



**Food and Agriculture
Organization of the
United Nations**

TECHNICAL REPORT

**OVERVIEWS OF FOOD SYSTEMS AND
AGRO-INDUSTRY, VALUE CHAINS,
AND FOOD LOSS AND WASTE
IN THE COUNTRIES OF
EASTERN EUROPE AND CENTRAL ASIA**

Technical Report

**Overviews of food systems and agro-
industry, value chains, and food loss and
waste in the countries of Eastern Europe
and Central Asia**

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Food and Agriculture Organization of the United Nations
Budapest, 2018

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Contents

INTRODUCTION	1
BALKAN COUNTRIES	2
Albania	2
Bosnia and Herzegovina	5
The former Yugoslav Republic of Macedonia	9
Montenegro	13
Serbia	17
EASTERN EUROPE	21
Belarus	21
Relevant activities and programmes in agriculture sector development.....	22
The Republic of Moldova	24
Ukraine	28
TURKEY AND CAUCASUS	32
Armenia.....	32
Azerbaijan	36
Georgia	40
Turkey	45
CENTRAL ASIA	49
Kazakhstan	49
Kyrgyzstan	53
Tajikistan	57
Turkmenistan	61
Uzbekistan	64
CONCLUDING REMARKS	67

Abstract

Many countries in the region have seen positive changes in agricultural development in recent years associated with countries' reforms during the transition period after the Soviet Union collapse, as well as due to support from international organizations. This report overviews eighteen countries in Eastern Europe and Central Asia. The report examines agriculture sectors and food systems, relevant programmes, it reveals the status of agro-processing sector and value chain development activities, and it covers food loss and waste. In the final analysis it was concluded, that more research and data collection are needed to understand the extent of food loss and waste at regional and national levels. It is recommended to update the regional agro-industry briefs that were compiled by FAO in 2014, and to supplement the briefs with the information on value chain development and food waste and loss. The report encourages better dissemination and sharing of results from partner organizations' work on value chains, post-harvest handling, agro-processing and particularly food loss and waste activities.

The report highlights that food loss and waste in the Europe and Central Asia region is not addressed in a uniform way. The report recommends to conduct more farmers' trainings in harvesting techniques and improving access to infrastructure and markets (especially for smallholders). Companies and service providers in cold value chains should be supported in handling and increasing capacities. One of the highlighted challenges is a matter of connecting rural producers with logistics centres. Better integration of smallholder farmers into value chains is needed. Improving the enabling environment is crucial and will depend on enhancing the capacity of supporting institutions, including better understandings of current situations and challenges in order to provide countries and relevant stakeholders with solutions on improving effectiveness of value chains, including measures to reduce food loss and waste at all stages of the value chain.

INTRODUCTION

Many countries in the region have seen positive changes in agricultural development in recent years. By and large, this has happened due to countries' reforms during the transition period after the Soviet Union break-up, as well as due to support from international organizations towards programmes and activities that enhance the capacity of relevant institutions to focus on smallholder farmers' incomes, improve food security, diversify the agriculture sector, and provide support to small and medium enterprises.

With the growing interest among investors in the region, some countries have managed to secure foreign investments in the agro-industry sector. Efforts to improve countries' access to export markets have brought positive developments in food-quality standards that require innovations in the processing sector, infrastructure and enabling environment. High-value products, including organic produce, and added-value products are becoming of interest and are being supported in some countries in a targeted way (e.g. the wine and cheese sectors).

Fragmentation of land holdings remains a challenge in some countries in the region (e.g. Azerbaijan, Georgia, Moldova and Armenia). The setting up of cooperatives and the consolidation of land are being promoted to address this issue. However, the significant role of the state in the agriculture sector leaves few opportunities for privately owned small and medium enterprises in some countries (e.g. Belarus and Turkmenistan). Across the region, a significant share of agricultural products is not traded on the market. Home processing of some products is also still prevailing.

Within the past five to ten years, a lot of programmes and projects in the region were focused on the development of agricultural value chains, in particular integrating smallholder farmers into value chains. Such activities are largely supported by international non-governmental organizations, with collaboration and funding from intergovernmental agencies and organizations, such as the Food and Agriculture Organization of the United Nations (FAO), the European Bank for Reconstruction and Development, the World Bank, and more.

There is limited information available on the extent of food loss and waste in the region and on post-harvest losses, more specifically. While certain aspects tend to be covered within the training programmes of development projects (assuming the trainings on best agricultural practices in production are part of these programmes), they often are not specifically described or mentioned in project documents and reports. FAO has supported research activities on the extent of food loss and waste in the region, including some country reports in 2013–2014. This information needs to be updated and studied in more detail.

Depending on the country (but also overall across the region), the agro-processing industry has seen positive growth in development. Not all countries are very effective in attracting foreign or national investments in the sector, but country priorities and FAO Country Programming Framework documents for countries' development indicate that these sectors are growing and that agribusiness competitiveness is one of the focus areas in many countries of Eastern Europe and Central Asia.

BALKAN COUNTRIES

Albania

Overview of the agriculture sector and food systems in Albania

Albania is an upper-middle-income country in southeastern Europe. Despite its mild climate, abundant water resources and fertile land, the agriculture sector remains underdeveloped due to the highly fragmented nature of the land and to the high share of small farms that have limited mechanization. According to information from export.gov, which is run by the United States of America's Department of Commerce, the main subsectors in Albania are meat, grains, cereals, animal feed, dry fruits and sugar.¹

The government plans on boosting the agriculture sector, which is responsible for about 20 percent of the national gross domestic product. In 2016, exports of agricultural products made up 10 percent of country's total exports. The government hopes to encourage agricultural production by providing financial support to farmers and by facilitating private investment in the agro-processing sector. Over the past six years, it has allocated an average of USD 10 million annually to develop fruit and olive orchards, vineyards, greenhouses and crop storage facilities. The agriculture sector also has opportunities for the production of high-value cash crops.

The last agro-industry brief for Albania, prepared by FAO in 2014, summarized some of the remaining challenges in the agriculture sector. These include insufficient investment in research and development, competition from imported products, difficulties in ensuring safety and product quality, lack of appropriate facilities (e.g. storage, renovation technologies, processing lines, packaging, logistics and delivery), and inconsistent flow of information between actors in the food supply chain. External factors include the potential for financial crises.

Stakeholders engaged in agriculture and value chain development

Public and private stakeholders are active in agriculture sector development. Among public agencies, the Ministry of Agriculture, Rural Development and Water Management; the Agrarian and Rural Development Agency; and the Association and Business Management Center are supporting development of the agriculture sector. Other institutions, such as the Albanian Centre for Competitiveness and International Trade, are also promoting activities that encourage growth in the sector. Several international donors and implementing organizations are supporting programmes dedicated to improving agricultural competitiveness. Programme activities through the European Union's Instrument for Pre-accession Assistance for Rural Development (IPARD) were conducted in the country during the period of 2008–2014, boosting an estimated EUR 95 million (approximately USD 114 million as of December 2014) in investments into the agriculture sector through 2020. The United States Agency for International Development (USAID) is supporting agribusiness reforms and regulations in Albania.² DAI, with USAID funding, ran a programme under the economic growth framework aimed at increasing productivity and

¹ U.S. Commercial Service. 2017. *Albania - Agricultural Sector* [online]. <https://www.export.gov/article?id=Albania-Agricultural-Sector>

² USAID. 2011. Albania Country Development Cooperation Strategy. https://www.usaid.gov/sites/default/files/documents/1863/CDCS_USAID_Albania.pdf

improving quality and market access.³ The Agricultural University of Tirana performs research activities on agricultural topics along with several other institutions, such as the International Centre for Advanced Mediterranean Agronomic Studies.

Relevant activities and programmes in agriculture sector development

FAO's support of the agriculture sector in Albania has following priorities: conservation and management of natural resources; disaster risk management and climate change adaptation; capacity development and policy support for gender equality and women's empowerment in Albanian agriculture; and alignment of agriculture and rural development policies with European Union standards to advance the process of the country's accession to the European Union. USAID has supported the development of the olive oil and citrus value chains. The World Bank is supporting a project dedicated to water resources and irrigation, helping municipalities restore the productive value of agricultural land and improve irrigation performance.

Overview of the main crop and livestock subsectors

Leading subsectors among crop and livestock products include grains, cereals, meat, and dried fruits, according to export.gov.

Albania has a structural deficit of its major agricultural commodities, which include cereals, fruits, oilseeds, poultry meat and sugar. These sectors are typically organized through traditional family farming systems, and in some cases the products require extensive processing.

The main vegetable crops cultivated in Albania include tomatoes, cucumber, melon, pepper, eggplants, carrots, onion, garlic, spinach and lettuce. Tomatoes, cucumbers and peppers are Albania's economically most important crops.⁴ In 2016, the country's agricultural exports were composed of plants and parts of plants (USD 30 million in value), tomatoes (USD 26 million), nuts (USD 9 million), as well as other fresh and frozen vegetables (USD 7 million).

Domestic production of beef and poultry has been growing. Livestock production accounts for about a half of total production in the sector, followed by plant crop production and fruit production (10 percent). Fruit and livestock production have had the highest growth. A study on the potential for diversification conducted by USAID (2011) identified that small-scale processing and marketing of milk, olive oil and wine had – along with rural tourism – the highest potential for growth.⁵

Status of agro-processing sector development

The largest production increases were in enterprises producing tinned fruits and vegetables, refined oils, dairy products, bread, sweets, biscuits and wine. Only a small volume of agricultural raw materials is sold to agro-processors, many of whom prefer to use higher-quality imported raw

³ DAI. *Albania—Albanian Agriculture Competitiveness (AAC) Program*. [online]. <https://www.dai.com/our-work/projects/albania-albanian-agriculture-competitiveness-aac-program>

⁴ USAID. *Commodity Development Plan: Fresh Vegetables*. [online]. http://pdf.usaid.gov/pdf_docs/PA00JN5G.pdf

⁵ https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2011/pot-diversif-albania-montenegro/full-text_en.pdf

materials with reliable supply chains and a sufficient volume of products. This includes vegetable oil for bottling, grapes for wine production and meat and vegetables for tinning.

There are some challenges that need to be overcome to improve agricultural productivity and develop the sector.⁶ There is a need for developing cooperation between producers and business sectors; marketing of products for export and facilities to store, process and pack products; and the development of irrigation and drainage systems and farming and processing technology. If the agrifood processors don't comply with safety standards, they cannot reach foreign markets, particularly those in the European Union. It was estimated that just 30 percent of Albanian livestock and crop production is currently sold through official market channels.⁷

Value chain development activities

Value chain development activities have been supported by FAO, USAID and several smaller projects, focusing on olive oil, citrus fruit, meat and vegetable production.

Food loss and waste

While some government priorities (such as improving technologies and knowledge along the food chain, food safety, controls and certification) might indirectly contribute to a reduction of food loss and waste along the value chain, there hasn't been any assessment or a targeted approach dedicated to understanding the extent of the issue and formulating country-specific solutions.

⁶ GAIN report. 2015. *Doing business in Albania*.
https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Doing%20Business%20in%20Albania%20Exporter%20Guide%202015_Rome_Albania_4-13-2015.pdf

⁷ FAO. 2014. *Agro-Industry Brief for Albania*.

Bosnia and Herzegovina

Overview of the agriculture sector and food systems in Bosnia and Herzegovina

Bosnia and Herzegovina is an upper-middle-income country in southeastern Europe with a potential for joining the European Union. Agricultural land occupies over 40 percent of the territory, with almost 20 percent being used for arable crops. The moderate continental climate allows for the cultivation of a variety of crops (fruit, vegetables and grapes) and the rearing of livestock. Many family farms are still using traditional farming techniques. Fisheries and dairies are also an important part of the agriculture sector in the country and have good growth prospects.

Overall, agriculture sector is responsible for almost 8 percent of the country's gross domestic product. According to the World Trade Organization, in 2016 Bosnia and Herzegovina exported 15.6 percent of its agricultural products.⁸ Sunflower seed (with a value of USD 73 million), bovine meat (USD 29 million), raw hides and skins of bovine (USD 48 million), and fruit and nuts (USD 36 million) were among the largest agricultural commodity export groups.

According to the World Bank, the key economic challenge for Bosnia and Herzegovina is the imbalance of its economic model: public policies and incentives are skewed toward the public rather than the private sector, toward consumption rather than investment, and toward imports rather than exports.

Export.gov, which is run by the United States of America's Department of Commerce, also notes that the absence of a single economic space in Bosnia and Herzegovina impedes companies' ability to operate in the entire country. Its complex political environment and government structure are among the obstacles to economic development.

Stakeholders engaged in agriculture and value chain development

State actors supporting the development of the agriculture sector in Bosnia and Herzegovina include three common national-level food institutions: the State Veterinary Office, the Plant Health Administration, and the Food Safety Agency. There is no a state-level ministry of agriculture, and therefore the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina has taken the lead in food safety, and it coordinates the implementation of agricultural and forest projects in the country. The Federal Ministry of Agriculture, Water Management and Forestry and the Ministry of Agriculture, Forestry and Water Management of Republika Srpska are responsible state bodies for agriculture and food industry development in the Federation of Bosnia and Herzegovina and Republika Srpska.

The source of funding of the Agriculture Support Program is the allocation of BAM 55 million (approximately USD 38 million in 2010) provided for agricultural subsidies within the budget of Bosnia and Herzegovina in 2010. In cooperation with the Development Bank of Bosnia and Herzegovina, the Federal Ministry of Agriculture, Water Management and Forestry established a credit line for the financing of agricultural investment projects in order to support crop and vegetable production, livestock production, the establishment of glasshouses and greenhouses,

⁸ WTO. 2016. Bosnia and Herzegovina Trade Profile.

and processing capacities (packaging, sorting, finishing and processing of fruit, vegetables, milk and fish, and cool storage facilities for fruit and vegetables).

Financed under the European Union's Instrument for Pre-accession Assistance for Rural Development (IPARD), a number of subsector analyses have been conducted during the 2012–2015 period examining the status and potential for growth of the agriculture sector.

Relevant activities and programmes in agriculture sector development

FAO assistance in Bosnia and Herzegovina is currently shaped by five priority areas: policy assistance in institutional capacity building in the process of accession to the European Union; improved quality and safety of food at all stages of the food chain; sustainable management of forests and trees; integration of family farms into value chains for sustainable improvements in smallholder livelihoods and rural development; and enhancement of disaster risk reduction and management for resilient livelihoods.⁹ Currently, FAO is supporting the project “Immortelle plant production and processing, export prospects and investment opportunities (2017-2018)” as well as Revitalization of Agricultural Promotion Centre in Sokolac (2017). In 2012–2016, USAID supported a country development cooperation strategy consisting of programmes to improve the productivity of environmentally sustainable commercial agricultural production and food processing and to obtaining European Union quality requirements and exports.¹⁰

Overview of the main crop and livestock subsectors

The main agricultural products in Bosnia and Herzegovina are wheat, corn, fruits, vegetables and livestock.

Cereals are produced in Bosnia and Herzegovina on most types of farms: subsistence and semi-subsistence farms, commercial family farms and corporate farms. The precise number of farms with cereals is not known from official statistics.¹¹ The processing of cereals includes primary processing of cereals into flour of different types and secondary processing into fresh bread and various types of baked products, cakes, etc.

The horticulture sector is the most significant sector for agricultural production in Bosnia and Herzegovina.¹² One of the main challenges of Bosnia and Herzegovina's fruit and vegetable sector is the duality of the production structure: the majority of producers grow less than four hectares; a smaller portion grow up to 10 hectares, and there also are a few sizeable corporate or large family farms. Medium-scale producers, who would be the main drivers of sector's development and would positively affect the supply chain and rural development, are missing or very much under-represented. The smaller holdings are usually using obsolete equipment, and they limit their expenditure in inputs by using lower-quality seedlings and seed they've produced themselves. Overall, they generate lesser added value.

⁹ FAO. 2015. *Bosnia and Herzegovina and FAO: Partnering for sustainable agricultural and rural development*. <http://www.fao.org/3/a-ax463e.pdf>

¹⁰ USAID. 2012. *USAID/Bosnia and Herzegovina Country Development Cooperation Strategy 2012–2016*. https://www.usaid.gov/sites/default/files/documents/1863/BosniaCDCS_0.pdf

¹¹ FAO. 2012. *The cereals sector in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au062e.pdf>

¹² FAO. 2012. *The fruit and vegetable sector in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au063e.pdf>

The Bosnia and Herzegovina Agency of Statistics estimates that the number of households and farms producing grapes primarily for wine production is around 11 000.¹³ There is a need to modernize the registered winery sector. Investments are needed to modernize the capacity of existing wineries and to support investments in new wineries, if relevant.

