



**Eva Lukášková / Kateřina Pitrová**

# **ECONOMIC AND SOCIAL ASPECTS OF FOOD SECURITY**



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The book provides expert information on food security, focusing on its economic and social aspects on a global and national scale. It reflects the current situation of food self-sufficiency, food safety, economic accessibility within the EU and the Czech Republic.

The book is intended for experts interested in food security issues from the point of view of its theoretical definition and practical impacts within the economic system of the Czech Republic. The book can also be used by people from the general public who are interested in obtaining expert information on the current issue.

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## SUMMARY

Food security is defined as a condition where the physical and economic access to sufficient quantities of healthy and nutritionally balanced food is provided that meets the nutritional needs and preferences of the individual for his active and healthy life. Even though the definition may seem that the problem of food security is completely bound to developing countries, it is important to realize that the problem of hidden hunger is also inherent to developed countries. The world population in the 21st century is facing a number of challenges to civilization - or global issues, whereas the possibility of ensuring food security across states would solve one fundamental problem.

The monograph “Economic and social aspects of food security” captures these particular issues in a broader context and coherence. The book is divided into three interrelated thematic areas.

In the first section food security is theoretically defined and the opening chapters of the book thus form the entrance to the specialized terminology related to the issue. This section also describes various factors affecting food security.

The second section shows the application of food security conditions in global world in the context of sustainable development. It also provides an analysis of food security strategies and food self-sufficiency of the European Union and of the Czech Republic.

The third section is then completely focused on case studies aimed to food security. There are described physical accessibility of food, necessary amount of basic food types for the Czech population and food security management.

The book is intended for professionals who deal with the above issues.

## ABBREVIATION USE

ASMR	Administration of State Material Reserves
BMR	Basal Metabolic Rate
CCC	Commodity Credit Corporation
CFS	Committee on Food Security
CSSD	Consultative sub-Committee on Surplus Disposal
EFSA	European Food Safety Authority
ES	Emergency Supplies
FAO	Food and Agricultural organization
FSTP	Food Security Thematic Programme
GIEWS	Global International Early Warning System
HACCP	Hazard Analysis and Critical Control Point
IEFR	International Emergency Food Reserve
IFAD	International Fund for Agricultural Development
IRS	Integrated Rescue System
LIFDC	Low Income Food Deficit Countries
MOBR	Mobilization Reserves
MR	Material Reserves
OPEC	Organization of Petroleum Exporting Countries
SEMCS	System of Economic Measures for Crisis Situations
SLM	Sustainable Land Management
SMR	State Material Reserves
UN	United Nation
UNCTAD	United Nations Conference on Trade and Development
USSR	Union of Soviet Socialist Republics
WFP	World Food Programme
WHO	World Health Organization

## PREFACE

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. (FAO, © 2017)

Even though the definition may seem that the problem of food security is completely bound to developing countries, it is important to realize that the problem of hidden hunger is also inherent to developed countries. The world population in the 21st century is facing a number of challenges to civilization - or global issues, whereas the possibility of ensuring food security across states would solve one fundamental problem. (Jha et al., 2014; Brown, 2014)

The importance of the topic of food security was also convinced by the economic experts at the meeting in Copenhagen, Denmark in 2012 who agreed that improving nutrition is the best investment that can be embedded in global development and health (WORLD DSM, 2013).

Food insecurity, which is both the cause and the consequence of absolute poverty, is taken into account as a development objective and an indicator of economic and social progress within the framework of the Sustainable Development Objectives for 2015 - 2030.

It is a paradox that there is currently enough food on our planet for all its inhabitants, but there is still no way to ensure that everyone has access to safe, energetically and nutritionally balanced foodstuffs.

The presented publication focuses on the definition of individual paradoxes of food security on a global and transnational scale; it summarizes the main approaches to the issue and presents a whole range of new, original findings from the given issue, while the individual studies focus on the European and Czech space.

## I THEORETICAL BACKGROUND

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## **1 HISTORY OF FOOD SECURITY**

Reverend Thomas Malthus, an English cleric and scholar, predicted that the population growth would unavoidably supersede the food production already in 1798. During the last decades the agricultural production has grown worldwide more rapidly than the population did. So at least in terms of macronutrients there is more food available to feed the world population, but the number of people suffering from food insecurity has been increasing and so is the proportion of the overall population suffering from insufficient food since a few years.

The last 80 years are divided in four periods based principally on the world food situation. It puts events in a chronological order and tries to highlight hidden links for a better understanding of approaches to food security (Simon, 2012).

### **1.1 1930 – 1945: POST WORLD WAR ONE AND LEAGUE OF NATIONS**

This chapter of the history of food security begins at the moment when “Food Security” starts to be a concern at worldwide level rather than just at a country, province, village or household level.

In the years following World War One, the League of Nations started its activities in world affairs. In the early 1930s, Yugoslavia as a member of the League of Nations proposed that in view of the importance of food for health, the Health Division of the League of Nations should diffuse information about the food position in representative countries of the world. Its report was the first introduction to the world food problem into the international political arena (Shaw, 2007).

A report on “Nutrition and Public Health” was submitted in 1935 after a survey was conducted by the Health Division of the League of Nations. The report showed that there was an acute food shortage in poor countries, the first account of the extent of hunger and malnutrition in the world. Reviewing the report, the Assembly of the League of Nations held discussions on nutrition and nutrition policies and the need for co-ordinated nutrition policies in a number of countries (UN, 2017).

While from one side, following the efforts undertaken by nutritionists and medical doctors, scientists, international civil servants and national diplomats were discussing the problems of malnutrition within the League of Nations, from the other side, other professionals, other international civil servants were talking with the same national diplomats about the

international commodity trade, the tariff barriers and whether a reduction of food production would contribute to rise prices which had dramatically fallen down following the economic crisis. This all was happening within the League of Nations. These latter series of discussions generated much more interest than the former in the world of food production, processing and trade, and in particular among the producers' organizations, some of which having since then become real political lobbies with little primary concern regarding malnutrition and food insecurity.

The League of Nations finally agreed that increasing food production to meet human needs would bring prosperity to agriculture, which would overflow into industry and bring the needed expansion of the world economy. This was described as the "marriage of health and agriculture" (Shaw, 2007).

This "marriage" represents probably the premises of the story of modern food security born from the troublesome and uneven relations between health and agriculture where the former did likely not get the feeling of leading the story and was probably even more frustrated by the arrival in the gang of other parties such as economists, for example. This first period of modern food security was conditioned by a number of factual events that had taken place earlier and that were all related to factors directly or indirectly influencing world food security. By the end of the 1920's and early 1930's the United States produced some agricultural commodities in surplus, excess stocks started to accumulate and world prices fell to very low level and the USA created a number of mechanism to influence, control and regulate the activities of its agricultural sector (Shaw, 2007).

The Agricultural Adjustment Act was approved in 1933 and aimed at controlling the production based on the area planted. Within the framework of this Act a Grain Stabilization Board was established to provide direct subsidies for agricultural exports. In addition to that, a Commodity Credit Corporation (CCC) was created in order to buy and sell agricultural products, to influence the prices on the market, and to make loans to farmers. Still today, the CCC is an important tool in the US agricultural policy and it has played a leading role in the procurement of surpluses and other food commodities purchased on the US market for the purpose of being shipped abroad as food aid.

In 1943, during the World War II, Nations of the World decided to establish the Food and Agriculture Organization of the United Nations at a Conference on Food and Agriculture convened by President Franklin D. Roosevelt in the USA.

During the World War II, governments' attempts to control farm output were reversed, especially in North-America and efforts were made to increase the food production in order to



reduce the dependency towards outside. The supply was not ensured due to the war. This breakdown of the supply chain left strong trace in the popular moral sense until the end of the century (Simon, 2012).

## **1.2 1945-1970: POST WORLD WAR II, UN, FAO, SURPLUSES**

After the end of the war food supply remained a major concern in many developed countries. In fact, it is still quite common to find traces of this situation in several European countries. In France, for example, vouchers to obtain limited rations of basic food commodities were in use until 1950.

All over Europe policies were developed to reinforce self-sufficiency and increase the agricultural production and therefore the farmers' revenue at a time where farmers still accounted for a majority of the population. There could be some kind of "political" interests beyond measures that were supporting and privileging the numerous population of the primary sector of the economy. Recently, in some instance the rural areas have been depopulated and some creative efforts have been made to bring people back to rural areas and develop new types of activities.

The newly established FAO organized its first World Food Survey in 1946, where the objective of the survey was to find out whether there was enough food, and more specifically enough energy or macronutrients (calories) for everybody on the Earth. The conclusions were that at least one third of the world population did not get sufficient amount of energy in 1945. This data together with the trauma left by the lack of food in many European and North American countries as post war elements pushed governments in the world to take care about the increase in food production with an aim to ensure that there would eventually be enough food for everybody on the Earth. Their policies all over Europe and North-America were so successful that quickly the production exceeded the consumption creating surpluses, which had to be managed. As early as 1946/1947, FAO had been requested to study also the possible consequence of overproduction of agricultural products, a phenomenon that soon became a concern for many countries (Carolan, 2013).

Overproduction of agricultural commodities generates food and other surpluses and part of this surplus food is utilized as food aid. Food aid is both in quantity and in value – but not necessarily in efficiency - the tool that has been the most utilized to fight food insecurity, therefore the link between food security and food surpluses and also the fact that it is still

impossible to review the evolution of food security without referring to the policies related to food surpluses that often were presented as being focused on reducing hunger and malnutrition, improving food security.

In this respect between 1948 and 1953 some 3 billion of US dollars were transferred from the US to Europe within the framework of the Marshall Plan. In 1952 the FAO established a Committee on Commodity Problems (CCP) as Member Countries had realized that increasing agricultural production would generate surpluses in food commodities. The CCP recommended that a set of principles to govern the disposal of agricultural surpluses should be agreed. It also recommended the establishment of a permanent committee to deal specifically with surplus disposal. The Consultative Sub-Committee on Surplus Disposal now known as the CSSD and established in 1954 still exists in Washington DC and still reports to the FAO Committee on Commodity Problems.

Research undertaken by FAO noted that there was a serious distinction between chronic malnutrition and famines, with chronic malnutrition being recognized as a growing concern and a first clear distinction between chronic and transitory food insecurity being acknowledged. Famine was perceived as a relatively sudden and unforeseen event due to natural element such as drought, floods or earthquake and in situation where people would be fully dependent on their own agricultural production with limited possibilities of assistance, other activities and transport of commodities from surplus regions. In fact, the proposal to establish the FAO “Famine Unit” within FAO, although approved by the FAO Conference, was never put in place. Studies conducted by nutritionists acknowledged the importance of malnutrition. The number of people affected by malnutrition was about 100 times more that the number of people affected by famine. Still, the main answer was the provision of bulk food commodities in the form of food aid (FAO, 2017).

In 1961, the World Health Organization (WHO) and FAO created together the joint Codex Alimentarius Commission in order to regulate the food safety by establishing international standards regarding processing, labelling, sampling of analysis, hygienic requirements, etc., of food commodities. Within the complex story of the “marriage of health and agriculture” mentioned above, this surely represented another missed opportunity to closely link food safety and food security.

The first International Wheat Agreement had been signed in 1962 but although the first “Agreement on Agriculture”, within the new WTO, was signed only in 1996, as part of the Marrakech agreement.

The increase of demand for food commodities, in particular by the Indian sub-continent and the decrease of the world food stocks in the early 1960's resulted in an increase of the prices of food commodities and reduced the availability of food surpluses. Therefore, the United States and Canada tried to share the burden of providing food aid to poor food-deficit countries with other major industrialized grain importing and exporting countries, especially in Western Europe and Japan which had provided little or no food aid until then (Shaw, 2009).

Often, people that have a first serious look at food aid are quite shocked by the fact that food aid transactions, as defined by the CSSD, include a number of operations that look more closely related to trade than to food security. Beyond the cultural and political dimensions of this reality the interrelations between these different negotiations provide some kind of institutional explanations.

In 1967 an International Grains Agreement was approved at a conference called by the International Wheat Council and United Nations Conference on Trade and Development (UNCTAD) in Rome. This agreement was made of two different Conventions: the International Wheat Agreement and the Food Aid Convention. Several "Food Aid Conventions" were approved since then but it was only the last one, signed in 1999 and still in force, which formally recognized that the objective of the Convention is to "contribute to World Food Security" (International Grains Council, 1999).

The Food Aid Convention has been the only legal commitment to provide food aid, not necessarily to aim universal food security. In 1969, the FAO Committee on Commodity Problems (CCP) approved the CSSD Catalogue of transactions which de facto was defining food aid. Both the Food Aid Convention and the CSSD Catalogue of transactions recognized as "Food Aid" a number of transactions which contributed to food security still remain to be demonstrated (FAO, 2017).

### **1.3 1970-1990: FOOD CRISIS, AMARTYA SEN, MAJOR REFUGEE SITUATIONS AND OTHER OF EMERGENCIES, DROUGHT IN AFRICA**

During the 1950's and 1960's the world food production increased by more than 50 percent and the production per capita increased by more than 20 percent. This increase had become an expected normal feature bringing, at the end of the 1960's, about 2 percent or 25 million tons in addition on the world market each year. By the end of the 1960's world cereal markets continued to suffer from important surpluses. The United States only had a programme of

concessional sales of more than 12 million tons of food aid. The USA and Canada were implementing serious plans of supply management with the aim to reduce their output through a diminution of the area planted and also a reduction of some of the supports offered to farmers.

An abrupt change came in 1972 with bad climatic conditions in several regions of the world resulting in a dramatic reduction in cereal production. The diminution in the cereal production was about 3 percent or 30 million tons. This resulted in the fact that the cereals available would represent 55 million tons less than expected.

Due to mainly climatic conditions, the USSR and a few other countries became food importers. Cereal exports from the USA in 1974 were 66 percent higher than in 1973 which had been already much higher than 1972. To do this, it had been necessary to draw on the existing stocks bringing them at their lowest level since at least 20 years. Worldwide cereal carryover stocks, for example, fell from more than 200 million tons in 1970 to slightly more than 100 million tons in 1974.

At the same time the Organization of Petroleum Exporting Countries (OPEC) decided to increase the price of petroleum to unprecedented record levels. This in turn affected both the transport of cereals and the cost of fertilizers. All this resulted in an increase of the prices of cereal food commodities similar to the situation in 2008 and 2010 (Simon, 2012).

Although many developing countries had seriously augmented their agriculture outputs, in average by 2 percent per year for the last 20 years, these countries were still dependant on the imports. Imports that took the form of either commercial transactions or food aid represented between 40 and 60 percent of the total imports of developing countries. Commercial imports were getting more expensive for developing countries; for the same amount of money they could buy less cereal. Food aid, with less surpluses and higher prices, was decreasing, too. In fact, food aid dropped from about 17 million tons of cereals per year in the late 1960's to some 7 million tons in the early 1970's.

Quantities of food aid purchased by donor countries, at higher prices, decreased as the budgets were not brought up as would have been necessary to maintain the quantities replaced. In view of the international food crisis, a number of countries from both developed and developing world requested the United Nations to organize an international conference to review the situation and agree on possible measures.

The United Nations World Food Conference took place in November 1974 in Rome to agree on measures to ensure that within a decade nobody should suffer from food insecurity. Therefore, the Conference approved a number of recommendations dealing with what was

referred to as “Food Security”. The Conference approved an International Undertaking on World Food Security which for the first time recognized that food security was a common concern of all nations (Shaw, 2009).

However, Food Security was understood and defined mainly as the availability of adequate food supply at all times. The efforts to solve the crisis had to deal mainly with the production of food commodities and all efforts to improve food security were mainly to be concentrated on increasing the production of food commodities and ensuring an increased availability of food. In line with this quantitative approach the conference recommended that donor countries provide at least 10 million tons of food aid annually to developing countries. This recommendation was committed to as one of its objectives by the Food Aid Conventions until 1995 inclusive.

Among many other proposals put forward at the conference, the following present some type of interest. The establishment of IFAD, the International Fund for Agricultural Development now playing an increasingly important role in food security, the creation, within FAO and as part of its governing body system, of a Committee on Food Security (CFS), which has now become the world focusing point for food security governance, the Global International Early Warning System (GIEWS), the World Food Council, the Committee on Food Aid Policies and Programme (CFA) to serve as the WFP governing body as well as the world focusing point for food aid governance, the International Emergency Food Reserve (IEFR), now one of the major source of funding of WFP’s emergency operations.

1979 and 1980 saw major afflux of refugees searching asylum after leaving their countries Afghanistan and Cambodia and forcing the international community to deal with protracted refugee and crisis situations and to reconsider in particular the modalities of their food aid operations. The 1983 – 1985 droughts in Africa appeared as another challenge for the affected countries and the international community to deal with food security in case of shocks. It will, however, be only after the fall of the Berlin Wall that, due to the changes in the world geopolitical balance, the concern for food insecurity will increasingly be related to emergency situations. The 1983 – 1985 as well as the 1992 food crisis in Africa being due to unfavourable climatic conditions having affected the harvests, the related analysis and responses were almost fully based on the availability dimension of food security. More resources were invested in solving logistical problems related to increasing the availability of food commodities in affected countries than in dealing with malnutrition.

More important for food security is the fact that in 1981 new concepts entered into the debate following research made on famines by the future Nobel Prize winner, the Indian Amartya

Sen. Sen's major argument was that during the past famines the main problem was not so much the lack of food but rather is inaccessibility for poor people. Sen explained that most cases of starvation and famines in the world resulted not from people being deprived of what they were entitled but rather from people not being entitled to adequate means of survival in the existing legal and social systems they were living in. During famines poor people were much more affected than others, due to a collapse in their entitlements (Carolan, 2013).

However, the access dimension as highlighted by Sen in 1981 was formally recognized in 1996 only at the Rome World Food Summit and practically put into practice by food security practitioners only after the 2005 Niger crisis and the 2008 world food prices crisis.

In 1976, FAO established a Food Security Assistance Scheme to assist developing countries reaching food security. This Scheme dealt mainly with short term food supply and with improving food production as well as with a special action programme for the prevention of food losses.

Following several years of discussions in different FAO Committees and in its Council, the 1979 FAO Conference approved a Food Security Action Programme aiming at assisting food deficit developing countries in importing and storing food commodities.

In 1983, the FAO Conference adopted a resolution on World Food Security which stated that "the ultimate objective of world food security should be to ensure that all people at all times have both physical and economic access to the basic food they need".

Many are the factors that could explain why this new approaches did not really open a new era. Food security was a concern for the international community but that there was no perceived need to actually change the approach and utilize new tools (FAO, 2017).

#### **1.4 1990-2005: GOLDEN YEARS OF FOOD SECURITY**

This period following the fall of the Berlin Wall started with the 1992 drought food crisis in Southern Africa and was characterized by the fact that at least fifteen high level international conferences dealt with food security and approved recommendations related to food security. Luckily, during this period the approach to food security was growingly characterized by its multidisciplinary dimension.

The 1992 International Conference on Nutrition, jointly organized by FAO and WHO, met in Rome and was a major landmark in the recent development of food security.

The final declaration approved by participant Member States stated there: “Determination to eliminate hunger and to reduce all forms of malnutrition. Hunger and malnutrition are unacceptable in a world that has both the knowledge and the resources to end this human catastrophe.” They further recognized that “access to nutritionally adequate and safe food is a right of each individual” and also that “globally there is enough food for all” and that “inequitable access is the main problem” (Simon, 2012).

The declaration took note of the “unacceptable fact that about 780 million people in developing countries did not have access to enough food to meet their basic daily needs.” The Conference approved an ambitious Plan of Action which called for inter-sectoral co-operation and co-ordination between all actors concerned (FAO, 2017).

This conference which may have appeared as another attempt to reinforce the “marriage of health and agriculture” mentioned at several occasions above in this text did not meet the expectations in this respect may be partly because the WHO Director General whom had probably not closely followed the recent development in terms of food security since 1974 and referred to the 1974 World Food Conference “which had focused on food security” and stated that “We know that food security alone is not enough to prevent problems of nutrition. This is why we address the nutritional security of all people. We are building a bridge that spans health and agriculture to achieve sustainable development”. This “bridge” unfortunately confirmed that health and agriculture were not yet sharing the same home (Simon, 2012).

In 1996 an important progress was made at the occasion of the World Food Summit organized by FAO in Rome. The Summit was and has remained a major milestone in the history of food security. The report presented by FAO at its Committee on Food Security in 1994 explained that impressive progress had been made in aiming at improving food security, that by 1992 both the absolute number of people and the share of the world population that were in a situation of food insecurity had declined, even if more recent data showed a modest deterioration in 1993/94. At a time where people were tired of expensive international forum, the Summit, therefore, could possibly work with some kind of serenity on substantive matters (Simon, 2012).

For academics the Conference mainly remains as the mechanism having permitted the approbation of a new definition of food security still in use two decades later and which has not yet been fully exploited. The many hours that experts and diplomats spent together negotiating this definition were worth it. This new definition of food security recognized the multidisciplinary approach of food security as well as the interrelated causes of food insecurity. The Conference confirmed the strong will of the nations of the world to get rid of

famines and starvation and its final Declaration reaffirmed the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right of everyone to be free from hunger. The conference approved a Plan of Action which recommended to governments that “each nation must adopt a strategy consistent with its resources and capacities to achieve its individual goals and, at the same time, cooperate regionally and internationally in order to organize collective solutions to global issues of food security”. Food Security is thus recognized to be a global concern (FAO, 2017).

The Plan of Action which aimed at uprooting hunger in all countries included the intention to reduce the number of malnourished people in the world by half until 2015. The Conference also approved the principle of the “Right to Food” although without the support of the United States of America which delayed a lot the implementation of the “Right to Food” which is not completed today, despite the courageous and competent efforts by non-governmental organizations. At the World Food Summit + 5 which was held in Rome in 2002 as well as at the meeting of the Committee on Food Security that took place in 2006, ten years after the WFS, figures were not very optimistic regarding the reduction of the number of malnourished people, rather some increase in these numbers was feared which, unfortunately have been confirmed since then (Simon, 2012).

However, some progress has been made. By 2002 and following the recommendations of the 1996 WFS 150 developing and transitions countries had been able to produce national food security strategies. The 1996 + 5 Summit in 2002 approved the creation of the International Alliance against Hunger (IAAH) which groups many international, non-governmental and civil society organizations and has a mandate to deal with advocacy, accountability, resources mobilization and co-ordination in order to strengthen national and global commitments and actions to end hunger. (FAO, 2002)

The 2005 food crisis in Niger that was largely reported by international media referring to famine and hence suggesting an important number of death while many people were “simply surviving” and suffering, highlighted some very specific aspect of the economic access dimension of food security. Unusual economic decisions taken in the neighbouring Nigeria resulted in an unforeseen increase of basic cereal commodities prices in Niger making this food unaffordable for many people living at the edge of food insecurity. The food was there, -available-, the harvests had been decent, but the price was simply too high for a large range of the population to acquire it.



Similarly, the 2008 world food prices crisis which saw, for a few months, the prices of cereal commodities dramatically increasing by being multiplied by three and sometimes four, resulting in an impossible access to food for many people in particular in developing countries, convinced many economists, development economists, agro-economists, etc. that there was an active role for them to play within a multidisciplinary food security (de Zeeuw, 2015, p. 224).

In 2009, the World Food Programme published the third report of the World Hunger Series entitled: "Hunger and Markets". This publication, another important step in the evolution of food security, offers access to most of the knowledge in terms of economic access to food as available today.

## **1. 5 THE FUTURE OF FOOD SECURITY**

Hunger and poverty are still predominant factors of people's life in many developing and transitions countries and will likely remain so for the next one or several decades.

A lot has been done; there are some encouraging but insufficient results. From the past experience we can learn the mistakes not to repeat, we can build new approaches. The efforts to implement the right to food will probably be the more visible part of the actions undertaken during the coming years.

The direct leadership of interdisciplinary teams of experts could contribute to improving their food security situation. In a world of globalization and rapid transmission of information, our hopes and objectives are that the knowledge will also move more quickly in order to reduce the suffering of those in situation of food insecurity (comp. de Zeeuw, 2015, Simon, 2012).

## 2 FOOD SECURITY TERMINOLOGY

Food security is defined as a condition where the physical and economic access to sufficient quantities of healthy and nutritionally balanced food is provided that meet the nutritional needs and preferences of the individual for his active and healthy life. (FAO, ©2017) Even though the definition may seem that the problem of food security is completely bound to developing countries, it is important to realize that the problem of hidden hunger is also inherent to developed countries. The world population in the 21st century is facing a number of challenges to civilization - or global issues, whereas the possibility of ensuring food security across states would solve one fundamental problem. The following subchapters will define the main concepts of food security, their choice being given by the approach to food security in the Czech Republic.

### 2. 1 FOOD SECURITY AND FOOD SOVEREIGNTY

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. (FAO, © 2017)

We define food security at two levels. The first level shall be defined as the country's food security, i.e. the required level of productive resources in relation to the domestic consumption in the longer term. It is basically the rate of coverage of domestic consumption, domestic factors in the case of emergencies, unexpected events (wars, natural disasters, and failure of international trade).

The second level of food security refers to various social groups of the country and expresses the degree of risk of certain social groups in terms of quantity and nutritional value of food. (Lawrence et al., 2010)

Food sovereignty represents the actual ratio between domestic production and domestic consumption of given agrarian commodity at a certain time. However, it has greater explanatory power in terms of food producers and their fulfillment interests rather than interests of consumers.

