and can also be applied in natural pharmacy or cosmetics. Some crops can be used as feed components for livestock as well as for exotic animals, but also for technical and energy purposes.

Table 3: Substance composition of selected small-scale crops (Moudrý and Vavreinová, 1998)

Component (% in dry matter)	Naked oats	Spelled wheat	Buckwheat	Amarant
Nitrogenous substances	17.2	18.1	13.6	15.4
NFES*	72.8	62.0	60.4	70.5
Fat	7.0	1.9	2.3	7.4
Fiber	1.1	1.7	2.5	3.1
Ash matter	1.9	1.9	2.3	3.6
*NFES - nitrogen-free extraction substances				

Social benefits

The introduction of alternative crops, especially if their cultivation is linked to post-harvest treatment and processing, increases employment in the non-growing period, possibly also bringing new jobs at primary producers or processors. Building of capacities for alternative crops processing will contribute to maintaining economic and social stability in rural areas. For a number of special crops, the need for skilled labour and the cost of production given by higher added value are increasing.

6. Organic food

6.1 Introduction of organic food

An organic product is, in accordance with EC Council Regulation No. 834/2007, EC Commission Regulation No. 889/2008, Act No. 242/2000 Coll., a product obtained from organic farming under the rules of the European Communities. Organic food is then a food produced under the conditions laid down in this Act and the European Communities' regulations, meeting the quality and health requirements laid down by special legislation. These regulations usually do not provide organic producers with relief but, on the other hand, lay down other requirements and conditions regarding assurance of the quality of production. According to the European regulation, an organic product can get certified if at least 95% of its ingredients was produced organically, or rather - during the various stages of production - only authorized substances and using practices comply with regulatory requirements and procedures. The same criteria are applied in an equivalent manner both to organic products in the European Union and to the imports products.

The certificate of origin of organic products and organic food is issued by the inspection body, which usually performs the control of the farm once a year. A copy of the certificate of origin of organic product and the organic food certificate must be handed over by the organic

farmer to the person who puts the product into circulation. Throughout the whole chain from the primary producer to the consumer, the quantity and origin of organic production are still directly controllable. After issuing a certificate of origin of organic product or organic food, it is possible to label the product with the word “organic” or “bio” or “eco” or the protected graphic symbol together with the identification code of the inspection body (e.g. CZ-CR-KEZ-001-BIO). It is prohibited to label a plant or animal product, which has not been given a certificate of origin of the organic product, with the word “bio” or “eco” or the graphic symbol or any data indicating the ecological, organic, natural way of agricultural production.

Although the graphic design is equal in the Member States the name differs as the terms biological, organic and ecological have dissimilar interpretations in national languages, for instance:

- in English – Organic Farming. EC-Control System,
- in German – Biologische Landwirtschaft,
- in Italian - Agricoltura Biologica. Regime di Controllo CE,
- in Polish - Rolnictwo ekologiczne - system kontroli WE,

6.2 Quality of organic products

The starting point is a holistic view of quality (it also includes the value of the whole production process and the system in which it takes place and acts on the environment). The quality of organic food is not yet legally defined in the world (except for the basic requirement that it was produced and controlled according to the IFOAM principles). Organically grown products are most likely to be expected to be hygienic and, most often, nutritional, better shelf life, and sometimes sensory value than conventional. However, origin does not give the consumer the impression that is at the same time a guarantee of better nutritional and health value or taste qualities.

Environmental principles include an emphasis on local production. However, the positive impacts of organic production also lie in a number of other aspects, of which the most significant is probably environmental support. While attempting to define an organic consumer as a blind believer in a higher health quality product, what is true is that most organic consumers are aware of the wider implications of promoting organic production. Support of organic products is therefore not only a step towards a better diet but, more generally, towards a healthier life also thanks to a better relationship between people and the environment.

Nutritional value

Nutritional value is usually better in the products of organic farming than the products of conventional farming. Nutritional value includes aspects such as the content of substances positively influencing human nutrition, the internal composition and the mutual proportions of the substances contained. Organic foods contain proteins with a favourable amino acid composition, fiber, pectins, vitamins, enzymes and essential minerals. Due to the ban on the use of industrial fertilizers, the protein content is usually lower. With the increasing content of

total protein in wheat grains, the proportion of albumin and globulin fractions with a characteristic higher content of lysine and some other essential amino acids, in terms of the most valuable nutritional quality, is decreasing. On the contrary, the alcohol content of the soluble gliadin fraction increases, and the amino acid composition is not full.

