



# CHALLENGES AND OPPORTUNITIES FOR THE INNOVATION AND SUSTAINABILITY OF AGRICULTURE

in Central and Eastern Europe,  
with special consideration of livestock sector

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# GLOSSARY

**CEE** Central and Eastern Europe

**FAO** Food and Agricultural Organisation

**OIE** World Organisation for Animal Health

**ATF** Animal Task Force

**CAP** Common Agricultural Policy

**V4 (Visegrad Four)** includes Poland, Hungary, Czech Republic and Slovakia

**EU-15** includes EU Member States in 2003: Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom.

**EU-N12** includes the Members States that joined the EU in 2004: the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia, and in 2007: Bulgaria and Romania.

**EU-N13** includes EU-N12 plus Croatia, which joined the EU the 1st July 2013.

**EU-27** includes EU-15 plus EU-N12, i.e. the European Union between 2007 and 2013.

**EU-28** includes EU-15 plus EU-N13, i.e. the European Union since 2013.

**Ha** hectares

# EXECUTIVE SUMMARY

**Increase of global population size leads to higher demand for animal proteins.** Achieving food security and improved nutrition can be done by:

- ensuring sustainable food production systems (*“producing efficiently high quality products, with special consideration of health and welfare of farmed animals”*)
- improving the agricultural productivity (*including livestock production*)
- implementing resilient agricultural practices
- striving to minimise pressure on natural resources (*feed, water, greenhouse gas emissions*)
- increasing investment in rural infrastructure and technology development
- guaranteeing access to knowledge

Achieving sustainability in the agriculture is of key importance for food exporting countries (e.g. CEE countries), providing them with strong economic advantages in the near future.

**Research and innovation** in the livestock sector is needed to meet the new challenges:

- novel genetic tools (e.g. *“-omics” techniques*)
- dual-purpose (DP)/crossbreeding
- novel integrated methods of animal health and welfare improvement (e.g. responsible use of pharmaceuticals, including innovative solutions)
- precision livestock farming (PLF) technologies/ smart housing systems
- nano-technology

Some opportunities on the political level for addressing the challenges of the sustainability include:

- rural development regulations (e.g. investment, training, agri-environmental measures, processing and marketing)
- animal welfare policy (e.g. regarding mutilations or pain alleviation methods)
- novel pharmaceutical solutions (e.g. regulation regarding veterinary medicinal products)

**Central and Eastern Europe.** Political changes of the last years positively affected sustainability of the agriculture, including livestock sector, in this region. To further protect it CEE countries at the EU level in Brussels should support:

- investments in science, technology and innovation that focus on fostering a more effective and knowledge-based agricultural sector
- holistic legislative approach to enable the development and adoption of all science-based solutions that contribute to sustainable livestock, striking a balance between the pillars of environmentally sound, socially responsible, and economically viable agricultural production
- equality of all farmers in the EU Member States under Common Agricultural Policy

# 1. INTRODUCTION TO THE GLOBAL CHALLENGES

The powerful forces governing the global transformation that started in the early 1990s are reshaping the world ever more strongly and rapidly nowadays. The world is becoming steadily more complex and more challenging<sup>1</sup>. This can be depicted by such global trends as:

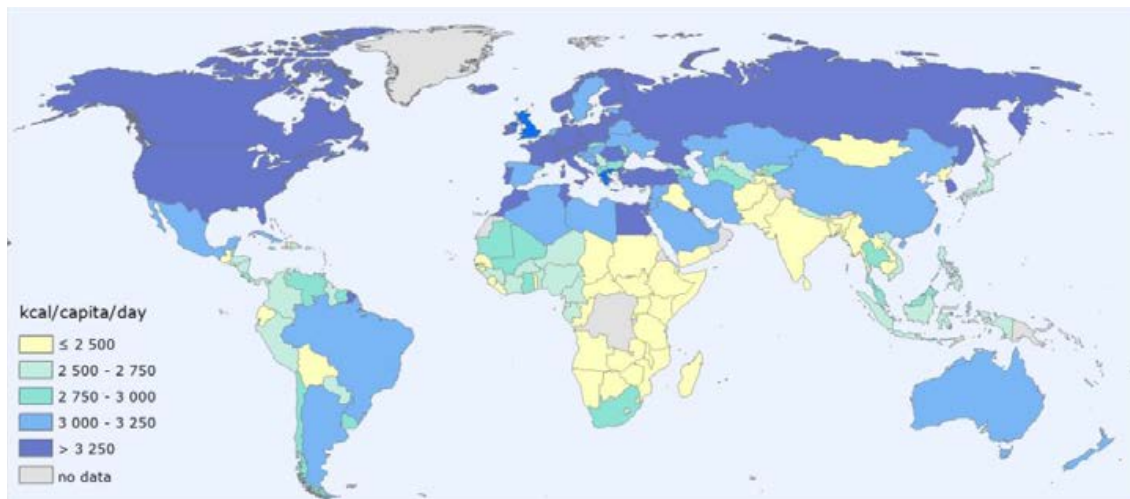
## 1.1 Growing population

The global population is expected to become **ca. 9 billion by 2050**<sup>1</sup>. With improvements in life expectancy, increasing urbanization, accelerating migration, and in the light of the finite environmental resources, these population trends will have far-reaching implications for generations to come. This trend will surely have direct effects on the global food security, the nutritional needs of the population, global economic and political environment.

### 1.1.1 Food security and improved nutrition

**Future demand for food.** Total demand for food is projected to grow by 70% until 2050, with the area of arable land per person decreasing by 1.5% per year if no major policy changes are initiated<sup>2</sup>.