Food availability means having available sufficient quantities of food on a consistent basis. Stachowiak indicates general and marginal determinants of food availability:

- General determinants:
  - Population nutrition level;
  - Food supplies level;
  - Food consumption desired pattern.
- Demand determinants:
  - Food price changes indicator;
  - GDP per capita;
  - Food expenditure amount;
  - Population incomes and food prices relation.
- Health accessibility determinants:
  - Energetic value;
  - Deviations: consumption and physiological standards levels;
  - Nutritional value;
  - Food rations models;
  - Unsafe food consumption. (Stachowiak, 2003)

Food access means having sufficient resources, both economic and physical, to obtain appropriate foods for a nutritious diet. (Lukášková et al., 2014) The accessibility on the national level (macro level) is influenced by inquiry, which is determined by home production, commercial imports, foodstuff help and foodstuff reserves. On a regional level, the accessibility is influenced by regional foodstuff production, foodstuff reserves, distribution system and on the household level by foodstuff production on this level, by the market and by foodstuff for work acquisition type. Access to the foodstuff is determined by general incomes of the households and usability means foodstuff wholesomeness. (Williams, 2012) Access to the foodstuff or Food Sovereignty is the right of peoples to healthy and culturally appropriate food, produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. (Food Secure Canada, 2017) Food use – appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

Figure 1 Food system - Why think about our food system



Source: Open Health, © 2014 – 2017.

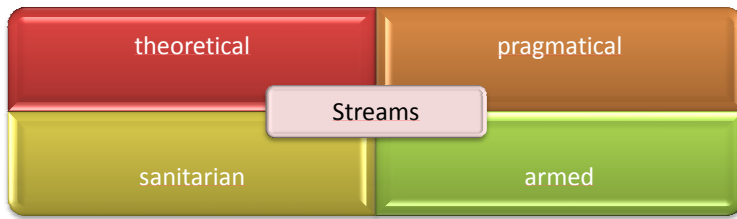
Food security is also anchored as a theoretical discipline. At the theoretical level of the country's food security, it is possible to explore issues that focus on:

- the systematic approach to the food security issue;
- the localization of the food security problem in the overall state security issue;
- the definition of the country's food security indicators.

Criteria of food security and their division:

- Ways of approach to solving issues of food security
- Food security and dimension of functioning
- Food security and conditions of achieving
- Food security and time horizon of formation
- Barriers and threats of food security and its formation

Figure 2 Criterion of dividing according to ways of solving issues of food security



Source: Stachowiak, 2003; adapted by authors.

## 2. 2 THE PRACTICAL ACTION OF GOVERNMENT INSTITUTIONS IN THE AREA OF FOOD SECURITY

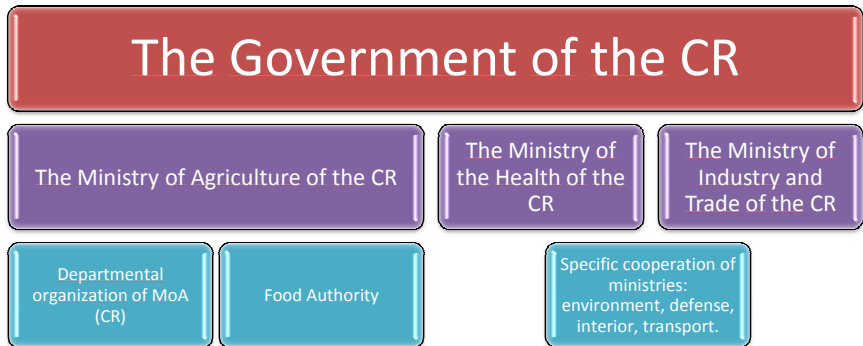
The practical operation of the state in the economic sphere is called economic policy. The implementation of economic policy, its success and efficiency, therefore, expresses how the state approaches the economy of its country. It is an activity in which economic policy makers (government, state authorities) use certain tools and powers to influence economic and social development while pursuing certain economic goals. Economic policy is based on macroeconomic theory and includes the wealth of lessons learned from other areas of expertise, such as politics, law, or economic history. Since food security can be understood as part of the state's security system and the country's economic system, food security issues are a part of the country's economic policy. This is mainly about ensuring mechanisms that will allow the smooth functioning of the market in the area of food supply and demand, in general, commodities produced by the agricultural sector.

Economic policy holders in the field of food security are especially the bodies of state administration and self-government (higher territorial self-governing units). In the area of legislation dealing with the issue of food security, it is the legislative institutions, especially the Parliament of the Czech Republic, in terms of executive power it is the government and individual government institutions.

In order to ensure food security, whether from the point of view of securing sufficient foodstuffs or their good availability to the consumer, for example at the time of the declaration of crisis, several ministries are involved (for clarity see the following diagram). Compliance with laws in the area and possible penalties for violation of these laws are

monitored by the judiciary and the institutions creating the market environment (Office for the Protection of Competition). (Lukášková et al., 2014)

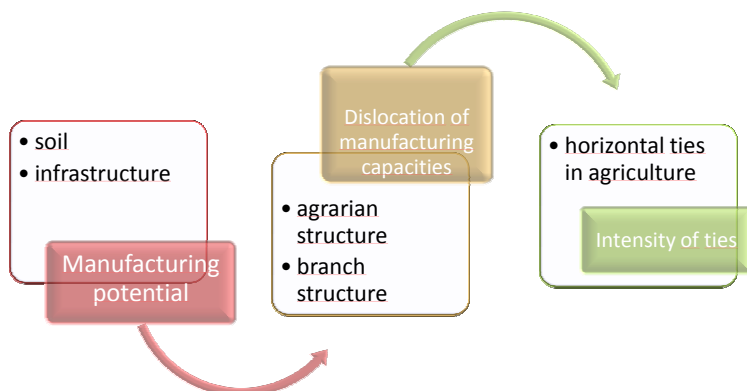
*Figure 3 Ministries which performs practical restrictions of economic policy in the area of ensuring food security*



Food security of the country is an integral part of state security, it is included in the field of the population protection and security; its place is therefore determined by the mutual relations among different types of social security. At the same time, ensuring food security is very important for military and political security.

The conditions for food security creation are therefore closely linked to the individual components of the population security and for ensuring food security it is essential that favourable conditions of economic, political, social, military, natural and ecological conditions are set in the state. If we take the area of functioning agriculture in the country as the prerequisite for food security, then it is important to positively fulfil the internal economic conditions for its development - it is possible to mention the above-described condition as the most important. (Lukášková et al., 2014)

Figure 4 Internal economic conditions of agriculture as the basis for food security



Source: Stachowiak, 2003; adapted by authors.

In developed countries, the supply system of the population is ensured through the market mechanism. At this point, the role of the market, state interventions, its sufficiency or insufficiency, will not be analyzed. In the context of food security and its ensuring when it comes to the declaration of some degree of the state of emergency, it is needed to define the system of emergency supply to the population that is part of economic measures for the state of emergency.

## 2. 2. 1 THE SYSTEM OF ECONOMIC MEASURES FOR CRISIS SITUATIONS (SEMCS)

The System of economic measures for state of emergency (SEMCS; Czech HOPKS) are organizational, material and financial measures taken by administrative authority in crisis situations for security and necessary supply of products, work and services without which, it is impossible to overcome crisis situations.

Economic Measures for State of Emergency are received after declaration of state of emergency, and intended:

- to satisfy the basic needs of individuals on the territory of the CR, also allowing survival of crisis situations without grievous bodily harm;

- to support the activities of the armed forces, armed security forces, fire brigades and emergency services;
- to support the performance of state administration.

Branches that are important for the supply of population in crisis situations:

- manufacturing of meat and meat products;
- manufacturing of bakery products;
- manufacturing of vegetable and animal oils, fats;
- manufacturing of sugar;
- manufacturing of bottled drinking water. (Lukášková et al., 2014)

The system of economic measures for crisis situations (SEMCS) is a set of organizational, material or financial measures taken by public administration bodies in accordance with Act No. 241/2000 Coll., On Economic Measures for Crisis Situations and on Amendments to Certain Related Acts, as revised the connection with ensuring the necessary and mobilizing deliveries of products, works and services without which it is not possible to ensure the overcoming of crisis situations.

The SEMCS system consists of five basic elements:

1) The Emergency Management System is designed to provide the necessary supplies needed to meet the basic life needs of the population, to support the operation of the fire brigade and to support the performance of state administration. It is based on the requirement that the necessary material resources are carried out as usually in a non-crisis situation. A priority source of the necessary material resources is assets and services owned by entrepreneurs, which can be used under the conditions involved by the law for the resolution of crisis situations.

2) The system of economic mobilization is designed to provide the necessary material resources for the armed forces and the armed security corps; they are delivered under state threats and in a state of war from the business sphere in the Czech Republic. Recently, the provision of the necessary material resources in peace has been solved by a system of measures for the preparation of their production in the volumes and deadlines established by the basic planning documents instead of the production of the finished material resources.



3) The system of state material reserves creates the material resources necessary to deal with crisis situations, which cannot be ensured by entrepreneurs and whose responsibility is guaranteed by the state. State material reserves are created on the basis of the requirements of the crisis plans of the central administrative authorities and can be divided into material reserves, emergency supplies, and humanitarian aid and mobilization reserves. The tangible reserves are the strategic reserves of the state in the field of emergency stocks of crude oil and petroleum products and supplies for securing the raw material and food security of the Czech Republic. Emergency supplies and supplies for humanitarian aid are created by the Administration of State Material Reserves in the Emergency Management System. Mobilization reserves provide the necessary requirements in the system of economic mobilization.

4) The construction of the necessary infrastructure is covered by the part of the material resources requirements, which are of an infrastructure nature.

5) The system of regulatory measures is prepared as an extreme measure of the SEMCS system for a period when the effects of the crisis situation will disrupt the normal market method of production and distribution of goods needed in particular to cover the basic living needs of the population in the area affected by the crisis situation. The SEMCS system, in its five core components, creates a comprehensive and compact system to provide the necessary material resources to address all types of crisis situations that can also be used to address large-scale emergencies. The system is closely interconnected with the crisis management system, the defence system and the emergency response system in the Czech Republic. (SSHR, ©2009)

## 2. 2. 2 ADMINISTRATION OF THE STATE MATERIAL RESERVES

The Administration of State Material Reserves (“ASMR” or “Administration”) is the state administration’s central body in the sphere of crisis situations - related economic measures and state material reserves. It was established according to Act No. 2/1969 Coll., on the Establishment of Ministries and Other Central State Administration Bodies, as amended.

ASMR’s competence is regulated, in particular, in Act No. 97/1993 Coll., on the Competence of the Administration of State Material Reserves, as amended.

In the Administration’s lead is the Chairman, who is appointed and discharged by the Government. The principles of the Administration’s activity and organization are involved

in the Statute of the Administration of State Material Reserves approved by the Government Resolution No. 1293 of 3 December 2001.

The Administration's principal missions are defined in:

Act No. 97/1993 Coll., on the Competence of the Administration of State Material Reserves, as amended,

Act No. 241/2000 Coll., on the Economic Measures for Crisis Situations and on the Amendments to Certain Related Acts, as amended, Act No. 189/1999 Coll., on Emergency Oil Reserves and the Resolution of Oil Emergency and on the Amendments to Certain Acts (Emergency Oil Supplies Act), as amended.

To deal with crisis situations, it is necessary, among other things, to have the means and services which could be used immediately to the benefit of the people struck by a crisis situation. These means and services must be available, in particular, for the emergency survival of people and for the assistance of the Integrated Rescue System (IRS) and the activities of state administration. This task results for the Administration of State Material Reserves (ASMR) from the laws and is elaborated on in the so-called 'System of Economic Measures for Crisis Situations (SEMCS)'.

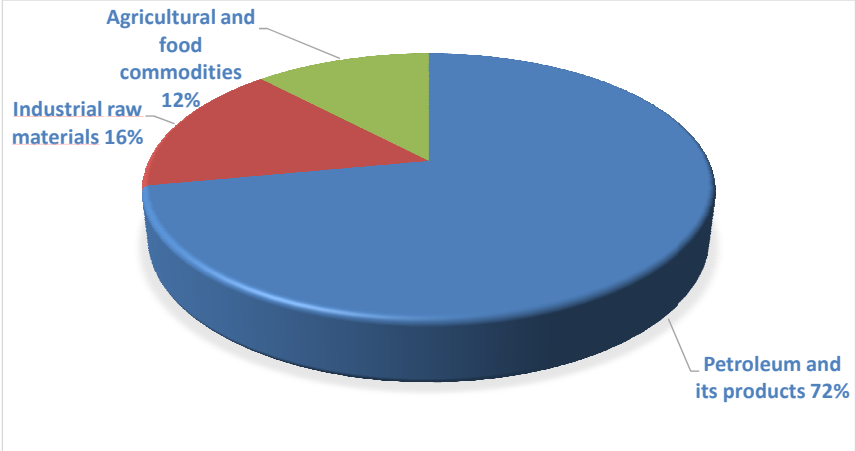
The persons and the bodies responsible for dealing with crisis situations need to work fast with a large amount of information to ensure quality and fast decision-making on what means and services to arrange and for whom and need to collect, verify, sort, group together and analyse such information. For this work to be as fast and accurate as possible, various information systems providing 'Information Support' in the dealing with crisis situations and, thus, ensuring the necessary means and services are used.

An important part of SEMCS is the sphere of state material reserves (SMR) divided, in terms of the purpose of use, into material reserves (MR), mobilization reserves (MOBR), emergency supplies (ES), and humanitarian help supplies (HHS). The responsibility for procuring, maintaining and funding SMR is one of the three basic competencies of ASMR. One of ASMR's major activities in this domain is to ensure the purposeful and timely 'Use of State Material Reserves in Crisis Situations' for the people and the regions struck by a crisis.

Based on the applicable laws, the resolution of crisis situations is dealt with by the crisis management bodies at all levels of state administration. The principal task of these bodies is to procure material resources according to the needs reported by the affected territories.

To this effect, the ‘Competence of Bodies in the Procurement of Material Resources’ is the applicable legislation. (SSHR, © 2009)

Figure 5 Structure of material reserves of the Czech Republic



### **3 FACTORS AND PROCESSES AFFECTING FOOD SECURITY**

Food security and its ensuring is a process that affects a number of factors. Main factors were defined in chapter 2 – Food availability, food access, food use and stability. Governments can influence the four dimensions of food security, with policies and investments that increase the availability of food sustainability, improve peoples’ access to it, ensure that their utilisation results in adequate nutrition, and guarantee stability across those three dimensions. (OECD, 2013)

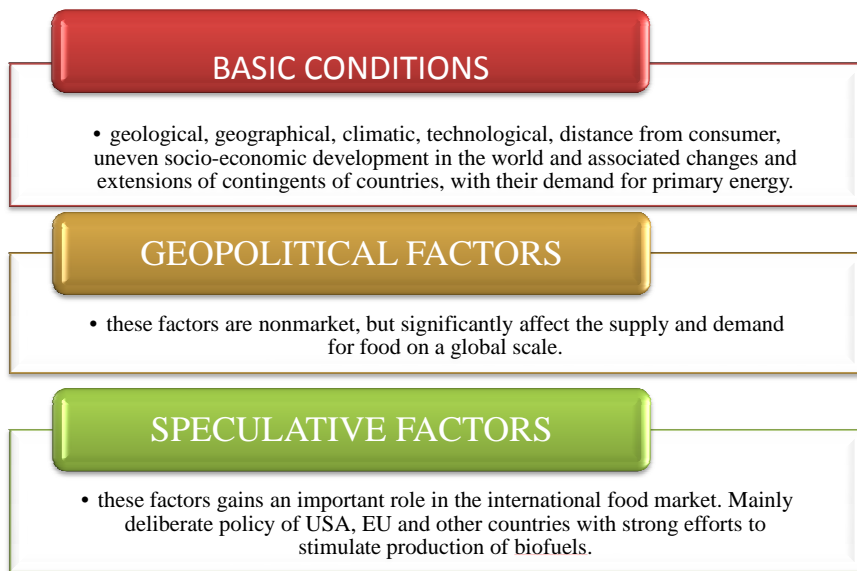
FAO presents classification of factors in terms of food security on a global scale. It is also possible to introduce factors which are divided according to the typology of global problems. The 21<sup>st</sup> century world is facing a number of complex and interrelated challenges, which have serious implications for the efforts of FAO, its member countries and partners to achieve global food security:

- The world’s population is rapidly expanding (it will reach 9 billion by 2050), with most of the growth in today’s developing countries.
- Rural-urban migration is increasing considerably, again predominantly in developing countries (urban areas accounting 70 percent of the global population in 2050).
- Changing patterns in the types of food consumed are resulting from economic expansion, globalization and urbanization.
- Natural resources are being subject to unprecedented pressure from human activities.
- Marked climate and environmental changes are occurring, including more frequent disasters and emergencies.
- Globalization is affecting the agriculture sector and food security, with major implications for the free trade of food and access to markets and information as well as the availability of land for food production and food prices. (FAO, 2011; Ingram et al., 2010)

#### **3. 1 CLASSIFICATION OF FACTORS IN TERMS OF FOOD SECURITY BY FAO**

There are a number of factors and processes that affect food security. Below you can find a list of factors that affect food security globally, along with food security and food safety indicators.

Figure 6 Factors that affect food security - global view



Source: FAO, 2011

Six indicators deduced from observations of the global cereals market are reviewed by the FAO Committee on Food Security. Even though these indicators are limited to cereals, the discord is that they enlighten the global food situation according to the weight of cereals in the overall food basket and accordingly overcome the difficulty of cumulating over food commodities in calculations of the total food supply and of food imports.

- Ratio of world cereal stock to world cereal utilization (ratio of 17-18 percent is measured to be the minimum necessary to safeguard world food security).
- Ratio of supplies to requirements in the five main exporters.
- Ratio of closing stock in the five main exporters to their domestic consumption plus exports.
- Cereal production in the three main importers (China, India and CIS).
- Cereal production in Low Income Food Deficit Countries (LIFDC).

- Production in LIFDC except China and India.

Potential indicators should mirror changes in the food import requirements of developing countries, and in their capability to finance any increase in the import bill. As a result of a world price increase, they should also be able to acquire the effect of the gap between an increase in the import bill and any increase in domestic production (and potentially exports).

These two indicators may appear useful in differentiating the impact of a weak supply response in agriculture in some developing countries:

- changes in the ratio of cereal import demands (derived in value terms as consumption requirements minus domestic production) to total agricultural export profit;
- changes in the ratio of cereal import demands (derived in value terms as consumption requirements minus domestic production) to overall goods. (FAO, © 2017)

The FAO focuses also on household issues in the context of food security, perceiving food security and its security not only on the global and macro-economic level, but also on the microeconomic level of food security at the heart of its interest.

Household food security is defined as the ability to ensure adequate food security depends on the ability to identify vulnerable households, where vulnerability refers to the full range of factors that place people at risk of becoming food insecure. The degree of vulnerability of an individual, household or group of persons is determined by their exposure to the risk factors and their ability to cope with or overcome stressful situations.

Habitually, vulnerable households will constitute three groups:

- The first one - those which would be vulnerable under any circumstances: for example, where the adults are unable to provide an adequate livelihood for the household for reasons of disability, illness, age or some other characteristics.
- The second one - those whose resource foundation is inappropriate to provide sufficient income from any available source.
- The third one – those households whose characteristics and resources provide them potentially vulnerable in the context of social and economic challenges and shocks: e.g. those who find it difficult to adapt to acute changes in economic activity brought about by economic policy. A significant increase in the consumer price of basic foods might be an example.

However, there is no implicit definition of ‘vulnerable’; a useful starting point is the estimate of income. Therefore, an appropriate representative in identifying vulnerable households is how poor is a specific household measured against some established criteria or ‘poverty-line’.

After defining who the poor are, the second stage is to identify their household characteristics:

- location - rural/urban; small village/large village; remote province/near to capital city;
- composition - size, age and dependency ratios; male/female head;
- sources of income - production, employment, trade, endorsements and other transfers.

(FAO, © 2017)

Factors and processes affecting household food security and national food security are government policies, structure of domestic markets, market infrastructure, GDP, income and asset distribution, border prices of tradable products, exchange rates, transport and communication infrastructure, household income and natural events. The aforementioned factors influence further or are influenced by markets (supply and demand, product prices, input prices – wages, rents, interest rates), livelihood assets (physical, financial, human, natural, social, personal), enabling agencies and service providers. A household is created by return to assets and transfers income. Expenditures are divided on consumption of food, health services, education services, durable goods, semi durable goods and other necessary expenditures. Level of consumption determines household food security status, household health status or household poverty status. (FAO, 2011)

### **3. 2 CLASSIFICATION OF GLOBAL PROBLEMS (FACTORS AFFECTING FOOD SECURITY)**

Global problems can be divided into inter-social and natural-social problems. However, the division is more usable for the theoretical level, in practical life the problems interlock and influence each other. Likewise, individual global issues affect the level of food security at regional, national and international levels. Below they are briefly defined and then the attention is paid to selected global issues.

Inter-social problems are connected with the mutual interaction of different social and economic systems and global coexistence of population in conditions of different values and ideologies, with the possibility of conflict of interests.

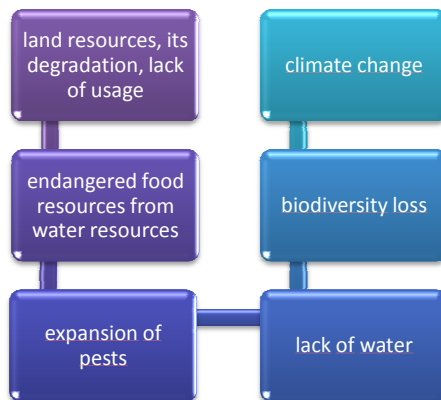
Inter-social problems include:

- problems associated with averting a world war, issues with the armament, fight with terrorism;
- social and economic backwardness of the third countries (rich North vs. poor South);
- global indebtedness;
- change in the international economic relations in the context of scientific and technical progress.

Natural-social problems are based on the conflict between human and nature, this conflict led into a disruption of balance in the context of inability to restore natural resources - issues with rareness of natural resources and increasing level of inhabitants on the planet. From the following text, this set of problems pops up:

- ecological;
- raw materials and energy;
- population;
- food (nutritional).

*Figure 7 Overview of natural factors affecting the food deficit in the world*





Natural factors of food security of the country that are suitable for the Czech Republic:

- soil fund and its degradation;
- biodiversity;
- climate change.

The OECD and the FAO produced the Outlook for the development of world agricultural production, consumption, agro-food products and prices, which foresaw nominal food prices to grow between 2011-2020 for cereals on average by 20% and for meat 50% higher than in previous years (2001-2010).

Prices of all major groups of agricultural and food products will grow in the future. Growth in world agrarian production is projected at 1.7% per year, 2.6% in the previous decade. Below are the factors (or global problems) behind OECD and FAO price volatility:

- changes in weather conditions and climate;
- persistent low and predominantly decreasing final stocks for a number of the most important commodities (for example, world stocks of corn which in the 2010/2011 season were enough to cover world consumption for only 47 days, while the international market agrarian experts recognized the equilibrium in the cereal supply on 70 days of global consumption. This number is currently unrealistic for all major agricultural commodities);
- growth in energy prices, which affect the growth of fertilizer prices, transport, agro-technical soil processing, in particular the growth of raw materials demand for biofuels;
- movements in exchange rates that have an impact on domestic commodity prices;
- growing demand, particularly in emerging countries (China, India and Vietnam), demand for “poor countries” is projected to increase by as much as 50% in the decade;
- higher input costs, slower roll-out of progressive technologies, the need to use less fertile land, less irrigation;
- trade constraints - partial and national restrictions on exports and imports boosting price growth on the international market;
- increasing volume of speculative deals.

In addition, there is another problem of scissors opening between supply and demand on agrarian markets. It is a slowdown in yields for a number of major crops, a decline in productivity growth rates, particularly in the cereals and oilseeds sector. The European Commission has elaborated an outlook on the agrarian market, which essentially coincides with the above-mentioned outlook. The EC predicts a decline in resources, especially available land, an increase in global demand and worsening climatic conditions, a greater incidence of disease in farmed animals and adverse effects of rising energy prices.

The natural social problems of the world are based on man's influence on nature, which, in the last two centuries, has led to a distortion of the balance. The disturbance of the balance of nature is taken in connection with the impossibility of restoring natural resources. From an economic point of view it is a category of rarity - natural resources are taken as rare and limited goods.

Of course, the imbalance is due, in particular, to the growing number of people on the planet as well as the increasing demands of people as consumers. A part of the natural social problems of the world is also a food problem. It is affected by a number of other global challenges, particularly the social and economic backwardness of developing countries (rich North vs. poor South). It is possible to define a number of inter-social and anthropo-social global issues that affect the availability of food. Selected issues are listed in the following diagram.

*Figure 8 Selected inter-social and anthropo-social global problems according to Jeníček and Foltýn*



FAO has already stated in 2011 that climate change will seriously jeopardize agricultural systems, which will particularly hit developing countries. The UN Food and Agriculture

Organization further notes the need to address the short-term impacts of climate change that directly threaten food security, but it is not necessary to underestimate the slower climate effects that may lead to deeper agriculture-related changes to the ecosystem. This could endanger food security between 2050 and 2100. One of the main measures proposed by the FAO is the development of key food crops that will be better adapted to the expected future climatic conditions (FAO, 2013).