Tab. 4: Quality and yield indicators of a collection of organic winter wheat varieties and in a conventional manner (Petr, Škeřík 1998)

	Protein content (%)	Wet gluten content (%)	Gluten-index (%)	Sedi-test Green (ml)	Decrease number (s)	Grain yield (t/ha)
Ecologically	10.70	21.5	73.9	20.7	303	4.71
Conventionally	11.27	23.9	74.9	27.2	313	5.85

Spelt, unlike common wheat, also provides, under extensive conditions, a relatively high protein content in the grain.

Tab. 5 : Some indicators of spelled grain quality and common wheat (from the experiments of VÚRV Praha)

	Protein % (N.5.75)	Gluten (%)	Gluten-index	Sedi-test (ml)
Common wheat: conventional variant	10.9	25.2	57.5	34
Ecological variant	9.9	21.4	54.0	25
Spelled wheat: conventional variant	11.1	18.5	27.0	16.8
Ecological variant	11.5	12.7	53.0	14.8

It can be said that the nitrate content, one of the main antinutritional factors among plant products intended for human feed, is one of the indicators which are strongly influenced by the way of cultivation. The organic products are proven to be better in this respect. Most of the results are clear about the advantages of the organic farming system in terms of this very important indicator of potato quality. In multi-tasking, 88% of cases were better (lower NO₃) of organic potatoes, 10% conventional, and 2% were virtually no differences. At average values, this meant a difference of 150.4 (eco) resp. 233.1 (Conv.) Mg. Kg-1 of fresh matter.

In other experiments, average nitrate levels were 63-111 mg. Kg⁻¹ for organic and 96 to 223 mg. Kg⁻¹ for conventional variants. For organic farming systems, it will be preferable to early varieties, for which an important measure of quality will be their shelf life.

Tab.6: Average values of qualitative indicators and yields of potatoes grown Ecological and conventional way in the multi-annual experiments of the Institute for Research and Development in Prague

	<i>Ecologically</i>	<i>Conventionally</i>
Dry matter %	21.5	22.3
Starch content %	15.2	13.8
L-ascorbic acid mg . kg ⁻¹	103.8	115.3
NO ₃ nitrates mg . kg ⁻¹	150.4	233.1
Glycoalkaloids mg . kg ⁻¹	77.8	81.3
Tuber yield t . ha ⁻¹	35.6	47.6

Hygienic quality

At present, the frequently discussed problem is the use of a wide range of preservatives, stabilizers, flavourings, dyes and other substances that are added in abundance to conventional foods. Addition of these substances, collectively often referred to as "Es" by laymen, is of course subject to certain rules, so it should not happen that each of them will be contained in the product to an extent that endangers the health of the consumer. Another thing, however, can be the interaction of these substances, which are practically ignored. Moreover, these add up not only in one but also in the consumption of each other product. In organic production, the use of additives is limited to the absolute minimum, so that organic consumers do not have to worry about the potential risks of their combinations.

As a counterweight, there is the occurrence of increased amounts of mycotoxins in organic products due to the absence of use of preservatives and, partially, due to the agricultural ecological system, which does not use fungicides. Research shows, however, that the mycotoxin content is significantly more determined by soil and climatic conditions, pre-crops and similar factors than by the farming system itself, and the absence of the use of chemical products in organic farming eliminates residues of these substances in final production.

Technological quality

Technological quality is a very important indicator for the manufacturer, because it can significantly influence the processing costs, i.e. the bid price. Technological quality has two aspects: the content of the active substance and the workability. The content of the active substance is important there, where it is obtained as the main product, thus for example, in processing oilseeds on oil, sugar beet on sucrose or in production of starch from potatoes or

cereals. Also, the sugar content of the grapes determines the quality of the final product - it therefore decides on the price. On the contrary, the workability indicates the ability of the raw material to be processed or the ability to produce a food product with the desired properties with minimal losses during processing and the use of standard and as simple as possible technology. Quality parameters depend on the type of food and the purpose of its production. It is therefore dependent on the requirements for the quality of the final product and the methods (technological procedures) of its production. Common parameters of technological quality are, for example: peelability, yield, colour stability, suitability for cooking, baking, suitability for various forms of conservation, resistance during transport, good shelf life

E.g.: Potato size and shape are decisive factors in the production of potato chips, the large and elongated shapes being optimal because of minimal waste when processing them.