**Fig. 1. World food availability per capita**



FAO, Food Balance, 2009-2011, (FAOSTAT).

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<sup>1</sup> UN DESA report, "World Population Prospects: The 2015 Revision"

<sup>2</sup> Greening Europe's agriculture, European Environment Agency, 2012

**Changing diets.** The dietary transition towards higher consumption of meat, fruits and vegetables, relative to that of cereals, will require commensurate shifts in output and adding pressure on natural resources.

**Undernourishment.** According to FAO, hunger and extreme poverty have been reduced globally since the 1990s. Yet, around 700 million people, most of them living in rural areas, are still extremely poor today, while 2 billion suffer micronutrient deficiencies. Access to affordable, wholesome and nutritious food is also a challenge for some regions in Europe<sup>3</sup>.

### 1.1.2 Increased demand for animal proteins

Livestock products, such as milk and meat are one of the best sources of protein and bio-active compounds (fatty acids, vitamins and minerals)<sup>4</sup>. Annual meat production is projected to increase to circa 380 million tonnes by 2030<sup>5</sup>. For example in China consumption of animal protein per capita increased already ten times over last 30 years to ca. 50 kg/capita.

## 1.2 Limited natural resources

At the global level, food, water and energy systems are becoming increasingly vulnerable. Global demand for energy and water is expected to rise by 40 % over the next 20 years<sup>6</sup>.

**Innovations in livestock production play a crucial role in efficient use of resources:**

- Maximizing recycling of the biomass from inedible resources
- Improving the efficiency of animals with regard to feed conversion rates and animal health and resilience

## 1.3 Agriculture

Agriculture sector remains central to the lives of a great many people even though it accounts for a comparatively small share of the global economy. In 2012, an estimated 1.3 billion (19%) were directly engaged in farming, but agriculture represented just 2.8% of overall income<sup>7</sup>. It produces significant amounts of feed, fuel, fibre, and, increasingly, agricultural biomass used to produce a host of industrial chemical and material products<sup>8</sup>.

The growth in agricultural output happened over last decades and has been uneven among regions. Today's high-income countries produced 44% of total agricultural output in 1961, and although production by the high-income countries almost doubled by 2011, their share of the global total shrank to 24.6 %. High-input, resource-intensive farming systems have caused massive deforestation, water scarcities, soil depletion and high levels of greenhouse gas emissions, so cannot deliver sustainable food and agricultural production. Therefore innovative systems that protect and enhance the natural resource base, while increasing productivity are needed.

### 1.3.1 Livestock sector

The livestock sector currently constitutes the world's largest user of natural resources<sup>9</sup>: with 80% of all agricultural land used for grazing or animal feed production and 8% of the global water use, primarily for irrigation of feed crops<sup>10</sup>. Livestock sector is also among the top significant contributors to local and global environmental problem.



**However, in a global circular bio-economy, livestock have many valuable roles<sup>11</sup>:**

- to provide sufficient protein-rich, safe and healthy food for humans
- to regulate the ecological cycles and close the nutrient loop
- to contribute to a more efficient agriculture by valorising food-chain by-products
- to improve soil fertility by the use of grassland and proper spreading of manure;
- to provide raw material for renewable energy and valuable by-products
- to provide ecosystem services linked to the vitality of diverse territories, employment in rural area, landscape and biodiversity preservation and cultural heritage.

**Therefore, it is crucial to develop animal friendly production systems that meet the physiological and behavioural needs of farm animals.**

### 1.3.2 Climate change

The contribution of the EU livestock sector to greenhouse gas emissions has been estimated to account for 9.1% of total EU emissions (including the impact of sourcing animal feed, for which the EU is a significant importer)<sup>12</sup>.

Reducing greenhouse gas emissions and resource use is paramount. The amount of emissions generated on-farm for each kg of meat or milk produced decreased significantly (between 38% and 76%, depending on the livestock products) since 1960's<sup>13</sup>.

**To further mitigate climate changes Paris (COP 21) and Marrakech (COP 22) climate agreement underlined the:**

- the importance of protecting food production while reducing emissions
- need to limit the increase in global average temperatures rise by year 2100 to well below 2°C and to pursue efforts to limit it to 1.5°C

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<sup>3</sup> Eurostat. EU Income and Living Conditions (EU-SILC) Survey data, 2013 (except Ireland, 2012); recalculated for number of households

<sup>4</sup> Global and regional food consumption patterns and trends, WHO, 2017

<sup>5</sup> FAOSTAT

<sup>6</sup> The European environment — state and outlook 2011, Environmental challenges in a global context European Environment Agency, 2011

<sup>7</sup> World Bank 2012

<sup>8</sup> Alston, Julian M., and Philip G. Pardey. 2014. "Agriculture in the Global Economy." *Journal of Economic Perspectives*, 28(1): 121-46.

<sup>9</sup> Aiking, 2011; FAO, 2009; Steinfeld et al., 2006; Steinfeld, Mooney, Schneider, & Neville, 2010

<sup>10</sup> Steinfeld et al., 2006

<sup>11</sup> A strategic research and innovation agenda for a sustainable livestock sector in Europe, White Paper, ATF

<sup>12</sup> Weiss, F., Leip, A., 2012. Greenhouse gas emissions from the EU livestock sector: A life cycle assessment carried out with the CAPRI model. *Agriculture, Ecosystems & Environment* 149, 124-134

<sup>13</sup> Reducing greenhouse gas emissions from livestock: Best practice and emerging options, Sustainable Agriculture Initiative (SAI) Platform, Accessed on 8th of May 2017, na [http://globalresearchalliance.org/wp-content/uploads/2014/12/ LRG-SAI-Livestock-Mitigation\\_web2.pdf](http://globalresearchalliance.org/wp-content/uploads/2014/12/ LRG-SAI-Livestock-Mitigation_web2.pdf)

## 2. SUSTAINABLE DEVELOPMENT AND AGRICULTURE

Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs<sup>14</sup>.