Another serious problem that needs to be addressed in relation to the topic of attention is the loss of soil. Simply stated, people are getting more and less soils. In 2012, a theoretical field of 28 acres was per inhabitant of the planet. But much more serious is the real situation caused by increasing construction, salting, and erosion. Soil is becoming one of the most sought-after commodities and its price is rising. The rising price of land thus logically increases the price of its rent and is reflected in the cost of agricultural production. According to the World Bank data, the purchase of agriculturally usable areas is growing at a significant pace. Only in 2009 around 45 million ha have been bought in the world by buyers from China, Saudi Arabia, the Gulf States, South Korea, the UK and India. Half of the plots are located in Africa (Tuček, 2012).

Characterizing a food problem is possible from several angles. One of these is the FAO Food Consumption. Another indicator is the level of basal metabolism - BMR, from which the nutritional needs of the population are derived. The indicator also sets out two opposing problems - the problem of food shortages and excesses. FAO indicates the optimum BMR ( $BMR = \text{body weight in kg} / \text{height}^2 \text{ in meters}$ ) for an adult from 18.5 to 25. The value below 16 is considered for critical malnutrition, over 40 on the other hand for critical obesity. Another option for assessing food sufficiency is the indicator per capita food stock. This is the total amount of food converted to the energy content of the food in a given country per capita. The value of the indicator in this country indicates the average availability of food, but it does not indicate the distribution of food among individual groups of the country (Lobell et al., 2010).

The problem of hunger can generally be divided into two groups - famine and endemic deprivation. Hunger indicates an acute food shortage accompanied by epidemics, resulting in the deaths of millions of people. Endemic deprivation then affects up to a hundred million people with illness, increased mortality, shortening life expectancy. Hunger may be in the form of starvation, chronic hunger, or various forms of malnutrition (Jeníček et al., 2003). According to press reports, 6 million children are starving in the world every year. Although

the proportion of planet suffering from long-term food shortages since the 1970s has fallen by more than half, hunger in 2010, according to UN figures, has suffered up to 1 billion people. On the other hand, a large amount of food is shed. A study by the Swedish Institute for Nutrition and Biotechnology states that it is economically mature and developing countries are cutting around 670 million tonnes in the same year. In developed countries there are 630 million tonnes. In industrialized countries, 222 million tonnes of waste will be consumed as a waste, which is the same amount of food produced by farmers across Africa south of the Sahara desert. Fruits and vegetables are the most common. Food losses occur during production, harvesting, transportation, and processing. Due to poor infrastructure, obsolete technologies, and inadequate investment in the manufacturing industry, losses in the developing countries are more pronounced than in the North. In developing countries, 40% of food losses are due to harvesting and processing food. 40% of the losses in developed countries are caused by poor storage and excessive consumption. So consumers buy more food than they can consume and then they throw it away. Everyone in North America or Europe spends between 95-115 kg per year of food, numbers in Sub-Saharan Africa and South and South-East Asia are talking about wasting within the range of 6 - 11 kg per capita.

There are also significant differences in food production. FAO reports that food production in today's developed world is around 900 kg per capita and per year, with only 406 kg per inhabitant in the poorest regions of the planet. Improvements to this situation can be brought about by the fact that in developing countries, farmers sell as many of their products as possible directly to consumers. Small farmers are paradoxically among those who are actually threatened with hunger. Farmers do not often see food prices, sell to markets through intermediaries who use farmers to have no storage capacity, and sell after food at very low prices. Because of the poor infrastructure, little information is sold by little farmers and they are bought back at a high price. These are small farms up to two hectares (Prášková, 2014).

The public and private sectors should invest a lot more in food transport, processing and packaging. In Western countries, consumers are gradually giving priority to products that have been harvested in accordance with sustainable development principles. Nevertheless, the improvement of that state is still largely the principle of both the problem and the real massive reality.

The European Union has a food security objective to prevent the underlying structural causes of food insecurity. This program contributes to alleviating poverty and food shortages in countries with chronic food insecurity; while mitigating the impact of the crisis

to the most vulnerable groups. Particular attention is paid to the role of the bridging tool between short-term (crisis) and long-term (country development) situations. The scope of this bridging function includes a lengthy crisis, recovery and resolving structural food insecurity as a first step in long-term poverty alleviation. The EU's external assistance strategy provides financial resources for food security, thus contributing to the first development target.

Given the multidimensional nature of food security and poverty, the EU has revised its food safety strategy in Council Regulation 1292/96 on food aid policy, food aid management and specific measures to promote food safety. Since 1996, it has integrated the EU's food safety policy into the objectives of sustainable development and the fight against poverty. The basic principles of EU food security policy are:

- developing food safety programs in support of poverty reduction;
- take into account the problems of access to food due to low incomes, and not only the issues of food availability;
- focus on partnership: food safety programs developed within the national strategies that the beneficiaries involve in the development and implementation of food security measures;
- finding compatibility with the European Union's development policy;
- ensuring that food aid interventions are compatible with the code of conduct agreed between the Commission and the Member States, in particular as regards the distribution of food aid based on need, the direction of food aid to the most vulnerable population, giving priority to local and regional purchases (Tripartite trade between the EU and two developing countries). (Lukášková et al., 2014)

## II APLICATION OF FOOD SECURITY PROBLEMATICS

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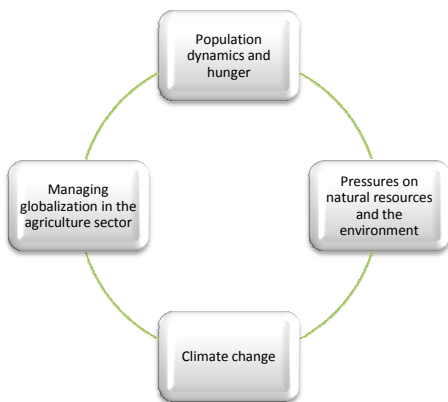
## 4 GLOBAL FOOD SECURITY STRATEGIES AND SUSTAINABLE DEVELOPMENT

This chapter focuses on getting together key strategies which address food security problems while reflecting sustainable development. For the issue is very wide, it is depicted in general, and only the main areas that are interlocked in other chapters of the book are defined. The first subchapter defines the main challenges of food security in the 21st century and the other subchapter briefly defines the main strategies for food security and sustainable development.

### 4.1 CHALLENGES TO FOOD SECURITY IN THE 21ST CENTURY BY FAO

The FAO has designated key challenges for food security in the 21st century. They are described below in more detail.

*Figure 9 Challenges to food security in the 21st century*



*Note: Created by authors from source FAO of the UN, Rome 2011*

#### *Population dynamics and hunger*

The world provides enough food to feed everybody, yet nearly 1 billion people remain hungry. Hunger and famine affect certain populations in all continents, in both developed and developing countries and in urban and rural areas. Without a doubt, the challenge of uprooting

hunger is intimidating, and attempts at both national and international levels have not proved very fruitful.

Overall food production will have to increase by about 70 % and production in the developing countries will virtually need to double to satisfy the needs of 9.2 billion people by 2050. Demand for cereals for both food and animal feed will reach around 3 billion tonnes by 2050. Largely as a result of higher incomes in developing countries the demand for animal source foods – meat, dairy, fish and aquaculture products – as well as vegetable oils will grow even faster.

To gain sufficient increases in food production, agriculture will be pressed to rely on a smaller rural workforce, accepting more efficient and sustainable production methods, while at the same time adapting to and alleviating climate change.

#### *Pressure on natural resources*

The world faces a rough contrast between the availability of natural resources and the demands of billions of people who require those resources for their survival in the 21st century. There was a time when natural resources seemed infinite. Yet, as the world's population has increased, the availability of natural resources that support human life – freshwater, food, quality soil, biodiversity and energy – have decreased proportionately, and existing stocks are being increasingly polluted, depleted and degraded.

The availability of quality water, land, forest and biodiversity resources is critical for food security. FAO is committed to ensuring land lease security for local landowners and supports the key principles of sustainable land management (SLM), which is based on the full involvement of local land users in management processes. Calling for greater efforts to reach food security while conserving and maintaining natural resources, FAO encourages ecosystem approaches and works with governments but also with the private sector and civil society to suggest and implement guidelines, codes of conduct and other international instruments to direct towards a more sustainable use of natural resources.

#### *Climate change*

The world has woken up to the reality that our climate shows alerting signs of changing more rapidly and more dramatically than at any time in registered history. Climate change has an effect on the frequency of extreme weather events, transforms agricultural growing patterns and affects the distribution patterns of pests, weeds and diseases that threaten both, crops and livestock. The total impacts of climate change on agriculture and food security are expected to



be increasingly negative, especially in those areas which are already defenceless to climate-related disasters and food insecurity. The consequences for food production, food security, agriculture, forestry and fisheries are tremendous. Understanding those consequences, and analysing how agriculture can be part of the solution as well as part of the problem, is essential. (Lobell et al., 2010)

Climate change is expected to have an effect on food production and food distribution systems and infrastructure, notably in the second half of the century. Agriculture is both a sacrifice of the effects of climate change and a coadjutor to its causes. To mention an example, agriculture contributes some 13.5 percent of the world's greenhouse gas emissions, and deforestation and forest degradation account for 17 percent more. FAO policies and activities support climate-smart agricultural practices such as integrated rice farming systems, low-energy use aquaculture, conservation agriculture, and sustainable forest and land management systems and agroforestry. It promotes country efforts in climate change mitigation through advocacy, the generation and extension of data, knowledge and technology, and support for institutional structures focused on realizing the alleviation potential of agriculture, forestry and other land-use sectors.

#### *Managing globalization in the agriculture sector*

No country stands alone in efforts to ensure sustainable food and nutrition security for its people in today's globalized world. No longer can the problems of people on one side of the world be ignored by those on the other side. The impacts of shocks caused by climatic disasters, price fluctuations caused by crop losses or surpluses, the effects of cross-border diseases all surge and can take a toll on global markets and food supply. Globalization itself is influenced by four main factors: market liberalization; growth of international trade; an increase in international financial transactions and capital flows; and advances in information and communication technologies (ICTs) as well as logistics systems.

FAO identifies the importance of agricultural trade for poverty reduction and food security and supports member countries in problems ranging from trade negotiations to developing land tenure governance guidelines for dealing with potential land sales. The Organization is also increasingly partnering with the private sector, working with agribusinesses as well as their associations and business leaders on a wide range of issues, including value chain and subsector development projects and standard-setting activities.

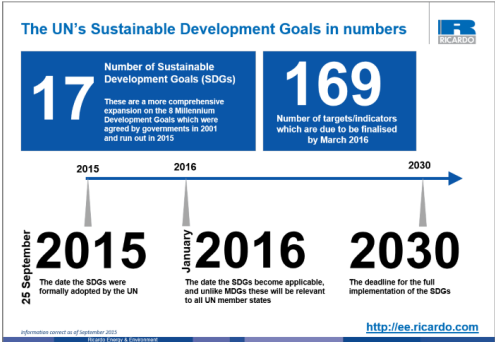
With the increasing push on agriculture to produce food, feed and fibre for a growing and changing population while preserving the world’s natural resources and softening climate change, investments in developing country agriculture are an entire priority for governments, the development community and private investors. However, investments in agriculture have been declining for several years. Moreover, in their pursuits to mobilize resources for agricultural development and create an investment environment favourable to agricultural productivity and food security, FAO and its member countries are facing an extremely competitive and rigorous financial resources market, calling for new and innovative approaches. (FAO, 2011)

### 4. 2 FOOD SECURITY STRATEGIES AND SUSTAINABLE DEVELOPMENT

In the text there are described the UN’s development goals related to food security issues. In the author’s opinion, this is an extensive strategy that targets on the development of the world with regard to sustainability issues. FAO’s vision for Sustainable Food and Agriculture is also introduced. The EU Strategy for Developing Countries is described below (The Food Security Thematic Programme – FSTP). This strategy supports activities aimed at improving food security for the poorest and most disadvantaged countries.

Selected strategies largely correspond to the professional focus of the book, but they are only briefly introduced here. The list of references contains references to the UN, FAO and the EU where the issue is described in more detail.

Figure 10 The UN’s sustainable development goals in number



## **Goal 1: End poverty in all its forms everywhere**

Facts about poverty:

- 836 million people of our planet still live in extreme poverty;
- about one in five persons in developing countries and regions lives on less than \$1.25 per day;
- the stunning majority of people living on less than \$1.25 a day belong to two regions: Southern Asia and sub-Saharan Africa;
- high poverty rates are often found in small, fragile and conflict-affected regions and countries;
- one in four children under the age of five in the world has inadequate height for its age.
- every day in 2014, 42,000 people had to abandon their homes to seek protection due to a conflict, e.g. war.

The main goal is to eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day by 2030. Reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions by 2030. Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the most vulnerable.

## **Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture**

Facts about hunger:

- globally, one in nine people in the world today (795 million) suffer from undernourishment;
- the immense majority of the world's hungry people live in developing countries, where 12.9 per cent of the population is undernourished;
- poor nutrition causes almost half (45 per cent) of deaths in children under five – 3.1 million children each year.

The goal is to end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round by 2030. End all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children less than 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older people by 2030. By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment. Ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality by 2030.

### **Goal 6: Ensure access to water and sanitation for all**

Facts about access to water:

- 2.6 billion people have gained access to improved drinking water sources since 1990, but 663 million people are still without it;
- At least 1.8 billion people globally use a source of drinking water that is fecally contaminated;
- 2.4 billion people have no access to basic sanitation services, such as toilets or latrines.

The goal is to achieve universal and equitable access to safe and affordable drinking water for all by 2030. Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations by 2030. By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

## **Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all**

Facts about economic growth:

- Global unemployment increased from 170 million in 2007 to nearly 202 million in 2012, of which about 75 million are young women and men;
- nearly 2.2 billion people live below the US\$2 poverty line and that poverty eradication is only possible through stable and well-paid jobs;
- promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.

The goal is to achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value by 2030. Devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products by 2030.

## **Goal 12: Ensure sustainable consumption and production patterns**

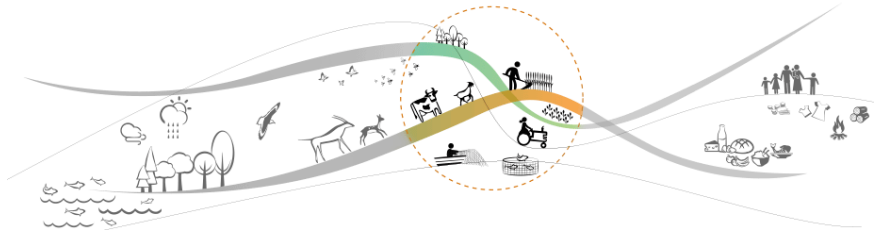
Facts about consumption and production:

- More than 1 billion people still do not have access to fresh water;
- 1.3 billion tonnes of food is wasted every year while almost 1 billion people go undernourished and another 1 billion hungry and starving;
- the food sector accounts for around 30 per cent of the world's total energy consumption and accounts for around 22 per cent of total greenhouse gas emissions;

The goal is to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses by 2030. Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment by 2020. By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse. Ensure that people everywhere have the relevant information

and awareness for sustainable development and lifestyles in harmony with nature by 2030.  
(UN, © 2017)

*Figure 11 5 principles of Sustainable Food and Agriculture*



FAO's vision for Sustainable Food and Agriculture was formulated in support to its Strategic Objective 2 "Make agriculture, forestry and fisheries more productive and more sustainable". It is a vision of a world in which food is nutritious and accessible for everyone and natural resources are managed in a way that conserve ecosystem functions to support current as well as future human needs. In this vision, farmers, pastoralists, fisher folks, foresters and other rural inhabitants have the opportunity to actively participate in, and benefit from, economic development, have decent employment conditions and work in a fair price environment. Rural men, women, and communities live in security, and have control over their livelihoods and just access to resources which they use in an effective way.

*Principle 1 Improving efficiency in the use of resources is crucial to sustainable agriculture*

- Adapting current practices can do much to intensify the productivity of many food and agricultural production systems.
- This principle focuses on the engine of transformation. Further achievements in productivity will still be needed in the future to provide sufficient supply of food and other agricultural products while limiting the expansion of agricultural land and containing interference in natural ecosystems.

Principle 2 *Sustainability requires direct action to conserve, protect and enhance natural resources*

- Food and agricultural production is dependent on natural resources and therefore the sustainability of production relies on the sustainability of the resources themselves.
- Intensification has also led to the radical reduction of crop and animal biodiversity. Such trends in agricultural intensification are not reconciliated with sustainable agriculture and are a threat to future production.

Principle 3 *Agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable*

- Securing that producers have appropriate access to and control of productive resources, and directing the gender gap, can contribute meaningfully to reducing poverty and food insecurity in rural areas.

Principle 4 *Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture*

- Extreme weather events, market unpredictability and civil conflicts impair the stability of agriculture. Policies, technologies and practices that build producers' resistance to threats would also contribute to sustainability.

Principle 5 *Sustainable food and agriculture requires responsible and effective governance mechanisms*

- The passage to sustainable production can only take place when there is the genuine balance between private and public sector initiatives, as well as accountability, justice, transparency and the rule of law. (FAO, © 2017)

The European Food Security Thematic Programme (FSTP) supports activities directed to improving food security for the world's poorest, most vulnerable and disadvantaged populations. It was addressed to structural issues leading to hunger and malnutrition in a bid to resolve these in the medium or long term, with an emphasis on developing sustainable solutions.

Key facts about the FSTP:

- The FSTP contributes to the achievement of Millennium Development Goal 1.
- It supported activities around the world.
- It had a budget of €749 million for 2011-13.

During the period 2011-13, this objective was pursued through three strategic priorities:

*Priority 1: Research, technology transfer and innovation to enhance food security*

This priority aimed to support pro-poor and demand-driven agricultural research and technology, especially by improving its radius and dissemination, and by fostering pilot practices and approaches to food security.

*Priority 2: Strengthened governance approaches for food security*

This priority aimed to:

- support global, continental, regional and national improvements in food security governance;
- make approachable and improve use of trustful and appropriate food security information;
- strengthen the policy dialogue and lessons-learning about food security at all levels and with all stakeholders;
- enlarge coordination and aid efficacy.

*Priority 3: Addressing food security for the poor and vulnerable in fragile situations*

This priority aimed to address the food insecurity of the most vulnerable and disadvantaged populations in exceptional situations of transition and fragility where EU geographical instruments are not present or are present but cannot conveniently address food security problems. (EUROPA, © 2017)



## 5 FOOD SECURITY AND FOOD SAFETY IN EU

The following subchapter will outline the challenges of food security in the EU. The next subchapter focuses on the issue of food safety and the latest food sovereignty in the EU that are part of food security.

### 5. 1 PROBLEMS AND CHALLENGES OF EU FOOD SECURITY

#### **Dimension 1: A growing number of Europeans struggle to put a meal on the table every day**

Food prices in many European countries have risen faster than incomes since the financial crisis, opening an affordability gap that has pushed many families to the edge. Well over 20 million households in the EU say they are unable to afford a high-quality meal – defined as one with meat, fish, chicken or a vegetarian equivalent – every other day. That’s over 10% of the entire population.

The household budget share that people spend on food varies hugely across Europe – but the data reveals similar trends in affordability. In the poorer countries, food naturally takes a higher share of overall spending since tradable food prices are higher than incomes. In Bulgaria, for example, 37% of people’s spending is on food – down from 41% in 2007. Poles, too, still spend 25% of their budgets on food on average, despite an improvement in recent years. In these countries, rising food prices are of massive significance. In Italy and the UK, the household budget data also reveals a rising food affordability gap over the past few years. But the absolute share of food in household budgets varies widely. That reflects different food traditions, the size of incomes and the relative cost of food, which is largely a result of supply chain efficiency. In Italy, almost 20% of a household’s spending goes on food – making rising prices particularly painful – whereas in the UK, the share is just below 10%. The affordability gap has widened massively in Italy and the UK since 2007 – and it is still worsening in Spain, France and Germany. Food insecurity is now an issue for the richer countries, not just for the poorer ones. (Enough, © 2015)

Many of the global food commodities that shot up in price in 2008 are now falling again and most European economies have come out of recession. But, while many farm-gate prices are

falling, retail prices for foods have remained high. Food banks have proliferated across the continent and demand for free or heavily discounted food is still rising.

The number of people admitted to hospital with malnutrition has doubled in the UK since 2008. The National Health Service estimates that around three million people in the UK are malnourished at any one time.

It is becoming increasingly clear that food insecurity in Europe is not a temporary phenomenon. People get caught in a cycle of poverty when they remain jobless for more than a year or earn too little to make ends meet. Their children, too, struggle to escape from deprivation. If food prices were to rise again as they have done over the past decade and incomes fail to keep up, many more people would enter this downward spiral. It is necessary to make sure that food remains affordable. (Enough, © 2015)

### *Food poverty*

One in four Europeans lives on the edge, according to the latest Eurostat data on people at risk of poverty. That number includes 83 million people living in Italy, Germany, the UK, Poland, Spain and France. The causes of their vulnerability vary across countries. In Italy and Spain, which has the highest share of people on the edge, both unemployment and low wages are a problem. The number of “working poor” – people whose incomes are not enough to make ends meet – is Poland’s major problem, exacerbated in some countries by wage polarisation and an increase in part-time work. But across the board, one of the drivers of growing poverty across the EU over the past six years has been food prices.

In Spain, the number of people using food banks has doubled over the past four years and is now at a height of 1.5 million. Around the same number receives food hand-outs in Germany, along with at least 1 million in France, where researchers put the number at risk of food insecurity at 6 million. In the UK, use of food banks tripled in 2012-13. (Enough, © 2015)

### *Food security and obesity*

There is something perverse about equating malnutrition and overweight. Indeed, until recently, the two were treated as separate phenomena. But increasingly there is a realisation that both are central to understanding the many realities of food insecurity.

While 800 million people worldwide suffer from hunger, more than 2 billion suffer from undernourishment and “hidden hunger” – a lack of micronutrients – which can manifest themselves as obesity, according to the FAO.

There is a lively and inconclusive debate among experts about the exact nature of the relationship between obesity and food security. But if we define a food-secure world as one in which food is simply a non-issue, then the necessity of seeing diet-related illness as part of the food security debate becomes clearer.

The real nutrition challenge is to ensure people eat healthy, balanced meals, with quality proteins, vitamins and minerals. (Enough, © 2015)

### **Dimension 2: Global demand for food is rising fast**

Keeping food affordable will depend to a great extent on how Europe responds to the rising global demand for food. For the EU, the world’s largest exporter and importer of agricultural commodities and food, growing international demand is a significant opportunity for growth. In fact, the EU was able to transform years of food trade deficits into a surplus in 2010 and overtake the US as the world’s largest exporter in 2013.

Most European countries have done little to build an efficient, modern food chain over the past decades. Agricultural productivity, especially in the UK, Germany and France declined markedly against that of the US over the past 20 years.

Increasing food production to the extent that is needed will require significant investments in innovation, research and development, and technology across the food chain. That is because we cannot increase food supply unless we find ways to make farming and food production more environmentally sustainable. Agriculture already accounts for more than 70% of all water withdrawn from lakes, rivers and aquifers around the world and around a quarter of greenhouse gas emissions. In Europe, farms use around 40% of land, but urbanisation and industrialisation continues to eat into land available. We cannot just add more land and more animals. We have to boost productivity and yield and do it sustainably. (Enough, © 2015)

## 5. 2 EUROPEAN FOOD SAFETY POLICY

The provision of safe, nutritious, high quality and affordable food to Europe's consumers is the central objective of EU policy, which covers all stages of the EU food supply chain, "from farm to fork". Its standards and requirements aim to ensure a high level of food safety and nutrition within an efficient, competitive, sustainable and innovative global market.

However, a series of emerging challenges and risks could put the currently successful European food system under severe stress. These challenges include demographic imbalances, climate change, resource and energy scarcity, slowing agricultural productivity, increasing concentration of the supply chain, price volatility, changing diet trends and the emergence of anti-microbial resistant strands. (EUROPA, ©2017)

The general principles of food and feed law are outlined in the General Food Law Regulation (Articles 5 to 10). They form an horizontal framework underpinning all Union and national measures relating to food and feed. They cover all stages of the production, processing and distribution of food as well as feed produced for (or fed to) food-producing animals.

General objectives of food and feed law:

- Guarantee a high level of protection of human life and health and the protection of consumers' interests. Also guarantee fair practices in food trade, taking into account animal health and welfare, plant health and the environment.
- Ensure free movement of food and feed manufactured and marketed in the Union, in accordance with the General Food Law Regulation.
- Facilitate global trade of safe food and feed, wholesome food by taking into account international standards and agreements when developing Union legislation, except where this might undermine the high level of consumer protection pursued by the Union.

The General Food Law Regulation establishes the principle of risk analysis in relation to food and feed and establishes the structures and mechanisms for the scientific and technical evaluations, which are undertaken by the European Food Safety Authority (EFSA).

Depending on the nature of the measure to be used, food law, and in particular measures relating to food safety must be underpinned by strong science. The Union has been at the forefront of the development of risk analysis principles and their subsequent international

acceptance. Food law is based on the three inter-related components of risk analysis: risk assessment, risk management and risk communication.

Risk assessment must be undertaken in an independent, objective and transparent manner based on the best available science.

Risk management is the process of weighing policy alternatives in the light of results of a risk assessment and, if required, selecting the appropriate actions necessary to prevent, reduce or eliminate the risk. In the risk management phase, the decision makers need to consider a range of other information in addition to the scientific risk assessment. These include, for example:

- most effective risk reduction actions depending on the part of the food supply chain where the problem occurs;
- feasibility of controlling a risk;
- socio-economic effects;
- environmental impact.