Products of organic farming typically have better shelf life. The organic form of cultivation can, as mentioned regarding nutritional quality, have a negative impact on the technological value there, where the protein content is a decisive factor. Wheat cultivated without the use of nitrogen fertilizers sometimes provides grain with such a reduced gluten content that is hardly usable in the mill-bakery sector. In case of malting barley, on the contrary, the decrease in protein is an advantage.

Sensory quality

The quality perceived by our senses has a subjective character. Typical evaluated properties include size, weight, shape, colour, smell, taste, external appearance flawlessness, integrity, etc. External quality parameters (appearance, size, colour) - do not have to match the inner ones (smell, taste). Optimal external sensory properties are due to extensive fertilization and pesticide use available in most products in conventional production better than in organic cultivation. The taste and smell are often better in organic products than in conventional products. Especially in fresh products, such as vegetables, fruits, potatoes, milk, etc., organic products are evaluated better in anonymous tastings.

6.3 Differences between the quality of organic products and conventional products.

Vegetables

From the point of view of the importance of nutrition of the broad population, we have traditionally placed vegetables and fruits to the forefront. Since they are consumed fresh to a large extent, it is very much appreciated that synthetic pesticides and industrial fertilizers have not been applied during their cultivation. On the other hand, however, it should be recalled that in case of vegetables and fruits, in the common practice, the external appearance is almost a sole criterion according to which the buyer assesses the goods. The absence of agrochemicals in organic grocery and fruit growing thus undoubtedly increases the risk of worse classification and therefore also lower market monetization. For this reason,

integrated production is currently being used more often, with smaller doses of pesticides used than in conventional grocery. Meeting all acceptable agrotechnical interventions during vegetation and in particular by choosing the right varieties for given soil and climatic conditions, enables high quality products to be cultivated even in organic gardening and horticulture. Considerable attention is permanently paid to the issue of **pesticide residues** in assessing the health quality of vegetables and comparing products from conventional and organic cultivation. A number of different species of leaf, root, cole and tuber vegetables have already been a subject of a number of studies and a wide range of pesticides, their active substances and metabolites have been established. In most cases, there was a tendency for lower concentrations of these substances in vegetables and vegetable products from organic farming, but also in products from conventional systems, the levels found did not usually reach the limit of maximum acceptable values.

No significant differences have been found so far between **heavy metal** content (cadmium, lead and mercury, tin, zinc, copper and arsenic) from an organic or conventional production system. This could be expected, considering the ways in which these elements can get into agricultural products. The only exception is cadmium, the source of which could be fertilization by sewage sludge in conventional production. Basically as for toxic metals, the same applies also to polychromed biphenyls whose penetration into the environment is not affected by growing systems.

Nitrates are a chronic problem in some vegetable species. The intensity of their accumulation is adjustable by the way of cultivating. In organically grown vegetables and exclusively organic fertilization, lower nitrate levels than in conventional vegetables have been clearly established. In some cases, the differences were not significant, but mostly clear and conclusive.

In the German germ storage test, evidence of lower soft rot was recorded for organic product (20,3 against 55,6 % for conventional). Organic carrots also had a higher solids content (10,9 %) against conventional (8,8 %) and sucrose (4,2 %) vs. conventional (3,2 %). The average nitrate content in organic carrot was 72 mg . kg⁻¹, while the conventional was 205 mg . kg⁻¹. There were no significant differences in potassium content. The storage test seemed to be convincingly in favour of organic carrots.

On the contrary, some **vitamins** are very well-rated ingredients of vegetables. In some cases, ecological variants seemed to be better in vitamin A or β -carotenes content, for example, in experiment with tomato or savoy cabbage, in others there were no differences recorded. Similarly, it was also the case for vitamin C, where only some studies found evidence of differences in favour of the ecological variants of lettuce and spinach.

From a nutritional point of view, we also value vegetables because of the presence of **minerals**. However, the identified differences between ecologically and conventionally grown products were not so conclusive as to allow clear conclusions to be drawn. An important part of vegetables is also the **carbohydrates**, which are applied in the formation of nutritional value and sensory properties of individual species and varieties. In some vegetable species, higher total sugar content was found in organic against conventional samples. Data on **fiber** content suggest that vegetables from organic production appear to be somewhat richer in this indicator.