Sustainable agriculture is “the efficient production of safe, high quality agricultural products, in a way that protects and improves the natural environment, the social and economic conditions of farmers, their employees and local communities, and safeguards the health and welfare of all farmed species”<sup>15</sup>. It is environmental soundness, social responsibility, economic viability.

Economically sustainable practices help farms to increase profits, decrease costs, and mitigate financial risk; environmentally sustainable practices protect farmland and the local ecosystem through soil conservation and land preservation efforts; and socially/culturally sustainable practices help to preserve farming culture and cultural artefacts, as well as creating strong community ties between farms and local residents<sup>16</sup>.

### 2.1 Sustainable livestock production

Animal production sector has a major opportunity to contribute to more sustainable food and nutrition systems. It should:

- be innovative and competitive
- lead the way in environmental stewardship
- ensure socially responsible production systems in a changing world

**Fig. 2. Three pillars of sustainable agriculture**



Sustainable livestock farming requires a systems approach to farm management, based on a commitment to continuous improvement, which means that performance gaps are identified and addressed, while recognising that actions taken must maintain an appropriate balance

among the three interdependent pillars of sustainability. A systems approach requires attention to detail and adopting innovative practices to move farm businesses towards delivering better on sustainability goals <sup>17, 18, 19, 20</sup>.

## 2.2 Sustainability through science, technology and innovation (examples)

There is a general consensus that scientific and technological development is accelerating. Innovation is at stake also for the future of livestock farming. Innovation is coming from research, private industries and from farmers themselves and the growing amount of information needs very clear and quick channelling to its end users which is currently often missing in many European countries.

Key to preserving resources is the development of knowledge-based, sustainable and innovative ways of increasing agricultural output from the current agricultural land, through innovative methods to:

### ⇒ *Increase efficiency of production*

It is essential to look into additional solutions to make livestock production more efficient and sustainable.

An alternative approach is to adopt innovations which improve the efficiency with which animals convert natural resources into edible animal products in a balanced way, without pushing their biological limits.

In this way the growth in the number of animals and related resources required to meet future global demand could be minimised, while good animal welfare standards maintained.

### ⇒ *Improve feed conversion ratios*

Improving feed conversion is a matter either of decreasing the amount of feed fed, increasing the amount of gain or combining both.

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<sup>14</sup> United Nations, 1987. Report of the World Commission on Environment and Development: Our Common Future (Brundtland Report).

<sup>15</sup> Sustainable Agriculture Initiative (SAI) Platform. Definition of Sustainable Agriculture. Accessed on May, 8th, 2017, on <http://www.saipatform.org/sustainable-agriculture/definition>

<sup>16</sup> United Nations. 2005 World Summit Outcome. Accessed on May 8th, 2017, on <http://www.who.int/hiv/universalaccess2010/worldsummit.pdf>

<sup>17</sup> Principles and Criteria of the Global Roundtable for Sustainable Beef. Accessed on May 8th, 2017, on [http://www.grsbeef.org/Resources/Documents/GRSB%20Principles%20and%20Criteria%20for%20Global%20Sustainable%20Beef\\_091514.pdf](http://www.grsbeef.org/Resources/Documents/GRSB%20Principles%20and%20Criteria%20for%20Global%20Sustainable%20Beef_091514.pdf)

<sup>18</sup> Science and Technology Options Assessment, STOA. Technology options for feeding 10 billion people, Synthesis report, Options for sustainable food and agriculture in the EU, STOA, European Parliament, November 2013

<sup>19</sup> UN Food & Agriculture Organization (FAO), 2013. The State of Food and Agriculture. Chapter 1: The role of food systems in nutrition. Accessed on May 8th, 2017, on <http://www.fao.org/docrep/018/i3300e/i3300e01.pdf>

<sup>20</sup> European Initiative for Sustainable Development in Agriculture (EISA), 2012. European Integrated Farming Framework. A European Definition and Characterisation of Integrated Farming (IF) as Guideline for Sustainable Development of Agriculture.

- **Meat poultry (chicken)** has the best rate for converting feed into meat, among commercial meat species and cattle are efficient in producing human edible proteins per unit of land use, on those lands which can only grow grass and forage.
- **Ruminants** are capable of consuming residues left over from human food, fibre, and energy processing and convert these by-products into high quality protein.
- **Aquaculture** is growing in popularity in terms of FCR and environmental aspects. Furthermore, animals provide manure and thus nutrients as well as organic matter that are recycled in crop production.

⇒ **Reduce waste**

Meat and dairy are already two of the food categories with least waste along the supply chain: 21 and 16% respectively globally, compared to 44% of fruits and vegetables and 28% of grains<sup>21</sup>. Livestock specific actions to further tackle waste and to turn waste into resources are needed.

⇒ **Improve animal health and welfare**

Animal welfare is vital for a sustainable livestock production. Farm animals depend on human care and it is society's responsibility to respect their welfare, including health.