Risk communication is the interactive exchange of information and opinion throughout the risk analysis process among risk assessors, risk managers, consumers, food and feed businesses, academics, and other interested parties.

The precautionary principle (Article 7 of the General Food Law) refers to specific situations where:

- there are reasonable grounds for concern that an unacceptable level of risk to health exists;
- the available supporting information and data are not sufficiently complete to enable a comprehensive risk assessment to be made.

When faced with these specific circumstances, decision makers or risk managers may take measures or other actions based on the precautionary principle, while seeking more complete scientific and other data. Such measures have to comply with the principles of non-discrimination and proportionality and should be provisional until the time when more comprehensive information concerning the risk can be gathered and analysed.

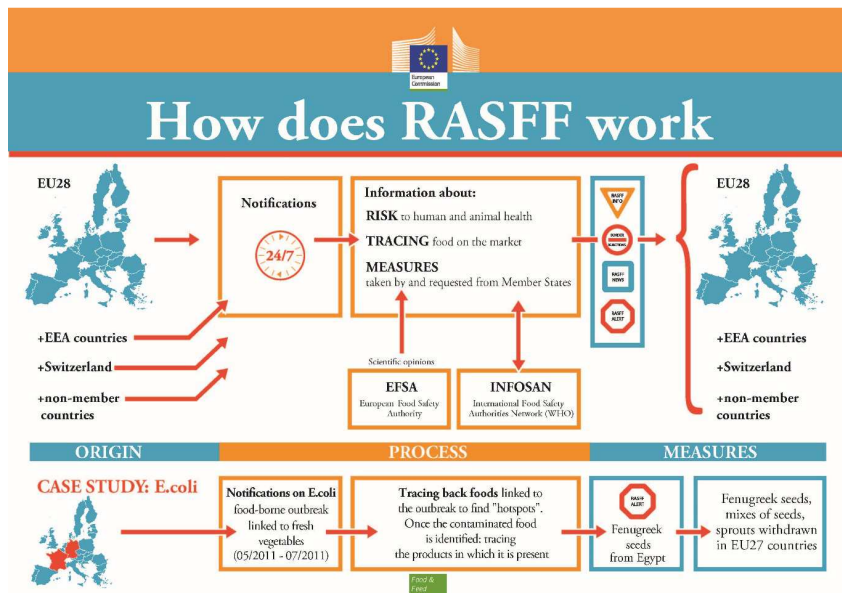
Food safety and protection of consumer interests are of great concern to the general public, non-governmental organisations, professional associations, international trading partners and trade organisations. Therefore, transparency of decision-making is of paramount importance.

The General Food Law Regulation provides for the mechanisms necessary to increase consumer confidence in food law:

- Effective public consultations during the preparation, evaluation and revision of food and feed law;
- Obligation on public authorities to inform the general public, where there are reasonable grounds to suspect that a food or feed may present a risk for human or animal health. (EUROPA, © 2017)

The Rapid Alert System for Food and Feed (RASFF) was put in place to provide food and feed control authorities with an effective tool to exchange information about measures taken responding to serious risks detected in relation to food or feed. This exchange of information helps Member States to act more rapidly and in a coordinated manner in response to a health threat caused by food or feed. More in-depth analysis of RASFF performance is available in annual reports. (EUROPA, © 2017)

Figure 12 How does RASFF work

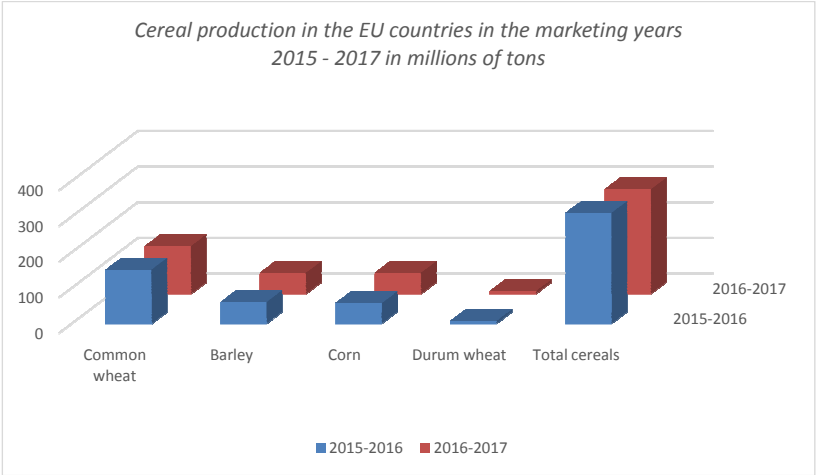


### 5. 3 FOOD SELF-SUFFICIENCY IN EU

EU states among themselves mutually traded within the common internal market, on the one hand, exports and then from the other country's imports, essentially food substitutes, countries are mutually competitive in varying degrees, which is due to the different approach of states to the subsidy policy in the framework of the common agricultural policy. As a whole, the EU is essentially self-sufficient in food. States that they are closest to self-sufficiency are particularly France and Poland.

Based on the results of the European Commission's statistical survey, 313.4 million tons of cereals were harvested in EU countries in the marketing year 2015/2016, out of a total area of 57.29 million ha, of which the usable production amounted to 310.5 million tons. This was an above-average cereal production in the EU. Harvest of wheat grown in the EU this year is a record. The total supply of cereals covered without problems in domestic consumption of the European market for food, feed and industrial use. (EAGRI, 2016)

Figure 13 Cereal production in the EU countries in the marketing years 2015 - 2017 in millions of tons

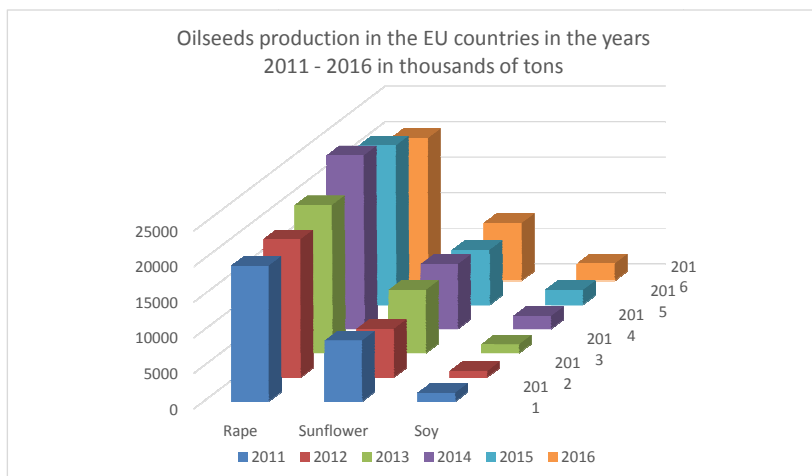


In individual EU countries, legumes hold an area of 17% of arable land and the most cultivated legumes are peas (50%) and beans (40%). To a lesser extent (up to 10%) are cultivated lupine, bean, lentils and vetches. Among the so-called protein-rich crops used both for the industrial production of compound feeds and for the production of farm animal feed in the EU, legumes are mainly peas, beans and lupines (protein crops). The largest areas of these protein crops are in France, Lithuania, Spain, Great Britain, Germany and Poland. The production of these states accounts for about 70-80% of all protein crop production in the EU.

Currently around 75% protein ingredients for animal feed industry is made by imports of soya. The EU is highly dependent on imports from the US and South America. Large degree of dependence on imports, along with instability in world prices puts the EU in a very vulnerable position. This trend is particularly serious risk to the livestock sector, which is dependent on the supply of raw materials for feed production. (EAGRI, 2016)

According to the data of COCERAL, the total area of the main oilseeds (rape, sunflower, soya) reached 11 291 thousand hectares in 2016 according to preliminary data. Until 2015, the area of major oilseeds fell by about 60 000 ha. The average yield fell from 2.83 t / ha to 2.70 t / ha. Olive oil production in the EU fell year-on-year as a result of land and yield changes from a yield of 32 161 thousand tons in 2015 to 30 533 thousand tons in 2016. This means a drop in production of 5%.

Figure 14 Oilseeds production in the EU countries in the years 2011 – 2016 in thousands of tons



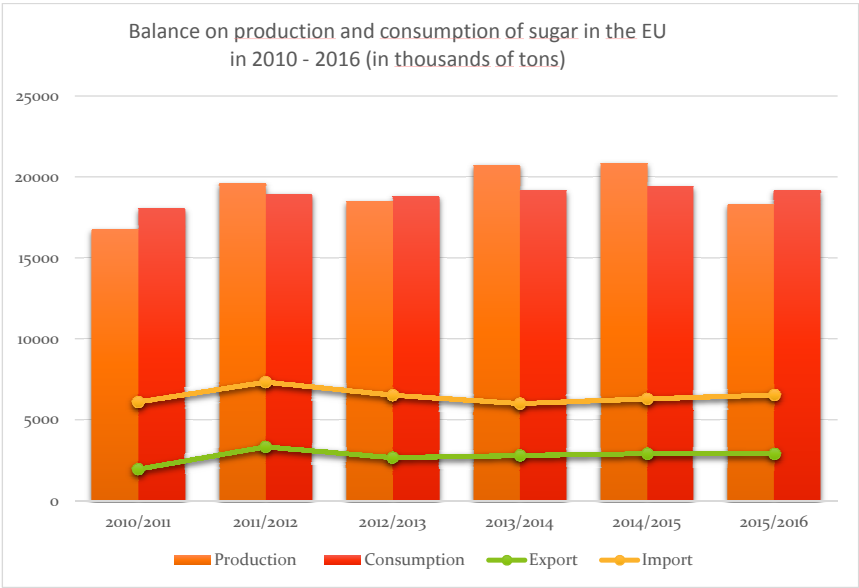


EU Common agricultural policy in the production of potatoes (early and others), including seeds and their subsequent trading was not restated and therefore ware potato production is no longer regulated or subsidized.

The total area planted in EU 28 reached 1,707 million ha (2015-1,692 million ha) in 2016. A harvest of 54.5 million tonnes (2015 - 53.4 million tonnes) is foreseen. This would mean the second lowest production in the last 10 years. The EU's leading potato countries - (Germany, France, the Netherlands, Belgium and the United Kingdom) expect a drop in potato production of 1.6% in 2016 compared to 2015 to a total of 24.9 million tonnes. Compared to an average of 5 years, this is a 2.2% decrease.

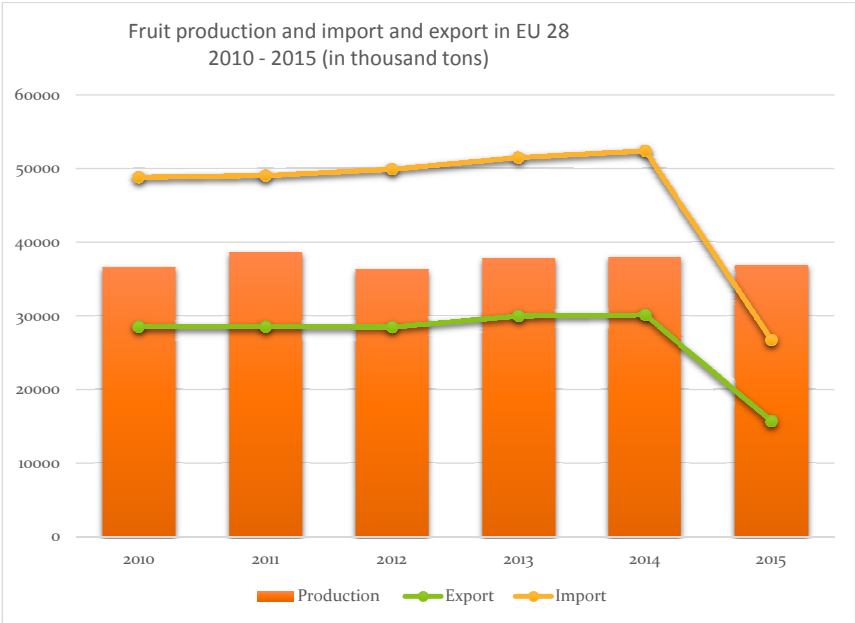
For the 2015/16 economic year, the EU-28 sugar beet area was valued to an estimated total of 1 337 thousand ha. This area is 14.2% lower than in the previous marketing year. Compared with the previous 2014/15 marketing year, when production in the campaign reached a record level of 19,513.5 thousand tons of white sugar, it decreased to 14 867 thousand tons of white sugar, which is 23.8 % less. The 2015/16 economic year thus ranks among the weaker years.

*Figure 15 Balance on production and consumption of sugar in the EU in 2010 - 2016 (in thousands of tons)*



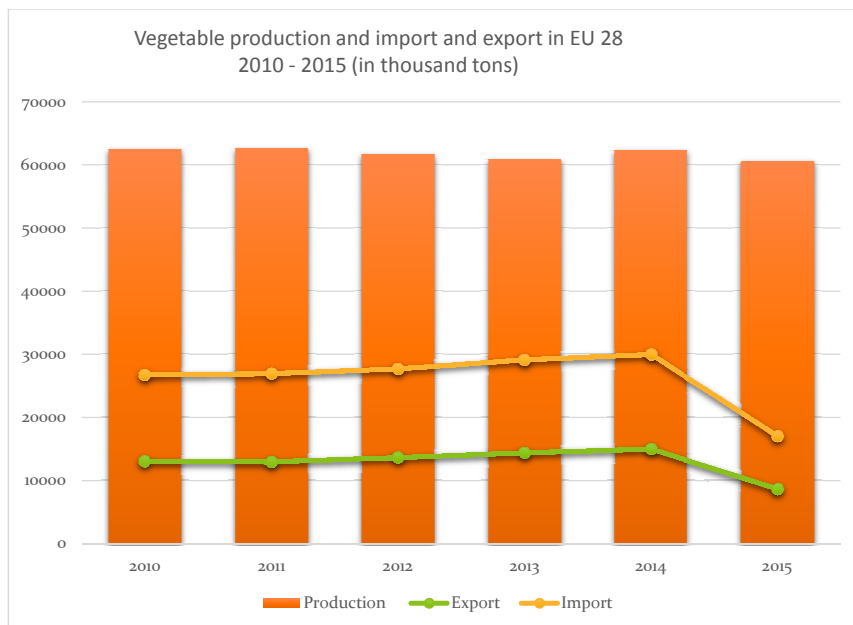
In 2015, the total area for fruit growing in the EU countries was about 2.3 million ha. The largest share of fruit production is put on apples, of which were harvested about 12.6 million tons, with about 25% of the total EU production of apples being produced in Poland, which is together with Spain and Italy also the leading producer of strawberries and cherries. Total EU fruit production and import and export in 2010-2015 are shown in the graph below. Export and import data for 2015 are listed for the first quarter. (EAGRI, 2016)

Figure 16 Fruit production and import and export in EU 28 2010 - 2015 (in thousand tons)



Total production of vegetables in the EU countries in 2015 amounted to 60.6 million tons. More than 50% of production is represented by four kinds of vegetables - tomatoes, onions, carrots and cabbage. In recent years, the rate of import of vegetables from countries outside the EU has been reduced, notably by half over the last 7 years. Total EU vegetable production and import and export in 2010-2015 are shown in the graph below. Export and import data for 2015 are listed for the first quarter. (EAGRI, 2016)

Figure 17 Vegetable production and import and export in EU 28 2010 - 2015 (in thousand tons)



In 2014, gross beef production, including calves in the EU, according to the European Commission data increased slightly by 2.5% to 7.68 million tons. The main reason was the favourable development of slaughter cattle prices in the previous two years (2012 and 2013), but also a year-on-year increase in beef exports to the third countries and an increase in consumer demand triggered by a fall in prices in 2014. The total Union meat production (44.7 million tons) in 2014 beef and veal meat accounted for 17.2%. It occupied the third place behind pork meat (51.0%) and poultry (30.7%), but was placed in front of sheep and goat meat (2.0%). (EAGRI, 2016)

In 2014, the pork meat market in the EU was characterized by a slight year-on-year increase in pigs, which grew year-on-year slightly by 1.4% to 148.3 million pieces. Growth was evident mainly in Hungary and Spain. Overall production of pork meat in the EU rose slightly by 0.7% to 22.1 million tons year-on-year. However, EU-15 production (86% of EU production) stagnated on 19.0 million tons. Pig production rose despite a slight decrease in

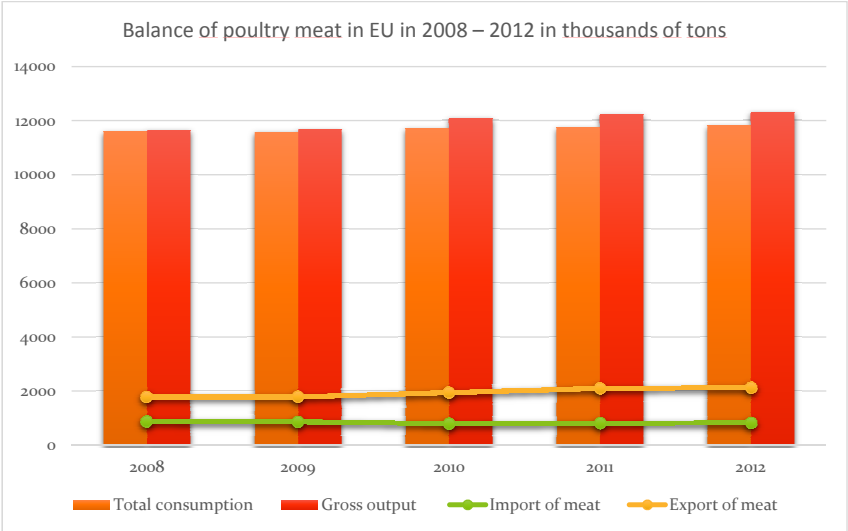
consumption, a decrease in exports due to Russia’s trade measures against the EU, an increase in imports and a weakening of the prices of slaughter pigs. The constant demand for pork in the world market coupled with the depreciation of the euro exchange rate helped keep the Union market at a relatively stable level until August 2014. (EAGRI, 2015)

Chicken market characteristics in 2013:

- Slight increase in poultry meat production volume.
- Declines in trade (import and export) with the third countries.
- Moderate increase in consumption of poultry meat.

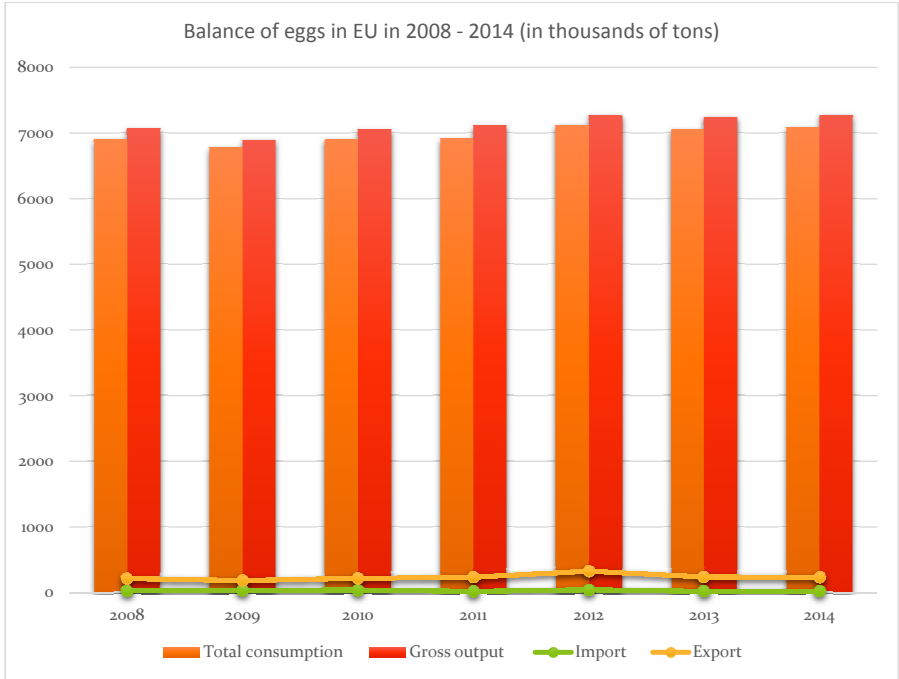
The position of EU countries on the world poultry meat market shows long-term stability. Its importance in the global context is, in addition to the volume of production, also the amount of traded production in the member countries. The poultry meat sector in the Union countries was not hit hard by the economic recession, but slower economic growth was reflected in a lower growth in output than would correspond to the rate of increase in global demand. In the EU, poultry meat currently accounts for 28% of pork (52%), but only beef (18%). (EAGRI, 2014)

Figure 18 Balance of poultry meat in EU in 2008 – 2012 in thousands of tons



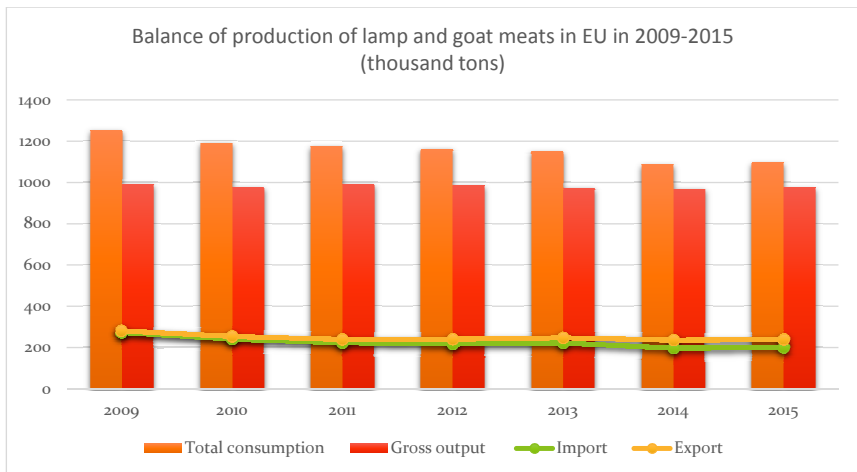
A balanced development of the egg market situation in the EU countries following the transition to new production technologies should continue in 2014. The EC outlook for the egg sector assumes that the production of eggs in the EU countries will fall year-on-year or even increase to 0.5%. In terms of traded production, year-on-year stagnation and exports can be expected to fall by about 2%. The most important producers of eggs are France, Spain, Italy, Germany and Poland. Production in these countries represents 58% of total EU countries. (EAGRI, 2014)

Figure 19 Balance of eggs in EU in 2008 - 2014 (in thousands of tons)



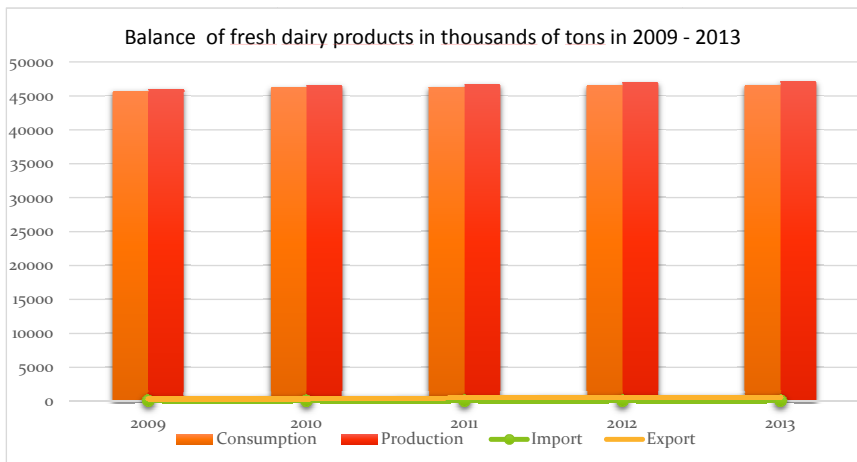
Consumption of sheep meat and goat meat and its production in the EU declined between 2010 and 2012, but in 2013, according to the European Commission’s estimate, increased. As production grew slightly more than consumption, self-sufficiency increased to 88.1%. (EAGRI, 2014)

Figure 20 Balance of production of lamp and goat meats in EU in 2009-2015 (thousand tons)



The EU is self-sufficient in the production of milk and dairy products, the EU is self-sufficient in the production of cheese and the EU is a major world exporter. But there is deteriorating competitiveness, e.g. in the production of milk powder. (EAGRI, 2013)

Figure 21 Balance of fresh dairy products in thousands of tons in 2009 - 2013



## 6 FOOD SECURITY AND FOOD SAFETY IN THE CZECH REPUBLIC

This chapter focuses on strategic concepts related to food safety issues. As part of previously established food security factors (availability, access, utilization, stability) there will be a brief discussion on the level of food security. In addition, the security, the security strategy and the security interests of our state, its security environment and the need to ensure food security will be defined. In addition, food safety strategy will be presented, with the issue of food self-sufficiency.

The following subchapters will assess the different pillars of food security in the Czech Republic on the basis of available relevant resources. However, as part of the introduction to this chapter, the Global Food Security Index (GFSI), which was developed by the Economist Intelligence Unit, is presented below. The Global Food Security Index monitors and evaluates the development of the main pillars of food security in 113 countries around the world. It is a quantitative and qualitative model that tracks 28 unique indicators and provides an objective framework for food security assessments across a range of countries. The model therefore assesses the affordability of food, the physical availability and food safety from the point of view of its health, and also includes a new category of natural resources and resilience. The natural resource category measures the country's exposure to the impacts of the changing climate, its susceptibility to natural resource risks, and the country's ability of adaptation to the risks (GFSI 2017).