Regarding **sensory properties**, there was no clear trend that could be generalized. For example, ecologically grown carrots are said to be lighter, but have a more uniform and intense orange colour and a more intense aroma than conventional products. Their texture was rated as firmer. Sensory assessments of cabbage and carrots from differently fertilized experimental variants did not lead to statistically significant differences, however overall, the samples fertilized scarcely and organically were evaluated more favourably.

Fruits

Regarding synthetic **pesticide** residues, there is a clear tendency towards lower levels in fruit from ecological conditions. No differences were found in toxic metal and PCB contents. Results of evaluation of the **sensory quality** of fruit fluctuated in individual years mainly due to varieties. Differences in the evaluation of freshly harvested fruit have sometimes faded away during storage, sometimes it was the opposite. No clear conclusions could be stated. Sufficient amount of verified experimental data are not yet available on possible differences in the shelf life of fruit from different farming systems. In general, organic fruits, like potatoes and some organic vegetables, are better suited to maintaining quality during storage.

Milk and dairy products

In the studies with milk, butter and cheeses, the quality of the products differed, in particular, depending on how the animals were fed. For the main substances determining the quality (**protein, fat**) the differences found were not statistically significant. Much greater influence was observed in different breeds, that is, in different genetic material. In some cases, the protein content in organic milk was lower than in conventional milk.

Concerning the content of **foreign substances**, there were no differences between the organic and conventional milk samples in the pesticide residue content. Similarly, this was also the case for studies monitoring PCB content (polychlorinated biphenyls). Even in terms of microbiological quality and sensory properties, no differences were detected.

No major differences were found in the protein composition.

Interesting results were obtained during the analytical examination of the **mineral** content. Both the total ash matter content and the calcium and phosphorus content were significantly higher in conventional milk. The same trend has been observed for sodium and potassium. The sensory evaluation seemed to be more favourable for organic milk.

A relatively extensive study of milk quality from conventional or organic production was carried out in Denmark. On average, higher values were found in milk from organic farms regarding protein content (the results of analyses on whey protein content were without any difference).

There was no difference in the total saturated fatty acid content. Of the unsaturated fatty acids, conventional milk was characterized by a significantly higher content of oleic acid, which was probably associated with higher fat content of feed concentrates used in conventional breeding. Higher content of branched unsaturated fatty acids was found in organic milk. The cause may be higher microbiological activity in the rumen of the experimental animals (depending on the method of feeding). In the ecological system,

animals were fed mainly by pasture, hay and grass silage, and in the conventional system with corn silage. In the mineral content, no differences were found between the milks from the two monitored farming systems.

Meat and meat products

In Switzerland, they compared several forms of pig breeding and fattening in terms of the quality of the meat produced. In addition to chemical analyses and determination of some physical parameters, sensory evaluation was also performed. An important feature of meat quality is its post-mortem acidity. Just after slaughter (45 minutes), the variants of both intensive and extensive were practically the same pH, but significant differences were seen after 24 hours, in favour of the extensive variant. The evaluation of meat colour and its defects has brought irrelevant results (PSE - and DFD - meat). The highest intramuscular fat content was detected in pig meat from intensive conventional breeding. Extensive fattening meat showed a significantly better ability to bind water than in conventional variants; it was slightly stiffer and juicier. No differences were found in water and fat content. The quality of the fat expressed by the composition of saturated and unsaturated fatty acids was significantly better in the extensive group (increased amount of stearic acid, linoleic acid and linolenic acid) at the expense of saturated acids.

Eggs

There is a tendency for genetically identical but differently bred hens to have differences in egg quality in terms of content of protein, lecithin and total carotenoids. The protein content in eggs is reduced in free-range hens, against cage breeding, while lecithin is found to be higher. Higher content of total carotenoids in eggs from free-range hens compared to the eggs obtained from cage breeding hens is conditioned by additional supply of carotenoids through grass and other green plants.

6.4 Production and storage of organic foods

The organic product must always meet the basic quality standards required for common products. In addition, it was produced under environment-friendly conditions. Therefore, not only the organic product is healthier (it is assumed to contain significantly fewer or no harmful substances, residues of chemical substances, etc.), but the environment in which it is cultivated is healthier.