There are only a few honey processors, and it is estimated that less than 30 percent of the total honey production in Bosnia and Herzegovina is sold through official channels and to honey processors. Beekeepers mainly sell their products on green markets, to their relatives and neighbours, and from door to door. From other studies it is known that the prime reasons for selling through unofficial channels are that the beekeepers are able to sell everything they produce and because they can sell at higher prices when selling in smaller quantities.

In Bosnia and Herzegovina, mushroom-processing facilities (e.g. drying facilities) and mushroom produce are mutually dependent and constitute an inseparable production structure.¹⁴ There is a need to update facilities that were not originally designed for mushroom growing and do not conform with food safety standards.

The livestock sector of Bosnia and Herzegovina is dominated by a large number of very small holdings.¹⁵ Over 300 000 agricultural holdings keep some kind of livestock, and livestock makes a significant contribution to their household income. Milk collection is quite diverse, including collecting centres and middlemen as well as direct collection by dairies, and some raw milk is not yet being cooled during collection.

The Fishery and Aquaculture sector in Bosnia and Herzegovina includes artisanal and recreational fisheries on marine and inland waters.¹⁶ The latter is exclusively associated with angling (sport fishing). The main types of aquaculture production systems are pond, tank and cage cultures. In addition to fish culture systems, some enterprises also produce molluscs. Bosnia and Herzegovina is rich in high-quality water resources. In addition to the huge and dense web of rivers, the country has many natural and artificial lakes. All natural waters in Bosnia and Herzegovina are under state or entity ownership, although ownership rights can be given or leased to public and private organizations. At present, no sufficient reliable data is available about ownership structures for inland waters.

Status of agro-processing sector development

According to the 2014 Agro-Industry Brief for Bosnia and Herzegovina prepared by FAO, the agrifood processing industry is recovering after a period of under-investment over the last decade. The domestic retail market, however, is still underdeveloped. The food processing industry in the country includes companies engaged in the manufacturing or processing of food and beverages for human consumption, including meat, milk, fruit, vegetables, sugar, oil and tobacco, as well as prepared feeds for animals and fowl.

Weaknesses identified via SWOT analysis (according to the FAO economic diversification report) based on workshops, case studies, interviews and a survey can be described as follows:¹⁷ The agro-processing and primary production sectors have small and fragmented holdings; and value chains

¹³ FAO. 2015. *The Wine sector in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au065e.pdf>

¹⁴ FAO. 2012. *Analysis of Economic diversification in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au061e.pdf>

¹⁵ FAO. 2012. *The meat and dairy sector in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au064e.pdf>

¹⁶ FAO. 2015. *The fisheries and aquaculture in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au016e.pdf>

¹⁷ FAO. 2012. *Analysis of economic diversification in Bosnia and Herzegovina*. <http://www.fao.org/3/a-au061e.pdf>

can be characterized by poor cooperation between producers and farmers associations, unregulated markets, difficulties with access to funding for the farmers, demographic factors (a relatively large proportion of older people), poor infrastructure (especially rural roads), a lack of education and marketing skills among farmers, a lack of entrepreneurial spirit, depopulation/migration, and an insufficient involvement of women in business activities in rural areas.

Value chain development activities

Value chain development activities (including analysis and project implementation) have been focusing on fruit and vegetable subsectors so far. Oxfam has supported raspberry value chain development aimed at helping the poor. The mushrooms and herb value chains and overall rural development have been supported within USAID's projects.

Food loss and waste

Several studies have looked at certain food loss and waste issues. Main reasons for post-harvest losses in Bosnia and Herzegovina are: inadequate harvest time for fruits and vegetables (early or late harvest), improper harvesting (damage during harvesting), poor handling, lack of hygiene in packaging (wooden pallets are not disinfected), and inadequate storage after harvesting.¹⁸ An additional problem is that Bosnia and Herzegovina doesn't have classic packing centres that collect large amounts of fresh fruits and vegetables or that store, calibrate, process and package the produce for the local or export markets. Also, the producers need to be adequately trained and equipped to avoid post-harvest losses.

¹⁸ US State Department. 2013. *Postharvest Loss Challenges Discussion Paper*. <https://2009-2017.state.gov/documents/organization/220958.pdf>

The former Yugoslav Republic of Macedonia

Overview of the agriculture sector and food systems in the former Yugoslav Republic of Macedonia

The former Yugoslav Republic of Macedonia is an upper-middle-income, land-locked country in southeastern Europe. The country is predominantly mountainous, with 80 percent of its territory consisting of hills and mountains and an average terrain elevation of about 850 meters above sea level. Agriculture contributes more than 8 percent of the country's gross domestic product. Wine, cereals, fruits and vegetables are among the main agricultural commodities.

The agriculture sector plays an important role in the Macedonian economy. It can be characterized by highly fragmented agricultural holdings. About half of all agricultural land in the country is pasture and about 40 percent is arable land, with the rest being land under permanent crops and meadows. The largest share of agricultural output is produced by agricultural holdings with mixed crop-livestock production (21.4 percent of all enterprises), while small producers specialize in certain crops (e.g. cereals and industrial crops).¹⁹

Exports of agriculture and food products in 2016 constituted 12.25 percent of Macedonia's total exports. The top markets for agriculture and food products are the European Union and Western Balkan Countries (Serbia, Kosovo, Albania, and Bosnia and Herzegovina). In 2016, the main export products from Macedonia were apples, pears and quinces (USD 24 million in value), other vegetables (USD 27 million), bread and pastries (USD 61 million), and wine from fresh grapes (USD 53 million).

According to export.gov, which is run by the United States of America's Department of Commerce, some of the challenges that the country still faces and that can affect economic growth include weak rule of law and corruption, political interference in the economy (including in the legislation), and a need for improvements in transport infrastructure, among others.

Stakeholders engaged in agriculture and value chain development

The main state bodies related to agriculture and agro-industry support and control in the former Yugoslav Republic of Macedonia are the Ministry of Agriculture, Forestry and Water Economy and the Ministry of Economy, which is responsible for creating and implementing documents and programmes regarding economic policy, industrial policy, small and medium enterprise competitiveness, and innovation enhancement. Other supporting institutions include the Agency for Financial Support for Agriculture and Rural development and the Agency of Foreign Investment and Export Promotion. Further stakeholders include international donors and implementing institutions, such as the World Bank, FAO and USAID, among others. The European Union's Instrument for Pre-Accession Assistance has been supporting agriculture sector development since 2007.

¹⁹ IPARD. 2014. *Rural Development Programme for Macedonia, 2014–2020*.
http://www.sep.gov.mk/data/file/IPA-2014-2020/IPARD%20ProgrammeMK_13022015_final.pdf

Relevant activities and programmes in agriculture sector development

The key priority areas of FAO's cooperation with the former Yugoslav Republic of Macedonia are: rural development, with a focus on enhancing capacity for the design and implementation of rural development programmes harmonized with European Union standards; agricultural competitiveness, defining public sector roles and supporting interventions to assist the private sector in performing successfully in the market; modernizing forest resource management; and biosecurity. The World Bank is implementing an education programme in the country.

The Instrument for Pre-Accession Assistance in Rural Development has supported multifaceted development of the agriculture sector in the country, including value chain development during the 2007–2013²⁰ and 2014–2020²¹ periods supporting investments in agricultural holdings, the development of producer groups, investments in processing and marketing, improvements in the diversification of the sector in rural areas and in rural infrastructure, and the provision of trainings and advisory services.

Overview of the main crop and livestock subsectors

Crop production contributes more to the gross domestic product than the livestock subsectors, largely due to the high production of perennial crops (fruit and wine grapes). Nearly half of the arable land area in 2013 was used for the production of cereals, and the remaining half was cultivated for vegetables, industrial crops, and fodder production. Around 1 000 ha are used for protected crop production under greenhouses.

Cereals are strategically important and are the most-grown crops, but the country does not produce enough to meet the domestic need. The former Yugoslav Republic of Macedonia imports a lot of grains (one-third of the wheat needed). There is insufficient domestic production of corn. The recent trend of the reduction in area of cereal crops is mainly a result of the reduction of the market price and of direct state support (price guarantee for wheat and premium for every kilogram of produced grains).

Vegetable production is export-oriented. Almost 80 percent of the vegetable production is exported either as fresh, preserved or processed vegetables. The production of vegetable crops is concentrated in the southern and eastern parts of the country, due to the favourable climate. Over 75 percent of production is in open fields, while 20 percent is in plastic tunnels and the rest in glass greenhouses. The top five vegetable crops are potatoes, peppers, tomatoes, cabbage and melons.

Although the country exports much of its wine in bulk, an emerging number of smaller private wineries are starting to export quality bottled wine. Over 80 percent of domestic wine production is exported, mainly to the European Union, former Yugoslav countries, China, Canada, Japan and the United States of America.

The former Yugoslav Republic of Macedonia has insufficient meat production, and the number of farm animals is dropping yearly. The country satisfies over 50 percent of its meat consumption through imports. The poultry industry is focused on egg production. There is a surplus of eggs, but poultry meat production is insufficient to satisfy the local fresh meat market. The domestic

²⁰ IPARD. 2013. *Agriculture and Rural Development Programme for Macedonia, 2007–2013*. https://ec.europa.eu/agriculture/sites/agriculture/files/enlargement/countries/kyrom/ipard_en.pdf

²¹ IPARD. 2014. *Rural Development Programme for Macedonia, 2014–2020*. http://www.sep.gov.mk/data/file/IPA-2014-2020/IPARD%20ProgrammeMK_13022015_final.pdf

pork industry satisfies 90 percent of the market for fresh meat, but the processing industry imports almost 100 percent of its needed quantities. There is a significant lack of beef, as most of the cattle are dairy cows. The findings of a study from 2015 indicate a need for structural change in the dairy industry as smallholders tend to sell to small processors, and large farmers more often sell to large ones.²²

Status of agro-processing sector development

The food and beverage industry performance has not been stable over time in terms of output and investments, but it has been stable in employment share. Important subsectors include dairy, meat, fruits, vegetables, and wine processing. Food and beverage processing are significant industries in the country, along with fresh fruits and vegetables. Processed foods include both semi-finished products (including frozen, dried and concentrate) and finished products (canned and preserved). Most of the food-processing facilities are in private hands.²³ Overall, the agribusiness sector has been growing fast in recent years.

The fruit and vegetable processing industry in the country consists of 50 companies with a processing capacity of approximately 120 000 tonnes of vegetables and fruits per year. Of these companies, 91 percent process vegetables, and 9 percent process fruits. The most significant raw materials are red peppers, industrial tomatoes, sour cherries, apples and plums. There are about 85 registered dairies, which are mainly small and medium enterprises but have mostly been taken over by foreign companies, such as from Serbia and Croatia. In the former Yugoslav Republic of Macedonia, there are about 40 registered facilities for the production of meat and 77 facilities for the processing and preservation of meat.

Value chain development activities

A formulation mission for a Technical Cooperation Programme pilot project on poultry value chain development was performed in 2017 by FAO specialists John O'Connell, Zoltan Hradzsky and Giang Duong. According to a feasibility study, the Macedonian broiler industry has a minor share in the domestic market (less than 1 percent). There is potential to develop a poultry industry by utilizing experience from egg and day-old chick production. The active processing facilities have the capacity to satisfy the needs of the industry and allow it to grow gradually from its current size. The U.S. Agency for International Development has analysed and supported development of vegetable value chains – tomatoes, cabbage, cucumbers, peppers and melons – within its AgBiz Program.

²² Krstevska, A. & Nilsson, J. 2009. *Conditions for structural change in the Macedonian dairy industry – The dairy farmers' choice of processors*. https://emnet.univie.ac.at/uploads/media/Krstevska_Nilsson_01.pdf

²³ U.S. Commercial Service. 2017. *Macedonia – Agricultural Sectors* [online]. <https://www.export.gov/article?id=Macedonia-Agricultural-Sectors>

Food loss and waste

Several studies have examined various aspects of post-harvest losses in fresh produce in the former Yugoslav Republic of Macedonia,²⁴ for example in sweet onions.²⁵ This work confirms that there can be significant year-to-year differences in the storage conditions for sweet onions, which can lead to increases in physiological loss. The non-governmental organization Ajde Makedonija (www.ajdemakedonija.mk) has expressed interest in partnering on development of food loss and waste strategy.

²⁴ Thanassouloupoulos, C.C., Spyrianidou, H., Giapanoglou, E. & Karagounakis, S. 1999. *Post-harvest losses of perishable commodities caused by fungi in Macedonia.*

<http://om.ciheam.org/om/pdf/c42/CI020458.pdf>

²⁵ 2014. *Sweet onion physiological post-harvest loss in Macedonia.*

<http://www.google.com/url?sa=t&ret=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwia0tOvxorbAhUBVxQKHZZfDsIQFggyMAA&url=http%3A%2F%2Fdoisrpska.nub.rs%2Findex.php%2Fagrozanje%2Farticle%2Fdownload%2F2936%2F2808&usg=AOvVaw0b9A0fWLuVrzdvgVPu7fsS>

Montenegro

Overview of the agriculture sector and food systems in Montenegro

Montenegro is a small, upper-middle-income country in southeastern Europe with the prospect of ascending to the European Union. Its mild Mediterranean climate permits the cultivation of a variety of crops, including grapes and olive oil. The agriculture sector accounts for 8 percent of the country's gross domestic product. In 2015, agricultural commodities' share in exports was 27.5 percent, according to the World Trade Organization, with the largest exports going to the European Union and Serbia.

Rural development policy plays a very important role in the new Montenegrin agricultural policy. More than a third of its population lives in rural areas. Agricultural production has good growth potential. The sector's potential is also significant in terms of the preservation of traditional agricultural practices (e.g. cheeses) and the development of tourism. The government supports the setting up of cooperatives and the development of short value chains.

However, at present, agriculture can be characterized by rather poor productivity due to a high share of small and inefficient subsistence farms. Financing opportunities are scarce, and many farmers are still using outdated technology leading to low yields. Market infrastructure needs improvements as well as better connections among the primary agriculture producers and the processing industry links. Complying with high food safety and quality standards is critical for growing exports to European Union markets.

Further challenges are associated with low consumer income and, therefore, low levels of spending. Also providing challenges are preferences in the retail sector for buying cheaper imported products and for serving international cuisine rather than promoting local cuisine.

Stakeholders engaged in agriculture and value chain development

The main state bodies related to agriculture and agro-industry support and control in Montenegro are the Ministry of Agriculture, Forestry and Water Management and the Ministry of Economy, Department for Industry and Entrepreneurship. Other supporting institutions are of the Council for Stimulating Competitiveness; the Agency for Foreign Investments and Reconstruction of Economy; the Investment and Development Fund of Montenegro; the Agrarian Marketing Information System; and the National Council for Scientific Research Activities. The World Bank supports four operations in Montenegro; areas of support include agriculture and rural development, higher education, energy efficiency, and industrial waste management. Montenegro's Institutional Development and Agriculture Strengthening project was implemented by the Ministry of Agriculture and Rural Development and financed by the World Bank (through an International Bank for Reconstruction and Development loan and a Global Environment Facility grant). The European Bank for Reconstruction and Development's country strategy for Montenegro focuses, among other things, on enhancing agriculture sector competitiveness through such efforts as the development of agribusiness value chains. Private stakeholders, such as the Montenegro Business Alliance, the National Association of Organic Producers of Montenegro (Organic Montenegro) and others, are supporting the private sector's role in the agriculture sector.

Relevant activities and programmes in agriculture sector development

FAO's support of Montenegro's agricultural development work has identified the following priorities: improving the competitiveness of the agriculture sector and better integrating with the processing industry, enhancing institutional capacities, improving the aquaculture value chain, and improving the capacities of advisory services in order to support farmers and producer groups in applying new technologies.

The new FAO/European Bank for Reconstruction and Development project in Montenegro aims to support more efficient and inclusive agrifood chains through better coordination on food safety and quality standards, through the development of origin-based labels in the meat sector, and through the sharing of knowledge on food safety, quality and geographical indications.