GSFI for the Czech Republic in the period 2012 - 2017 was 72.6 - 75.8 (the best score is 100), and in 113 countries the Czech Republic ranged from 23<sup>rd</sup> to 28<sup>th</sup> place. In 2017, it was ranked on 23<sup>rd</sup> place in the framework of food security, with its 26<sup>th</sup> place at affordable price pillar, with 25<sup>th</sup> place in the evaluated countries in terms of food availability, health and safety. From 2017, the level of natural resources and resistance has been newly assessed, when the total score is 80.3 and in the ranking of countries the Czech Republic occupies the third place (GSFI 2017).

### 6. 1 THE FOOD SECURITY EXTENT IN THE CZECH REPUBLIC

On the basis of the theoretical definition of the individual levels of food security of the country, it is possible to comment on whether the Czech Republic systematically approaches

the food security problem as it is located in the overall state security issue and how the country's food safety indicators are defined.

Food safety is anyway located in the overall state security issue, as it is mentioned in the chapter dealing with the Czech Security Strategy. From this point of view it can be stated that food safety is part of the overall concept of state security.

The question remains whether to perceive the approach to the problem of food security in our state as systematic. A systematic approach to food safety issues is meant in terms of their health and quality. However, it is part of food security and food self-sufficiency, and the most controversial views in this area. At present, even with regard to the international situation, the issue will gain in importance and the systematic approach will be applied also in the area of food self-sufficiency.

A preview of food security is possible according to several criteria. The first one is a way to tackle food security issues. The situation in the Czech Republic can be characterized by the fact that the theoretical approach to the issue of food safety is not of prime interest, the military approach is represented by the aforementioned security strategy, a pragmatic approach can be attributed to the interest organizations in the field of agricultural and food production, which highlight in particular the issue of food self-sufficiency.

The second criterion is the width of global, macroeconomic and microeconomic food security. The Czech Republic as a country with a significant level of foreign trade should undoubtedly have to pay attention to ensuring food security also at global level. From a macroeconomic point of view, the Czech Republic has a limited possibility to influence food security because it is a part of the European integration group and takes over the agricultural policy from the EU centre. Of course, it can, within its negotiating positions, influence the common agricultural policy in order to ensure the highest possible level of food security. In terms of microeconomics, it is particularly important to ensure food security in the area of food accessibility (access to them).

Conditions for achieving food security are the third criterion. The basic conditions for achieving food security are three - the approach, the reachability and the usability. In terms of availability, it is possible to understand the volume of food available on the market or possibly to be immediately supplemented. In this area, the Czech food market is not yet a problem, but the fact is that some commodities are imported in high volumes, but mostly within the EU internal market. Under the approach, it is possible to understand the



possibilities of individual consumers, i.e. whether they are able to buy the food that can be bought. Access to quality food is currently reduced in the Czech Republic in particular to low-income groups - households of the unemployed and pensioners. The share of food in total household spending is steadily increasing. There are several reasons, because of the intervention of the state; an increase in the rate of value added tax on food has been a measure that undermines food security. The state is therefore able to strengthen the area of consumer access to food by reducing the value added tax rate. Another term is usability, which means the health of the food and, last but not least, its quality. In this area, it is possible to state that although health safety in the Czech Republic is at a very good level (mainly due to the food safety system), it is worse with food quality, as confirmed by the inspections of the Czech Agriculture and Food Inspection Authority.

The fourth criterion of food security is the horizon of its formation. That is the time horizon for which food security is ensured. From a short-term perspective, for example, immediate food aid should be provided (in the event of a crisis situation) over the medium-term horizons of food supply and agricultural production in individual years, up to the long-term horizon represented by the increase in domestic agricultural production in order to ensure the food security of the state.

The last criterion can be seen in the possible barriers and threats that can disrupt the food security of the state. In the Czech Republic, the most frequent example of a possible threat to the food security of the state are the sudden natural events, especially the floods. (Lukášková et al., 2014)

## **6. 2 STRATEGIC FOOD SECURITY FRAMEWORK**

Human history is therefore closely related to the search for ways and forms of international, external and internal security. Security can be defined as a state in which individuals, groups and states do not feel threatened with serious threats, they are considered to be effectively protected before them and they can create their own future according to their own ideas. The degree of security or threats depends on subjective feelings, historical experiences, self-concept, and the environment.

Figure 22 Various types of security



The Czech Republic as a part of the EU has common or coordination procedures in all areas of economic policy and must respond to current global challenges undoubtedly also in different strategic documents.

Security Strategy of 2015 is the basic document of security policy of the Czech Republic, to which the sub-strategies and concepts are established. This is a government document, which perceives safety issue, comprehensively defines the security interests of our country, as well as its security environment. Food security is a part of the security strategy. Strategic interests are, inter alia, ensuring energy, raw material and food security of the country and adequate strategic reserves. One of the defined security threats is the threat to critical infrastructure functionality, which is also necessary to ensure food security. Security strategy also mentions the growing importance of food security and ensuring access to drinking water. In the strategy of prevention and suppression of security threats there is explicitly stated that with regard to the cultivation of energy crops the Czech Republic creates usable conditions for growing these commodities, so that the country's food security is not threatened. Adequate stocks of strategically important agricultural and food commodities are also maintained. The Czech Republic pays attention to strategic reserves of groundwater for drinking water supply, as well as potential sources of surface water. (Lukášková et al., 2015)

We can recognize four basic parts of security strategy of the Czech Republic:

- Strategy of promoting security interests of the CR;
- Security environment of the CR;
- Background of security strategy for the CR;
- Security interests of the CR – life interests, strategic interests and other interests.

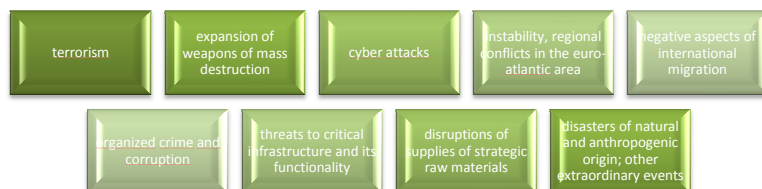
Life interests are ensuring sovereign existence, territorial integrity and political independence of the CR, maintaining all requirements of democratic state, rule of law, including guarantees and protection of fundamental human rights and freedom of inhabitants. Protection of life interests in each state and its inhabitants is a fundamental responsibility of the government.

Strategic interests include for example:

- Security and stability;
- Prevention and management of local conflict;
- Ensuring energetic and resource security;
- Ensuring economic security;
- Ensuring food security and adequate reserves.

Security environment - threats, their resources and bearers have either national but also more of non-national and supra-national character. Internal and external security threats are intertwined and differences between them are blurring. (BS ČR, 2015)

*Figure 23 Specific security threats for the Czech Republic*



Food security is specifically mentioned in Security Strategy of the Czech Republic three times. For the first time in defining the strategic interests of our state in connection to the need to ensure energy, raw materials, food security and adequate level of strategic reserves. The second time with the security threats, particularly the threat of supply disruptions of strategic raw materials or energy. The third time is connected with the strategy of enforcing the security interest in the strategy of prevention and suppression of security threats. In the event that food security is seen as part of the critical infrastructure, it is necessary to mention the threat of danger to the functionality of critical infrastructure. Security Strategy of the Czech Republic does not specifically mention food security in that paragraph; critical infrastructure, however, is here seen as a key system of elements whose disruption or failure should have a serious impact on national security, the security of the basic needs of the population and economy of the state. Ensuring food availability to all residents is certainly undoubtedly viewed as securing of one of the basic necessities of life. (BS ČR, 2015)

According to the Security Strategy of the Czech Republic, it is necessary to understand the interdependence of individual critical infrastructure sectors and its possible threats to perceive complex - natural, technological and asymmetric threats.

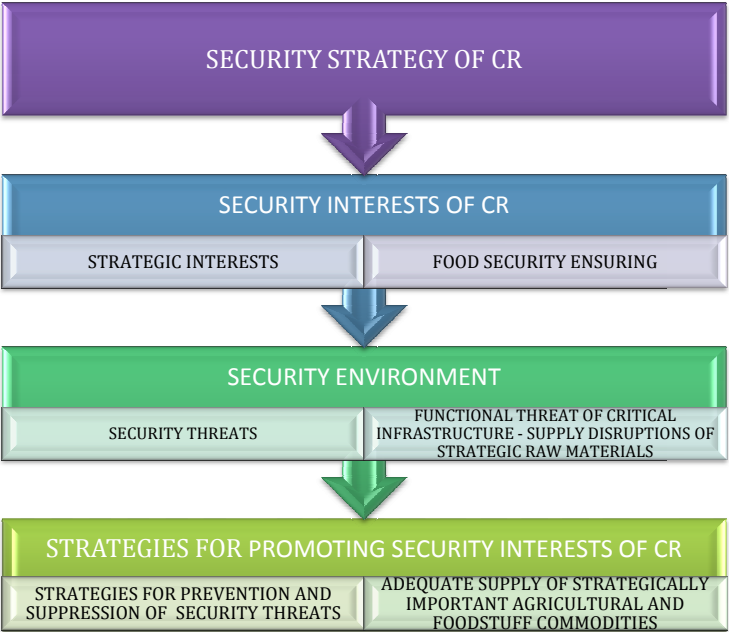
The threat of disruption of supply of strategic raw materials or energy is associated with rapidly changing global world. Competition for access to resources, strategic (energy) resources, becomes an integral part of international relations. The priority of the state is to create conditions for sustained diversified supply of strategic raw materials and in the home environment, then the conditions for a stable supply of electricity and for the creation of strategic reserves of the state. The growing importance of food safety and ensuring access to drinking water are also emphasized.

Indirectly the need to ensure food security is even mentioned in the threats to disasters of natural and anthropogenic origin and other emergencies. In the context of emergencies, there is mentioned the possibility of threat not only to the lives, health and property of people, possibly endangering the environment, but especially the impact on the country's economy, supply of raw materials (it should be understood including food) and drinking water.

In the context of strategies for the prevention and suppression of security threats in the threat of interruption of supply of strategic raw materials or energy there is the priority of the government to create conditions for diversified supply of strategic raw materials, the growing importance of food security is re-emphasized again. (BS ČR, 2015)

The following figure shows the anchoring of food security in Security Strategy of the Czech Republic.

Figure 24 Defining of Food Security in Security Strategy of the Czech Republic (BS ČR, 2015)



### 6.3 STRATEGIC FOOD SAFETY FRAMEWORK

Food safety is a fundamental principle of European food policy, which guarantees the protection of consumers' health. In the context of food security, in developed countries, a great deal of attention is currently paid to food safety from a health point of view. The quantity of food in the EU and other developed countries is not yet a problem, although for example the food sovereignty of the Czech Republic has been decreasing for several years.

The European Commission decided to radically reorganize the food safety system in the first decade of the 21st century. Legislative measures have been taken in the field of animal feed, health and protection of animals, hygiene, residues and novel foods, and an independent European Food Authority was set up. EU Member States were called on to follow a similar

approach to food safety. Candidate countries were recommended to participate in the European Food Authority's activities at that time. The EU's goal was to reach the highest standard of food safety. (Lukášková et al., 2014)

Food safety includes hygienic food production, control mechanisms, monitoring of food chains and feed safety. To ensure food safety, the main contributors are state organizations and institutions financed by the state, namely by the creation of legislation, continuous and consistent control of health safety and quality, long-term monitoring of the incidence of the xenobiotics (monitoring), applications of scientific opinions to the practice, notification and education of consumers.

Safe foods must meet the conditions of health and hygiene safety and biological value -

***System 3s: safe-wholesome-sound:***

- Safe food is the food which according to current knowledge and diagnostic options contains no pathogenic agent in a dosage in order to cause disease for humans (not harmful for health).
- Hygienically wholesome food is the food which is made in compliance with approved manufacturing practices and hygiene standards that determine its properties. Hygienically unsafe food may not necessarily be healthy unsafe.
- Safe food is healthy and hygienic wholesome food, which does not necessarily mean that it is biologically worthwhile, that is nutritionally balanced with respect to the nutritional needs of consumers' food.

Food safety is part of the concept of quality food, which can't be understood merely as a biological value of food (balance nutritional value of the food). Food can be a quality and also nutritionally unbalanced (e.g. alcohol, salt, and sugar).

The issue of health food, food hygiene and protection of human health are dealt with in Act No. 110/1997 Coll., On Food and Tobacco Products, as amended, and Act No. 258/2000 Coll., On the Protection of Public Health and on Amendments to Certain Related Acts, as amended. The Food and Tobacco Products Act defines the basic concepts that affect food safety and health, the following are the selected basic terms.

Foodstuff are substances intended for human consumption in the unaltered or modified condition as food or drink, unless it is not medicament and narcotic or psychotropic substances; as a food, according to the law of food are considered also additive substances,

auxiliary substances and flavouring substances, which are designed for sale to consumers for consumption.

Wholesome food is food which meets chemical, physical and microbiological requirements for health safety stipulated by the law of food and tobacco products.

Quality is defined as a set of characteristics attributes of individual species, groups and subgroups of food and tobacco products, whose limits are set by the law of food and the implementing regulation.

Contaminants are defined as the substances that were added to food accidentally in the production, processing, packaging, transport or storage outside of mechanical contaminants, microbes, live or dead pests and parts of their bodies.

Food production, cleaning, sorting, editing, manufacturing or processing of raw materials, or addition of other authorized substances, including packaging and other editing of food for the purpose of putting them into circulation; for food production is not considered agricultural primary production.

Putting food into circulation, offering for sale, sale itself or other form of offering for consumption; storage, transportation for the needs of sale and imports for resale from the date of release into the free circulation.

Expiration date, the date which closes the period for which the food is perishable, while it complies storage requirements, preserves its specific properties and fulfil requirements on health wholesomeness, and for which it can't be put into circulation.

The date of minimum durability, it is the date which defines the minimum period for which the food retains its specific properties while it complies storage requirements and fulfil requirements on health wholesomeness.

Food of unknown origin, food for which can't be proved its manufacturer or imported food country of origin and its manufacturer.

Already since 2001, the basic food safety management documents of the Czech Republic are in the area of food safety. The Fifth Strategy, Food Safety and Nutrition Strategy 2014-2020, currently approved by Government Resolution No. 25 of January 8, 2014, is currently in force.

The food and nutrition security strategy for 2014-2020 is divided into several parts. The first part briefly describes the current state of ensuring food safety in the Czech Republic, defines

its main elements, emphasizes the importance of cooperation in the field of food safety at national level and highlights cooperation with the European Food Safety Authority (EFSA). The document in this first part also describes the current nutritional situation, which is one of the key factors of primary prevention of the most frequently occurring chronic non-infectious diseases (heart and vessel diseases, type 2 diabetes mellitus, hypertension, etc.). In the second part, the Strategy provides the starting points for prioritization. There are many positive and negative trends including a description of the situation in the area of legislation which characterizes the current situation in the field of food safety and nutrition. Based on these characteristics, specific priorities are defined for the 2014-2020 period in the third part of the document, incl. Introducing a responsible ministry or organization. (EAGRI © 2009-2017)

Food safety system in the Czech Republic is coordinated by the departments of agriculture and health in cooperation with other ministries and other government organizations. For coordination of cooperation has been created a coordination group of food safety, on the basis of above mentioned government resolution, which is interdepartmental platform connecting individual subjects in the system of food safety, organizations responsible for risk evaluation, risk management and risk communication.

The Scientific Committee for risk assessment in food industry:

- The veterinary;
- Animal nutrition;
- Phytosanitary and the environment;
- For food;
- For genetically modified food and feed.

*Figure 25 The supervisory authorities of the food safety system*





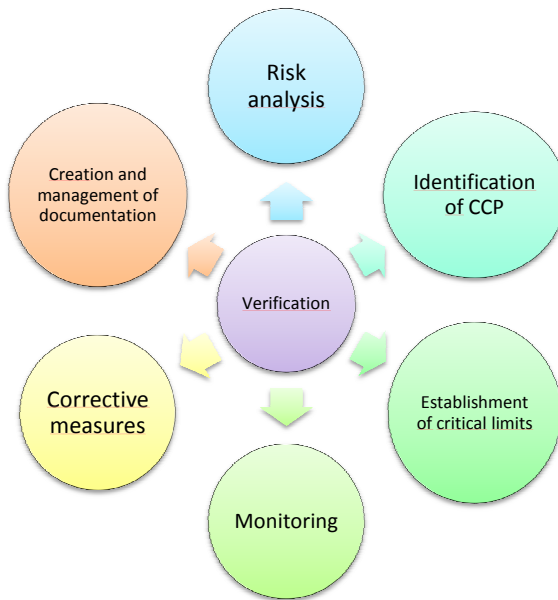
Rapid Alert System for Food and Feed (RASFF) is used for notification of a direct or indirect risk for human health, deriving from food or feed. It provides fast and efficient sharing of information about dangerous food or feed among the members of system: the European Commission, member state of the EU and EFTA (Iceland, Liechtenstein and Norway) and the European Food Safety Authority (EFSA).

The goal of Codex Alimentarius (from now and on, CA) is to promote protection for consumers and to facilitate worldwide trade with food through developing and creation of food standards, standards with correct practice and other instructions.

The European Food Safety Authority (EFSA) has its permanent headquarters in Italian city of Parma, since 2005. The mission of this Authority is to provide independent, scientific opinions, and scientific, technical support for the activities of the European Community in all areas, which have direct or indirect influence on food and feed security. That is the way it should contribute to an increase of confidence among the consumers, the smooth functioning of internal market and to a high level of human health protection, animal health and welfare, plant health and environment protection.

The correct hygiene practice means to be in compliance with all law adjusted and hygienically requirements, usage of hygienically rules and responsibility in the process of food production and during its putting into circulation. On the basis of directly applicable legislation of European Community, member states support developing of international instructions for the correct hygiene practice and for the usage of HACCP principles. HACCP System (Hazard Analysis and Critical Control Point) stands on the knowledge of critical points, i.e. points, where probability of food chain contamination is the highest, whether it is microbiological, chemical or physical contamination. It is system which is not limited only on controlling of final product but it is also focused on prevention of creation danger which is threat to health of consumer. It provides preventive, systematically approach to early danger identification in terms of health wholesomeness and to prevent its occurrence. Its consistent application significantly decreases not only health risks, but also economic losses in production. (Knechtges, 2012; FAO, 2012)

Figure 26 Principles of HACCP System



#### 6. 4 FOOD SELF-SUFFICIENCY IN THE CZECH REPUBLIC

The notion of food self-sufficiency can be briefly described as the country's capacity to produce and provide, in the case of any situation - hence the crisis (whether it is a crisis of a military or non-military) enough food for the sustenance of all its inhabitants. However, nowhere is it stated what specific percentage of self-sufficiency or food commodities should be achieved, if strictly insist on 100%.

Agricultural production and the food production related to this is one of the traditional industries of the national economy. The share of agriculture (together with forestry) in gross added value in the national economy is now coming closer to the average for the countries of the European Fifteen. Czech agriculture has under its belt centuries of tradition that not only guaranteed the coveted self-sufficiency of the nation in basic foods, but also made this Central European corner of the world famous abroad. Commodities such as milk, livestock, grain, sugar and malt have long asserted themselves as agricultural exports. Agricultural entrepreneurs now farm around 4264 thousand hectares of agricultural land in the Czech

Republic, around half (54 %) of the total area of the country. There is 0.42 hectares of agricultural land per one member of the population of the country; 0.30 hectares of this being arable land (roughly the European average). More than one-third of the land fund of the Czech Republic consists of forest land. There has been a decline in agricultural land of 15 thousand hectares and a rise of 16 thousand hectares of woodland since 1995.

Plant commodities are understood to be field and special crops cultivated for their primary and secondary products for use in human sustenance and consumption and are used to feed farm animals and for technical and pharmaceutical use. They include products such as grain, pulses, root crops, fodder plants and technical and special crops that include vines, sugar beet, oil crops, hops, fruit, vegetables and curative and aromatic plants.

There are currently 4.2 million hectares of agricultural land in the Czech Republic. A decisive part of this area (3 million hectares, 71 %) is arable land on which individual crops are rotated as part of sowing procedures according to farming areas and actual orientation. Permanent cultures consist of grassland (978 thousand hectares), gardens and fruit orchards (209 thousand hectares), vineyards (19 thousand hectares) and hop fields (10 thousand hectares).

Animal production is a very important part of agricultural production, mainly due to the effective use of plant production as a source of all types of feed and the major part this industry plays in maintaining the landscape.

This mainly involves sub montane and mountain areas where the pastoral breeding of cattle and sheep predominates. The principle aim of animal production is to produce meat, milk and eggs for the domestic market and for effective export. Technology which is comparable to that used in surrounding EU countries is used in the Czech Republic for breeding individual categories of farm animals.

Therefore, besides producing foodstuffs animal production also helps maintain the cultural landscape without overburdening it in some environmentally-unfriendly way, whilst all the time using the best technology that suits animals and the people that care for them alike. (EAGRI © 2009-2017)

The following will discuss the food sovereignty of the Czech Republic in the production of commodities of plant and animal origin.

The most widespread group of crops are cereals, has the largest acreage of wheat and barley. By integrating the Czech Republic into the EU in 2004 is secured by regulation cereals market through the CMO. Czech Republic is self-sufficient in cereal production. For corn was

gradually increased self-sufficiency, it is now possible to say that corn is ranked among the crops, the production of which the Czech Republic is self-sufficient. (EAGRI © 2009-2017)

Figure 27 Sowing area of agriculture area in hectares in 1920 – 2012 in the Czech Republic

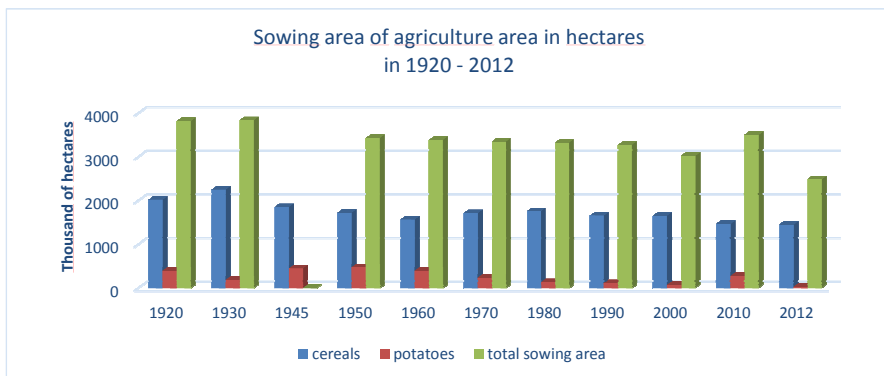
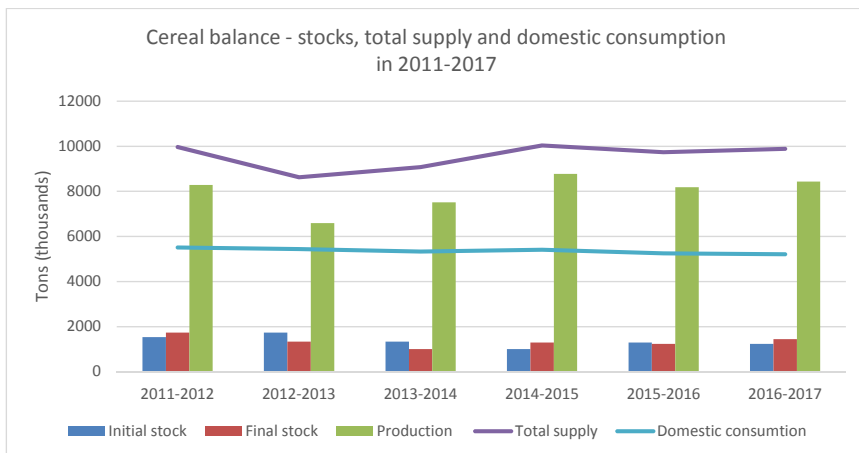


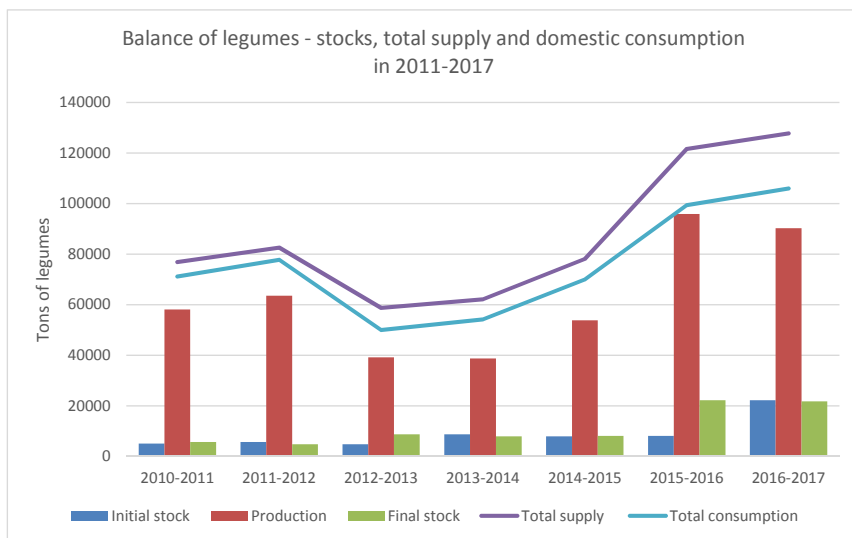
Figure 28 Cereal balance - stocks, total supply and domestic consumption in 2011-2017



In the case of legumes in recent years in the Czech Republic but also in most European countries, it is possible to speak about depression and less of the growing interest. In the Czech Republic legumes area fell up to around 1% of arable land. Among the reasons for the decline include in particular the subsidy policy, low prices legumes, low profitability of

cultivation and low yields. Specifically, about self-sufficiency the report does not speak, but it is clear that the production of legumes and because of low consumer demand is sufficient for us. (EAGRI © 2009-2017)

Figure 29 Balance of legumes - stocks, total supply and domestic consumption in 2010 - 2017



According to the definitive harvest data, in the Czech Republic, for the marketing year 2015/16, the oil yields were 446.0 thousand ha of land. The area of oilseeds decreased year-on-year by less than 4%. The total harvest of oilseeds according to the final data of the Czech Statistical Office reached 1 355 thousand tonnes, this is a significant year-on-year decrease representing 17.5%. The most cultivated oilseed oil was rape oil with 366.2 thousand ha.