- **Five Freedoms:** the ideal state to strive for is that farm animals should be free from hunger and thirst, discomfort, pain, injury and disease, fear and stress, and they should be free to express normal behaviour.
- **Three Essentials of Stockmanship** are: the knowledge, skills, and personal qualities of the caretaker.

Under the **One Health Approach**, healthy livestock and healthy people are inextricably connected since healthy animals guarantee food safety and public health. At the livestock production level, this can be achieved through good husbandry practices, preventing and controlling animal diseases, and promoting the responsible use of veterinary medicines, including antimicrobials, leading to reduction in losses due to animal mortality and morbidity.

Animal welfare is one of the topics that has consistently ranked on the top of items brought to the attention of governmental organizations and politicians across European countries. Concerns about animal welfare among European citizens are founded in well thought expectations from governments, industry and other stakeholders.

**Disease is a good example of a joint threat to animal welfare and business sustainability:**

- Disease causes avoidable pain and distress.
- The OIE “estimates that morbidity and mortality due to animal diseases cause the loss of at least 20% of livestock production globally. This represents at least 60 million tonnes of meat and 150 million tonnes of milk with a value of approximately USD 300 billion per year.”<sup>22</sup>
- Farm animal welfare relies on the availability of medicines for all kept species, given that even in the best kept flocks and herds there will be infections and conditions that require medication regardless of whether the specific farmed species is reared indoors or outdoors<sup>23</sup>.

- Antimicrobial and anthelmintic resistance, changing geographical disease patterns or societal demands for higher animal welfare are listed among biggest challenges in the One Health Approach.
- An opportunity for sustainable livestock has come recently through the ongoing review of veterinary medicines definition creating unique opportunity for addressing the challenges of animal farming in Europe.

⇒ ***Reduce greenhouse gas emissions and mitigation of climate change***

The livestock sector worldwide can play a key role in mitigating climate change through adoption of improved technologies. Innovative approaches could reduce methane emissions by 40%.

These approaches include:

- precision livestock farming for optimising feed quality and digestibility,
- breeding for reduced methane emission,
- fostering the microbiome (microbial populations that natively inhabit the animal), fortifying animal robustness,
- potential vaccines and potential methane inhibitors to abate methane production<sup>24</sup>

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<sup>21</sup> Sustainable Agriculture Initiative (SAI) Platform. Definition of Sustainable Agriculture. Accessed on May 8th, 2017, on <http://www.saipatform.org/sustainable-agriculture/definition>

<sup>22</sup> <http://www.rr-africa.oie.int/en/news/index.html>.

<sup>23</sup> Farm Animal Welfare Committee (2017). Sustainable agriculture and farm animal welfare: Farm Animal Welfare Committee. London: Defra Farm Animal Welfare Committee. Accessed, May 08, 2017, [http://researchinformation.bristol.ac.uk/files/105375301/Advice\\_about\\_sustainable\\_agriculture\\_and\\_farm\\_animal\\_welfare\\_final\\_2016.pdf](http://researchinformation.bristol.ac.uk/files/105375301/Advice_about_sustainable_agriculture_and_farm_animal_welfare_final_2016.pdf).

<sup>24</sup> Sources: a) GRA and SAI, 2014. Reducing greenhouse gas emissions from livestock: Best practice and emerging options, b) European Commission. DG for Agriculture and Rural Development. Towards a Long-term Strategy for European Agricultural Research and Innovation by 2020 and Beyond. Workshop Background Paper. Expo Milan, 19 June 2015

# 3. ROLE OF THE EUROPEAN UNION TO IMPROVE GLOBAL AGRICULTURAL SUSTAINABILITY

## 3.1 Significance of livestock sector in European Union<sup>25</sup>

The EU livestock sector is the largest in the world and it makes up 40% of the EU's agricultural production value. It accounts for 48% of total EU agricultural activity, with an estimated €130bn output value annually (at producer prices) and creates employment for almost 30 million people<sup>26</sup>. Besides contributing to the EU's economy, the livestock sector supports the livelihoods in rural areas and has the potential to bring about a better functioning agro-ecosystem and climate-smart agriculture. European standards in animal production are undisputedly extremely high compared to those from other parts of the world in term of animal welfare, safety, healthiness, environment, etc. It is therefore imperative that the EU livestock sector plays an important role in realising global food and nutrition security in a sustainable way.

## 3.2 European Union as the global innovation leader

Research and innovation have contributed substantially to make Europe's livestock sector as competitive, balanced and efficient as it is today. There are two important examples of the EU actions to support knowledge-based innovation in the livestock sector:

- **European Commission** has been promoting the concept of the "bio-economy"<sup>27</sup>. This term describes the new uses and processes of biomaterial, which are feasible because of new technologies and knowledge, where the objective is to achieve greater resource efficiency and sustainability (i. ex. Bio-Based Industries Partnership<sup>28</sup>).
- **European Parliament** adopted the report (2015/2227(INI)) on enhancing innovation and economic development in future European farm management. Actions should be executed in order to foster future innovation in R&D, policy, and at the farm, as well as a knowledge-based livestock sector.

Continued support for research and innovation in the livestock sector is needed to meet the new challenges and to support the adaptation of these innovations in the corresponding farming systems.

## 3.3 Future of the EU's Common Agricultural Policy (CAP)

### 3.3.1 Level-playing-field

The CAP is responsible for the conditions of competition in the single market, while determining the predictability and stability of agricultural activity. It is thus necessary to depart from the historical criteria of allocating the resources for direct payments and complete the process of equalizing the level of direct payments among the Member States.