Agricultural producers from all parts of Montenegro, most from the north, signed contracts for grant support for investments in agricultural holdings through IPARD Like 1.2 Public Call. The total investment of these project amounted to EUR 4.2 million (approximately USD 5.2 million). For this purpose, EUR 2.4 million (approximately USD 3 million) was provided through grants from the European Union funds and the national budget.²⁶

Montenegro, as a candidate country for European Union accession since the end of 2010, has become entitled to use the funds from all five Instrument for Pre-Accession Assistance components; the IPARD programme was developed focusing on comprehensive support to the development of the agriculture sector.

Overview of the main crop and livestock subsectors

Advantages of Montenegrin agriculture include price competitiveness of some products (e.g. wine, lamb, prosciutto and cheeses), good conditions for organic food production, traditional agricultural production, evident changes in the institutional framework in the past few years, and positive changes in the production process. Important commodities in terms of domestic production are figs, olives, rye, cherries, walnuts and sheep's milk.²⁷

Only 5.65 percent of agriculture land in Montenegro is used for plant production (fruits, vegetables and vineyards). The fruit and vegetable sectors are very fragmented. A large number of small producers and few specialized ones grow fruits and/or vegetables in the traditional way, usually for their own needs, while the surplus is placed on the market. Large-scale commercial production is less pronounced in the country. Grape production occupies more than 4 500 ha, with an annual average production of 17 million grapevines. More than 3 000 ha are under olive production, accounting for 500 tonnes of average annual olive oil production.

The meat industry in Montenegro has been experiencing dynamic development during the past decade. Significant investments have been made in terms of capacity improvement and equipment modernization. Livestock farming traditionally plays an important role in Montenegrin agriculture. Due to a higher availability of natural resources, ruminant rearing (cattle, sheep and goats) is dominant in the livestock subsector. Pig and poultry production have not been well developed due to a lack of cereals for animal feeding.

²⁶ Government of Montenegro. 2017. *Pljevlja: New successes in agriculture promoted – new investments of EUR 4.2 million, with grant of EUR 2.4 million and another one protected product*. [online]. <http://www.gov.me/en/News/172587/Pljevlja-New-successes-in-agriculture-promoted-new-investments-of-EUR-4-2million-with-grant-of-EUR-2-4-million-and-another-one.html>

²⁷ FAO. 2014. *Agro-Industry Brief, Montenegro*.

Montenegro also has a small fisheries sector, which accounts for only 0.5 percent of the gross domestic product. Apiculture also has a long and rich tradition in Montenegro, with more than 2 500 farms.

Status of agro-processing sector development

The most important subsectors are meat processing and preserving, which represent more than half of the agriculture sector's value. Bakery, dairy, fruit and vegetable processing, wine, and mineral water production are also important subsectors.

The World Bank is supporting the sector with investments and policy dialogue to improve links among small and medium enterprises in the agribusiness sector and food processors, retailers and markets (including logistics, storage capacities and equipment), enhancing links between local producers and the tourism sector.²⁸ Improving the competitiveness of the agribusiness sector is also supported by national agencies and international donors by improving the compliance of the agrifood sector with food quality and safety standards. The unfavourable structure of companies and an insufficient level of technical equipment were observed to have negative effects on the competitiveness of the food industry.²⁹

Value chain development activities

FAO and the European Bank for Reconstruction and Development are committed to continuing the support of value chain development in Montenegro – in particular, support of geographical indication of Montenegrin agricultural products. Geographical indication is “an origin-based official labelling system that protects the reputation of traditional agrifood products, helping them to stand out in the fierce competition for market shares thanks to recognised high quality standards”.³⁰

A report that examined the wine value chain and the limitations of this subsector found that needed elements include the formation of new associations, improvements in registration procedures, improvements in the business environment of the value chain, and improvements in integration with the retail industry.³¹

The European Training Foundation has explored value chains in the dairy sector, highlighting that one of the main characteristics of the Montenegrin dairy sector is the small share of milk processed by the dairy industry, which is still less than 15 percent of total milk production. Farms retain 85 percent of the milk produced.³²

²⁸ <http://www.worldbank.org/en/news/press-release/2016/09/09/world-bank-continues-to-support-agriculture-sector-in-montenegro>

²⁹ Jovanović, M., Despotović, A., & Joksimović, M. 2015. *Position and Perspectives of Development of the Food-Processing Sector in Montenegro*. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development. Vol. 15, Issue 1.

http://managementjournal.usamv.ro/pdf/vol.XV_1/Art33.pdf

³⁰ FAO. 2017. *FAO and EBRD mark 20th anniversary with renewed commitment to sustainable food value chains*. [online] <http://www.fao.org/about/who-we-are/director-gen/faodg-news-archive/detail/en/c/1070120/>

³¹ Springer-Heinze, A. 2017. *Value Chains in Development Cooperation*. <http://www.regionale-wertschoepfung.info/rwp/data/Vortrag%20Euregia%20ash%2029-10-08%20v2.pdf>

³² ETF. 2012. *Value Chain Analysis, Montenegro dairy sector*. [http://www.etf.europa.eu/webatt.nsf/0/B6C0CB5820AB5307C1257B9B003A7B79/\\$file/Value%20chain%20analysis_Montenegro%20dairy%20sector.pdf](http://www.etf.europa.eu/webatt.nsf/0/B6C0CB5820AB5307C1257B9B003A7B79/$file/Value%20chain%20analysis_Montenegro%20dairy%20sector.pdf)

Food loss and waste

High losses from the reduced availability of post-harvest facilities and equipment is among the challenges of Montenegrin agriculture. The improvement of the sector is not easy, as it will also require increasing sales and developing exports to the region.³³ There haven't been a many efforts to target the reduction of food loss and waste or to estimate the extent of the issue. Such a study would be beneficial, as solutions can be incorporated into ongoing activities of the sector's improvement.

³³ Jovic, R. n.d. *Competitiveness of the Montenegrin Fruit and Vegetables Sector and Recommendations for Improvement*. Mediterranean University of Montenegro.
http://ageconsearch.umn.edu/bitstream/138087/2/9_Radislav_Apstract.pdf

Serbia

Overview of the agriculture sector and food systems in Serbia

Serbia is an upper-middle-income country in southeastern Europe. Favourable climatic conditions permit the cultivation of a variety of fruits, berries and vegetables. Agricultural land occupies more than 3.5 million ha. Agriculture is also the most important export sector in Serbia. In 2016, agriculture and food production accounted for 19.4 percent of all Serbian exports and enjoyed a surplus of USD 1.4 billion, an increase of USD 130 million over 2015 (mostly due to an increase in processed fruit and vegetable exports). In 2016, Serbia exported fruits and nuts worth more than USD 350 million USD, in addition to USD 138 million of apples, pears and quinces and USD 372 million of maize.

According to the Serbian Agriculture Census from 2012, there are approximately 630 000 registered agricultural entities in the country; approximately 99.6 percent of them are family households, and 0.4 percent are legal entities.

Serbia enjoys significant trade advantages with the Russian Federation and the European Union. However, Serbia has a low level of compliance with European Union standards, especially in the meat sector. Therefore, increasing the competitiveness of Serbian agriculture remains a priority.³⁴

In 2014, the Serbian government adopted a new Agricultural and Rural Development Strategy 2014–2024. The strategy, a requisite for receiving European Union funding, sets guidelines for adjusting Serbia's agriculture to meet European Union and World Trade Organization requirements and defines basic reforms needed in the agriculture sector. The strategy is focused on reforms that will improve Serbia's business environment and competitiveness, raise living conditions, and introduce greater stability for farmers in rural areas.

Stakeholders engaged in agriculture and value chain development

The main state bodies related to agriculture and agro-industry support and control in Serbia are the Ministry of Agriculture, Forestry and Water Management (MAFWM); the Ministry of Internal and External Trade and Telecommunication; and the Ministry of Health.

Other supporting institutions are: the Plant Protection Directorate and the Veterinary Directorate under the MAFWM; the Serbia Investment and Export Promotion Agency; the Agency for Investments Promotion and Business Support in Central Serbia; the National Council for Regional Development and the Regional development agency; the Business Registers Agency; the Institute for Vegetable Crops; the Maize Research Institute; the Institute of Meat Hygiene and Meat Technology; the Fruit Research Institute; and the Institute of Field and Vegetable Crops.

Private industry groups and associations are also active in subsector development activities. Several international donors have supported agriculture sector development as well, such as the World Bank, FAO, the United States Agency for International Development, and the European Bank for Reconstruction and Development, among others. FAO and the European Bank for Reconstruction and Development have been supporting the country in its upgrade of food safety

³⁴ FAO. 2016. *Promotion of food exports in Serbia*. <http://www.fao.org/3/a-bl849e.pdf>

and quality standards in the dairy and meat sectors by facilitating dialogue between policy-makers and the private sector. Among other developments, these efforts have resulted in the introduction of a Serbian quality label, the removal of specific export barriers, the development of a risk communication protocol, and guidelines to cope with aflatoxin and increased government capacity to negotiate accession into the World Trade Organization.

Relevant activities and programmes in agriculture sector development

FAO's assistance in Serbia contributes to two priority areas identified by the government and the United Nations country team: economic development, growth and employment; and environment, climate change and resilient communities. Technical assistance has focused on support for the development of appropriate policies and good governance, investment support, sustainable development and social inclusion – particularly for small farmers – and the strengthening of cooperation and stability in the region.

Within the framework of the IPARD programme, “grants will be provided for: farmers producing milk, meat, fruits and vegetables and other crops; micro-, small-, and medium-sized enterprises processing milk, meat, fruits and vegetables; organic production; and the development of private rural tourism facilities.”

DAI implemented a United States Agency for International Development-funded project on agribusiness development in Serbia, aiming at increasing the competitiveness of the agriculture sector.

Overview of the main crops and livestock subsectors

Serbia is the world's third largest producer of raspberries and is also known for its sour cherries, blackberries, blueberries, apples and plums.³⁵ Approximately 60 percent of Serbia's agricultural land is used for cereal crop production, including corn, wheat, barley, sunflowers, soya and sugar beets.³⁶ The major agricultural land is in the northern part of the country; Vojvodina accounts for 84 percent of total cultivable land in Serbia.

The grain supply chain is the most important food system for Serbian agriculture exports. It is also the food value chain with the most stakeholders. Input suppliers can be divided in three groups: for seeds, mineral fertilizer and pesticides. Over the past decade, almost all international seed companies have become operational in Serbia. In addition, almost every farm produces some grain. The most important grain is corn, with a 73-percent share. Wheat is second with 23 percent, while barley, oats and rye have marginal importance in total grain production.³⁷

Fruit and vegetable production in Serbia is a profitable sector. Vegetable production occupies about 230 000 ha, and potatoes account for 40 percent of this land. Other significant vegetables in terms of planted area are: cabbages, tomatoes, beans, onions and peppers. Farmers who own more than 1 ha or even more than 10 ha of orchards have recently invested in new fruit production technologies. There are also examples of companies from other sectors of the economy that have invested in large fruit or vegetable production and vegetable production in greenhouses.

³⁵ FAO. 2014. *Agro-Industry Brief, Serbia*.

³⁶ U.S. Commercial Service.

³⁷ FAO. 2012. *Processor-driven integration of smallholder farmers*.

Mushrooms, honey, herbs and wildfruit: The wild mushroom business can have a direct impact on thousands of rural Serbs throughout the southern regions of the country. The mushrooms are collected from public and private forests in the hills of that region of Serbia.³⁸ The licenses are purchased by companies for the amount that they want to purchase from collectors.

Serbia's livestock production represents approximately 34 percent of the total value of Serbia's agricultural production. In the meat sector, the major challenge now is to consolidate the primary production side to enlarge farm size and allow for specialization.³⁹ Research results have indicated low returns on investment, profitability, liquidity and high debt among the companies in the meat industry in Serbia.⁴⁰

Two dairy production systems with biggest share in total milk production in Central Serbia are small farms with tie-stall barn systems and small farms with grazing period systems.⁴¹ Improving sustainability and the integration of small farmers in the dairy supply chain are important for this subsector.

Overall, it has been shown in several studies that neither farmers' nor processors' organizations work properly in the country. In comparison to other Eastern European countries, the vertical integration of the sector is rather limited – only a few processing companies start to acquire their own farms, making quality control costly and inefficient.

Status of agro-processing sector development

The food processing industry is an important sector of the Serbian economy, and its output has been growing in recent years. However, according to export.gov, which is run by the United States of America's Department of Commerce, the industry still lacks modern technology.⁴² The grain milling industry processes about 1.2 million tonnes of wheat into flour and other products, for both the domestic market and for export. The active processing sector in the food and vegetable subsector has an annual capacity of about 300 million kg, which is significantly less than the total fruit and vegetable production. There are about 20 companies that carry out hot processing of fruit and vegetables, and 20 plants for juice and concentrate production.

Overall, the food processing industry has strongly developed and grown during the years of transition. A trend in the food industry is the expansion and growth of conglomerates, which are active in several sectors. "Made in Serbia" food is present around the globe, from Japan to the United States of America, and is sold under Serbian brands and through the world's largest supermarket chains.

Value chain development activities

The USAID Agribusiness Project was a five-year programme (2007–2012) of technical and financial assistance to the agricultural and food industry value-chains in Serbia, implemented by

³⁸ USAID. 2012. *USAID Serbia Agribusiness Project*. http://pdf.usaid.gov/pdf_docs/pdacy190.pdf

³⁹ FAO. n.d. *A systematic analysis of the agribusiness sector in transition economies: The Serbian meat value-chain*. http://www.eastagri.org/files/Serbia_meat_VC_final.pdf

⁴⁰ Mijić, K., Zekić, S., Jakšić, D. & Vuković, B. 2014. *Meat industry in Serbia: performance analysis of meat-processing and livestock companies*. <http://www.custoseagronegocioonline.com.br/numero3v10/Artigo%207%20meat.pdf>

⁴¹ FAO. 2012. *Sustainability of dairy farming systems in Central Serbia*. <http://www.fao.org/family-farming/detail/vn/c/283711/>

⁴² U.S. Commercial Service. 2018. Belgrade. *Serbia – Agriculture* [online]. <https://www.export.gov/article?id=Serbia-Agribusiness>

DAI. The overall objective of the USAID Agribusiness Project was to increase the value of Serbian agricultural product sales and increase agricultural employment. The project was designed to achieve this objective by increasing the efficiency and competitiveness of Serbian agribusinesses along the value chain in the high-potential sectors identified during sector selection and analysis, and by improving the enabling environment for Serbian agribusinesses. The project had two main grant components: one for the introduction of standards, and one for marketing and promotion.⁴³

With the support of the FAO/European Bank for Reconstruction and Development and the European Union, value chain development activities are being implemented in the most important agricultural subsectors of Serbia.

Food loss and waste

The total capacity of refrigerated or frozen storage in Serbia was estimated at 500 000 to 600 000 tonnes.⁴⁴ According to the findings of the study, 29 storage facilities exist in Serbia with a capacity between 50 000 and 60 000 tonnes. Serbia has been very successful in the production and export of frozen raspberries; it makes one-third of the world's total exports. To improve the situation and to decrease high post-harvest losses in the fruit and vegetable sector, there is an urgent need for establishing a long-term network among all segments of this sector, together with more intensive cooperation among Western Balkan countries in post-harvest research.

There are also losses occurring in the grain subsector. Most corn, for example, is stored at farms and used as livestock feed. Losses are high because storage conditions on farms are poor, with rodents and insects destroying up to 10 percent of the yield. In the fruit and vegetable subsector, another study found that there is a lack of storage and processing capacities.

A comprehensive study of the extent of the problem would be beneficial for understanding the reasons for losses and developing solutions and recommendations for improving the situation in the country.

⁴³ FAO. 2016. *The promotion of food exports in Serbia*. <http://www.fao.org/3/a-bl849e.pdf>

⁴⁴ Jemrić, T., Pašalić, B., Ilić, Z. & Drkenda, P. 2013. *Postharvest losses of fruits and vegetables in Croatia, Bosnia and Herzegovina and Serbia*. [Cited 13 October 2017]. https://www.researchgate.net/publication/257999708_Postharvest_losses_of_fruits_and_vegetables_in_Croatia_Bosnia_and_Herzegovina_and_Serbia

EASTERN EUROPE

Belarus

Overview of the agriculture sector and food systems in Belarus

Belarus is an upper-middle-income, landlocked country in Eastern Europe. The share of utilized agricultural area is 26.8 percent of the country's territory. However, one-third of the agricultural land in the country is drained (2.9 million ha in 2013) and exposed to a high risk of degradation.