Organic food producer is any person who produces organic food in order to market it. Organic food production means cleaning, sorting, treating or processing of organic products. When acquiring organic products from which organic food is produced, it is necessary to comply with the statutory conditions determined for both plant and livestock production. Organic product and organic food processing should be carried out according to procedures causing minimal physical, chemical and biological changes.

Authorized processing procedures according to the Decree to the Law on Organic Farming:

Mechanical processing, heat treatment, smoking without the use of chemicals, pressing, filtration or clarification, cooling and freezing, homogenization, extrusion, fermentation, spreading, emulsification, steam and alcohol extraction, distillation.

Forbidden operations that are not natural procedures:

- Exchange of cations and anions, bleaching, pickling with the use of chemicals, hormones action, hydrogenation, smoking and the use of chemicals, irradiation, microwave heating.
- The importance of maintaining minimum processing to preserve the character of the processed food is one of the principles of organic food processing. Prohibited procedures for processing organic foods are ionic exchangers, bleaching, synthetic hormones action, irradiation, microwave heating, the use of dyes, aromas, and sweeteners of synthetic origin. The efforts to avoid the possibility of contamination or confusion with conventional food.
- Organic products and organic foods must be stored and transported separately from other raw materials and foods, in such premises and under such conditions that allow their unequivocal identification and preservation of their quality.

ANNEXES

ANNEX 1. How to expand the consumption of regional foods

I'm starting

- I will ask our suppliers to provide us with information about the origin of our food.
Talk to suppliers - how can communication be improved?
- When purchasing, I usually turn to suppliers who can tell me about the origin of the products.
As an option, support vendors who provide clear information.
- For fruits and vegetables, I know in what months they are available in the Czech Republic.
Take advantage of the seasonal calendar.
- Individual foods from abroad will be replaced by regional products.
Use rice or exotic fruits, such as bases, pineapples rarely. On the other hand, more attractive regional alternatives (apples, plums) can be used.
- My coworkers know about the benefits of using regional food.
Protecting the environment, strengthening the regional economy, food without genetic manipulation and preserving the diversity of species!
- We will replace the min. 5 meals containing regional ingredients with regional meals.

I'm going on

- We use direct operations with regional farmers for each product group.
Also communal catering facilities have the opportunity to contact smaller manufacturers.
- I know where the foods that are the most important in terms of quantity come from.
Potatoes, meat products, cabbage, apples, salad ...
- I am gradually reducing the use of manufactured semi-finished products.
The origin of raw materials is often unknown to raw materials in semifinished products.
- Will I offer a dessert fruit? It does not necessarily have to be bananas - many Czech fruits are available on the Czech market.
Apples offer a great variety of flavors and flavors. This means change.

- I will offer simple and cheap meals with regional ingredients a week.
Eg pan with potato mix with garlic and cheese, potato dumplings with mushroom sauce, ham and French potatoes
- At least once a year, we will organize the so-called Action Week on the topic of Regionality. This week we will be offering regional dishes.
Flip a varied Czech table!
- We regularly inform our catering participants of the origin of the products and suppliers.
Use table stands, info tables, etc.
Motivate your catering participants!

Especially for fresh products I want to come from the region

For professionals

- At least during the winter and summer months, my menu focuses on seasonal dishes.
To a greater extent, food items that have a season come to your diet.
- In order to reduce the possible high costs caused by regional products, I buy in larger quantities, prepare cost-effective food and do not use industrial products.
Also for meat: Do not use only the most valuable parts, process less valuable parts.
- At least once a week, we offer food whose main raw material is of regional origin.
Internet, personal contacts to the supplier.

I exchange information with other kitchen managers and inform regional suppliers.

ANNEX 2 How to Eat More Seasonal Foods

I'm starting

- We have special meals and supplements, which we offer exclusively in the summer. *In the summer, a large number of fruits and vegetables are available in the Czech Republic.*
- We have special meals and accessories that we offer exclusively in winter. *Use vegetables like beet, cabbage, cabbage, cabbage or leeks, instead of dumplings of alternative crops (couscous, buckwheat, millet).*
- Every year I will design 5 new season-adjusted meals. *Make use of a recipe database specifically designed for communal catering*
- I know if our vegetables are grown in a heated greenhouse? *Greenhouses need a lot of energy - use vegetables grown in the field.*
- The name of a vegetable or fruit dish indicates what kind of fruit or vegetables the dish contains. *Eg: Zucchini sauce instead of vegetable sauce.*
- Kitchen staff know about the benefits of using seasonal food. *By direct contact with diners, the kitchen staff are an important function.*

I regularly inform you about recipes with innovative, authentic and seasonal dishes.