**The future direct payment system should maintain elements which proved effective:**

- the single area payment scheme (SAPS);

- preferences for small and medium-sized agricultural holdings and
- voluntary coupled payments with modification for protein crops sector.

### 3.3.2 Food security

In the future CAP should provide the EU society with high-quality food, i.e. assure food security, while contributing to achieving the sustainable development goals (including maintaining land, water, air and biodiversity in a good condition for future generations). It also ensures the EU's contribution to global food security in a sustainable manner.

### 3.3.3 Ongoing reform

The on-going reform of the Common Agricultural Policy (CAP) is an opportunity to improve the sector's resource efficiency and environmental performance<sup>29</sup>. The reform prioritizes rural sustainability by encouraging livestock farmers in adopting technological improvements that aim to reduce emission intensities, while increasing productivity.

### 3.3.4 Expected results of Brexit on the agricultural sustainability

The UK's exit from the EU could potentially have additional impact on the next phase of agricultural policy making, leaving a question mark hanging over the future EU budget to the tune of EUR 10 billion a year. There have been many concerns reported from the livestock sector's stakeholders, associations and unions about the prospect of the upcoming commercial chaos.

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<sup>25</sup> data according to Eurostat, 2016

<sup>26</sup> Eurostat, 2017 Accessed on 8th of May 2017, ([http://ec.europa.eu/eurostat/statistics-explained/index.php/Agricultural\\_accounts\\_and\\_price](http://ec.europa.eu/eurostat/statistics-explained/index.php/Agricultural_accounts_and_price)),

<sup>27</sup> McCormick and Kes, 2010; European Commission, 2010

<sup>28</sup> <https://www.bbi-europe.eu/>

<sup>29</sup> European Environment Agency, 2012 - Greening Europe's agriculture. <https://www.eea.europa.eu/themes/agriculture/greening-agricultural-policy/greening-europe2019s-agriculture>

## 4. MID- AND LONG-TERM SUSTAINABILITY OF THE LIVESTOCK SECTOR IN CENTRAL AND EASTERN EUROPE

### 4.1 Bratislava Declaration on Common Agricultural Policy post 2020<sup>30</sup>

Representatives of chambers of agriculture of Poland, Czech Republic, Slovakia as well as Estonia, Lithuania and Croatia defined recently priorities which they will advocate in the period of preparation of the new CAP post 2020. Among them were the following ones, underlining importance of the sector's sustainability (economic, environmental and social):

1. CAP should be common and equal for farmers in the EU, thus not distorting the market;
2. New CAP programming period has to contribute to balanced territorial development and production in all rural areas. Support of production development in all rural areas including less favourable areas could contribute to preserve rural settlement, protect environment and maintain biodiversity.
3. New policy is required to ensure sustainability of the farming sector, fair price for farm products, on time payments and rules against unfair trade practices on the EU level. In order to improve food chain functioning, monitoring of competition, better negotiation power of farmers, fair price formation against external markets should be implemented.
4. New EU legislation should ensure equal quality of the same brands of food in all EU member states and applicability of equal food standards to all food coming from third countries.
5. Greening payments, including local conditions in particular member states have to be reviewed. It has to be simplified as CAP greening today causes extensification of farming and reduces competitiveness against the third countries.
6. Rules of CAP need to be understandable, realistic and feasible, while system of support transparent and radically simplified. Reduction of administrative burden is required.
7. Efficient and systematic measures of for management of imbalances and risks on the agricultural commodities market and price volatility are needed.
8. More intensive application of the measures ensuring fair and efficient utilization of the CAP limited resources as financial instruments and system measures for risk management.
9. Support for producer groups/ cooperatives in their growth and association.
10. Financial and organisational mechanisms supporting young farmers and new stakeholders.
11. Allocation of funds for promotion and marketing channels to third countries for EU agricultural production.

### 4.2 Challenges and opportunities for the sustainability of the livestock sector in Central and Eastern Europe.

Political changes which happened in the CEE after accession to the EU positively affected the innovativeness, development of the agricultural sustainability and resulted in the increased competitiveness of the region.



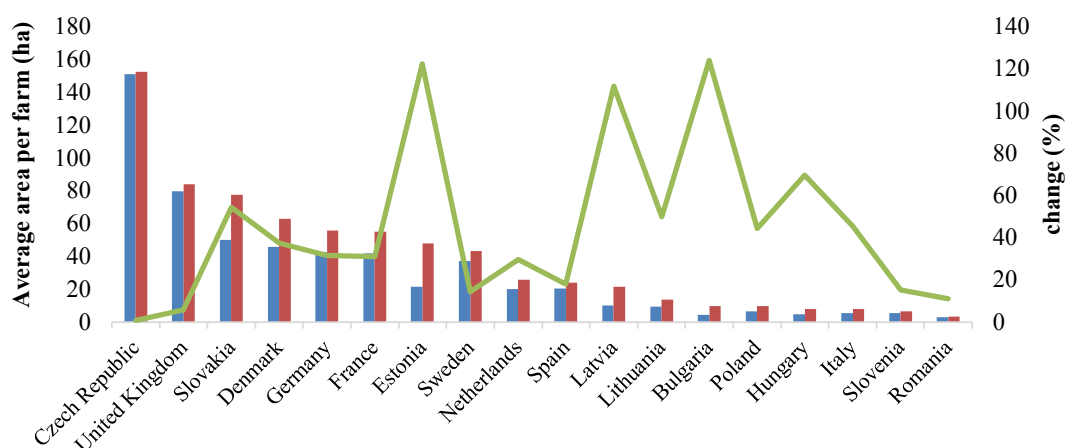
Changes in agriculture are closely linked to the public funding opportunities for structural transformation including CAP mechanisms.