Belarus is one of the largest economies in which the small and medium enterprise sector is underdeveloped. The agriculture sector in the country is dominated by large agricultural enterprises. Subsistence farms generate about 20 percent of the agricultural output, while private farm enterprises produce only about 1.5 percent of the total agricultural output. Agricultural land is owned by the state, with limitations to its access.

State-owned enterprises in the country contribute more than two-thirds of the country's gross domestic product and receive significant subsidies from the state. The Government of Belarus, however, is aiming at supporting private-sector participation in the economy and has taken steps to develop a support policy for small and medium enterprises, according to the AGRICISTRADe report on Belarus.⁴⁵

The main crops produced in the country include cereals, potatoes and vegetables. However, the structure of crop production is not stable.⁴⁶ It can vary across specific years and be determined by other external factors, such as changes in prices. As of 2016, agricultural products represented 17.3 percent of total Belarussian exports.⁴⁷ Nearly 90 percent of food consumed in Belarus is produced domestically. Among the products with the highest agricultural value are cow's milk, cattle, pig and chicken meat, and potatoes.

Stakeholders engaged in agriculture and value chain development

The main state bodies related to agriculture and agro-industry support and control in the Republic of Belarus are the Ministry of Agriculture and Food, the Ministry of Antimonopoly Regulation and Trade, and the Ministry of Economy. The government also established the National Agency of Investment and Privatization in 2010, which has been under the Ministry of Economy since 2011. Several international donors and implementing organizations are supporting reforms and modernization of the agriculture sector (FAO), private sector development (USAID), and infrastructure (World Bank). The Belarusian Chamber of Commerce and Industry supports trade development, and the Institute for Privatization and Management Research Center supports research efforts in the field of agriculture.

⁴⁵ AGRICISTRADe. 2015. *Country report for Belarus*. http://www.agricistrade.eu/wp-content/uploads/2015/05/Agricistrade_Belarus.pdf

⁴⁶ Ibid.

⁴⁷ WTO. 2016. *Belarus profile*. [online]. <http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=BY>

Relevant activities and programmes in agriculture sector development

Signed in 2017, the collaboration agreement between FAO and Belarus for the next four years will focus on value chain development, food safety, and agro-industry competitiveness of products for export.⁴⁸ FAO's assistance in Belarus is focused on two main priority areas: (1) conservation, management of natural resources and climate change adaptation with outcomes that look at preserving agricultural resources, strengthening safety along the food chain, sustainably developing the forest areas to meet market-driven demands, making agricultural production less volatile, and preparing stakeholders to mitigate challenges related to the effects of climate change; (2) agrifood chains and agrifood policy programming that have the outcome of making agrifood chains more efficient and up-to-date, and developing standards and requirements to meet the needs of the sector.

Overview of the main crop and livestock subsectors

Centralized planning in Belarus determines national production as well as development programmes. Belarus is an important exporting nation of agricultural products. Currently, 87 percent of trade is performed with Russia.

Wheat production in the country is the main agricultural subsector. An AGRICISTRADO report notes that due to climatic conditions, crop harvests fluctuate significantly from year to year.⁴⁹ The only firm trend in the structure of crop production was noted as increasing the share of technical crops, such as rape oil and sugar. Most cereal crops are produced by state enterprises.

Households produce more than 20 percent of the total agricultural output in Belarus (22.1 percent in 2013). They usually grow different kinds of crops. Households play the most important role in the labour-intensive sectors of vegetables, potatoes, and fruit and berry production (fruit and berry production volumes are rather low).

In the horticulture subsector, potatoes represent the most important crop. The volume of potato production is comparable with cereal production. However, cultivation area decreased significantly from 2004 to 2013, which resulted in the reduction of potato production by one-third. Potatoes are largely cultivated by households, so their production decrease is related to falling agricultural activity of households.⁵⁰

The AGRICISTRADO report also highlighted that vegetable production fell between 2009 and 2012. However, the volume of production is significantly higher than in 1990s. As in the case of potatoes, reduction of the area cultivated with vegetables is related to the decreasing agricultural activity of the population. Key vegetable crops in Belarus are cabbage, carrot, beet and onion.

Some farmers specialize in greenhouse production of cucumbers and their export to Russia. The competitiveness of this crop is partly based on cheap energy resources. Tomatoes are also cultivated in Belarus, but they are less competitive due to rather unfavourable conditions for growing tomatoes. Fruits and berries are also produced, mainly by households. The land under these crops did not decrease much from 2004 to 2013 in contrast to vegetables, as they need less effort for their cultivation. Furthermore, prices for fruits and berries are high, which creates incentives for their cultivation. However, the dynamics of fruit and berry production is

⁴⁸ FAO. 2017. *Belarus signs four-year cooperation agreement with FAO*. [online]. <http://www.fao.org/europe/news/detail-news/en/c/1037202/>

⁴⁹ AGRICISTRADO. 2015. *Country report for Belarus*. http://www.agricistrado.eu/wp-content/uploads/2015/05/Agricistrado_Belarus.pdf

⁵⁰ Ibid.

determined by yields that vary due to weather conditions and the lifecycles of plants. A share of strawberry harvests is exported to Russia.

Meat market development is prioritized in Belarus, as meat and milk products are export-oriented.⁵¹ There are state programmes aimed at supporting investments in dairy and pig farms. Milk accounts for around 40 percent of the total animal output. The production of eggs accounts for 6 percent of the animal-sector output. Other animal products are produced in Belarus in minor volumes. Within meat production, key subsectors are beef, pork and poultry.

Status of the agro-processing sector

The food-processing industry (in particular, meat and dairy products) serves the domestic and export markets. According to the findings of the AGRICISTRADe report, although consumer expenditure on food has doubled in the period of 2009-2012, the sector needs better infrastructure and requires greater consolidation in production, coupled with the creation of a better distribution network.

The fish and fish-processing subsectors have also grown in Belarus; they are more than five times larger than they were in 2000. Dairy, cheese and sweetened milk are the main products of the country's processing sector. A significant amount of these products is exported, in particular to Russia.

Value chain development activities

Dairy value chain development activities have been supported by FAO and the International Fund for Agricultural Development. Meat subsector development also enjoys state support; however, it is realized in the form of subsidies.

Food loss and waste

There hasn't been any specific study on the extent of food loss and waste in the country. Such work would be highly beneficial for understanding weak elements of the food supply chain and developing recommendations and solutions to be integrated in value chain development activities.

⁵¹ Vorotnikov, V. 2016. *Belarus eyes international markets*. Global Meat News. [online]. <https://www.globalmeatnews.com/Article/2016/07/07/Belarus-eyes-international-markets>

The Republic of Moldova

Overview of the agriculture sector and food systems in the Republic of Moldova

The Republic of Moldova is a lower-middle-income, land-locked country in Eastern Europe. Its proximity to the Black Sea defines the country's rather mild climate. A significant share of agriculture is rain-fed, with limited irrigation infrastructure.

The main advantages of Moldovan agriculture are large areas of fertile soils.⁵² The country has rich traditions and experience in wine, tobacco, and the production of fruits and vegetables.⁵³ It also has capacities for the production, processing and storage of high-value products such as hazelnuts and cherries, as well as organically grown crops and added-value processed fruit and vegetables. The country also enjoys the advantage of proximity to developed markets in the European Union with high demand for agri-food products.

According to export.gov, which is run by the United States of America's Department of Commerce, "after a 0.5-percent recession in 2015, the economy grew 4.5 percent in 2016 on the back of a recovery in agriculture and strong consumption."⁵⁴ Overall, agriculture and trade have been growing in the recent years, facilitated by the country's independence and opening of the economy. Wine and spirits, as well as fresh and processed fruits and vegetables, represent a considerable share of Moldovan exports, contributing up to 40 percent of the total exports.⁵⁵

Some challenges that impede economic growth opportunities include systemic deficiencies in the lending sector. The AGRICISTRADO study for the Republic of Moldova (2015) has identified that these include, among others, high interest rates (up to 15 to 20 percent per year) as well as underdeveloped market instruments such as loan-guarantee funds and interest subsidies. In addition, the instability of agricultural business is one of the obstructions of the sector's development. The agriculture sector has been stagnating recently, with the largest growth observed in the services sector.

The agriculture sector is represented by the following groups of major actors: a corporate sector, composed of large companies, and individual producers, represented by peasant farms and private land owners.

Stakeholders engaged in agriculture and value chain development

The Ministry of Agriculture, Regional Development and Environment and the Ministry of Economy and Infrastructure are the main state bodies for agriculture and the agro-industry in the Republic of Moldova. Other supporting institutions include the Agency for Innovation and Technology Transfer, the Chamber of Commerce and Industry, and the Moldova Investment and Export Promotion Organization. Several sectoral producer associations and unions exist in the

⁵² AGRICISTRADO. 2015. *Moldova*. http://www.agricistrado.eu/wp-content/uploads/2015/05/Agricistrado_Moldova.pdf

⁵³ MIEPO. 2016. *Agriculture and Food Processing*. Republic of Moldova. <http://miepo.md/sites/default/files/reports/Agrifood%20sector%20overview.pdf>

⁵⁴ U.S. Commercial Service. 2017. *Moldova – Market Overview* [online]. [Cited 18 September 2017]. <https://www.export.gov/article?id=Moldova-Market-Overview>

⁵⁵ European Commission. 2014. *Bilateral Relations in agriculture*. https://ec.europa.eu/agriculture/sites/agriculture/files/bilateralrelations/pdf/moldova_en.pdf

Republic of Moldova, e.g. the National Farmers Federation of Moldova, the Union of Agricultural Producers, and the National Association of Beekeepers of the Republic of Moldova). Agricultural research is supported by the Research Institute of Field Crops “Selectia” and the institute of Horticulture, among others. The National Agency for Rural Development is a national extension network that supports smallholder farmers through providing market information as well as diverse consulting and training services for rural entrepreneurs. The Moldova Investment and Export Promotion Organization supports companies in the agriculture sector via promoting competitiveness and strengthening partnerships with the companies that want to invest in the country. A number of international non-governmental organizations and intergovernmental organizations also support the efforts of entrepreneurs in strengthening the agrifood sector, such as the United States Agency for International Development, the World Bank, and several others. USAID has recently renewed its plans to support high-value agricultural products in the Republic of Moldova.⁵⁶

Relevant activities and programmes in agriculture sector development

The FAO Country Programming Framework is focused on increasing the competitiveness of the agrifood sector, fostering sustainable agriculture and rural development, and improving capacity for sustainable management of natural resources and management of disaster risk. The Republic of Moldova has initiated several activities that target improvements in fruit and wine growing, land-protected vegetable production, organic farming, and milk and meat production. Such activities include, for instance, special tax regimes and investments. Some international development organizations are supporting agricultural and economic development as well.

Overview of the main crop and livestock subsectors

The FAO Agro-Industry Brief for Moldova reported that as of 2011, the top five agricultural products in terms of value in the country were grapes, cow milk, wheat, apples and pig meat.⁵⁷ The production of vegetables, potatoes, forage crops, livestock and other products with high added value has decreased in the Republic of Moldova during the transition period from 1990s to the present, according to AGRICISTRADe study findings.⁵⁸ There are about 65 000 ha of orchards with high potential for production, but this potential is not fully exploited due to the lack of funding and the lack of post-harvest facilities.

Cereals and cereal-based production are mostly targeted at ensuring food security in the country and sustaining employment. The sector producing cereals and cereal-based products in the Republic of Moldova has quite a diverse composition and includes both small and large operators and state-owned and private companies. Production of fodder crops on arable lands has decreased, leading to disruptions in crop rotation patterns, deterioration of livestock forage and increasing pressure on the land. The production of maize and sunflowers has been growing despite the unsuitable soil and climate conditions for these crops in some areas.

The main varieties of vegetables grown in the Republic of Moldova include tomatoes, onions, cabbage, cucumbers, pumpkins, peppers, carrot, red beet, garlic, squash, aubergine and green

⁵⁶ USAID. *Moldova*. [online]. <https://www.usaid.gov/moldova>

⁵⁷ <http://www.fao.org/europe/resources/eastern-europe-and-central-asia-agro-industry-development-briefs/zh/>

⁵⁸ AGRICISTRADe. 2015. *Moldova*. http://www.agricistrade.eu/wp-content/uploads/2015/05/Agricistrade_Moldova.pdf

peas. Fruit production focuses on apples, plums, sweet and sour cherries, pears, peaches and nectarines, quinces, apricots, soft fruit, walnuts, and table and technical grapes (used for wine making).⁵⁹

The total annual production of fruits is about 486 000 tonnes, with apples the most important crop, accounting for a minimum of 70 percent of total production (approximately 308 000 tonnes, depending on the year). Plums are the second most important crop, with annual volumes of around 100 000 tonnes, followed by cherries (6 000 tonnes), peaches (25 000 tons), and apricots (8 000 tonnes). Approximately 85 000 tonnes of table grapes are produced annually.

Some challenges that the crop production subsector experiences include a large number of household plots and the fact that only 25 percent of the stock can be considered “young.” Upgrading and strengthening the value chains for major fruit and vegetable subsectors is needed, along with growing the most-profitable varieties, improving produce qualities according to market requirements, adopting improved storage technologies and compliance with food safety requirements. Tomatoes, for example, are widely grown in the Republic of Moldova, but according to a value chain report by USAID (2011), tomatoes imported from Turkey were preferred by customers. Improving shelf life and other quality characteristics are among the aspects that need improvement. Product uniformity and visual appeal (lack of visual defects) as well as compliance with sanitary and phytosanitary standards are also yet to be improved.

The Republic of Moldova’s meat-processing industry is highly consolidated. Official statistical data indicate that there were 90 meat processing enterprises and production units in 2014. The recovery of the livestock sector after the economic crisis of the 1990s has been slower compared to the crops sector. Animal products largely originate from households and small-scale peasant farms. Almost 65 percent of the total meat production is produced by these agricultural holdings, including 86 percent of beef production, 70 percent of pork production, 93 percent of sheep and goat meat production, and about 51 percent of poultry meat production. Households and small-scale agricultural holdings also produced about 97 percent of the total milk and 61 percent of the eggs in 2013.

Milk production is very important in terms of livestock production of the country. The dairy industry is based primarily on the supply of raw milk from small producers, company-owned collection centres and dairy cooperatives with collection centres financed by the dairy companies or through donor programmes.

Across the subsectors, farmers are often facing insufficient access to high-quality inputs. Procedures for the registration of plant varieties can take a long time and are associated with high costs. Persisting lack of coordination in the supply chains was highlighted by the authors of the AGRICISTRADe study for the Republic of Moldova as a reason for the low competitiveness of the agrifood sector⁶⁰.

Status of agro-processing sector development

Fruit and vegetable processors can be divided into two main groups. The first comprises a small number of large firms, focused on export markets and producing about 80 percent of the total sector output. The second consists of about 80 small and medium canneries, mainly serving the domestic market. Large quantities of fresh produce are purchased by various actors (including supermarkets and the hotel, restaurant and catering sector) from open-air and wholesale markets. Processing enterprises in the dairy, meat, and fruit and vegetable sectors are often

⁵⁹ MIEPO. 2016. *Agriculture and Food Processing*. Republic of Moldova.

http://miepo.md/sites/default/files/Agriculture_report_!_0.pdf

⁶⁰ http://www.agricistrade.eu/wp-content/uploads/2015/05/Agricistrade_Moldova.pdf

located close to the raw material production areas. Important subsectors include wine and cognac production, tinned fruit and vegetable production, and vegetable oil production.

Value chain development activities

The United States Agency for International Development and several other international donors have been supporting the development of agricultural value chains in the Republic of Moldova, including apple, wine and some other crop subsectors. Recently, funds for a new World Bank project dedicated to improving the competitiveness of Moldovan agriculture have been approved to support the enhancing of market potential.⁶¹ Increasing resilience of Moldovan agriculture and improving high-value crop production are also supported by the International Fund for Agricultural Development.⁶² A wine sector restructuring project⁶³ and a “Fruit Garden of Moldova” project are continuing projects dedicated to supporting the competitiveness of the sector.⁶⁴

Food loss and waste

Some agriculture development projects, such as an Agricultural Competitiveness and Enterprise Development project from USAID that trained producers in best practices, have contributed to enhancing farmers’ knowledge of reducing post-harvest losses.⁶⁵ According to the Moldova Investment and Export Promotion Organization report, there are investment opportunities in the processing sector that indicate a need for improvement: “Equipment and technology are required for storage, packaging and long-distance transportation of fresh products; drying; instant freezing; canning; and the production of ingredients and additives.”⁶⁶ Although there hasn’t been any study of the extent of the food loss and waste problem in the country, addressing the issue via upgrading the value chains would be beneficial for reducing food loss and waste as well.