I'm going on

- My diet is focused on seasonal meals. We have a summer and winter menu. *Dividing the menu is challenging but it pays off!*
- I have a salad buffet? There is also a summer and winter buffet. *Chinese cabbage salad, cabbage salad, lettuce salad, carrot salad and leek, chicory are attractive winter Alternatives.*
- I regularly reduce the proportion of frozen foods in favor of fresh foods. *Frozen vegetables are indispensable in many communal catering facilities - identify the savings potential!*
- I regularly reduce the proportion of blanks. *In the case of semi-finished products, it is difficult to prove whether seasonal foods were used in production.*
- Our share of southern fruit in total fruit and vegetable consumption is not more than 10%. *Treat your southern fruits economically!*
- Our suppliers inform us if Czech fruit and vegetables are ripe and available on the market. *Buy groceries in the season because they are much better*
- We organize min. one week in session on the topic Seasonality. *Offer exclusively seasonal dishes!*
- Information materials for catering participants will be placed in the dining room in a convenient location. *On the umbesa.rma.at website, you will find the materials to print!*

For professionals

- My share of seasonal fruit and vegetables should be at least around 30% of the total amount of fruit and vegetables consumed.
Calculate the proportion of seasonal fruits and vegetables according to the quantity you can compare with other kitchens.
- I can continually adjust my meals to regionally produced foods.
You will support the regional economy.
- Minimally 3 times a week I offer seasonal meals at the menu.
If possible, mark them on the menu to make you curious.

ANNEX 3 How to eat less meat

I'm starting

- Min. 2 times a week will be served meat mixture with a lot of vegetables.
Set the roasting of minced meat, meat sauces or meat sauces with more vegetables - less meat, more vegetables!
- Min. 1 per week the menu will include fish combined with a meatless menu.
The menu of fish dishes is often very low in communal catering facilities. Increase this offer!
- I'm going to increase the amount of meatless meals in the diet, which is good for me.
Good-tasting meals can also be changed.
- Beef, pork, poultry, turkey - care must be taken to change!
Beef has the highest levels of emissions, while chicken meat is the lowest. Contribute to climate protection!
- Does my co-workers know about the changes that are going on and why?
For staff members, staff should professionally provide information.
The implementation of new recipes will be trained appropriately.

I'm going on

- By reducing the amount of meals containing meats, I will increase the proportion of meals containing vegetables in parallel.
Meals with meat can usually be compensated for vegetables with vegetables.
- When lowering the portion of the meat, it is also an attractive offer of attachments.
This can increase the value of the meal in the eyes of the catering participants.
- My portions of meat are optimized from the physiological point of view.
The optimal portion of the meat is around 60-90g for children according to the age of the boarder and 60-180g for adults.
- I will optimize the min. 5 industrially prepared ready meals containing meat and replace them with fresh preparation.
The origin of meat in semi-finished products is very difficult to predict. Moreover, the meat quality is low
- Unpertured meals containing meat will be replaced by autistic, regional meatless dishes.
Make a list of your favorite dishes! Which foods do they have the minimum response?
- I know which meat comes from abroad, we replace them with regional products.
Contacts with domestic manufacturers and suppliers
- My diners know why there is a change in meat in the kitchen about eating meat.
Newsletter, posters - there are many ways to communicate with the catering participants!
- My diners know why there is a change in meat in the kitchen about eating meat.
Table cards, information brochures ...