In 2015, total production of potatoes was in the Czech Republic according to the “Final data on the harvest of agricultural crops for 2015” processed by the CZSO, a total of 28,694 ha, of which 22,681 ha in the agricultural sector and 6,013 ha in the household sector. For several years, the Czech Republic has not been self-sufficient in the production of potatoes. Domestic production currently covers 83% of domestic potato consumption. (EAGRI © 2009-2017)

Figure 30 Balance of Rape Oil - production, total supply and consumption in 2010 - 2017

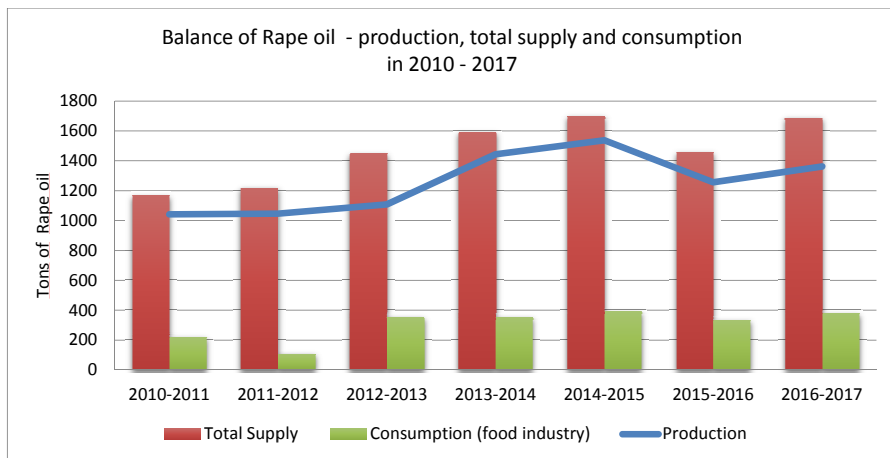


Figure 31 Productions area of potatoes in CR in 2004 - 2017 in hectares

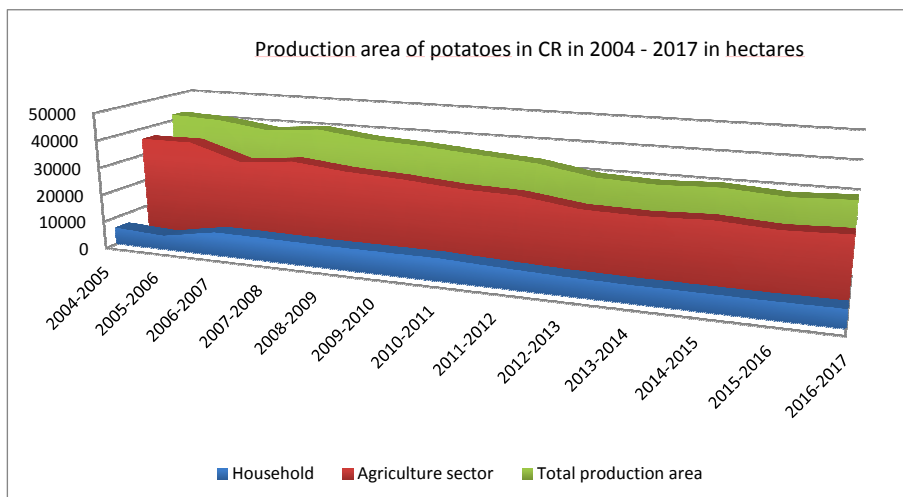
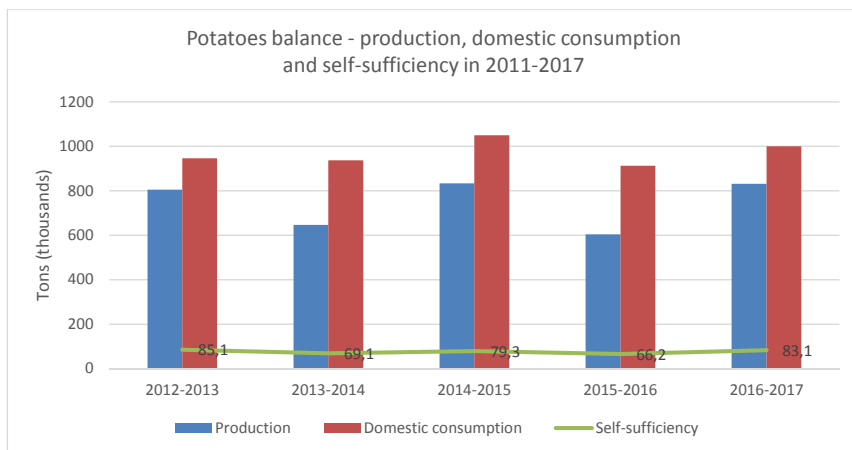


Figure 32 Potatoes balance - production, domestic consumption and self-sufficiency in 2011 – 2017



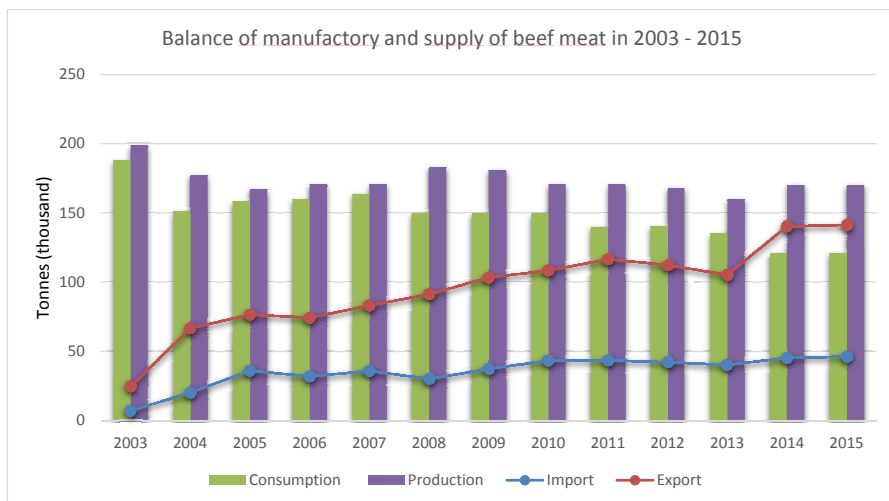
The Czech Republic is one of the traditional producers of sugar beet sugar in Europe. The Czech Republic is a net exporter of sugar within the EU. It is therefore self-sufficient in the area, however, that it would not import sugar from other EU countries. In the area of fruit and vegetable production, in the Czech Republic, the level of consumption coverage by species and year is between 35-78%. Large volumes of fruits and vegetables are therefore imported from other countries. (EAGRI, 2013) Self-sufficiency in the production of fresh climate moderate is 40%.

Vegetable crops have declined by almost 30% over the last decade. Imports of vegetables grew by more than 50%; currently 2/3 of the Czech Republic comes from the Czech Republic. This is mainly due to higher support for green growers in some EU countries, compared with support in our country (AGRIS, 2013).

In livestock commodities, the Czech Republic's situation is similar to that of vegetable commodities. For some self-sufficiency, the problem is not - for example, beef, milk, and other self-sufficiency are steadily declining - the pork meat production is widely published. The Czech Republic is not self-sufficient in the production of eggs, poultry, sheep and goat meat. In the following, on the basis of situational and forward-looking reports and other expert texts, the level of food self-sufficiency in the production of different types of meat has been assessed.

Beef production is determined by demand on the domestic market and export opportunities for both beef and live cattle abroad. Self-sufficiency in beef production in recent years is still above 100%, though gradually declining as reducing beef production, while increasing imports. Domestic beef consumption has been falling mainly due to the rising prices. (EAGRI © 2009-2017)

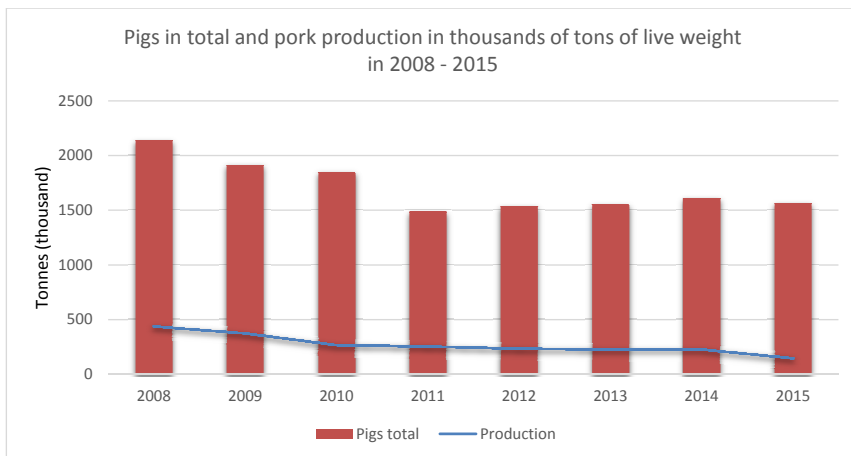
Figure 33 Balance of manufactory and supply of beef meat in 2003 – 2015



Development of pig breeding in the Czech Republic thus directly affect the profitability of the sector, which adversely affects the cost increases, fluctuations in agricultural producer prices for pigs for slaughter and imports of live pigs and pork. (Lukášková et al., 2014) The low competitiveness of the pork sector is reflected in the passive balance of foreign trade. The pig breed economy shows a long-term negative profitability. The Ministry of Agriculture is fully aware of the situation in pig breeding, looking for a way to support pig breeding. In the same way as in previous years, the Czech Republic has not been self-sufficient in the production of pork but has nevertheless improved the degree of self-sufficiency, which rose year on year to 57.5% but was still well below the EU average. (EAGRI, 2015)

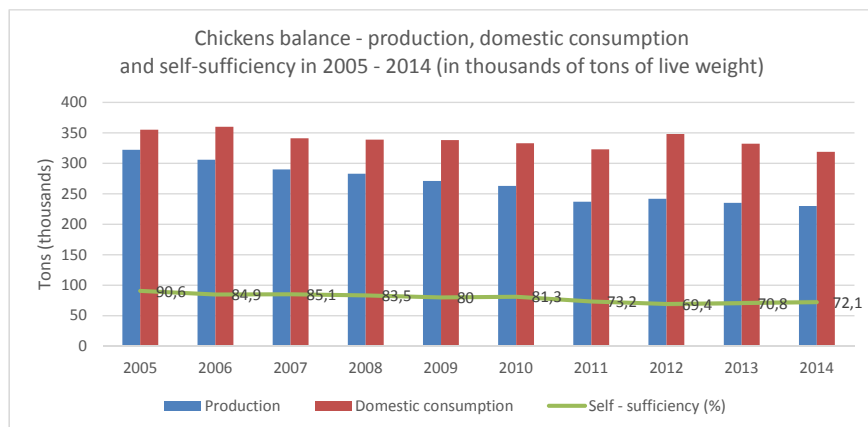


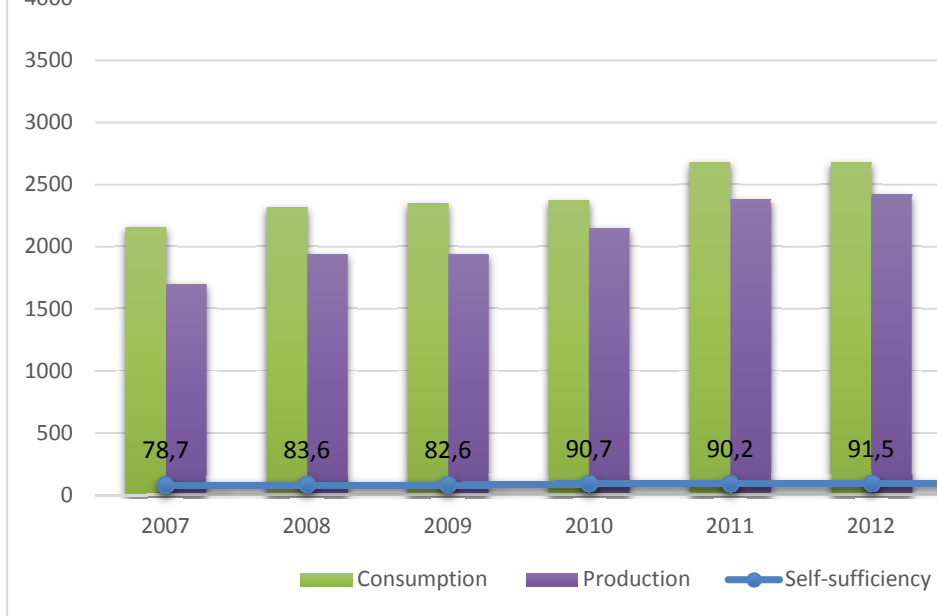
Figure 34 Pigs in total and pork production in thousands of tons of live weight in 2008 - 2015



The poultry meat balance is still negative and the difference between supply and demand is filled by imports. The self-sufficiency rate is estimated to be 72.1% for 2014. The degree of self-sufficiency of the Czech Republic in egg production is 92.6% (EU27 on average reached 102.8%, 2014) and it was possible to reduce the import of eggs to the Czech Republic and to increase their exports due to the higher domestic supply and the year-on-year increase in demand. (EAGRI, 2015)

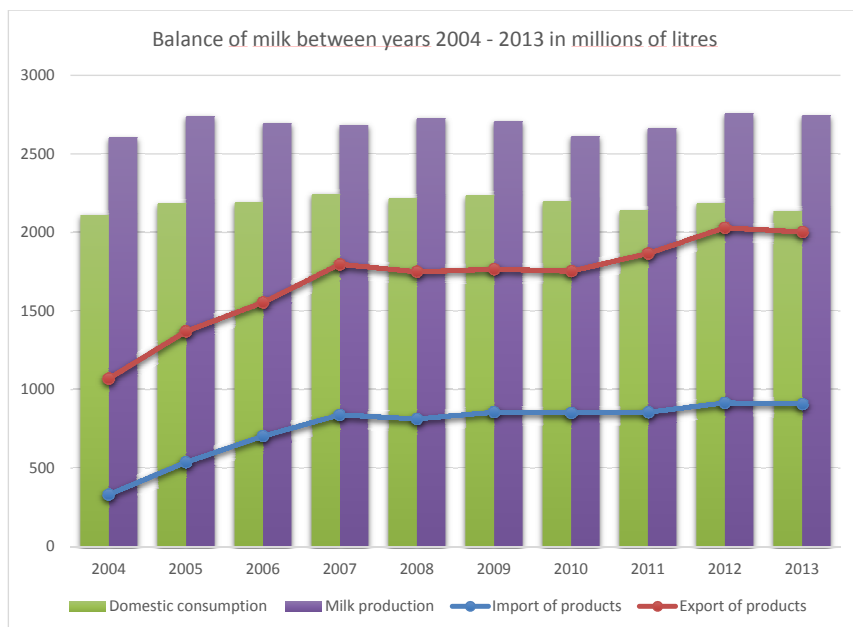
Figure 35 Chickens balance - production, domestic consumption





There are several conclusions from the milk production and use balance for the dairy raw material increases. The performance of dairy cows growth consumption of milk and dairy products were not optimistic prospects persistent effects of the economic crisis and rising dairy prices reduce addition, the proportion of imported dairy products is growing in consumption graph shows the milk production and use balance. (EAGRI, 2013)

Figure 37 Balance of milk between years 2004 - 2013 in millions of litres



Within the Czech Republic, production of market fish was achieved in 2015 20 200 tons. The species representation of market fish is relatively stable and has not changed significantly compared to the previous years. Carp was 88.4% of the total fish caught. Fish stock volumes depend on consumer demand in the domestic and foreign markets.

In the Czech Republic, food self-sufficiency has been declining for a long time, and the decline has accelerated since it joined the EU. It decreases in particular for commodities of animal origin. Opinions on the importance of food self-sufficiency vary greatly. However, according to the available texts, it can be said that for important commodities it should not fall below 80%. In the Strategy for Growth - Czech Agriculture and Food Industry after 2013, several crucial tasks can be found not only for the resort, but also for other state institutions that deal with the issue.

From the point of view of the food security strategy, the long-term objective of the economically justified strategic level of production in the major agricultural commodities of the temperate belt and the corresponding market share of the production of potentially

competitive processed agricultural and food products are stated. Underestimating the appropriate level of food self-sufficiency could be a source of risk for social tension in society in the future. According to the strategy, the main strategic objective of the further development of Czech agriculture is to participate in sustainable food security at national and European level and contribute to the Czech Republic's energy self-sufficiency within the set energy mix (EAGRI, 2013).

**III FOOD SECURITY CASE STUDIES**

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## **7 ECONOMIC ANALYSIS OF THE NECESSARY AMOUNT OF BASIC FOOD TYPES FOR THE POPULATION OF THE CZECH REPUBLIC**

This chapter of the book is a case study analysis aimed at determining the necessary quantity of basic types of food for the population of the Czech Republic. The performed analysis is based on the calculation of the fulfilment of energy intake per person per day. The population was divided by sex and age to determine the energy value of food intake through the use of basic food types. The observed data can serve as a basis to determine the level of food self-sufficiency in our country and as a basis for assessing the food security of the Czech Republic.

### **7.1 UNDERLYING ASSUMPTIONS OF THE CASE STUDY**

The paper is an analysis of basic food types needed for inhabitants of the Czech Republic since the age of three; the population is divided by gender and age with respect to the energy needs of the various population groups. Based on those assumptions and economic study there is then across the energy value calculated on the basis of basic food types needed for inhabitants of the Czech Republic by region. This information could serve as a basis for food self-sufficiency, which is part of food security. Simultaneously, this data may also serve bodies of the state and local governments in preparing for emergencies in the context of economic measures for crisis situations (e.g. studies about population protection against floods, Šafařík et al., 2015).

In the research have there been adopted following assumptions in order to determine the necessity of food for each region of the Czech Republic:

- Energy value is always determined as an average caloric intake for each age group with respect to gender, age and average weight with regard to physical activity. It is therefore determined the baseline measurement of calories required for basic conversion (basal metabolic rate) plus PAL (physical activity level) = average daily energy requirement for physical activity as a multiple of basic metabolism.
- Body weight is calculated from measured heights and under optimal BMI value of 22 for men (age range 15-18 years) and value of 21 for women (age range 15-18 years); value of 24 for men (ages: 19-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and

60-64 and 65+) and value of 22 for women (ages 19-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60-64 and 65+).

- For men of all ages from 15 to 64 years of age including, PAL is set at a value of 1.8 (activity mostly standing and walking) for ages 65+, PAL is then at 1.2. For women of all ages from 15 years to 64 years of age including, PAL is set at a value of 1.6 (sedentary activity with occasional light activities while standing or walking) for ages 65+ PAL then at 1.2 (same for men and women).
- Children are divided by gender and age into several groups; the youngest age group is 3 years old. Children from 0-3 years of age are not included in the study. Energy value is again determined according to dietary reference values.
- All data relating to population, gender and age are the official data by the Census of people, houses and flats from 2011 - the CSO statistics.
- Population is divided into groups according to tender and age.
- Figures will be given in kJ and kcal (for better comprehensibility).
- A healthy individual is always considered who can receive traditional diet without restrictions.
- There are not taken into account the different dietary habits based on religious, ethnic or other reasons, the individual does not consume certain types of food or he consumes them only after a specific type of treatment.
- The types of food that are used to meet the energy needs of different population groups have been established under prescribed necessities for survival of an inhabitant for 10 days (Foldyna, 2009).

There are the data provided on the required energy and its coverage of essential food types in men, women and children with regard to their age, physical activity and weight in next tables.

Table 1 Necessary survival needs per person per day

Raw Materials	Unit	Dose for One Person
Meat and meat products	g	86,6
Milk and dairy products	ml	233,3
Lipids	g	58,3
Breads	g	241,6
Side dish	g	316,6
Flour	g	191,6
Sugar	g	50
Eggs	pcs	2/10

Note: No gender, weight, physical activity was used – it served as a basis for calculating the energy value for men with a need of 13,707 kJ.

Table 2 Expressing the necessary energy value of the basic types of food for men

Men					
Age	Body weight in kg	Energy value in kJ/day while counting PAL	Food type	Food amount in grams	Energy value of food in J
15 – 24	67	13707 (13707)	Meat and meat products	90	870
			Milk and dairy products	240	1128
	74	13707 (13707)	Lipids	70	2037
			Bread	250	2350
			Side dish	310	3556
			Flour	200	2794
			Sugar	50	890
			Eggs	27	82
25 – 49	74	13104 (13109)	Meat and meat products	85	822
			Milk and dairy products	230	1081
			Lipids	66	1920
			Bread	240	2256
			Side dish	298	3418
			Flour	192	2682
			Sugar	48	854
			Eggs	25	76



50 – 64	72	11900 (11975)	Meat and meat products	80	774
			Milk and dairy products	210	987
			Lipids	60	1746
			Bread	220	2068
			Side dish	270	3097
			Flour	180	2515
			Sugar	40	712
			Eggs	25	76
≥ 65	68	7079 (7096)	Meat and meat products	50	484
			Milk and dairy products	130	611
			Lipids	40	1164
			Bread	125	1175
			Side dish	155	1778
			Flour	100	1397
			Sugar	25	445
			Eggs	14	42

*Table 3 Expressing the necessary energy value of the basic types of food for women*

Women					
Age	Body weight in kg	Energy value in kJ/day while counting PAL	Food type	Food amount in grams	Energy value of food in J
15 – 19	58	9774 (9773)	Meat and meat products	70	677
			Milk and dairy products	190	893
			Lipids	49	1426
			Bread	175	1645
			Side dish	217	2489
			Flour	140	1956
			Sugar	35	623
			Eggs	21	64

20 – 24	60	9306 (9311)	Meat and meat products	70	677
			Milk and dairy products	190	893
			Lipids	47	1368
			Bread	166	1560
			Side dish	206	2363
			Flour	138	1928
			Sugar	33	461
			Eggs	20	61
25 – 49	59	8971 (8970)	Meat and meat products	65	629
			Milk and dairy products	180	846
			Lipids	45	1310
			Bread	160	1504
			Side dish	195	2237
			Flour	130	1816
			Sugar	32	570
			Eggs	19	58
50 – 64	57	8502 (8503)	Meat and meat products	62	600
			Milk and dairy products	170	799
			Lipids	43	1251
			Bread	150	1410
			Side dish	185	2122
			Flour	124	1732
			Sugar	30	534
			Eggs	18	55
≥ 65-	55	5874 (5875)	Meat and meat products	40	387
			Milk and dairy products	100	470
			Lipids	29	844
			Bread	110	1034
			Side dish	130	1491
			Flour	90	1257
			Sugar	20	356
			Eggs	12	36

Due to the incomplete comparison (different age distributions - reference value intervals and census), the data were modified as follows:

- For the 3 - 5 age group, the mean value in kJ for children in the 1 - 3 and 4 - 6 age group was taken;
- For the 6 - 9 age group, reference values for the 7 - 9 age group were taken;
- The average of the reference values for 10 - 12 and 13 - 14 age groups was taken for 10 - 14 age groups.