⁶¹ The World Bank. 2018. *Moldova Agriculture Competitiveness Project 2nd Additional Financing*. [online]. <http://projects.worldbank.org/P157765?lang=en>

⁶² <http://www.ifad.md/en/programs/dejstvujushhie-programmi/programma-povisheniya-jekonomiko-klimaticheskoy-ustojchivosti-seliskoj-mestnosti-IFAD-VI>

⁶³ Wine Moldova. *About the Program*. [online]. <http://www.winemoldova.md/despre.php?lng=en>

⁶⁴ European Investment Bank. 2017. *Technical assistance to support the implementation of the "Fruit Garden of Moldova" operation, and the beneficiaries Small and Medium-sized Enterprises (SMEs)*. [online]. <http://www.eib.org/about/procurement/calls-technical-assistance/ta2016044.htm>

⁶⁵ DAI. *Moldova—Agricultural Competitiveness and Enterprise Development Project (ACED)*. [online]. <https://www.dai.com/our-work/projects/moldova-agricultural-competitiveness-and-enterprise-development-project-aced?related-box>

⁶⁶ MIEPO. 2016. *Agriculture and Food Processing*. Republic of Moldova. http://miepo.md/sites/default/files/Agriculture_report_!_0.pdf

Ukraine

Overview of the agriculture sector and food systems in Ukraine

Ukraine is a lower-middle-income economy in Eastern Europe. About two thirds of Ukrainian territory is occupied by agricultural land. One-third of the worldwide stock of the most fertile black soils belongs to the country; these rich soils are very well-suited for crop production. Agriculture is Ukraine's largest export industry and generates 12 percent of its gross domestic product. In 2015, agricultural products represented over 40 percent of the country's trade balance.⁶⁷ Ukraine produces and exports a large amount of sunflower seeds and oils, maize, wheat, barley, soya beans and poultry.

In 2013, the share of agrifood-sector products for export reached 27 percent. This increase experienced in recent years was driven by growing demand for wheat and sunflower oil from Commonwealth of Independent States countries. Conventionally produced dried apricots, prunes, apples and cherries are among the main items currently exported to the European Union from Eastern Europe and the Caucasus.

Ukraine's agriculture sector has experienced significant development in recent years. Smallholder integration into agricultural value chains has improved.⁶⁸ While the country's economy overall has been growing recently, it still faces challenges in terms of doing business. Such challenges include a long list of permits, licensing and sometimes unnecessary mandatory standards and certifications and other hurdles imposed by the outdated Soviet-era regulatory system that the companies have to comply with.

The institutional environment in the agrifood sector allows for significant agricultural tax benefits, which puts a low emphasis on the provision of public infrastructure and other supporting services.⁶⁹ Agricultural policy support focuses on subsector strategies, emphasizing the field crop, pork and cattle subsectors. The payments are based on area, which causes uneven distribution of support, with less support effectively being provided to small peasant holdings. Larger-sized enterprises contribute 45 percent of the output in the agriculture sector.

Analysis of the needs of the eastern part of the country, which has been affected in the military conflict, has revealed that significant support is needed to revive the agriculture sector. Measures are needed to improve post-harvest processing management, adding value in the fruit and vegetable sector, such as in the production of pickles and jams, especially for households headed by the elderly and women.⁷⁰ Strengthening producer organizations in crop and livestock subsectors is crucial to the recovery of the regional economy. Improving supply should include modernizing processing and packaging capacity, improving transport and storage, and improving food safety.

⁶⁷ WTO. 2017. Ukraine: Trade profile.

⁶⁸ FAO. 2013. *Processor-driven integration of small-scale farmers into value chains in Ukraine*. <http://www.fao.org/3/aau851e.pdf>

⁶⁹ AGRICISTRAD. 2015. *Ukraine*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Ukraine.pdf

⁷⁰ FAO. 2015. *Socio-economic impact and needs assessment in Donbass, Ukraine*. <http://www.fao.org/3/a-i5171e.pdf>

Over the past year, greater political stability, a stronger economy, a more stabilized currency and delayed demand enabled and encouraged Ukrainian farmers to resume badly needed capital investment, including in agricultural equipment.⁷¹

Stakeholders engaged in agriculture and value chain development

A variety of stakeholders are involved in agricultural value chains in Ukraine. Institutional support is provided by state agencies as well as private member clubs, such as the Ukrainian Agribusiness Club. Ukraine's agricultural advisory services are underdeveloped. State support is marginal, and services remain largely underfunded. Ukraine's agricultural research system appears to be disconnected from both the practical needs of Ukraine's farmers as well as from international research efforts, and it suffers from the same institutional and management weaknesses as the education system. There are also associations of agricultural producers, such as the Ukrainian Agrarian Association and Ukrainian Agrarian Confederation representing the interests of their members.

Relevant activities and programmes in agriculture sector development

Recent political developments in the eastern part of the country are mostly addressed by international development efforts. Donors are seeking solutions to rebuild it following the crisis that has affected 4.4 million people, of whom 3.4 million require humanitarian assistance and protection.⁷² Activities on supporting agricultural value chain development are also being conducted by several international donor organizations. Some efforts are initiated by investors, including international and national ones.

Overview of the main crop and livestock subsectors

Main crop groups are represented by grains (predominantly wheat and barley), maize, pulses, sugar beet, sunflowers, potatoes and vegetables. Wheat, barley, maize and sunflowers alone cover about 70 percent of Ukraine's total arable land.

Significant progress has been made in the grain industry in Ukraine since 2000 by increasing production and improving the quality of wheat.⁷³ Ukraine's grain industry is dominated by small enterprises and family farms, but agroholdings have recently emerged, bringing new technologies to the sector. Ukraine has also been increasing its corn exports. The country primarily exports corn to the Middle East and North Africa region and the European Union with the hopes of increasing overall corn exports 91 percent by 2021. Ukraine has turned to the private sector to modernize its grain infrastructure.

Sunflower seed dominates oilseed production in Ukraine, and its production is trending upward (with some short-run fluctuations). The growth has been especially pronounced in the last decade

⁷¹ U.S. Commercial Service. 2017. *Ukraine - Agricultural Sector*. [online]. <https://www.export.gov/article?id=Ukraine-Agricultural-Machinery>

⁷² Humanitarian Response. 2018. *Ukraine 2018 Humanitarian Needs Overview*. <https://www.humanitarianresponse.info/en/operations/ukraine/document/ukraine-2018-humanitarian-needs-overview-hno>

⁷³ Yalch et al. 2015. *Ukraine Wheat Report*. https://sites.duke.edu/minerva/files/2013/08/5.19.15_Russia-UkraineWheat-GVC_FINAL.pdf

because of its response to the demand from growing crushing industry. Better technologies, farm practices, management, production and post-harvest logistics investments have been the main reasons for improved yields. Still, the yield levels in Ukraine are far from reaching their potential, and they are far from the countries with high specific intensities, such as in Western Europe.

Fruit and vegetable production accounts for about 21.7 percent of the gross agricultural output, and people employed in the sector occupy approximately 25 percent of the jobs available in the agriculture sector. The fruit and vegetable sector of Ukraine has been growing in recent years. Supporting activities in this sector have included providing trainings for individual farmers to improve their competitiveness and improving relationships among different actors in the market.⁷⁴

Apples, cherries, pears and plums represent the major crops in the fruit subsector. The large export potential is almost untapped in Ukraine. In order to increase exports, large investments to improve productivity and reduce losses in the horticulture value chains are needed.

Milk production is still dominated by households, accounting for about 80 percent of total milk production, as compared to 24 percent in 1990. Some problems in the subsector are associated with milk quality and with difficulty to scale up production and guarantee a stable supply of high quality milk for the milk-processing industry, which is comprised of almost 200 enterprises. Dairy sector support has contributed to establishing cooperatives of individual farmers who, in this way, can form a relationship with larger-producing enterprises, one of the examples being Danone's collaboration with Heifer International.⁷⁵

The poultry sector of Ukraine has successfully recovered after the transition from the Soviet Union and turned into an export-oriented sector. Production of pork also has been growing in recent years. Although Ukraine imports some meat, it has good chances of becoming a net exporter, mainly due to abundance of grains for feed production.

Status of agro-processing sector development

Demand for ready-to-eat food, including sweets, cakes and crisps, as well as high-quality meat and fish products, has been recently growing, especially in large cities.⁷⁶ Despite strong competition from European suppliers, Ukraine's potential of agrifood chain development is very high, as food-processing companies will need to modernize their production.⁷⁷ Recent trends in the agro industry include the emergence of "agroholding" enterprises that consolidate smaller organizations.

Ukraine has a well-developed culture of cheese consumption. Cheese consumption has been increasing due to the growing popularity of foreign cuisines (Italian and French, among others) and efforts of producers to improve local cheese production.

⁷⁴ MEDA. *Ukraine Horticulture Business Development Project*. [online]. <https://www.meda.org/about-uhbdp>

⁷⁵ WTO. 2013. *AID for Trade and Value Chains in Agrifood*.

https://www.wto.org/english/tratop_e/devel_e/a4t_e/global_review13prog_e/agrifood_47.pdf

⁷⁶ FAO. 2014. *Eastern Europe and Central Asia Agro-Industry Development Country Brief, Ukraine*.

⁷⁷ U.S. Commercial Service. 2017. *Ukraine – Food Processing and Packaging*. [online]. <https://www.export.gov/article?id=Ukraine-Food-Processing-and-Packaging>

Value chain development activities

Some of the challenges remaining in the agriculture sector include the lack of traceability of meat products, outdated machinery, and difficulties with implementing food-safety standards. Value chain development is prioritized by FAO and several other organizations working on strengthening the country's agriculture sector. There is a lack of an extensive network for storing agricultural products, creating challenges in value chain efficiency: Only large enterprises have their own storage networks that allow for a production-storage-processing-selling system. Some activities in strengthening agricultural value chains have been conducted in the dairy subsector, the soya beans value chain, and the fruit and vegetable subsectors, among others. Another challenge that is yet to be overcome is the availability of affordable financing for agricultural enterprises in Ukraine.

Food loss and waste

A country report on the situation of food loss and waste, prepared in 2013 by the FAO, identified the main needs in the following priority agrifood chains: wheat (among cereals), potato (roots and tubers), apple (fruits and vegetables), pork (meat, fish and seafood) and milk and dairy products (milk and eggs).

The majority of losses were identified as happening in the initial stages of the value chain: damage and losses in harvest due to insufficient and outdated machinery, facilities without temperature and ventilation control (resulting in excessive losses of potatoes and apples), poor maintenance and feed regimes of cold storage and sanitized facilities for meat and milk production.

At later stages, including retail, the losses were lower, which in part was attributed to low penetration of food processing in the country. Fresh produce losses sold by household producers through local markets were estimated by the authors as rather high due to the absence of refrigeration and sanitation.

At the consumption level, waste was estimated as rather high due to high rates of discard and cleaning and due to the purchasing of milk products just before they perish.

A more detailed study of food losses and waste in specific subsectors would be beneficial to update the rates of losses and verify whether the situation has improved. Currently, there also are efforts in the country in the fisheries sector dedicated to improving the estimation of reduction of food losses and waste.⁷⁸

⁷⁸ FAO. 2017. *Украина учится оценивать продовольственные потери и пищевые отходы в рыбном хозяйстве*. <http://www.fao.org/europe/news/detail-news/ru/c/1027743/>

TURKEY AND CAUCASUS

Armenia

Agriculture and food systems in Armenia

Armenia is a lower-middle-income country in the Caucasus. More than 90 percent of the country has an elevation higher than 1 000 meters above sea level. Agricultural land accounts for about 70 percent of the total land base, with about half being attributed to pastures. Over 300 000 farms operate in the sector, with an average holding size of around 1.4 hectares per household. This does not allow for an efficient and diversified production system involving both crops and livestock. Livestock breeding is central to Armenian agriculture and contributes almost 40 percent of the country's GDP. Animal products – meat and milk – mainly come from the Gegharkunik and Shirak regions. Gegharkunik is also a well-known area for growing potatoes – about 47 percent of potatoes grown in Armenia comes from this region.

The production of almost all crops has increased since 2011, including the area under grains and leguminous plants. High yields were observed for potatoes, vegetables, watermelons and grapes in the Ararat region. In 2016, the country exported USD 23 million in tomatoes, USD 17 million in grapes, and USD 14 million in cheese and curd.⁷⁹ Membership in the Eurasian Economic Union has provided Armenia with direct access to the Russian, Belarusian, Kazakh and Kyrgyz markets.

The Government of Armenia and FAO have identified the following priority areas for the period of 2016–2020: sustainable use of natural resources, management and reduction of disaster risk, plant protection and food safety, food and nutrition security, and poverty reduction.⁸⁰ Raising efficiency and implementing modern technologies and approaches in agriculture also are priorities of the government and have been included in the Republic of Armenia's Second Poverty Reduction Strategy.

Stakeholder engagement in agriculture and value chain development

The Ministry of Agriculture both implements its own programmes and seeks international assistance to address different issues in improving agriculture sector performance. Several rural development funds have been set up in recent years with support of international donors. National farmer associations represent interests of their members in the country; examples include the Agrarian Farmers' Association of Armenia, the Farmers National Union and Armenian Association of Winemakers. The Association of Dried Food Producers of Armenia is active in expanding business operations and facilitating export. Out of a partnership with the United States Department of Agriculture (USDA), the following institutions have been established and are currently operating: Farm Credit Armenia, the International Center for Agribusiness Research and Education, and the Center for Agribusiness and Rural Development.

⁷⁹ WTO. 2016. *Armenia trade profile*. [online]. [Cited 16 November 2017].

<http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=AM>

⁸⁰ FAO. 2018. *FAO in Armenia*. [online]. <http://www.fao.org/armenia/en/>

AgroCredit Armenia supports the agriculture sector through providing financial services to farmers. There are also private-sector associations and non-governmental associations supporting value chain development in the country: Healthy Garden Cooperative, Fund for Rural and Agricultural Development in Armenia, and smaller ones such as Shen NGO and Ayele NGO. Several national and international retail chains, such as SAS, SuperStar and Carrefour, are present in the country.

Relevant activities and programmes in agriculture sector development

A variety of donor-sponsored projects and programmes aim at enhancing the business environment in Armenia. The “Small and Medium Entrepreneurship Development National Center of Armenia” Fund (SME DNC of Armenia) has operated since 2001. FAO is supporting the restoration of the Armenian viticulture sector. The International Finance Corporation and FAO are supporting projects in aquaculture-sector development. The World Bank supports the work on greenhouse crops exports.⁸¹ The USDA Marketing Assistance Project has established and developed over 60 food-processing enterprises, over 25 agricultural marketing consumer cooperatives, and 50 credit clubs, and it has helped to create Agricultural Support Centers in every region of Armenia.

Overview of the main crop and livestock subsectors

Wheat growing is concentrated in non-irrigated areas of the country. Wheat production, however, is characterized by rather low productivity.

Fruit and vegetable growing and processing is a well-developed industry in Armenia and is concentrated in the Ararat and Armavir regions, where irrigation is available. A variety of canned food, sweet jams (from apricots and peaches), tomato paste, and vegetable and juices is produced. Walnuts, fig, berry and other preserves are made using traditional technologies. Weak implementation of scientific principles in crop production (e.g. fruit and berry growing), however, is one of the weak characteristics of the sector.⁸² Greenhouse enterprises in Armenia produce and export vegetables (tomatoes and cucumbers), mushrooms, berries (strawberries), and cut flowers. The main export destinations are markets in the Russian Federation and other Commonwealth of Independent States countries.⁸³ Some losses in product quality are attributed to not enough focus being placed on the sorting and packaging of products and to troubles with selecting crop varieties.