For professionals

- In our kitchen we have min. 1x vegetarian or non-vegetarian meal a week.
Satisfy those diners who want to consciously eat meatless dishes
- .The proportion of meat and meat products does not exceed 10% of total food consumption.
Regularly check food consumption - best in terms of quantity (not with regard to costs), which makes it possible to compare it with other communal catering facilities.
- I know my meat suppliers with me personally. I know the conditions of breeding and slaughtering animals. *Organize your co-workers with a organic farm excursion!*
- To buy biomass, I use suppliers' actions and offers. Do not reject your suppliers' offers

ANNEX 4 How to consume more fresh foods at the expense of semi-finished products

I'm starting

- I know what blanks are the most expensive. I will replace them with fresh products.
Acquisition costs are decisive for total costs.
- I will optimize the minimum of 5 annexes I receive as a semi-product every year for the benefit of the fresh product. *E.g. Prepared packs of salads or fries*
- I will optimize industrially processed semi-finished products for freshly prepared meals every year. *E.g. Vegetable slices, cordon bleu, pre-fried fish.*
- In the beginning of the transition, I offer an increased amount of simple and fast meals.
The kitchen staff can be so motivated!
- Keep in touch with our catering participants and inform them of their satisfaction.
Especially for new, optimized, freshly prepared meals, it is important to know the opinion of the catering participants.
- Freshness is a quality criterion in our business. This image is supported by our collaborators.

I'm going on

- The proportion of frozen foods does not exceed 5% of the total food consumption.
Calculate the proportions by quantity, then compare it to other kitchens
- The proportion of semi-finished products does not exceed 20% of total food consumption. *Semi-finished products = various preserves, pasta, prepared salads, salad dressings, oils, fats*
- Do I have a salad buffet? I only use canned foods if the kitchen can not prepare fresh meals. *Find optimization potential for fresh preparation.*
- If possible, I prepare vegetables in the kitchen. *It goes through small steps - concrete fresh meals are being designed.*
- We have min. 3 times a week, fresh menu ', which does not contain frozen products and other semi-finished products. We can add 1 piece of seasonal fruit to each one for free for the fresh menu. *Certainly we can recommend it especially in the early stages of transition.*
- Ready meals (eg pizza, fried steak) I use as little as possible, max 2 times a month.
Reduce the number of blanks regularly.



- Spaghetti sauce, lasagna, etc. will be freshly prepared in the kitchen. *Also, ready-made sauces need to be warmed, soaked and eventually diluted - but they are usually more expensive*
- The menu for fresh food preparation is indicated on the menu. This is how much attention can be drawn.
- *For major changes, such as menu spraying with freshly prepared meals, I will provide the publishers with the appropriate information.*
- Take advantage of the ideal of your eating facility or create an information sheet and pass this information to your chefs.
- Kitchen staff are continuously informed and trained.

For professionals

- Every day I offer fresh menus that do not contain frozen products and other semi-finished products.
- *In advance to provide information to the catering participants and explain the motives of the changes*
- It is not possible without proper staff. *The "fresh preparation" criterion is also supported by staff representatives. Encourage good cooperation with staff representatives.*

ANNEX 5 How to replace semifinished products

I'm starting

- I know which blanks are the most expensive. I will replace these with fresh products.
. *Acquisition costs are decisive for total costs.*
- I will optimize the minimum of 5 annexes I receive as a semi-finished product every year, in favor of the fresh product.
- *E.g. Prepared packs of salads or fries*
- I will optimize industrially processed semi-finished products annually in favor of freshly prepared meals
- *. E.g. Vegetable slices, cordon bleu, pre-frozen fish.*
- In the beginning of the transition, I offer an increased amount of simple and fast meals. The kitchen staff can be so motivated!
- Keeping in touch with our catering participants and informing them about their satisfaction.
- *Especially for new, optimized meals with fresh preparation, it is important to know the opinion of the dishes.*
- Freshness is a quality criterion in our company. This image is supported by our collaborators.

- **I'm going on**
- The proportion of frozen foods does not exceed 5% of total food consumption. Calculate the shares by quantity, then compare it to other kitchens!
- The proportion of semi-finished products does not exceed 20% of total food consumption. Semi-finished products = various preserves, pasta, prepared salads, salad dressings, oils, fats
- Do I have a salad buffet? I only use canned foods if the kitchen can not prepare fresh meals.
- If possible, I prepare vegetables in the kitchen. Find optimization potential for fresh preparation.
- We have min. 3 times a week, fresh menu', which does not contain frozen products and other semi-finished products. It goes through small steps - concrete fresh meals are being designed.
- To make the right promotion for fresh menus, we can add 1 piece of seasonal fruit to each one for free. Certainly we can recommend it especially in the early stages of transition.
- Ready meals (eg pizza, fried steak) I use as little as possible, max 2 times a month. Reduce the number of blanks regularly.
- paget sauce, lasagna, etc. will be freshly prepared in the kitchen. Also, ready-made sauces need to be warmed, soaked and eventually diluted - but they are usually more expensive.