*Table 4 Expressing the necessary energy value of the basic types of food for boys*

Age	Boys			
	Body weight in kg	Energy value in kJ/day while counting PAL	Food type	Food amount in grams
3 - 5	5550 (5558)	Meat and meat products	37	358
		Milk and dairy products	100	470
	Lipids	28	815	
	Bread	102	959	
	Side dish	124	1422	
	Flour	83	1160	
	Sugar	19	338	
	Eggs	12	36	
6 - 9	7900 (7900)	Meat and meat products	56	542
		Milk and dairy products	150	705
	Lipids	44	1280	
	Bread	140	1316	
	Side dish	172	1973	
	Flour	111	1551	
	Sugar	27	481	
	Eggs	17	52	
10 - 14	10300 (10300)	Meat and meat products	69	667
		Milk and dairy products	182	855
	Lipids	52	1513	
	Bread	190	1786	
	Side dish	230	2638	
	Flour	154	2151	
	Sugar	35	623	
	Eggs	22	67	

Table 5 Expressing the necessary energy value of the basic types of food for girls

<b>Girls</b>				
<b>Age</b>	<b>Body weight in kg</b>	<b>Energy value in kJ/day while counting PAL</b>	<b>Food type</b>	<b>Food amount in grams</b>
<b>3 – 5 let</b>	5100	Meat and meat products	35	339
	(5112)	Milk and dairy products	100	470
		Lipids	25	728
		Bread	95	893
		Side dish	115	1319
		Flour	75	1048
		Sugar	16	285
		Eggs	10	30
<b>6 – 9 let</b>	7100	Meat and meat products	50	484
	(7100)	Milk and dairy products	130	611
		Lipids	40	1164
		Bread	125	1175
		Side dish	155	1778
		Flour	100	1379
		Sugar	24	445
		Eggs	15	46
<b>10 – 14 let</b>	8950	Meat and meat products	65	629
	(8949)	Milk and dairy products	180	846
		Lipids	45	1310
		Bread	160	1504
		Side dish	195	2237
		Flour	130	1816
		Sugar	30	534
		Eggs	24	73

## 7. 2 CASE STUDY RESULTING DATA

The following graphs and maps show the value of total supplies of basic foodstuffs for the day and year for men, women and children, summed always based on individual calculations for each group into groups of men 15+, women 15+, boys 3-14 years old, girls 3 - 14 years old and children 3-14 years old in total, with total population of the Czech Republic from 3 years of age. The following table shows the population of the Czech Republic, according to the last census in 2011. (Lukášková et al., 2016)

*Table 6 Population of the Czech Republic according to the Census of people in 2011*

	<b>Boys 0 – 14 years old</b>	<b>Girls 0 – 14 years old</b>	<b>Men 15+</b>	<b>Women 15+</b>
<b>Population</b>	763 949	724 979	4 325 915	4 586 090
<b>Total</b>	1 448 928		8 912 005	

*Figure 38 Need for basic food types for men 15+ in the Czech Republic for one year (in tonnes)*

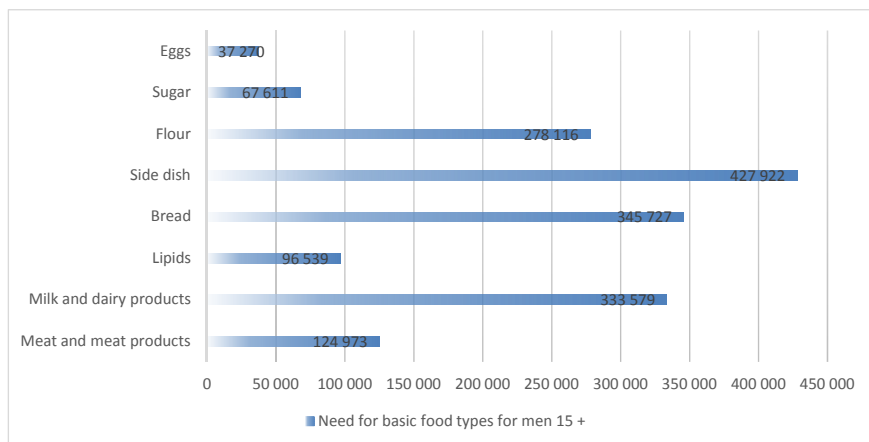


Figure 39 Need for basic food types for women 15+ in the Czech Republic for one year (in tonnes)

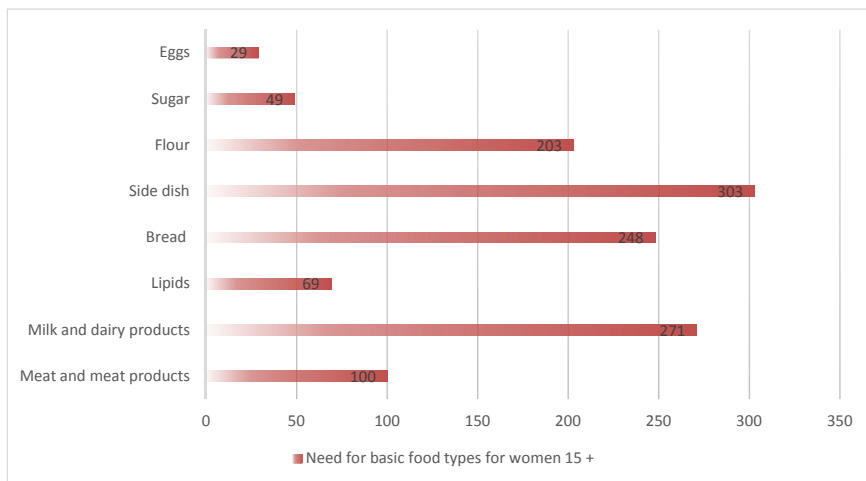


Figure 40 Need for basic food types for children 3 - 14 in the Czech Republic for one year (in tonnes)

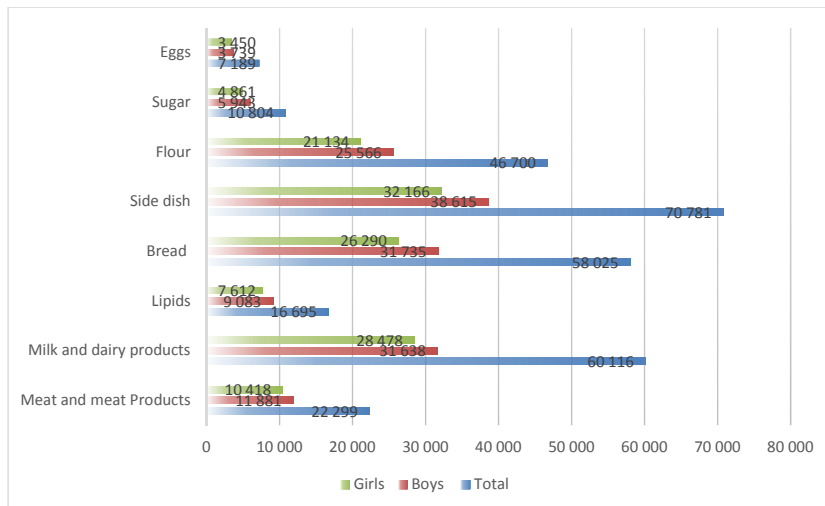
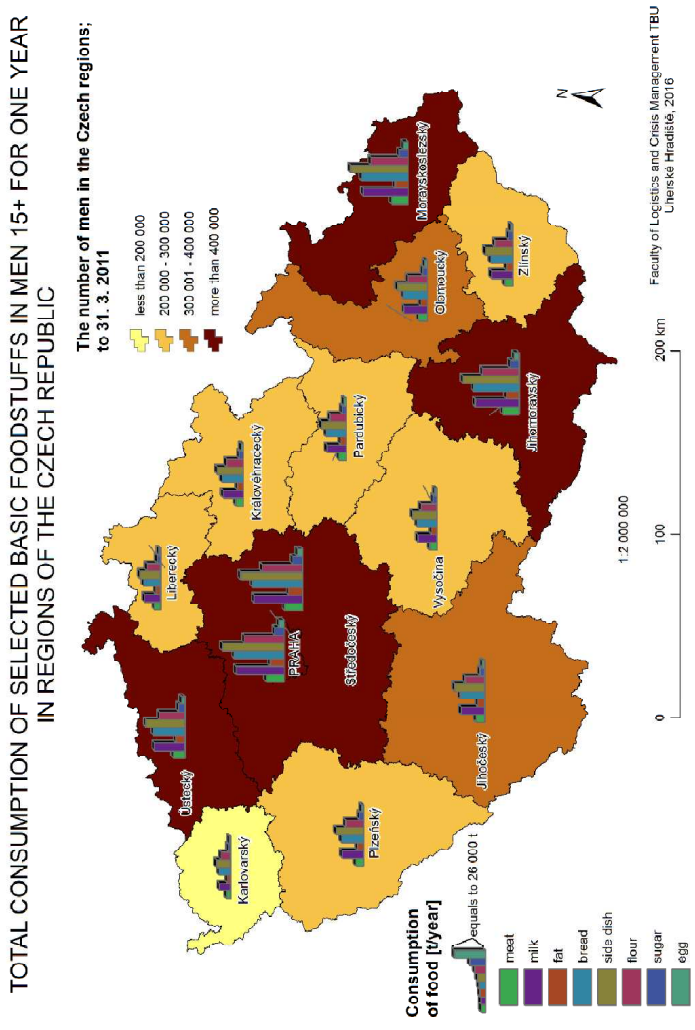




Figure 42 Total Consumption of Selected Basic Foodstuffs in Men 15+ for one Year in Regions





There are following results derived from the analysis of the needs of a number of basic food types for the inhabitants in the Czech Republic on the basis of the specified energy value of food intake: energy needed for different population groups was met by eight basic food types. For different population groups, which were divided by gender and age, it was determined necessary amount of meat and meat products, milk and dairy products, lipids, bread, different types of side dish (potatoes, rice, pasta), flour, sugar and eggs. The results can be used to determine the value of food self-sufficiency in food types evaluated for the Czech Republic. In the paper there were presented some of the results of the economic study.

## 8 PHYSICAL ACCESSIBILITY OF FOOD

The case study focuses on the analysis of economic and physical accessibility and availability of food in the Czech Republic. Food security includes three main pillars - availability, access, and utilization. (Duram, 2011) There is precisely examined the area of access to food, in terms of affordability and in terms of the possibility of physical access to food, because in the Czech Republic the physical accessibility to food is ensured through a single network of retail stores very well, economical access - affordability, however, is lower for many population groups.

Food security is defined as a condition where the physical and economic access to sufficient quantities of healthy and nutritionally balanced food is provided that meet the nutritional needs and preferences of the individual for his active and healthy life. (FAO, 1996) Concept of food security is defined by three main pillars – availability, access and utilization.

### 8.1 ECONOMIC ACCESS TO FOOD

Possibility of access to food for individuals is crucial in the context of their basic needs. In terms of physical access to food it is possible to analyze the density of retail network in the Czech Republic, in terms of affordability of food there is the expenditure of households on food. In the Czech Republic an average household issues for food and beverages (including tobacco) on average 20.7% of their income, households of pensioners, however, up to 27%. In the following text there is an analysis of the evolution of prices of main food commodities over time and an analysis of physical availability of food in the retail network, focusing on the stores that are in the Czech Republic economically significant market power. In this paper attention is not paid to distribution or offer of water respectively. The issue of water management in the context of food security, i.e. the possibility of access to and availability of water for the residents, addresses the entire range of studies, e.g. Strohmandl et al., 2015. Attention is within the professional research in the Czech Republic also paid to other sub-pillars of food security according to access to food and transport of foodstuffs (e.g. Musil et al., 2014 and 2015, Strohmandl et al., 2015).

A very important part of ensuring food security is to ensure the accessibility of food to citizens of the state - to consumers. It is one of the pillars of food security, as shown in next figure.

Figure 43 Three Pillars of Food Security and Sub – Pillars of Food Access



Source: India's Water and Food Security, adapted by authors

According to statistical data an average Czech household issues for food and beverages (including tobacco) on average 20.7% of their income, a household of pensioners but more than 26% despite the drop in food consumption. The data of food and non-alcoholic beverages expenditure for the third quarter of 2015 show that Czech household expenditures on the respective commodities are 18-24% of their income. Employed people without children issue the least - 18, 1% of their income, households with children then 18.7%. In terms of the above expenses are the most vulnerable groups of the population unemployed, pensioners and families where food expenditure shares of total spending 22-24%. The two population groups can be considered as groups that have a reduced economic access to safe food. (CSO CR, 2015) In recent years Czech consumers have changed their diet – they eat less and buy other types of food - the reason is the increasing price. In the long term the consumption of e.g. bread decreases, on the other hand the consumption of pasta, rice and potatoes in particular increases. According to developments in prices the consumption of fruits and vegetables is fluctuating (Málek et al., 2014, Lukášková et al., 2014).

Consumer food prices increased the most between 2011 and 2012, mainly due to the increase in VAT by 4%. In the given period prices of food and non-alcoholic beverages increased, compared to the EU average of more than 2.5 times. At present, prices of some food commodities are falling moderately (pork, milk, yogurt, butter), others grow (ordinary bread, vegetables and fruit) (CSO, 2016).

Table 7 Annual Change in Consumption of Chosen Foodstuff Commodities (CSO, 2013)

Commodity	Commodity Consumption in 2012	Annual Change in Consumption
<b>Bread</b>	41,3 Kg	- 1,1 Kg (↓)
<b>Pasta</b>	7,1 Kg	+ 0,4 Kg (↑)
<b>Beef</b>	8,1 Kg	- 1,0 Kg (↓)
<b>Poultry</b>	25,2 Kg	+ 0,7 Kg (↑)
<b>Milk</b>	57,3 l	+ 1,3 l (↑)
<b>Eggs</b>	245 pcs	- 9 pcs (↓)
<b>Non-Alcoholic Beverages</b>	278,0 l	- 9,0 l (↓)
<b>Alcoholic Beverages</b>	175,2 l	+ 6,4 l (↑)
<b>Of which: Beer</b>	148,6 l	+ 0,6 l (↑)
<b>Wine</b>	19,8 l	+ 0,4 l (↑)
<b>Spirits</b>	6,7 l	- 0,2 l (↓)

## 8. 2 PHYSICAL ACCESS TO FOOD

Another part of the research was to assess the status of the second sub-pillar of food security and physical access to food. There was conducted the survey of grid density of individual retail chains – Albert (supermarket, hypermarket), Billa, Enapo, Globus, Lidl, Kaufland, Penny, Tesco. Results are shown in the following figures, where cartographic visualization was used. Methods used for the spatial visualization were adapted from the thematic cartography (Slocum, 2010). We used ArcGIS for further analysis according to principles of regional development described e.g. in Trojan (2012).

Below you can find a brief description of the distribution of the retail network in the Czech Republic (and Macro wholesale) according to the division into individual regions.

Prague as a separate region has a rich network of various retail chains due to a relatively small area. The retail stores Tesco, Lidl, Billa and Albert Supermarket dominate. In Central Bohemian Region is a relatively compact network of stores. Popular stores are Enapo, especially in the district of Prague-East; there is a high concentration of this type of market. On the contrary, there are not any Globus and Makro stores. Karlovy Vary Region has a rich layout of stores (mainly in the northwest district of Karlovy Vary) due to its smaller area. There are all types of stores available. The greatest concentration of stores in Plzeň Region is in major district towns Plzeň, Tachov, Domažlice, Klatovy, and Rokycany. As in Karlovy Vary Region, there are all kinds of stores. In Liberec Region, all these retail chains can be found. The most occurring are Enapo stores and Penny Market. In the capital district of Liberec are superstores such as Globus and Makro. The deployment of chains is concentrated

in the most populous areas of the region, in major district towns. Due to the size of the districts, Most District has the highest density of stores. On the other hand, the districts of Ústí nad Labem and Louny have the smallest number of stores. Retailers are allocated relatively equally among the region. Penny Market and Tesco often occur. Enapo store is also popular, especially in the district of Trutnov. The branch of the retail chain Globus misses there. In Pardubice Region all chains are available except Makro store. Most of the stores can be found in the district of Ústí nad Orlicí, the least in Pardubice District. In the district towns Brod and Třebíč the sale network Enapo dominates. On the contrary, there are Tesco and Albert Supermarket in Jihlava District. In the city Jihlava is possible to find Makro superstore, but there is not the store Globus. Retail chains are equally allocated to all the districts, the highest concentration of markets is in major district towns České Budějovice, Jindřichův Hradec, Tábor, Písek, Strakonice, Prachatice and Český Krumlov. Penny, Lidl, and Tesco most commonly occur. There are all kinds of shops, including Globus and Makro in České Budějovice.

In South Moravian Region stores are densely distributed throughout the region. The dominating store is Enapo. Even several stores of the branch occur in one city. For example in Brno, there are seven stores and five stores can be found in Vyškov. In the South Moravian Region are also stores Globus and Makro with the residence in Brno. Due to its size, Zlín Region has a large number of retail chains. Most of them are in the major district towns such as Zlín, Kroměříž, Uherské Hradiště, Vsetín and their surroundings. Similarly to South Moravian Region, there is a great prevalence of stores Enapo, followed by Albert Supermarket and Tesco. In this region it is possible to find all of these stores except Globus. In this region, stores are located distinctly unevenly. The highest density of markets is concentrated in the district of Opava and Ostrava-City. In the district of Karviná the predominant network is Enapo. The high concentration of retail chains is also in the district of Frýdek-Místek and Jablunkov in Frýdek-Místek District. The largest amount of retail network is concentrated in major district towns such as Olomouc, Prostějov, Přerov, Šumperk, and Jeseník. In Olomouc, Globus and Makro are available. There is not distinctively predominant pattern of some of the retail chain network, different types of retail stores are concentrated equally (Lukášková et al., 2016)

Figure 44 Penetrations of Grocery Stores Retail Chains in the Czech Republic to 31. 12. 2015

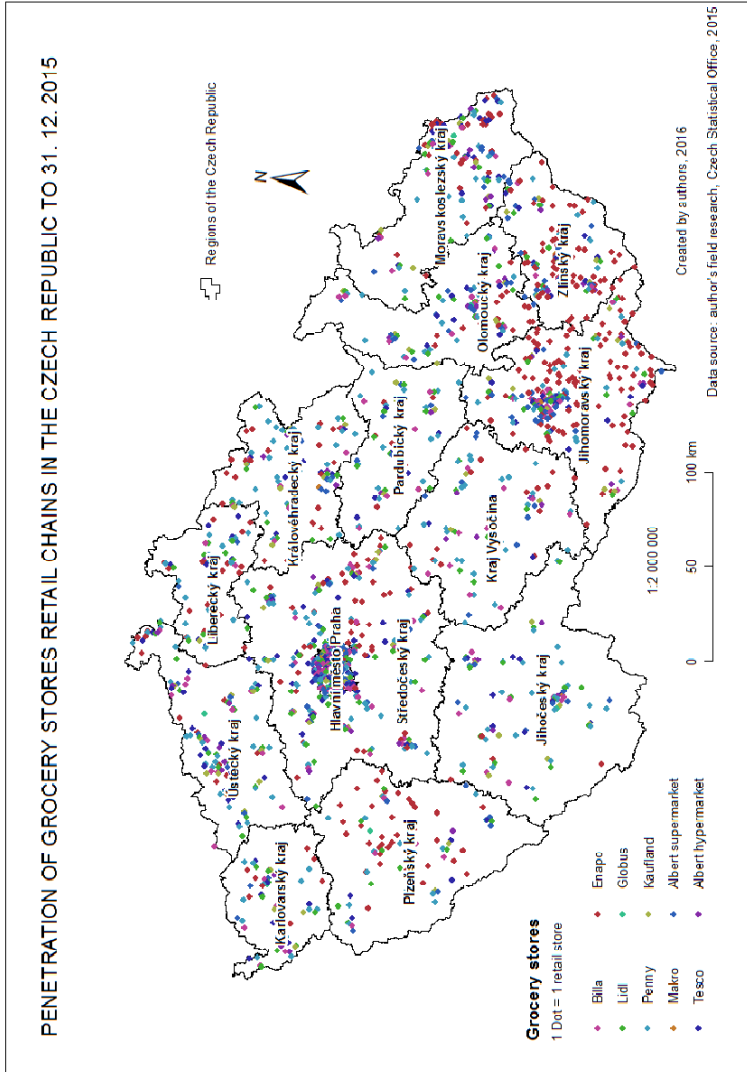


Figure 45 Numbers of Grocery Stores Retail Chains in the Czech Republic to 31. 12. 2015

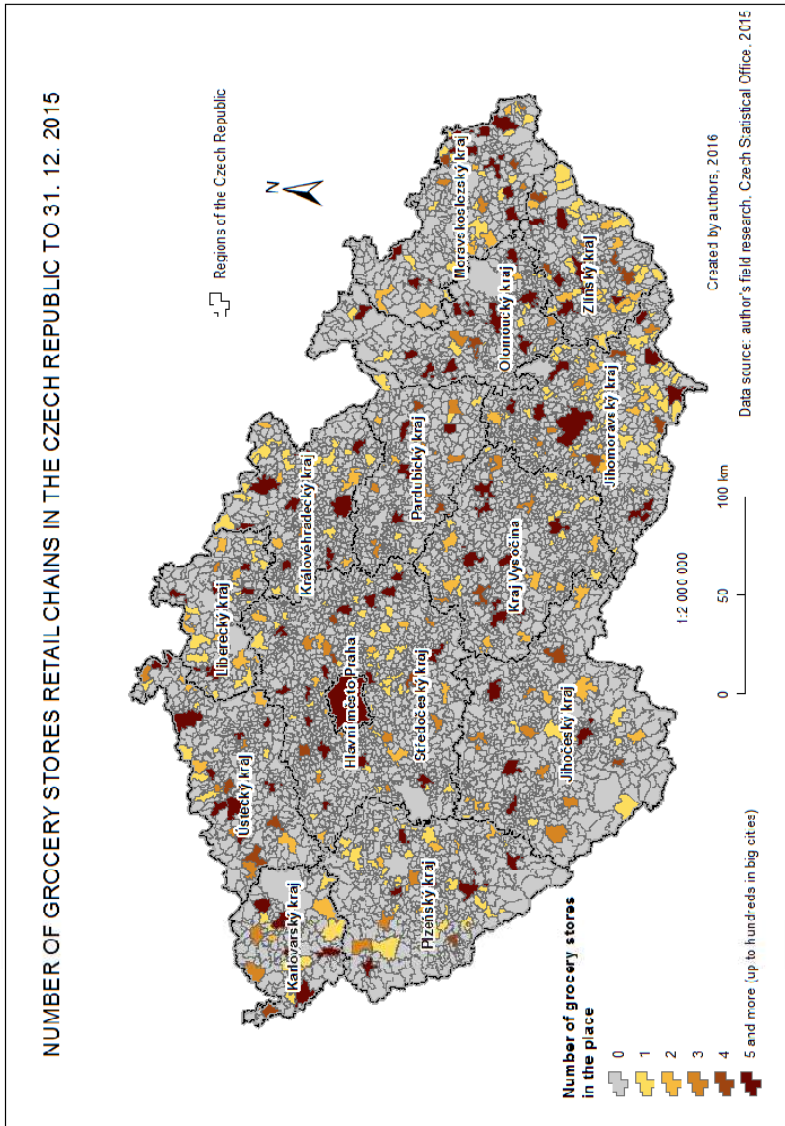
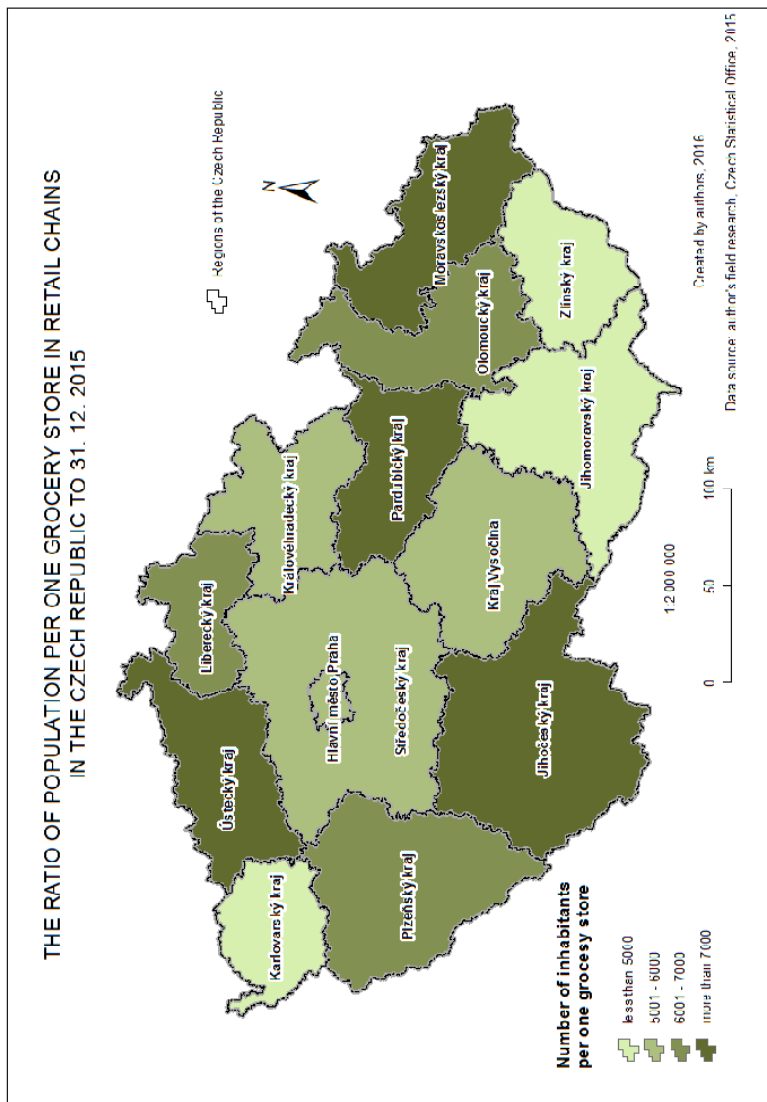


Figure 46 The Ration of Population per one Grocery Store in Retail Chains in the Czech Republic to 31. 12. 2015





In the text there was evaluated economic and physical access to food for the population in the Czech Republic. Based on the research results it can be stated that the physical availability of food is not a problem, mainly because of a dense network of retail chains in the country. In recent years, fluctuating value of economic access to food, which can be assessed both in terms of the amount of food prices and in terms of the volume of funds released for various household types of total expenditure on food consumption and non-alcoholic beverages. Significantly worse situation in terms of economic access to food occurred in the years 2011 and 2012, in particular because of the combination of rising food prices (and increased VAT on food) and also because of lower income situation of households due to the deceleration of economic recession. At present, mainly because of the increasing performance of the Czech economy which is accompanied by a decrease in unemployment and low inflation, the economic household access to food increases. That is documented in the above statistics.