The berry subsector has been described as experiencing complicated logistics and difficulties with irrigation.⁸⁴ In the apricot value chain, there are limitations associated with the short period for harvesting (a 25-to-30-day window). Another challenge for apricot production is associated with

⁸¹ International Finance Corporation. 2016. *Export supply chain of greenhouse crops in Armenia*. <http://documents.shihang.org/curated/zh/965341495523888285/pdf/115194-WP-IFC-600244-PUBLIC.pdf>

⁸² AGRICISTRADÉ. 2015. *Country Report: Armenia*. http://www.agricistrade.eu/wp-content/uploads/2016/07/Agricistrade_Armenia_rev.pdf

⁸³ International Finance Corporation. 2016. *Export supply chain of greenhouse crops in Armenia*. <http://documents.shihang.org/curated/zh/965341495523888285/pdf/115194-WP-IFC-600244-PUBLIC.pdf>

⁸⁴ EV Consulting. 2015. *Fruit and Vegetable Assessment*. Report presented to the AGRICULTURAL PROJECT IMPLEMENTATION UNIT (APIU).

not keeping the fruits in cool storage from when they have been transported by wholesale procurers to when they are transported further.

The winemaking sector has experienced a decline in vineyard territories in the period following privatization. However, grape production has been revitalized, leading to grape subsector output contributing to a quarter of the fruit production in Armenia. Armenian wine production has become a significant export item and has attracted investments in recent years.

Milk production and milk processing have increased significantly over the last decade. Former state-owned dairy factories were privatized during the 1990s, resulting in the formation of small enterprises. No single dairy processing company dominates the market. Milk production is fragmented, with the majority of milk coming from smallholders with two or three cows. Most milk in retail stores has a rather short shelf life (10–12 days), highlighting the importance of investing in the processing sector.

Livestock production has been described as continuing to experience some challenges, such as unsustainable pasture management, livestock diseases, low productivity and marketing constraints. Ninety-five percent of milk and almost 55 percent of meat in Armenia is produced locally. Wholesalers supply sides of meat to the retail market without adding value to the products. Poultry production is concentrated, with several large producers dominating the market and relying on imported feed.

The government agenda for the aquaculture sector includes promoting environmentally friendly production and the export of fish products. The sector still needs improvements in productivity, output quality and safety standards. Improving product competitiveness is crucial for greater access to export markets.

Status of agro-processing sector development

The agro-industry in Armenia comprises a very important sector in the country's economy. This sector is largely represented by small, private businesses created through the privatization process of the former state agro-processing enterprises.⁸⁵ There are approximately 1 600 food-producing companies in Armenia, with the majority focusing on dried fruit processing (350 companies), meat (68) and milk (65) processing. Thirty-five companies are active in the processing of fruits and vegetables. Overall, in the period 2011–2014, production of the main agricultural products, including meat, cheese, dairy and milk products as well as canned fruit and vegetables, has increased.⁸⁶ Some challenges still remain from this time, including limited rural infrastructure and depreciated machinery, lack of specialists (e.g. agronomists), and access to finance for small enterprises.⁸⁷

Value chain development activities

International organizations that are supporting value chain development activities in Armenia include FAO, the United Nations Development Programme, the World Bank Group, and others. Examples include wine sector development, greenhouse crops value chain assessment and development, and supporting the competitiveness of exporting companies.

⁸⁵ FAO. 2014. Agro Industry Brief for Armenia.

⁸⁶ Ministry of Agriculture of Armenia. 2015. Statistics on Agro-processing. [Cited 1 October 2017]. <http://minagro.am/>

⁸⁷ AGRICISTRADe. 2015. *Country Report: Armenia*. http://www.agricistrade.eu/wp-content/uploads/2016/07/Agricistrade_Armenia_rev.pdf

Food loss and waste

A report on food loss and waste in Armenia conducted in 2014 revealed that the cereals sector experiences around 15 percent losses, while losses in the roots and tubers sector were estimated at 19 percent. The lowest losses were reported in the fruit and vegetable sector. It was also highlighted that the cold chains are rather weak and contribute to food losses due to produce spoilage.⁸⁸

The main causes of food waste and loss were identified as outdated storage facilities and access to refrigerated storage and cold storage.⁸⁹ Farmers do not have sufficient funds to keep produce in commercial storage facilities. Instead, they often use poor storage techniques and insufficient know-how. Knowledge on post-harvest handling and treatment of agricultural products was also estimated as contributing to the situation with food losses. Some quality issues also have been highlighted as contributing to the rejection of produce by supermarkets.

⁸⁸ USAID. *Rapid Assessment of Value Chain Opportunities in Armenia*.

http://www.rciproject.com/rcicaucasusarmenia_files/Armenia_USAID_Rapid%20Assessment%20of%20Value%20Chain%20Opportunities_10.pdf

⁸⁹ http://www.fao.org/fileadmin/user_upload/Europe/documents/Publications/FLW/Armenia_en.pdf

Azerbaijan

Overview of the agriculture sector and food systems in Azerbaijan

The Republic of Azerbaijan is a lower-middle-income country in the Caucasus. Azerbaijan's rich agro-climatic conditions allow farmers to grow a variety of crops, from wheat to tropical fruits. The agriculture sector employs up to 40 percent of the population. After the transition of the country to the market economy, land privatization reforms were held, leading to land fragmentation and creating over 800 000 small farms. Although poverty in Azerbaijan is relatively low (4.9 percent in 2015), rising prices are affecting the purchasing power of the population.

Due to expanding oil and gas production and infrastructure as a consequence of the development of large-scale energy projects, investments have increased in large infrastructure projects. The government has also taken measures to improve the welfare of the population.⁹⁰

In the past ten years, the country has made progress in development of its economy. Agricultural exports constitute slightly above 5 percent of the total. Export commodities of the agriculture sector include raw sugar (USD 221 million in value in 2015), fresh fruit (USD 72 million), fresh and dried nuts (USD 69 million), and animal or vegetable fats and oils (USD 60 million).

The business environment in Azerbaijan has been estimated by the World Bank as favourable for beginning a business, registering property and protecting investments. However, in the agriculture sector of Azerbaijan, the level of foreign investments is not that high. The situation is similar in the food-processing sector. According to the World Bank's forecast, non-oil output will continue to grow at a slow pace due to limited credit growth and the still-weak business environment.⁹¹

Stakeholders engaged in agriculture and value chain development

The United States Agency for International Development, the World Bank and the German Agency for International Cooperation are among the donor organizations that are leading development programmes targeted at agriculture sector development. USAID is helping the country to diversify and strengthen its economy by targeting assistance in the agriculture sector.⁹² Specifically, USAID is helping local businesses and farmers increase the productive efficiency and quality of their products and address issues of food safety, storage and competitiveness.

FAO's support of the development of the agriculture sector in the country focuses on six priority areas that include the promotion of women's representation in rural organizations and income-generating activities for rural women as a cross-cutting issue. These six priority areas are animal health and plant protection; supporting investments in agriculture, food security and rural development; capacity development, including agricultural education, research and extension; strengthening the policy and institutional framework for agriculture and rural development;

⁹⁰ AGRICISTRADe. 2015. *Country report: Azerbaijan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Azerbaijan.pdf

⁹¹ The World Bank. 2017. *The World Bank in Azerbaijan*. [online]. [Cited 14 November 2017]. <http://www.worldbank.org/en/country/azerbaijan/overview#3>

⁹² USAID. *Azerbaijan profile*.

https://www.usaid.gov/sites/default/files/documents/1863/Country_Profile_Azerbaijan_final.pdf

improvements in crop, fisheries and livestock production; and sustainable, equitable and efficient forestry, land and water resource management.

The National Agricultural Research System includes 20 institutes in total. Other state agencies, such as the State Service on Management of Agricultural Products and Credits and others, are supporting development of the sector. Producers' associations are active in the country in various subsectors, such as hazelnuts and honey. Extension service providers include regional advisory services as well as regional offices of the Ministry of Agriculture. Advisory services provided by private companies (e.g. Ganja Agribusiness Association) and non-governmental organizations are also available to farmers.

Relevant activities and programmes in agriculture sector development

The World Bank is leading activities on improving financing modalities in the agriculture sector. A dairy chain development project is in preparation. The German Agency for International Cooperation is supporting the development of the wine and non-alcoholic beverage sectors. The European Union is funding project activities dedicated to the development of the tomato, honey, grape, pomegranate and onion value chains, among others.

Overview of the main crop and livestock subsectors

Mainly wheat, barley, rice and corn are grown as grain crops, and peas, lentils, beans and others are grown as leguminous crops in Azerbaijan. Both the production and production efficiency of wheat have increased over the past ten years in Azerbaijan. However, small land parcels, outdated equipment and inadequate irrigation are often characteristic of the wheat subsector. Rice production is profitable, but its production is limited due to water availability. Corn and barley are grown for animal feed, with feed mills operated mostly by larger farmers.

The fresh fruit and vegetable sectors were estimated as viable; apples, cherries, persimmons, pomegranates, greenhouse vegetables, kiwi and feykhoa are produced in high volumes and are destined for local markets and export. The quality and quantity of produce varies but can be addressed through adoption of improved production methods and value chain development.

Hazelnut production in Azerbaijan is quite developed, as is the hazelnut-processing industry. This subsector has potential for organic production development. The production of table grapes in Azerbaijan has recently increased; 151 000 tonnes of grapes were produced in Azerbaijan in 2012, 30 percent more than in 2008 and 10 percent more than in 2011 due to an intensive governmental vineyard restoration programme (aiming at reviving and modernizing the Azerbaijani wine industry).

During recent years, production of all types of cattle and poultry meat has increased in Azerbaijan.⁹³ The demand for poultry and beef and veal meat is mainly provided by local production, while more than 25 percent of milk is imported. The dairy sector was described by several reports as underdeveloped, but investments into the sector are planned by the World Bank. The poultry sector is represented by large-scale agro-holdings, with some middle-sized producers who sell their products on local markets. Sheep breeding is developed in Azerbaijan and, especially after independence, this sector has become one of the most developed. Regarding

⁹³ Government of Azerbaijan. 2015. Livestock Production and Processing. [online]. <http://www.agro.gov.az/en/heyvandarlıq-mhsulların-istehsal-v-ema>

beef and veal production, actions were taken to enhance artificial insemination of livestock animals in order to improve the breed composition of cattle; additionally, more productive animals were brought into the country and sold to farmers under suitable leasing terms. Geographically, the region around Baku specializes in livestock production. Livestock products and slaughtered animals are mainly sold by smallholder farmers to intermediaries. This is the main selling mechanism of small-scale farms. In big farms, the product (mainly poultry meat and eggs) is sold to wholesale and retail centres.

Status of agro-processing sector development

The main producers of perishable agricultural products are the small-scale farms.⁹⁴ According to the country report, small farmers have limited independence in terms of export.⁹⁵ They act through intermediaries, processing enterprises and other logistic chains due to the absence of their own storage facilities. However, the report notes that new wheat, fruit and vegetable storage facilities have been built. The authors suggest that improvements are needed in transportation and other services. Several other sources also note that there is potential for further development in the food-processing industry.

Azerbaijan's agro-processing sector produces a wide variety of products, including fresh and processed items with strong brand recognition in post-Soviet markets.⁹⁶ Fruits and vegetables are marketed as fresh products, which requires well-established commercial channels and the availability and accessibility of cold storage facilities. Azerbaijani dried fruits and canned, flavoured peanuts also have a recognized brand in post-Soviet countries; therefore, further improvements are envisaged in the processing industry to improve production volume for export.⁹⁷

Value chain development activities

A value chain gap analysis conducted by the FAO Regional Office for Europe and Central Asia has concluded that value chain development activities have been increasingly targeting major agricultural subsectors.⁹⁸ In the livestock sector, for example, value chain activities are supporting various activities, from input supplies to marketing, that involve improved forage, better nutrition of livestock, artificial insemination and the development of irrigation infrastructure for pastures and grassland.

An AGRICISTRADe report notes that the intervention of mediators (dealers) is very active in the supply chain.⁹⁹ Mediators include collectors and distributors in the stage of producing areas, consigned wholesalers in wholesale markets, and ordinary merchants in traditional retail markets.

⁹⁴ AGRICISTRADe. 2015. *Country report: Azerbaijan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Azerbaijan.pdf

⁹⁵ *ibid*

⁹⁶ U.S. Commercial Service. 2016. *Export.gov*. [online] [Cited 18 October 2017]. <https://www.export.gov/>

⁹⁷ *Ibid*.

⁹⁸ FAO. Forthcoming. Value chain gap analysis report on Azerbaijan.

⁹⁹ AGRICISTRADe. 2015. *Country report: Azerbaijan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Azerbaijan.pdf

Food loss and waste

The reduction of food losses is an important component of agricultural value chain development. Improving infrastructure, including the addition of new storage facilities, and improving farmers' knowledge on reducing post-harvest losses, adopting new technologies and techniques, should help minimize losses in the agro-processing sector and enhance the competitiveness of agricultural products in Azerbaijan. The AGRICISTRADO report noted that establishing storage houses, elevators and refrigerated storage facilities is important to develop the food-processing industry and to improve the current state of grains, fruits and vegetables, and meat products.¹⁰⁰

¹⁰⁰ AGRICISTRADO. 2015. *Country report: Azerbaijan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Azerbaijan.pdf

Georgia

Overview of the agriculture sector and food systems in Georgia

Georgia is a lower-middle-income country in the Caucasus region, and its location makes it a strategic logistics and transit hub at the crossroads of Europe and Asia. Farming systems in the country vary according to climatic zones. Non-irrigated areas are primarily used for livestock rearing and for rain-fed cereal crops, while production in irrigated areas is concentrated on growing fruits and vegetables. The economy has been growing steadily in recent years, but it has been affected by the conflict between the Russian Federation and Ukraine and related international sanctions that have lowered commodity prices. Georgia's economy grew at a relatively low rate of 2.9 percent in 2015 and 2.7 percent in 2016.¹⁰¹ One of the major issues remaining involves infrastructure, in particular the connectivity of rural areas to regional centres.

More than 640 000 agricultural holdings exist in Georgia. Small, fragmented family farms dominate the agriculture sector. In most cases, they are involved in subsistence agriculture. These holdings are characterized by small-size production, a lack of modern technologies, and difficulties in entering the market. Only around one-fifth of the holdings produce cash crops. Since the collapse of the Soviet Union, the country's agriculture sector has recovered at an average rate of 0.6 percent per year (since 2001). The main agricultural products in Georgia are maize, potato, wheat, barley, vegetables and fruits (grapes, citruses, apples, hazelnuts) and livestock (cattle, sheep and goats, pigs, poultry).

Relatively few of the loans are related to agricultural activity (e.g. primary production or processing).¹⁰² This can be attributed to the high fragmentation of the land. The Strategy for Agricultural Development in Georgia 2015–2020 aims to create an environment that will increase competitiveness in the agrifood sector, promote stable growth of high-quality agricultural production, ensure food safety and security, and eliminate rural poverty through sustainable development of agriculture and rural areas. FAO's support in Georgia is focusing on empowering smallholders and family farms, agrifood trade and market integration in Europe and Central Asia as well as strengthening food security and nutrition, natural resource management (including fisheries and forestry), and control of animal and plant pests and diseases and food safety hazards.

Stakeholders engaged in agriculture and value chain development

A number of public and private stakeholders are supporting agricultural development in the country. The Georgian Farmers Union and Georgian Farmers Association are representing the interests of their members and partnering in several international projects. The European Union's support in encouraging the cooperation of small farmers is primarily channelled through non-state actors (e.g. the European Neighbourhood Programme for Agriculture and Rural

¹⁰¹ U.S. Commercial Service. 2017. *Georgia – Market Overview*. [online]. [Cited 14 September 2017]. <https://www.export.gov/article?id=Georgia-Market-Overview>

¹⁰² Pellillo A., Kochlamazashvili I. & Kakulia N. 2014. *Agriculture and Rural Development in Western Georgia: A Baseline Assessment*. ISET Policy Institute, Tbilisi, Georgia. <http://enpard.ge/en/wp-content/uploads/2015/05/Agriculture-and-Rural-Development-in-Western-Georgia-A-Baseline-Assessment.pdf>

Development project currently being implemented by FAO). Oxfam, Mercy Corps, Care, People in Need and the United Nations Development Programme offer capacity building and complementary investment support to selected small-farmer cooperatives in different regions of the country. The United States Agency for International Development, through such efforts as its Restoring Efficiency in Agricultural Production project, has targeted improving the competitiveness of Georgian agriculture. There also are organizations providing training services for farmers. The Georgian National Investment Agency is coordinating the financing streams into the country. A National Investment Fund recently established in the country is focusing on projects in the production of dairy, beef and pork, wine, and fruits and vegetables to increase import substitution and provide long-term funding.