### 4.2.1 Agricultural structure

The structure of agriculture in the EU Member States varies depending upon differences in geology, topography, climate and natural resources, as well as the diversity that is found in terms of (former) political and economic systems, regional infrastructure and social customs:

- countries with high numbers of small farms<sup>31</sup> are characterised by semi-subsistence, family holdings
- larger farms are more likely to be corporately-owned, joint stock and limited liability farms, or cooperatives.

**Fig 3: Changes in the average farm size (ha) in selected EU Member States**



In EU-28 the average size of agricultural holdings increased from 14.4 ha per holding in 2010 to 16.1 ha per farm in 2013. In Bulgaria, Poland, Hungary, Slovenia or Romania average farm size was smaller than EU average (9.8; 9.6; 8; 6.5; and 3.4ha respectively) (Fig.3).

Different tendency was observed in Czech Republic, where the average area per holding in this country represented the highest value within the EU-27: 133 ha per farm - about two times bigger than the second highest one recorded among the EU Member States (84 ha per holding registered in the UK)<sup>32</sup>. In Slovakia, a fairly limited number of holdings covered a large agricultural area. The average area per holding in Slovakia (77.5 ha per farm) was the third highest among EU Member States (Fig.3).

<sup>30</sup> Held on the 30th – 31st of March, 2017, Bratislava, Slovakia

<sup>31</sup> It is important to acknowledge that small farms support rural employment and can make a considerable contribution to territorial development, providing specialist local produce/products as well as supporting social, cultural and environmental services.

<sup>32</sup> Czech Statistical Office, data from 2015

**Table 1. Volume of total export, agri-food products and international trading countries of the selected EU Member States<sup>33</sup>.**

Country	Exports (in US\$ Mil):	Share of agri-food products in the national export (%)	Trade value (in US\$ Mil) and Share (%):				Top five trading countries regarding			
			Food products	Animals	Vegetables	Food products		Animals		
						Export	Import	Export	Import	
Netherlands (NL)	473834	18,4	34622 (7,3%)	21686 (4,6%)	31104 (6,6%)	DE, BE, UK, FR, US	DE, BE, Brazil, FR, UK	DE, BE, UK, FR, IT	DE, BE, UK, FR, PL	
Poland (PL)	194461	13,2	12096 (6,2%)	7864 (4%)	5657 (2,9%)	DE, UK, FR, NL, IT	DE, Argentina, NL, IT, FR	DE, IT, UK, NL, FR	DE, NO, DK, NL, BE	
Bulgaria (BG)	25779	10,7	149 (5,8%)	424 (1,7%)	2181 (8,5%)	RO, GR, UAE, TUR, DE	RO, DE, GR, PL, NL	GR, FR, RO, DE, TUR	PL, DE, ES, RO, NL	
Romania (RO)	60605	10,5	1976 (3,3%)	827 (1,4%)	3567 (5,9%)	IT, BG, DE, H, UK	DE, PL, H, Brazil, IT	GR, Jordan, IT, BG, H	DE, H, PL, NL, ES	
Hungary (H)	100297	8,4	3416 (3,4%)	1837 (1,8%)	3166 (3,2%)	DE, RO, PL, A, CZ	DE, PL, SK, A, NL	RO, IT, A, DE, Japan	DE, PL, SK, A, NL	
Sweden (SE)	140134	5,6	1509 (2,5%)	4077 (2,9%)	2278 (1,1%)	NO, F, DK, US, DE	DE, DK, NL, FR, IT	PL, FR, UK, ES, P	NO, DK, DE, NL, F	
Czech republic (CZ)	157194	5,2	3981 (2,5%)	1583 (1%)	2649 (1,7%)	SK, DE, IT, PL, H	DE, PL, SK, NL, IT	SK, DE, PL, IT, A	DE, PL, SK, NL, ES	
Slovakia (SK)	75051	4,1	1226 (1,2%)	682 (0,9%)	1195 (1,6%)	CZ, H, PL, A, DE	CZ, PL, DE, H, A	CZ, H, PL, DE, IT	CZ, PL, DE, H, Brazil	
Finland (F)	59682	2,5	534 (1%)	606 (0,9%)	344 (0,6%)	SE, Russia, EST, NO, DK	DE, SE, NL, FR, DK	SE, FR, NL, ESR, China	DE, DK, NO, SE, NL	

Mainly in Poland but also in Hungary the agricultural land ownership during communistic times was majorly private (about 80%), while the remaining 20% of the agricultural land belonged to the states. This was not the case for Czech Republic and Slovakia, where it was largely state-owned.

**Observed changes in the agrarian structure are the result of an economic obligation to improve management effectiveness, an increase in work efficiency, principles of operating in a market economy, and direct support of agricultural income.**

#### 4.2.2 Trade

Overview of the data regarding international trade of agri-food products for the selected Member States in EU is presented in the Table 1.

Generally, the share of the agri- food sector in the total export of the CEE countries is higher than in the Western Europe countries (2,5% in Finland and 5.6% in Sweden); with the exception of The Netherlands (18.4%).

Among the CEE countries Poland, Bulgaria and Romania, Hungary have the highest share of the agri-food products in the total exports of the country (13.2%, 10,7%, 10,5%, 8,7% respectively). Poland is followed by Hungary with regard to animal trade, while by Czech Republic considering trade of food products.