### **8. 3 PHYSICAL ACCESS TO ORGANIC FOOD – MARKET IN THE CR**

Interest in organic products is growing slowly annually and with this offer of the organic market grows as well. Consumers buy most of the organic foods in the Czech retail networks, followed by health food and organic food stores. At the end of the year 2014, there was available in total 2,893 organic food items in selected retail chains. Average annual consumption per capita remains below 200 CZK.

At the end of 2014, there were registered 352 distributors of organic foods (an increase of 15% to previous year). Organic food imports reach up to 60% of the turnover of the Czech market, with the inclusion of the final organic food imports amounted to 46% of the retail turnover (data from 2012). Most of the buyers of organic food are middle-aged women. On the other hand, older men present the least number. The main reason for buying organic food is the fact that it is healthier and tastier. In opposite, the biggest barrier purchasing organic products are their price and followed by the range of the products.

In the Czech Republic, organic farming has been developing since 1990. While this year first three organic farms were registered, in 2014 it was already 4,023 certified organic farms that manage area of nearly 500,000 hectares of farmland which represents a share almost of 12% of the total agricultural land in the country.

Year after year, also the number of organic food producers is increasing. We are now producing in 539 establishments. (BIO, 2016)

*Table 8 The assortment of organic food offered by retail chains in 2010 (BIO, 2016)*

<b>The type of product</b>	<b>Globus</b>	<b>Tesco</b>	<b>Albert H</b>	<b>Kaufland</b>	<b>Billa</b>	<b>Albert S</b>	<b>Penny</b>
Tee	5	9	9	10	3	8	2
Fresh fruit and vegetables	31	14	12	11	12	12	1
Chilled food and delicacies	4	3	2	1	1	2	0
Confectionery and chocolate	8	5	9	2	2	4	0
Jams and marmalades	8	0	4	0	3	0	2
Coffee and cereal coffee	3	5	1	10	3	1	0
Baby food	60	57	43	77	9	5	0
Canned and pickled food	5	0	5	2	0	3	1
Spices and condiments	10	4	7	10	0	5	0
Legumes	5	9	9	3	4	7	0
Meat and meat products	12	12	10	4	27	9	2
Milk and dairy products	53	37	30	17	48	16	21
Flour, semoline, groats	4	10	9	7	4	8	0
Frozen products	5	0	8	0	0	2	2
Alcoholic drinks	10	6	5	0	2	0	0
Non-alcoholic drinks	17	16	30	30	6	12	4
Cereal and legume mixture, semi-finished products	13	11	4	9	0	1	0
Cereals	8	15	9	6	7	5	1
Oils and fats	2	1	4	2	1	1	1
Buts and seeds	10	7	0	3	9	0	0
Others	18	8	13	6	4	5	1
Fresh bakery	0	4	2	0	3	0	0
Durable pastry and bakery products	30	16	26	22	12	15	4
Spreads, pastes, creams	6	1	2	0	0	2	0
Sweeteners, sugar, honey, syrups	5	7	9	9	3	5	0
Breakfast cereals	9	9	7	3	4	7	3
Dry fruits	6	6	0	1	11	0	0
Pasta	9	10	9	4	5	6	0
Eggs	1	1	1	1	2	1	1
Flakes, germ, bran, fibre, husks	3	4	3	4	1	5	0
<b>The total amount of products</b>	<b>360</b>	<b>287</b>	<b>282</b>	<b>254</b>	<b>186</b>	<b>147</b>	<b>46</b>

As it was noted above, most people buy organic food in retail chains. Some chains even offer a relatively wide range of organic food. The retail chains Tesco and Globus have the biggest assortment. Most of the retail chains have their own organic food brand, whose products are in the range with other brands of organic food.

Globus retail network offers the widest selection of organic products from all the retail chains. The assortment of organic food in 2013 has grown to more than 530 kinds of products and continues to grow. Globus has not its brand of organic foods. Therefore, it purchases most of the organic products from suppliers or the brand Alnatura Alnavit.

Tesco retail network has its own brand of organic food Tesco Organic. The brand was introduced in the Czech retail networks in 2007 and now offers more than 100 products for customers.

The size of organic food range differs according to the type of store. Albert Hypermarket offers more products as well as organic products than Albert Supermarket. At the moment, Albert is offering 160 types of organic products. In addition, the retail chain Albert has its brand of organic foods Albert Bio where a range of more than 80 types of organic products can be bought. Considering future, Albert is going to continue to expand the size of the organic food network.

In Kaufland store, more than 200 types of organic products of different brands currently observe because sales network has not introduced its brand in the Czech Republic. Own brand of Kaufland - Kaufland Bio is only available in Germany. In Czech stores, the organic brand has not been registered.

Billa retail network has its Czech brand of organic food Naše Bio. The brand was introduced in 2009 and is intended only for the Czech and Slovak markets. By this, the company Billa wants to give space for domestic producers and local specialties. (BIO, 2015)

The company Penny has introduced its own brand Bio Style in 2009. At that time, the assortment received 11 organic products of the brand and was planned to rise further. Except the brand products Bio Style, Penny offered more than 80 other organic products.

Although Penny Market is only discount chain selling organic food, this privilege does not work among customers. Penny customers are not interested in store's organic food offer, and the company is reducing the range of organic products from year to year. Currently, it is possible to find only 5 kinds of organic food in Penny Market, including 3 products of Bio Style.

The results of the analysis may be seen surprising but they perfectly express the reality and the economic situation of customers. The interest in buying organic food is increasing slowly; sometimes people do not buy organic food only because they are not economically accessible.

However, high price always cannot be the only reason for disinterest. A significant role is also played by the inadequate awareness of people in the very essence of organic farming. The wave of exaggerated mediatisation inflated the importance of organic food to such proportions that captured rather distrust among people. People do not trust organic product brands what is understandable for many scandals with fake organic producers. On the other hand, it is necessary to mention the fact that customers do not control what they buy. They do not care about the labelling of real organic food which authenticity is guaranteed by the Ministry of Agriculture of the Czech Republic and European Union.

Whether organic food from the range of some retail chains will disappear completely is a question not only of the social security of the state but also of the access of consumers to food purchasing and responsibility for their health.

## 9 FOOD SAFETY MANAGEMENT

This chapter presents a case study of the use of the HACCP system for checking the activities associated with food preparation in the selected operation. The HACCP system is an important tool for quality control of meals prepared by an F & B manager. The article presents a hazard analysis and determination of critical control points for the entire process of food preparation - from food intake, through their storage to their preparation. The chapter also presents a diagram of the spatial arrangement of the cuisine with incorporated symbols HACCP. Also insurance is presented here as an important tool for elimination of economic losses.





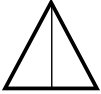




### 9.1 HACCP SYSTEM AS AN IMPORTANT TOOL FOR QUALITY CONTROL

System of control points, known under the English acronym HACCP, catalyses one of the fundamental important tools for accomplishing safe food together with good agricultural, manufacturing and hygiene practices (Lukášková et al., 2012). In 1997 there was an exact determination of the principles of the HACCP system in “*General Principles of Food Hygiene*” issued by the Codex Alimentarius (Kameník, 2013). Codex Alimentarius is motivated in food standards and guidelines and procedures for food safety with regard to the health of consumers. It also tries to ensure quality during import and consumer audacity in food safety (Codex Alimentarius, 2014). Entrepreneurs functioning in the food sector, with the exception of primary production, are required by law to exercise during their manufacture any of the procedures based on the principles of HACCP (Lukášková et al., 2014).

HACCP system functions by collecting data from the entire process of food production. Data obtained in the analysis are used to determine the possibility of risk in specific situations, thus helping to put safeguards in place to prevent the recurrent food hazards. It is a complex system, which takes into consideration not only the technological processes and added substances or materials during production as well as possible ways of treatment of consumers when completing the product or simple handling (Koudelková, 2014). It is thus an important and necessary tool, whose functioning management determines the success of a particular operation by an F & B manager. Critical control point system is based on seven consecutive parts, which are based on the aforementioned document created by the Codex Alimentarius Commission.

When inaugurating a system of control points in a firm providing catering service, it is recommended to use experienced symbols for representation of processes and transactions relating to work with food. The symbols then provide employees with quick and clear orientation about potential threats during the manufacturing process. Overview of the symbols is shown in next figure. The following symbols have been analysed in relation with threats of a selected service – pension for senior citizens, and positioned so as to show the kind of danger that could occur during food preparation.

*Figure 47 Recommended symbols for HACCP system planning*

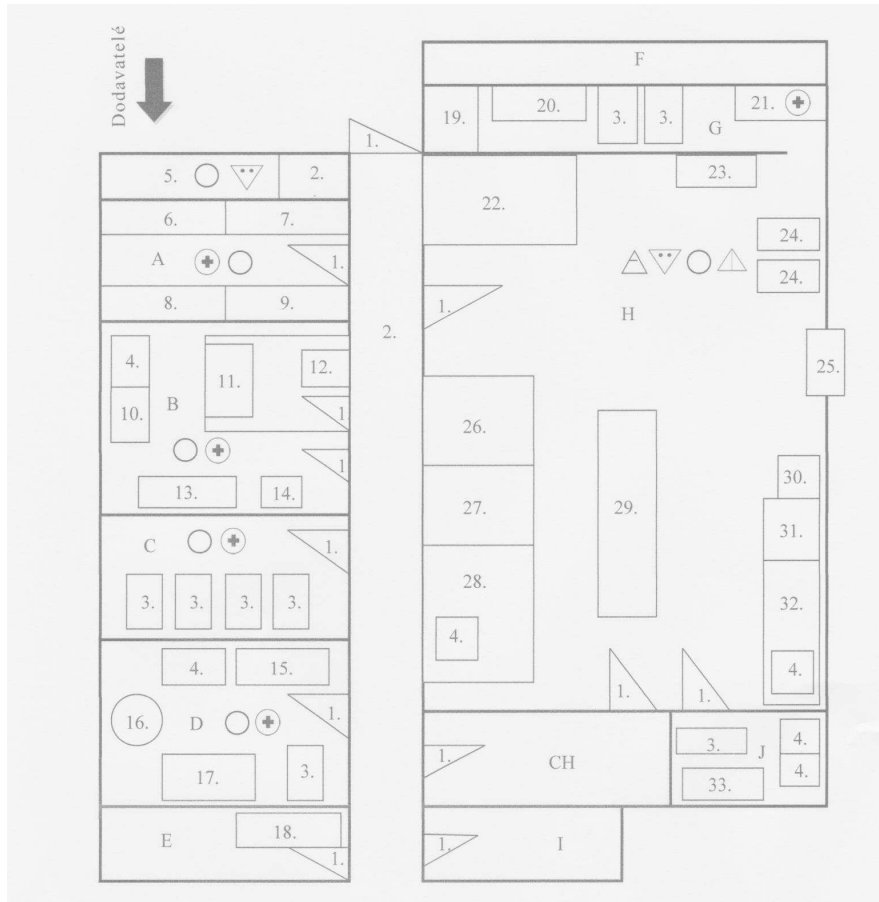
The symbol	The meanings
	Working operation
	Possible working operation
	Production process direction
	Food contamination possibility by pathogenic microflora from people
	Primary food or water infection or contamination possibility by pathogenic microorganisms
	Food contamination possibility from the surface of the device or contact with the surface
	Survival possibility of microorganisms
	Reproduction possibility of microorganisms
	Reproduction of microorganisms is unlikely

## 9. 2 CASE STUDY OF RISK ANALYSIS AND DETERMINATION OF CRITICAL CONTROL POINTS IN THE FACILITY

In the subsequent diagram layout of the facility there are numerically marked dispositions of the property (e.g. a refrigerator, a freezer). With the help of recommended symbols there are marked the places where food can be contaminated from different sources. The following describes the processes involved in moving food - raw materials, their storage and processing the critical control points.

Numbers 1 - 4 in the diagram indicate the main door (1), a hall (2), a storage space for kitchen utensils in the operating section (3), a sink (4). Risk analysis of good manufacturing practices disturbance can occur during food acceptance, respectively even before it - from suppliers. Food in the pension is imported from reliable suppliers; it is of the order of a dozen suppliers. Among them, there are small farming businesses located in the surroundings. There have not been found any troubles with wrong assortment during the period of mutual cooperation. It is possible to mark these suppliers as compliant in terms of raw materials safety. Ramp for receiving goods (5) is a place where you need to perform a thorough scan of the range of goods. Packaging integrity is checked, in terms of certain food also their sensory evaluation. Control operation is performed by the F & B manager, in his absence by his deputy. After the takeover of food there is their division into respective stores. It is carried out with the use of supply trucks. Possible identified risks in the area for receiving food and raw materials are not important because of reliable system of suppliers (Koudelková, 2014).

Figure 48 Spatial arrangement diagram of the operating section



Source: Koudelková, 2014. (note: Dodavatelé = Suppliers)

The following table shows risk analysis in the process of receiving goods.



Table 9 Risk analysis in the context of receiving goods in the selected pension for senior citizens

PLACE	TYPE OF ACTIVITY	RISK LEVEL	RISK TYPE	PREVENTIVE MEASURES	PROPER VALUES/ DOCUMENTS
<b>Ramp for receiving goods</b>	Receiving food and raw materials	1st and 2nd risk level	<i>Biological:</i> moulds, pathogenic microorganisms, warehouse pests <i>Chemical:</i> extra and contaminating substances, disinfection and cleaners <i>Physical:</i> damaged packaging, inappropriate or damp packaging, expired minimum guaranteed storage period	Consumption only from reliable and proved suppliers. Compliance with sanitary conditions for receiving goods. Thorough inspection of the inviolability of the packaging and consumption data. Sensory control of the parameters of individual foods - appearance, aroma, colour, presence of impurities, food totality.	<i>Corrective measures:</i> returning the goods to a supplier  <i>Documents:</i> Delivery bills and invoices - type and amount of food, delivery date must be specified

Source: Own customization according to Koudelková, 2014.

Analysis of storage areas showed no significant risk. The reason is the compliance of demanded storage conditions. F & B manager performs random controls of storage facilities to minimize the risk of hazards arising in connection with the possible improper storage of raw materials. Next table summarizes the risk analysis due to the food storage.

During the risk analysis process in the preparation of food there have not been observed any significant risks. There is assumed the preparation of various foods in separate parts of the warehouse and the use of hygienic tools and surfaces. Transferring modified food in the kitchen is done in compliance with the hygiene requirements for safe food.

Table 10 Risk analysis in the context of food storage in the selected pension for senior citizens

PLACE	TYPE OF ACTIVITY	RISK LEVEL	RISK TYPE	PREVENTIVE MEASURES	PROPER VALUES/ DOCUMENTS
<b>Storage rooms</b>	Storage of food and raw materials	1 <sup>st</sup> , 3rd and 4th risk level	Occurrence and reproduction of moulds and microorganisms over given extreme limits. Contamination through disturbed packaging. Failure to comply with temperature conditions, expired minimum guaranteed storage period.	Compliance with storage and hygienic conditions, especially temperature, humidity, twilight or darkness depending on the food. Separate storage space for disparate types of food. Regular control of the pest. Regular monitoring of physical factors (temperature and air).	<i>Proper values:</i>
<b>A-D</b>					Meat and poultry +4° C Minced meat +2° C Vegetables +10° C Eggs +5 to +18° C Dairy products +4 to +8° C Refrigerated ready meals +4° C Freezers -12 to -18° C Dry storage max. +25° C Relative humidity max. 75% <i>Documents:</i> Records on random inspection

Source: Own customization according to Koudelková, 2014.

Room A is a refrigeration and freezer space and is designed for storing food. There is a freezer for vegetables - the freezer temperature is between -12 to -18 ° C (6), a freezer for poultry and fish - the temperature is the same as in the previous case (7), a refrigerator for dairy products - the temperature hovers between +4 to + 8 ° C (8), a refrigerator for cold food - the temperature of +4 to + 10 ° C (9). Room B is divided into two parts. The larger area is used for meat preparation, where is the counter - part of the panel, the sink and the board for meat, where it is being cut and overall prepared for necessary heat treatment (10), as well as a refrigerator for meat - the temperature does not exceed + 4 ° C (13 ), the weight for meat (14). A separate part inside the room is used for egg preparation and storage. There is a counter for preparing and slicing eggs, part of it is a basin (11) and a fridge for eggs - temperature range +5 to + 18 ° C (12). Banquet room, which is on the diagram marked with the letter C, is used as a warehouse for dry beans, rice, flour, canned fruits and vegetables, jams and various kinds of canned food. Temperature here is at + 25 ° C. The only part of the

warehouse storage racks are needed for the location of raw materials. Another room (D) is intended for storage and cooking of vegetables. There are a sink and storage space, as well as vegetable waste grinder (15), a counter for cleaning vegetables (16) and a refrigerator for vegetables - temperature + 10 ° C (17) (Koudelková, 2014).

*Table 11 Risk analysis in the context of preparing food in the selected pension for senior citizens*

PLACE	TYPE OF ACTIVITY	RISK LEVEL	RISK TYPE	PREVENTIVE MEASURES	PROPER VALUES/ DOCUMENTS
<b>Storage rooms B and D</b>	Preparation of food and raw materials	2 <sup>nd</sup> , 3 <sup>rd</sup> and 4th risk level	Wrong washing and cleansing of foods, or failure to comply with the principles of good hygiene. Contamination of raw materials with unclean clothing, tools and hands of workers. The possibility of foreign objects in food.	Thorough cleaning of food. Preventing the possibility of cross-contamination by separating conflicting activities. The use of clean and proper working tools in different parts of the warehouse. Maintaining the conditions of heat chain.	<i>Proper values:</i> Procedures according to good hygiene practice.

*Source: Own customization according to Koudelková, 2014.*

E is a cleaning room; there is also a fridge for leftovers. The waste is stored in the designated transport containers so as to correspond to all requirements. Subsequently, the waste is disposed of in a waste disposer. The room F is connected with food consumption, so it is a dining room. Due to physical problems of some clients of the pension food is being served to their room. To prevent potential risk of contamination, food is transported by an elevator (room H in the diagram). G is a canteen room, which is from the kitchen area separated by a short wall. There is a dishwasher there used for white dish - plates, glasses and cutlery (19), further a window for used dish (20) and a delivery window (21).

Based on a risk analysis made by a person responsible for the pension there was set a control critical point in this part of the working operation. This point focuses on delivering food and

the desired temperature. There is a related danger of reproduction of undesirable microorganisms which can be caused by a temperature failure during dispensing. As a preventive measure there has been introduced stricter and more frequent monitoring of the point. Random check measurements are performed by an operating officer. Delivering in the kitchen, the dining room and individual departments are monitored. Measurements are carried by a leading person in the kitchen always when distributing the main course. A needle thermometer is used for monitoring the temperature. The degree issued for cold food must not exceed + 4 ° C, with hot meals there is a minimum level of + 80-85 ° C. At a lower temperature there would not be guaranteed proper food temperature when delivered to the client, it would be necessary to heat the food. In a worse case there could be an exclusion of food from circulation. In addition the extreme limits of required temperature include the deposit time for ready-made dishes; the range should not exceed 4 hours. At the control point there is defined how to record the controls. In the pension there is a HACCP protocol with records of measurements and any record of the exclusion of circulation (Internal source, 2014).

*Table 12 Risk analysis in the context of delivering food in the selected pension for senior citizens*

PLACE	TYPE OF ACTIVITY	RISK LEVEL	RISK TYPE	PREVENTIVE MEASURES	PROPER VALUES/ DOCUMENTS
<b>Delivering part of the kitchen</b>	Dish delivery	4th risk level	Contamination due to non-observance of sanitary conditions. Reproduction of unwanted microorganisms due to disregard of proper temperature when dispensing and preserving food.	Cleanliness of working environment and white dishes. Compliance with right serving temperature of food. Upon detection of unsatisfying parameters, exclusion of circulation. Refilling dishes only by replacing entire gastro containers.	<i>Proper values:</i> <i>Hot meals</i>  Core temperature of the food administered in the dining room or in the client's room may not be lower than + 60 ° C. <i>Cold meals</i> Cold meals may not be served with a temperature higher than + 8 ° C. The same criteria for issuing in the client's room or in the dining room.

Table 13 Risk analysis in the context of hot meals production in the selected pension for senior citizens

PLACE	TYPE OF ACTIVITY	RISK LEVEL	RISK TYPE	PREVENTIVE MEASURES	PROPER VALUES/ DOCUMENTS
<b>Kitchen</b>	Production of hot meals	3 <sup>rd</sup> and 4th risk level	Failure to comply with technological processes of production, especially temperature. When undercooked or other bad heat treatment there can survive pathogenic microorganisms, or there may be a change in sensory properties.	Monitoring of process compliance. Sensory control of dishes. Using thermometers for the control during the production process. Control of functioning and cleanliness of the equipment used for finishing dishes.	<i>Proper values:</i> Correct programme and parameters adjustment of electrical equipment used for preparing and finishing dishes. Safe temperature level during the heat treatment min. + 75 ° C.  <i>Documents:</i> Use of proper hygiene practices.

Source: Own customization according to Koudelková, 2014.

Table 14 Risk analysis in the context of cold meals production in the selected pension for senior citizens

PLACE	TYPE OF ACTIVITY	RISK LEVEL	RISK TYPE	PREVENTIVE MEASURES	PROPER VALUES/ DOCUMENTS
<b>Kitchen</b>	Production of cold meals	2 <sup>nd</sup> and 3 <sup>rd</sup> risk level	Failure to comply with technological processes of production.	Preventive measures are the same as for the preparation of hot meals.	<i>Proper values:</i> Using solely chilled raw materials and food. Prepared meals are delivered after completion or stored in a refrigerator at + 4 ° C.

Source: Own customization according to Koudelková, 2014.

Kitchen is the pivotal room of entire scheme (room H). All the preparation and finalization of dishes, both cold and hot, run here. There is a convection oven here - possibility of finishing

meals with a variety of thermal adjustment (22), a cutter - used to cut bread, salami and cheese (23), heating trolleys - they are required for transportation and storage of food for the patients eating in their rooms (24) elevator for ready meals (25) - transport of finished dishes using the heating trolley on each floor of the house. If serving hot meals on another floor the trolley is plugged in to maintain the temperature of the meals served. For further manipulation with the food a department worker is responsible. He is responsible for the temperature of the food, which should not be at the time of consumption less than + 60 ° C. As for cold dishes, meals must be stored in the refrigerator immediately after removal to the respective tray until delivery. Furthermore, the kitchen is a working area for preparing cold dishes and finished meat (26) a handy refrigerator (27), the area designated for the preparation of salads and fruit compotes (28), cooktops (29), a sink (30), a robot - used to produce dough for pastries (31) and a preparation room for desserts (32).

The analysis confirms adherence to proper processes. Severity of risk is not significant interrupted if the correct technology practice is somehow interrupted. Sensory controls show corresponding values.

The room CH is a daily room for cooks. There is a space in which all workers of the kitchen reside during their breaks. In the room there is a refrigerator for personal food of the workers. It is also equipped with a computer and printer needed to draw up weekly menus. The room I - cloakroom and storage space for personal belongings of employees of the kitchen, as well as sanitary facilities. The room J is separated from the kitchen by a short wall; it is used for storing and washing black crockery. There is a black crockery dishwasher - dishwasher for small utensils needed to prepare meals (33).

In the interest of the pension it is to provide healthy food and meals, even if the serving of meals is a side activity. To avoid creation of other critical points there are precisely defined limits of not only aforementioned problematic points, but of all other work operations. Thanks to the use of standard processes and equipment critical limits and corrective measures could be compiled based on the experience of the kitchen workers (Koudelková, 2014).

The attributes monitored when receiving refrigerated and frozen food is the intact packaging and the minimum guaranteed storage period, everything is based on visual inspection and during each delivery. The critical limit is the integrity of the packaging and adequate storage period of food. When crossing the limit, there is a return of the food to manufacturers. For storage of chilled and frozen products and semi-finished products there is monitored by spot checks the temperature and continuously the minimum guaranteed storage period. During the

monitoring is to check the accuracy of food describing and temperature on individual devices. The critical limit is not exceeded in case of compliance with its durability and accuracy of temperature according to the necessary requirements for individual types of food. If the limit is not responding, the food is either transferred or withdrawn from circulation, it is evidenced by the record of food disposal. In the heat preparation in the form of stewing, baking and cooking, the monitoring character reaches the set of temperature and time adjustments in all parts of the process. Monitoring focuses only on food finished differently than in a convection oven. There is performed sensory testing and temperature measurement by a needle thermometer. Critical limit includes the effect of the temperature falling below 75 ° C in the core of the food for 5 minutes. A corrective measurement is extending the period of completion. There is also assessed the readiness of operations, especially in the context of the state of readiness of operation before starting work. Assessment takes place at the beginning and the end of the shift in the form of sensory assessment. The presence of foreign objects and debris of raw materials and food means exceeding the extreme limits. Cleaning the area is part of the corrective measurement.

The risk analysis is made and documented in this chapter, which is part of the HACCP system, and the results of the analysis describe the critical control points. The risk analysis was performed on several levels according to the possible occurrence of possible danger during the preparation of food. Case studies of selected pension for senior citizens found high standard of food safety. A functioning system HACCP is a guarantee of quality for the running establishment in a closed system board for the F & B manager. (Málek et al., 2016)

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