Relevant activities and programmes in agriculture sector development

Within the ENPARD project, a number of activities are dedicated to improving the efficiency of the development of agricultural value chains in several subsectors. Significant investments in the country are also being made in the wine sector. For high-value crops such as hazelnuts, several private-sector partnerships have been developed, e.g. with Ferrero, a large chocolate producer. Perdue, from the United States of America, has invested in the poultry sector. HiPP, from Germany, has invested in fruit and juice production, and Wimm-Bill-Dann, from the Russian Federation, has invested in dairy production. Assessments have been conducted in the honey, tea, trout, walnut, potato and vegetable sectors to evaluate their effectiveness and develop recommendations for their improvement. USAID has supported horticulture in the country via the Economic Prosperity Initiative.

Overview of the main crop and livestock subsectors

A wide variety of high-value agricultural products are grown in Georgia, including grapes (table and that are used for wine), nuts (hazelnuts, almonds, walnuts and chestnuts), citrus fruits, apples, peaches, and apricots. However, the crop sector still experiences low productivity attributed to limited technological innovation, insufficient availability of credit, crop damage, absence of efficient crop rotation, lack of quality seeds, and poor-quality inputs.

Cereal grains are mostly represented by wheat and are grown in areas that do not require irrigation. Wheat comes second after maize in terms of the share of the total sown and harvested area. Over the past eight years, maize accounted for 47 percent of sown and harvested areas of annual crops on average, with no significant fluctuations. In 2013, wheat accounted for 15 percent of the total annual sown area.¹⁰³ Wheat productivity remains relatively low compared to some of the least-developed countries. Corn flour is one of the staple foods in Georgia. In the Imereti region, there are approximately 15 large corn producing enterprises that sell 100 percent of their corn.¹⁰⁴ The majority of them own agricultural machinery and are using German, French and American hybridized types of corn seeds to earn a high-quality harvest.

Potato is also among Georgia's major staple and cash crops. The area under potato cultivation occupies approximately 30 000 ha per year, but productivity remains rather low. With a productivity of the potato yield ranging from 8.9 to 12 tonnes/ha, Georgia's potato yield is only

¹⁰³ AGRICISTRADÉ. 2015. *Country Report: Georgia*. http://www.agricistrade.eu/wp-content/uploads/2015/05/Agricistrade_Georgia.pdf

¹⁰⁴ ENPARD. 2015. *Corn production – Agricultural Value Chain in Imereti and Racha regions*. http://enpard.ge/en/wp-content/uploads/2015/05/Corn_Market-Assessment_AYEG_ENG.pdf

three to four times higher than the seed rate. Poor seed quality is one of the main reasons for low production; this became more acute following the collapse of the Soviet Union and the consequent disruption of seed production and trade.¹⁰⁵ The other reasons for low productivity are late blight (*Phytophthora infestata*), poorly adapted cultivars and poor husbandry practices at the farmer level.

Horticulture

There are many different kinds of fruit grown in farms and household holdings, but only a few of them reach industrial-scale production.¹⁰⁶ Most are consumed in households, and only a small part is put on the market. The production of permanent crops in Georgia is dominated by grapes, due to the favourable natural conditions and a long-standing tradition of winemaking. The Kakheti region represents the main region for the production of grapes. Tangerines and apples are also among the top three permanent crops in terms of the volume of production.

The ENPARD project's analysis revealed a potential for expanding the production and processing of berries in the Imereti and Racha regions, where currently no processing factories exist.¹⁰⁷ The study showed that berry farming was developing quickly in the Imereti region as market demand has risen.

Tea plantations are being replaced by other crops (e.g. hazelnuts, blueberries and kiwi), given that producers are receiving higher prices for these commodities. Analysis of the Georgian tea sector suggested that reviving tea production and processing could bring significant economic and social benefits to western Georgia's rural communities.¹⁰⁸ The sector could also play a role in alleviating rural poverty by providing families with steady jobs and livelihoods.

The livestock sector is a priority area for the development of the agriculture sector in Georgia, as it provides opportunities for generating employment, raising rural incomes and improving food security. However, the main problem in the livestock sector is low productivity (FAO, 2015).¹⁰⁹

There are several meat-processing plants in the region (e.g. Gurmani Ltd. in Kutaisi) producing various complete and half-finished products.¹¹⁰ Their price generally exceeds the beef price by 20 to 50 percent, depending on the type of manufactured products and ingredients used. Pork, which costs approximately 15 percent less, is also used together with beef in the production process.

The majority of family holdings that are involved in cattle breeding follow traditional rearing approaches.¹¹¹ Most family holdings are involved in milk production, and some produce dairy products and meat. The ENPARD study concluded that improving and upgrading the dairy

¹⁰⁵ International Potato Center. 2010. *Strengthening the potato seed system in Georgia: preliminary results*.

<http://cipotato.org/wp-content/uploads/2014/08/005387.pdf>

¹⁰⁶ ENPARD. 2015. *Fruit processing – Agricultural Value Chain in Imereti and Racha region*.

http://enpard.ge/en/wp-content/uploads/2015/05/Fruit-procesing_MA_-AYEG_ENG.pdf

¹⁰⁷ ENPARD. 2015. *Berry farming – Agricultural Value Chain in Imereti and Racha regions*.

http://enpard.ge/en/wp-content/uploads/2015/05/Berry-Farming_MA_-AYEG_ENG.pdf

¹⁰⁸ ISET Policy Institute. 2015. *The Georgian Tea Sector: A Value Chain Study*. http://enpard.ge/en/wp-content/uploads/2015/05/TeaValueChainAnalysis_ENG.pdf

¹⁰⁹ FAO. 2015. *Global Strategy to Improve Agricultural and Rural Statistics – Report of in-depth country assessment*.

http://www.fao.org/fileadmin/templates/rap/files/Project/Global_Strategy_Country_Pages/Georgia/IdCA_Report_Georgia.pdf

¹¹⁰ ENPARD. 2015. *Beef production – Agricultural Value Chain in Imereti and Racha regions*.

http://enpard.ge/en/wp-content/uploads/2015/05/Market_Assessment__Beef__AYEG_ENG.pdf

¹¹¹ ENPARD. 2015. *Milk and dairy – Agricultural Value Chain in Imereti and Racha regions*.

http://enpard.ge/en/wp-content/uploads/2015/05/Market-Assessment_Dairy_AYEG_ENG.pdf

product value chain would bring advantages to the dairy sector, in particular to smallholder farmers.

Fisheries sector: Almost no Georgian farms specialize in trout processing.¹¹² As a result, only live (or fresh) trout is sold on local markets. Similarly, due to a lack of proper technology, facilities and processing capabilities, Georgian farmers only export live trout. One of the constraints that were identified by the authors of the study is the lack of modern technology and processing facilities, which limits farmers' ability to differentiate their produce. Additionally, the absence of professional veterinary care and disease prevention services leaves farmers exposed to substantial losses.

Honey production in Georgia is concentrated among small- and medium-scale apiarists.¹¹³ Production and marketing practices are usually rather basic and do not follow economies of scale. Productivity levels are low, due to improper feeding practices and inadequate measures against diseases and pests. Honey production costs were described as high, which – along with uncompetitive pricing strategies – made the products less competitive. Value addition is also very limited.

Status of agro-processing sector development

The agro-processing sector is growing steadily, with a proliferation of Georgian-brand products – wine, beer, dairy, nuts, sausages, fruit juices and mineral waters – filling local stores and beginning to find new export markets.¹¹⁴ Some of the challenges remaining in the sector include continued use of existing processing plants remaining in the country from the Soviet period, which utilize equipment that does not provide high productivity or technical safety.

The ENPARD project's assessment of agribusiness in the country, completed in 2016, made several recommendations.¹¹⁵ It was suggested that both the livestock and crop sectors would benefit from increasing the availability of qualified agronomists and veterinarians (for the livestock holders). Introducing high-productivity breeds of livestock also was highlighted as an important measure to increase productivity in the sector. Improving machinery services would benefit crop production and reduce the erosion of hayfields. Farmers involved in both crop and livestock sectors were in need of training.

Regarding agro-processing in particular, the recommendations included supporting agribusiness initiatives and facilitating the establishment of new food-processing and marketing enterprises. Supporting the creation of cooperatives among small- and medium-sized farmers was highlighted, along with increasing the availability of financing modalities for agribusiness enterprises.

¹¹² ISET Policy Institute. 2016. *The Georgian Trout Sector: A Regional Value Chain Study*. http://enpard.ge/en/wp-content/uploads/2015/05/TroutValueChainAnalysis_ENG.pdf

¹¹³ Javakhishvili, I. 2015. *Honey Value Chain*. Rural and Agricultural Policy and Development Institute. <http://enpard.ge/en/wp-content/uploads/2015/05/HoneyValueChain-ENG.pdf>

¹¹⁴ U.S. Commercial Service. 2017. *Georgia – Food Processing and Packaging*. [online]. [Cited 10 September 2017]. <https://www.export.gov/article?id=Georgia-FoodProcessing-and-Packaging>

¹¹⁵ ENPARD. *Strong Rural Economy for Better Life!* <http://enpard.ge/en/wp-content/uploads/2015/05/Overview-of-ENPARD-Phase-I.-Strong-Rural-Economy-for-Better-Life.-Eng1.pdf>

Value chain development activities

The ENPARD project supports the development of agricultural value chains in the country in several subsectors. Private-sector partnerships involving foreign investors are also contributing to value chain development and have been successful in the hazelnut, dairy, and fruit and juice sectors. Post-harvest management improvements and support for the development of processing facilities are included under the priority area of value chain development within the FAO Country Programming Framework. Other aspects of value chain functioning, such as questions of agricultural food imports from other countries, food processing and storage, and financing and insurance, were suggested as factors to be taken into consideration for the functioning of agriculture.¹¹⁶

Food loss and waste

The rejection of certain products and the loss of potential higher income (if not utilizing the added-value component) remain challenging for Georgian agriculture. An assessment made within the ENPARD project in 2016 identified that the most common causes for losses included:

- lack of awareness among farmers and processors on good agricultural practices, good handling practices, and post-harvest management skills;
- lack of knowledge about new technologies, coupled with lack of access to technology;
- lack of readiness to manage the effects of unexpected and drastic changes of temperature;
- lack of efficient market linkages;
- lack of proper packaging materials at farm level or at aggregation centres (leading to damages and microbial contamination of fresh fruits and vegetables); and
- lack of regulated and functioning cold chain and storage and warehouse facilities for apples and citrus fruits. Causes and symptoms of this high of losses haven't been investigated.

Further work on the reduction of losses will focus on including post-harvest management improvement activities into the value chain development within the ENPARD project and other projects.

It was recommended that the activities in the supply chains focus on the following subsectors: citrus fruits, mainly mandarins (due to high perishability and high rate of losses); vegetables (due to their importance to small farmers' food security); hazelnuts (due to their high losses and potential for export) and potatoes (due to their high losses and importance for food security and income for smallholders).

¹¹⁶ ZEF. 2013. *Workshop report: 'Knowledge gaps and knowledge flows in agriculture in Georgia'*. https://www.zef.de/uploads/tx_zefportal/Publications/ashtaltovna_download_Scientific%20WSTbilisi_130417.pdf

Turkey

Overview of the agriculture sector and food systems in Turkey

Turkey is an upper-middle-income country in Eastern Europe and Western Asia. Arable lands represent about 40 percent of the total land area, allowing for cultivation of grains, pulses, oil seeds, fruits and vegetables, cut flowers, poultry, dairy products, and honey. Turkey's traditional agriculture sector accounts for about 25 percent of employment and contributes to 7 percent of the country's gross domestic product. The sector's financial contribution to the overall GDP increased 40 percent from 2002 to 2016, reaching USD 52.3 billion in 2016.¹¹⁷

Turkey is the world's seventh-largest agricultural producer overall and is the world leader in the production of dried figs, hazelnuts, sultanas/raisins, and dried apricots. The country is also one of the leading honey producers in the world. Turkey boasted production of 18.5 million tonnes of milk in 2016, making it the leading milk and dairy producer in its region. The country also saw production totals of 35.3 million tonnes of cereal crops, 30.3 million tonnes of vegetables, 18.9 million tonnes of fruit, 1.9 million tonnes of poultry, and 1.2 million tonnes of red meat.¹¹⁸

In 2016, the country exported bread and pastry worth USD 887 million, USD 745 million in plants and plant parts (otherwise preserved), USD 1.375 million in nuts (including fresh and dried), USD 894 million in citrus fruit (fresh or dried), and USD 1.078 million in wheat.¹¹⁹

Through the widespread presence of modern international and domestic grocery retail outlets as well as rising incomes, the consumption patterns of Turkish consumers have shifted away from bulk and raw foods towards packaged and processed foods, including ready-to-eat meals and frozen foods.

In a country that has been a primarily agrarian one for many years, social and economic circumstances have created the medium for agricultural cooperatives to emerge and proliferate.¹²⁰ Some of the challenges that the agriculture sector is still facing include cold storage capacity and deficiencies of packing houses.

Stakeholders engaged in agriculture and value chain development

The Ministry of Food, Agriculture and Livestock and the Ministry of Science, Industry and Technology are the main state bodies for agriculture and agro-industry in Turkey. A number of supporting institutions have been established in Turkey: the Food Institute; the Scientific and Technological Research Council of Turkey; the Entrepreneurship Council (consisting of business NGOs and ministries); the Small and Medium Enterprise Development Organizations; the Market Surveillance and Product Safety Evaluation Board; the Sugar Authority; and the Guarantee Fund Corporation (to facilitate access to finance for small and medium enterprises). Important associations for food production and processing are: the Turkish Food and Drink Industry Federation; Vegetable Oils & Fats Industrialists Association; Tomato Paste Exporters

¹¹⁷ Republic of Turkey Prime Ministry Investment Support and Promotion Agency. *Invest in Turkey*. <http://www.invest.gov.tr/en-US/sectors/Pages/Agriculture.aspx>

¹¹⁸ Ibid.

¹¹⁹ WTO. 2016. Turkey trade profile.

¹²⁰ Okan, N.D. & Okan, C. 2013. *An overview of cooperatives in Turkey*. FAO. <http://www.fao.org/3/a-ar427e.pdf>

and Manufacturers Association; Dairy, Meat, Food Industrialists and Producers Union; Agricultural Products, Cereals and Pulses Processing and Packaging Industrialists Association; Organic Product Producers and Industrialists Association; the Feed Millers Association; and the Poultry Meat Producers and Breeders Association. The Turkish Farmers Union and Turkish Seed Industry Association are also among the stakeholders active in the country. International donor organizations have been providing assistance to the country to support the agriculture centre; examples include technical assistance from FAO and the World Bank as well as, more recently, emergency assistance provided by the World Food Programme and several others.

Relevant activities and programmes in agriculture sector development

FAO's cooperation with Turkey is guided by three priorities: food security and food safety, with a view to improving food quality and safety at all stages in the food chain; sustainable use of natural resources and raising awareness on climate change impacts; and institutional capacity enhancement by providing technical assistance for strengthening farmer organizations, developing training programmes for institutions, and developing national and international agricultural data for more effective decision making. IPARD II has been developed to support some elements of strengthening the agriculture sector in Turkey, focusing on investments in agricultural holdings, investments concerning marketing and processing of agricultural and fish products, and farm diversification and business development.¹²¹

Overview of the main crop and livestock subsectors

Turkey is self-sufficient in a lot of foods, although some agricultural commodities are imported.

The main region of wheat and barley production is Central Anatolia. Wheat is produced on small-scale family farms, which tend to be very fragmented. These farms tend to allocate a portion of their wheat production for home consumption. Wheat enters the market via one of three channels: through a trader or processing industry, through the Turkish Grain Board, or through the Cereals Stock Exchange. Many farmers in Turkey are now trying to increase yields; new technologies, such as subsurface irrigation, are becoming popular.¹²² Corn is also gaining popularity among farmers in Turkey. High returns, government support and availability of irrigated land are among the contributing factors. The Government of Turkey also supports rice cultivation with production premium programmes. The consumption of wheat is high, as bread remains the staple food for the population.

The horticulture sector in Turkey is represented by the strong role of vegetable production, and tomatoes in particular.¹²³ Watermelons and melons account for 12.5 percent of overall fresh fruit and vegetable production, while citrus fruit (oranges, tangerines and lemons) represent 9.3 and grapes represent 8.6 percent, according to the Turkish Ministry of Economy.