It can be observed that CEE countries tend to trade animals and food products more actively between each other, rather than Western European countries do, with exception of Poland, mainly due to strong meat poultry sector.

#### 4.2.3 Employment in the agriculture

After the year 2004, many important changes took place on the labour market within EU. Many workers from the new Member States were able to work in the Western Europe, while innovation and investment in the agricultural infrastructure allowed to increase farms' efficiency and productivity.

- employment in the agricultural sector fell in all Member States. In general, the largest decreases were found among the New Member States (12): Estonia (-55%), Bulgaria (-48%) and Slovakia (-43%) or Romania (-41%), whereas in Poland only 11%, whereas among Western Europe Member States with the highest employment in the agricultural sector, employment fell by 16% in Italy and by 17% in Spain
- real agricultural income per worker rose in 17 Member States and fell in ten. The highest increases were found in Latvia (+140%), Estonia (+131%), Poland (+107%), the United Kingdom (+71%), and the largest decreases in Denmark (-46%), Italy (-36%), Ireland (-30%).

The average number of people working in agriculture in the EU-28 was little below 6%. In the CEE, compared to the Western Europe, the proportion of workers employed in agriculture was higher. For example in Poland it was nearly double to EU-28 average (11,2%) (Fig. 4).

In Slovakia employment in the agriculture, which was high at the beginning of nineties (12% of economically active population), later decreased sharply and represented 3.5 % of economi-

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<sup>33</sup> World Integrated Trade Solution, (2015); <http://wits.worldbank.org/CountryProfile/en/Country/POL/Year/2015/Summarytext>

cally active population. In Czech Republic, the average registered number of employees in agriculture represented 2.7% of the total workforce, Whereas in Hungary in 2016, employees in agriculture was reported as 4.6% of the working population (Fig. 4).

The member states of the CEE agree that the European Union's Common Agricultural Policy should ensure the livelihood of agricultural workers and encourage them to increase their productivity, and that all Member States should be treated equally<sup>34</sup>.

**Fig 4. European countries by employment in agriculture (% of employed)**<sup>35</sup>



#### 4.2.4. Livestock production trends in CCE countries<sup>36</sup>

The situation in the whole EU with regard to livestock production over last years has affected strongly situation in the CEE countries, as shown by some examples below:

##### **Further expansion of EU milk production to be expected in 2017 and 2018.**

In 2016, cattle herd levels grew marginally for the EU as a whole, but there was a great deal of fluctuation within several EU Member States due to the abolishment of the EU milk quota this year. In 2016, EU milk deliveries have increased by 0.4% compared to 2015 while in Poland by 2.4%. By contrast, milk collection declined strongly in the UK (-4.3%), France (-2.5%), Belgium, Portugal and Slovakia.

##### **Poultry: expansion of EU production pushes domestic prices downward.**

Poland occupies the first place in terms of meat poultry production and contributed about 15 % to EU-28 production of poultry meat in 2015, reaching production of 2.5 million tonnes. Investments in broiler production in Poland have been significant in recent years and farmers keep on producing to cover at least their fixed costs.

## Pork

Improved profitability is expected to sustain EU pork supplies through 2017. Given the saturated domestic market, EU producers are active in opening new markets.

Poland is a 4th largest pork producer in the EU. Pork meat dominates Poland's meat market and shows increasing tendency with an average Pole estimated to consume about 39.5 kg of pork meat per year, according to the Institute of Agricultural and Food Economics (IERiGZ). On the one hand Polish exports of fresh and frozen pork recorded a 5% increase in the first quarter of 2016 (shipments to Germany, the United States and Hong Kong grew significantly (by 28%, 34% and 55% respectively), however Polish domestic production has recorded a decline over recent years, so to support growing export volumes Poland has been importing a significant number of finishers from other member states (from Germany and Denmark).

### EU live cattle exports continue to rise.

In 2016, EU cattle net production reached 7.9 million t, an increase of 2.3% year on year, both in the EU-15 (+1.9% or 128 000 t) and the EU-N13 (+5.9% or 50 000 t). The rise in EU production comes mainly from herd destocking in the dairy sector and a higher slaughtering rate of female animals — cows (+7% in heads and 6% in volume) and heifers (+6% in heads and 5% in volume).

## 4.2.5. Health and welfare

There are still many challenges with regard to livestock health and welfare in the CEE countries. Developed countries (for example in Western Europe) tend to<sup>37</sup>:

- have more financial resources and infrastructure than developing countries to support improvements in animal welfare (including improvements to housing, feeding systems, and transportation; addressing problems such as drought, cold, and predators; and strengthening animal welfare research programs)
- have a greater number of veterinarians and animal production specialists, more developed industries for vaccine and animal health supplies, and enhanced education and industry awareness regarding animal welfare

Less developed countries (including CEE countries) often face significant challenges with regard to resources, knowledge, research, and awareness around animal welfare. According to OIE<sup>38</sup>: “many countries of Central and Eastern Europe face major challenges even with effective implementation of quality veterinary services.

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<sup>34</sup> <http://www.due.hu>

<sup>35</sup> “Employment in agriculture (% of total employment)”. The World Bank. Retrieved 9 August 2016.