I'm going on

- I will mark the menu with fresh food preparation on the dish. This is how much attention can be drawn.
- For large changes, such as menu spraying with freshly prepared meals, I will provide the chefs with the appropriate information. Take advantage of the ideal of communal catering or create an information sheet and pass this information to your catering participants.
- The kitchen staff are continuously informed and skipped.

For professionals

- Daily I offer fresh menus that do not contain frozen products and other semi-finished products. Important: In advance, provide information to the catering participants and explain the motives of the changes
- Without the appropriate staff it is not possible. The "fresh preparation" criterion is also supported by staff representatives. Encourage good cooperation with staff representatives.

ANNEX 6 How to increase the share of organic food in the diet in school canteens

I'm starting

- Single, unprocessed, dairy products are harvested in organic quality (eg milk, yoghurt). *The higher the fat content, the more expensive the product is.*
- For individual foods from the dry goods category, we have already switched to organic products. *Flour, pasta, cereals ... products that are available all year round are very well suited to change.*
- Potatoes (preferably unprocessed) I mainly eat in organic-quality. *Buy food year-round in organic-quality.*
- In the diet, I am increasing the amount of cereal and potato foods, as the raw products in the organic-quality are quite advantageous. *One or the other change to your diet plan!*
- I have a bid for organic-products from suppliers and compare it with conventional products. *Buy organic products at lower price differences compared to conventional goods.*
- I will take advantage of offers and actions for the purchase of fresh produce in organic quality. *Shop in bigger quantities, it'll be better!*
- I buy single drinks as fruit juices all year in organic quality. *Replace products with a warranty period!*
- I count the proportion of organic foods (in terms of quantity) per year of the total food consumption and also the increased costs of using organic-products. *The assembly is not only for your information, but also for management.*
- Increased costs for organic products: I will take austerity measures to reduce these increased costs. *For example, seasonal menu planning, components in the organic-quality instead of the whole menu, reduce the proportion of meat and meat products.*
- I inform the catering participants of planned changes.
- *Promote "organic" as a quality criterion! Name the reasons for the change.*
- The kitchen staff stood for the intention. A organic farm excursion can greatly help!

I'm going on

- My meals have a certificate.

Highlight the products in the organic-quality!

- I'm going to offer supplements in organic-quality to an increasing extent.

Pasta, potatoes, rice - Replace conventional (and processed) attachments!

- Do I offer a salad buffet? We went to organic.

At the same time, bring in the winter and summer buffet!

- To prevent the use of a larger number of organic-quality products from the budget, they will stop using semi-finished products at the same time.

E.g. Stop using ready-made sauces and prepare fresh sauces in the kitchen.

- The fruit is converted to the quality of the fruit especially during the season.

The origin of products is constantly watching!

- The share of organic vegetables is regularly built.

Eg Winter vegetables in the organic-quality, such as carrot, leek, etc.

- I mainly focus on seasonal products and I use organic fruits and vegetables.

Price differences between organic and conventional products are significantly lower in the season.

- The share of organic products is about 10% per year in our country (in terms of quantity).

Try to change foods that are important in terms of quantity (potatoes, apples).

- Take further steps to reduce the increased costs of organic products.

Reducing portions of meat and meat dishes; Increasing vegetarian meals, potato dishes, or alternative crops (couscous, millet) and Mediterranean cuisine, because it is largely non-mashed.

- I propose new and innovative supplements and organic-rich dishes.

Diners also decide on the attractiveness of the food, not just by using organic products.

- Do I also offer snacks or small snacks?

I use organic products here.

- Minimally once a year, we organize an action week, where we offer organic food to a greater extent and we try to inform our customers sufficiently.

Action weeks are ideal to get the attention of the catering participants - report these weeks in time. Create an information booth!

For professionals

- Starting with the use of meat and meat products in organic-quality.

Take advantage of your suppliers' actions. Do not use only the finest pieces of meat.

- Put in a menu line where you will be offering high organic-rich meals.

Mark the dishes on the menu!

- Eggs and high-fat milk products (cheese, etc.) are mainly bought in organic-quality.

Egg production not only in quality but also in the region!

For all menus, buy vegetables, fruits and salads from organic production according to the season.

Soups are mainly offered in organic quality.