<sup>36</sup> Directorate-General for Agriculture and Rural Development – Short term Outlook – N°17 [http://ec.europa.eu/agriculture/markets-and-prices/index\\_en.htm](http://ec.europa.eu/agriculture/markets-and-prices/index_en.htm)

<sup>37</sup> Improving Animal Welfare in Livestock Operations, International Finance Corporation, World Bank (2014), , Sprawdzona, 08/05/2017, na <http://www.ifc.org/wps/wcm/connect/67013c8046c48b889c6cbd9916182e35/IFC+Good+Practice+Note+Animal+Welfare+2014.pdf?MOD=AJPERES>

<sup>38</sup> Proposed action to support OIE Member Countries in Eastern Europe in the implementation of the OIE standards on animal health and welfare. 81st OIE General Session in May, 2013

The impact of epidemic livestock diseases such as Avian Influenza (AI), African Swine Fever (ASF), or Foot and Mouth Disease can have negative effect on farmers and the economy as a whole – in a specific country, a continent or even globally. It has been identified that both ASF and AI spread is mainly through small-scale farmers.

⇒ This is especially relevant in the Central and Eastern Europe characterised still by many extensive farms with low numbers of animals, on which control of biosecurity measures is difficult.

Opportunities to increase sustainability of the CCE countries through better animal health and welfare come mainly from the implementation of the innovative and efficient production methods<sup>39</sup>.

#### **Improving husbandry conditions**

- development of housing systems with finely monitored ambient conditions and offering possibilities for the animal to explore their environment (growing pigs, poultry).
- understanding of the diet and nutrition effect on the social behaviour of animals is an issue in various systems
- development of sensor-based systems for automated welfare assessment and customised management that provides each animal (or group of animals) with its requirements at the right times

#### **Breeding to improve animal welfare**

- development of improved tools to identify important welfare phenotypes, and to identify DNA markers that would facilitate incorporation of welfare traits into genomic selection breeding programmes
- integrative genomics/genetics and breeding approaches that reveal genes and molecular mechanisms that reduce stress and improve welfare

#### **Reducing stress and pain**

- development of the alternative strategies based on environmental enrichment, genetic selection to raise animals without mutilation practices (surgical castration, debeaking, tail docking) and reducing stress and pain during transport and at slaughter.

#### **Monitoring of progress of animal welfare at policy level in EU Member States**

- to confirm that corporate and farming efforts are having the desired effects at food chain, farm and animal levels, and also to improve transparency
- design of new support policies and the development of overarching advisory tools for farmers and politics combining welfare, productivity, environmental performance and possible win-win situations

### **4.2.6. Fluctuations of prices**

Farmers are often confronted with substantial changes in the prices they receive for the sale of their agricultural products, which causes financial uncertainty about their incomes. Commonly referred to as ‘price volatility’, this phenomenon is more evident in agriculture than in other economic sectors due to a variety of economic, natural and political factors.

For example in Poland in 2014, price were reduced of cattle by 3.8%, swine by 10.6%, poultry by 3.3%, egg prices remained the same, and milk prices increased by 1.1%.

⇒ The Common Agricultural Policy (CAP) for the 2014–2020 period is mainly aimed at

compensating farmers for the negative effects of price volatility and at tackling income volatility, rather than directly addressing price volatility itself.

#### 4.2.7. Payments

European aid programmes have in the last 10 years become an impulse for changes in agriculture in rural areas and in fishery in the Central and Eastern Europe. Thanks to the modernization of their farms, farmers can effectively compete on the domestic and EU market with farmers from other states. Integration with the EU brought about a growth in the income of farmers. Also, the economic competitiveness of rural areas has increased, which consists of not only agricultural production, but also tourism, services, trade, craft and small companies.

**New member states have been getting only a part of funding from the EU money and it has been “topped up” by the individual payments from the national sources.**

⇒ While proportion of the support from the EU CAP budget has been rising increasingly since 2004, top up payments still do not make for the whole difference between EU funding and the level of support farmers would be eligible for (they could theoretically get the same support as their counterparts in old member states).

**In the years 2015-2020 all member states have introduced a new system of direct payments, which is expected to equalize the level of payments for the EU Members from the Central and Eastern Europe.**

#### 4.2.8. Investments and technology

While there are already some strategies in place to enhance research and innovation in Central and Eastern Europe, those countries remain low in number of patents per capita (Czech Republic: 20 and Poland: 15 patent applications per 1 million of citizens, compared to Switzerland with 873 applications per million inhabitants, the Netherlands (419) and Sweden (392), followed by Finland (365) and Denmark (346))<sup>40</sup>.

⇒ **Research infrastructures** needs improvement, both physical and virtual, for efficiency of delivery and to ensure that European resources are up-to-date and fit for foreseeable purposes. Infrastructures should be further developed to facilitate not only enabling research but also innovation, linking research experimental farms, commercial experimental farms, demonstration farms and innovative commercial farms and for harmonisation of ethical aspects for research on animals through Europe.

⇒ **Technical infrastructure** is an important factor in the development of rural areas, affecting both the quality of life of the inhabitants, as well as the possibilities of investing in these areas. New technologies helped to improve the quality of conducted agro-technical procedures, and

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<sup>39</sup> A strategic research and innovation agenda for a sustainable livestock sector in Europe, White Paper, ATF, 2017.

<sup>40</sup> Eurostat, 2016

quality and safety of the farming products. In Central and Eastern Europe investment projects are mostly undertaken by big and economically strong farms. Most of them relate to purchase of machinery, not to constructing buildings used for agricultural production. The number of investing farms can be estimated at 200,000-250,000 in the nearest future<sup>41</sup>.

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<sup>41</sup> Wigier, M. Changes in the Polish agriculture in the light of the CAP implementation. DOI: 10.5604/00441600.1151760