The meat and dairy subsectors are important for the domestic demand in livestock products. The dairy industry accounts for about half of the share of the total livestock production industry in

¹²¹ IPARD. 2016. *What is IPARD Programme?* [online]. <http://www.ipard.gov.tr/prog-en>

¹²² Karabina, K. . 2017. *Turkey Grain and Feed Annual Report*. USDA Foreign Agricultural Service. https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Ankara_Turkey_3-29-2016.pdf

¹²³ Ministry of Economy of Turkey. 2017. *Fresh Fruits and Vegetables in Turkey*. <https://www.economy.gov.tr>

Turkey.¹²⁴ Because of its importance, in order to improve milk yield in Turkey, the Ministry of Food, Agriculture and Livestock has been working on animal improvements through genetic studies and importing high-quality genetics.

Status of agro-processing sector development

According to McKinsey and Co., Turkey offers significant investment opportunities in agribusiness subsectors such as fruit and vegetable processing, animal feed, livestock, poultry, dairy, functional food, fisheries, and enablers (in particular cold chain distribution, greenhouses, irrigation, and fertilizers).¹²⁵

Important subsectors include the pastry and milling industry, biscuits, processed fruit and vegetable products, sugar and confectionery, chocolate and cocoa products, vegetable oil, meat and meat products, pulses, tobacco products, tea products, non-alcoholic drinks, ready-made food and baby food.

Value chain development activities

Current problems that impede the strengthening of agricultural value chains include non-institutionalised organization, low levels of education, lack of capital, lack of access to market data (price, production, demand, etc.), scarcity of statistical data regarding smallholders, lack of production with packages and brand, and lack of competition as a result.¹²⁶ Agricultural cooperative development is being actively supported by state actors. For smallholder producers, marketing of their produce remains an obstacle.

Food loss and waste

An assessment of the scale of food waste and loss in Turkey was performed in 2013 by FAO. Some of the critical loss points were identified as poor levels of cooperation and small size and fragmentation among primary producers.¹²⁷ Losses at the agricultural production stage are mainly associated with farmers' traditional methods, habits and practices. More specific studies have also looked at post-harvest losses in tomato and fresh bean production in the Tokat province of Turkey.¹²⁸ Improving the handling of oranges also has been addressed regarding the need to optimize the process of dumping, cleaning, packing, sorting, etc. to minimize price losses.¹²⁹

Preventing bread waste in Turkey has been addressed in a campaign that resulted in 384 million loaves of bread being saved from being thrown away. The campaign contributed USD 1.4 billion to the economy of Turkey. Findings of a regional study on Turkey from the Standing Committee

¹²⁴ USDA Foreign Agricultural Service. 2016. *Milk surplus in Turkey*.

¹²⁵ Republic of Turkey Prime Ministry Investment Support and Promotion Agency. *Invest in Turkey*. <http://www.invest.gov.tr/en-US/sectors/Pages/Agriculture.aspx>

¹²⁶ Aytac, M. & Ekmen, E. 2015. *Promoting Agricultural Value Chains in Turkish Agriculture*. Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation. <http://www.comcec.org/wp-content/uploads/2015/11/Turkey2.pdf>

¹²⁷ http://www.fao.org/fileadmin/user_upload/Europe/documents/Publications/FLW/Turkey_en.pdf

¹²⁸ Buyukbay, E.O., Uzuno, M. & Bal, H.S.G. 2011. *Post-harvest losses in tomato and fresh bean production in Tokat province of Turkey*. Scientific Research and Essays Vol. 6(7). http://www.academicjournals.org/article/article1380638252_Buyukbay%20et%20al.pdf

¹²⁹ Kabas, Ö. Post-Harvest Handling of Orange. Bat Akdeniz Agricultural Research Institute, Antalya, Turkey.

for Economic and Commercial Cooperation of the Organization of the Islamic Cooperation revealed that losses in vegetable production were quite high, constituting 33 percent of total post-harvest losses: 8 percent during handling and storage, 10 percent during processing and packaging, 10 percent at the distribution stage, and 5 percent in household consumption.¹³⁰ Above 10 percent of total post-harvest losses were also observed for oilseeds, potatoes and tubers, and cereals. An update on the current status of food loss and waste and development of further solutions would be beneficial for addressing the problem of food loss and waste in Turkey.

¹³⁰ Republic of Turkey Ministry of Food, Agriculture and Livestock. 2016. *Reducing Post-Harvest Losses in Turkey*. <http://www.comcec.org/wp-content/uploads/2016/10/8-AGR-PRE-10.pdf>

CENTRAL ASIA

Kazakhstan

Overview of the agriculture sector and food systems in Kazakhstan

Kazakhstan is an upper-middle-income country situated in the centre of Eurasia. Kazakhstan has limited connections to waterways for trade. According to the World Bank, external demand from China and the Russian Federation, the country's key trading partners, as well as global oil demand and prices, remain the key external factors impacting Kazakhstan's economy.

Although Kazakhstan has large areas of fertile land, the country suffers from environmental issues such as water scarcity and harsh climate conditions. Moreover, important structural challenges affect its agricultural development; examples include weak integration of domestic food chains, poor access to external markets, and low credit resources. Kazakhstan's agricultural exports mainly consist of wheat, flour and vegetable oil.

Agricultural formations in Kazakhstan are divided into large agricultural enterprises, peasant farms and household farms.¹³¹ Farmers raise sheep and cattle, and livestock products include dairy goods, leather, meat and wool. The country's major crops are wheat, barley, cotton and rice, with wheat exports a major source of hard currency. Kazakhstan is one of the top ten grain exporters in the world, exporting to over 70 countries. The International Grains Council forecasts wheat production in Kazakhstan for 2016–2017 as 13.5 million tonnes.¹³²

Recent policy changes include encouragement by the government for the formation of agricultural cooperatives.¹³³ However, some of the remaining challenges include addressing problems related to the country's competitiveness and economic diversification, its over-reliance on the extractive sector, continued corruption, and the need for increased transparency and rule of law.

The Strategic Plan for Development of the Republic of Kazakhstan until the Year 2020 identifies agriculture and the food-processing industry as key areas for economic diversification and food security – in particular, agricultural exports, increased labour productivity and the processing of meat, milk, fruits and vegetables.

Stakeholders engaged in agriculture and value chain development

The main state bodies related to agriculture and agro-industry development in the Republic of Kazakhstan are the Ministry of Agriculture and the Ministry of Industry and New Technologies. A number of other public and private actors support the sector's development, including the Center for Sustainable Production and Consumption, Kazakh National Agrarian University and others. The Union of Food Products Producers of Kazakhstan represents members, along with support provided by the National Chamber of Entrepreneurs "Atameken". Several international

¹³¹ AGRICISTRADÉ. 2015. *Country Report: Kazakhstan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Kazakhstan.pdf

¹³² U.S. Commercial Service. 2017. *Kazakhstan - Agricultural Sector*. [online]. <https://www.export.gov/article?id=Kazakhstan-Agricultural-Sector>

¹³³ Lyddon, C. 2016. *Kazakhstan*. World-Grain.com. <http://www.world-grain.com/Departments/Country-Focus/Country-Focus-Home/Kazakhstan-2016.aspx?cck=1>

donor organizations, such as FAO, the United States Agency for International Development, the World Bank and the Asian Development Bank are supporting reforms and projects in the country targeted at structural changes in the economy and the enhancement of overall competitiveness of the agriculture sector in order to decrease the country's dependency on oil trade.

Relevant activities and programmes in agriculture sector development

FAO's assistance in Kazakhstan focuses on five priority areas: food safety and organic food production; animal health and livestock production; pasture and phytosanitary management; sustainable natural resource management, with a view to strengthening national capabilities and enhancing policy dialogue and regional cooperation; and fisheries and aquaculture, with support focused on the responsible management and conservation of fisheries resources as well as information technologies for agricultural statistics and related data collection and analysis.

Overview of the main crop and livestock subsectors

The major players in the market of the grain industry are vertically integrated holdings, whose structure includes production and processing of grain and marketing of products.¹³⁴ Within the cereals group, wheat and barley are of the greatest economic importance in terms of employment generation, contribution to foreign exchange, impact on smallholder producers, share in agricultural production of the country and involvement of processing and marketing activities.

To diversify the grain sector, there is a need for support for the changing of crop rotations, development of related industries and processing (e.g. livestock and fodder production), development of new marketing channels for grain (e.g. interstate projects), and overall development of and access to storage infrastructure, as well as transport infrastructure development for all value chains.

The largest enterprises in the processing of sunflower seeds are leading manufacturers in every region of the country. Existing capacities of the major companies in Kazakhstan for sunflower oil production can process up to 740 000 tonnes of sunflower seeds to get up to 300 000 tonnes of oil. However, virtually all businesses do not operate at full capacity due to lack of the necessary volume of oilseeds.

Horticulture: The main vegetables produced in Kazakhstan include cabbages, carrots, cucumbers, onions, peppers and tomatoes. The main fruits produced in Kazakhstan are apples, apricots, cherries, grapes, pears and plums. The highest proportion (59 percent) of fruit and vegetable production is concentrated in the Almaty region, and significant portions of the total output are produced in the South Kazakhstan region (20 percent) and the Zhambyl region (16 percent).

Potatoes are produced and consumed throughout the country, though production is lower in western Kazakhstan. The majority of potatoes are produced by households (65 percent in 2013), followed by smallholders (almost 30 percent) and large farms.

According to the state Committee on Statistics, the number of enterprises producing livestock products in Kazakhstan in 2013 was 468.¹³⁵ More than 80 percent of cattle in Kazakhstan are owned by household farms. According to an AGRICISTRADEREPORT prepared for Kazakhstan in

¹³⁴ AGRICISTRADEREPORT. 2015. *Country Report: Kazakhstan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Kazakhstan.pdf

¹³⁵ <http://stat.gov.kz>

2015, in 2010 an innovative project KazBeef Ltd. was created with the participation of a subsidiary of national holding KazAgro, JSC KazAgroProduct, and the American company Global Beef, whose goal is to market the meat production in Kazakhstan and abroad.¹³⁶ Kazakhstan has 191 companies producing dairy products, of which the main output is produced by 24 dairies. According to the Statistics Committee in 2013, 173 enterprises were producing poultry meat. Small businesses employing fewer than 40 people account for 79.2 percent of all businesses. Poultry meat production is concentrated in the south and east of the country, and egg production is mostly situated in the north and the centre of the country.

The dairy subsector in the country still experiences a number of challenges, such as a lack of a strategy for the development of the Kazakh dairy industry, long distances, poor road conditions, hot summers, severe winters, the pronounced seasonality of milk, weak knowledge of dairy cattle breeding and available state support for the industry, expensive feed, limited access to high-quality feed, shortage of personnel (both skilled and unskilled workers), development delays due to the the long-term prosperity of intermediaries (procurers), and insufficient control over compliance with the requirements of the Eurasian Economic Community technical regulation.

Sheep and goat breeding in Kazakhstan is the most ancient and developed branch of the livestock sector and is widespread throughout the republic. Kazakhstan has developed a long-term programme on development of commercial fisheries.

Status of agro-processing sector development

The food and beverage industry forms a large part of Kazakhstan's economy, generating 2.7 percent of the gross domestic product. Important subsectors include the flour and cereals industry, meat processing, and dairy processing. The major products are juices, dry fruits and canned vegetables (potatoes, tomatoes and cornichons). Processing of fruits and vegetables in the northern regions of Kazakhstan is limited due to insufficient availability of raw materials.

With regard to agriculture, key issues of the new economic strategy are modernization of the agriculture sector, development of farming and small- and medium-sized enterprises in agricultural processing and trade, and enhancement of water resources policy.¹³⁷

The Government of Kazakhstan has also made a significant effort to increase cooperatives.¹³⁸ According to industry sources, one of the major reasons behind this initiative has been the anticipated breakup of agro-holdings in Kazakhstan.

Value chain development activities

An analytical report by KazAgro (2014)¹³⁹ highlighted that in the long-term perspective, the development of the industry will be stimulated by the state in the following areas: expansion of

¹³⁶ AGRICISTRADe. 2015. *Country Report: Kazakhstan*. http://www.agricistrade.eu/wp-content/uploads/2015/06/Agricistrade_Kazakhstan.pdf

¹³⁷ FAO. 2017. *Kazakhstan: Country Fact Sheet on Food and Agricultural Policy Trends*. <http://www.fao.org/3/a-i7676e.pdf>

¹³⁸ USDA Foreign Agricultural Service. 2017. *Kazakhstan Grain and Feed Annual Report*. https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Astana_Kazakhstan%20-%20Republic%20of_4-28-2017.pdf

¹³⁹ KAZAGRO National Management Holding. 2014. *Analytical review of fresh fruits and vegetables market*. KazAgro. <http://www.kazagro.kz/documents/19/294368/Analytical+review+of+fresh+fruits.pdf/ce0a4b3c-1121-4ca6-906d-6e0fab83fad6>

intensive orchard areas; increases of areas with drip irrigation; increases in the production of vegetables in greenhouses; and increases in the capacity of vegetable stores. Investment subsidies, subsidized concessional loans and growth of demand for products are needed to increase the attractiveness of the fruit and vegetable market, which in the long-term perspective retains its attractiveness for private investment.

Food loss and waste

According to the 2014 FAO assessment of food losses and waste in the country, agricultural production is one of the stages of the chain in which most losses occur. The products with the largest losses at this stage are potatoes, wheat and sunflower seeds, as they are field crops and depend to a large extent on conditions during harvesting; the size of the producer; the type, condition and number of harvesting machines; crop varieties; means of transportation; and control of on-farm product flows.

Significant losses also occur at the post-harvest handling and storage stage. The products with the highest levels of waste are potatoes, wheat, sunflower seeds and milk. The main reasons for losses of potatoes and milk is inadequate storage conditions, while for wheat and sunflower seeds it is misinformation about quality by elevators and crushers. Other factors affecting the extent of losses are inadequate equipment for post-harvest handling, inadequate transportation methods, and the size of on-farm storage.

The processing and packaging stage experiences lower losses than the previous stages. This is mainly due to higher levels of mechanization. The highest losses at this stage were found in relation to potatoes, which may be explained by additional sorting during bagging.

Further remaining challenges include long distances from markets, logistics, storage infrastructure, and the availability of financial resources, especially among poor rural farmers.

Kyrgyzstan

Overview of the agriculture sector and food systems in Kyrgyzstan

Agriculture is one of the most important sectors of the economy; it generates 12 percent of the total export value¹⁴⁰ and an estimated 20 percent of the gross domestic product. The most important agricultural areas are the Fergana Valley and, in the north, the Chui and Talas valleys. The top agricultural commodities that were exported in 2016 included USD 55 million worth of dried leguminous vegetables, USD 14 million in dried fruit, and USD 8 million in butter and other fats and oils.

The agriculture sector employs up to 40 percent of the population in the country, with a gross domestic product per capita of USD 1 148 (2014–2016). Most agriculture in the country is family based and practiced on small plots of land. Often, fruits and vegetables that are produced by families are consumed locally. Larger productions of some crops, including apples, apricots, sugar beets and walnuts, can be described as regional and rather small-scale compared to Western standards.¹⁴¹ Besides traditional agricultural production by households and small- to medium-sized farms, producers in the country are also represented by agricultural enterprises, the latter comprising in turn the remnants of the old collective units.

Kyrgyzstan has been importing significant amounts of food, in particular such commodities as oil, flour, meat and poultry.¹⁴² The agriculture sector is developing within the country's food security and nutrition programme, which is part of its National Sustainable Development Strategy, and is supported by multilateral organizations with several donor projects providing assistance to small and medium enterprises. However, private-sector companies often lack up-to-date technology and equipment and thus have limited opportunities to export their produce. Governance remains among of the country's development challenges. Improvements in the rule of law, transparency and regulatory reforms are needed for the country to attract investment and improve the performance of the private sector.

Stakeholders engaged in agriculture and value chain development

FAO is supporting agricultural development in the Kyrgyz Republic in four priority areas: enhancing capacities to assess, plan and implement action for achieving sustainable food and nutrition security; strengthening professional and institutional capacities, legal frameworks and services for sustainable use of natural resources for agricultural productivity growth, effective inclusive agricultural value chains, and increased rural income; improving resilience to climate change, crises and disasters; and enhancing capacities for strengthening a socially sensitive market economy to reduce rural poverty, especially among women-headed households.

The main state bodies related to agriculture and agro-industry development in the Kyrgyz Republic are the Ministry of Agriculture and Land Reclamation and the Ministry of Economy and

¹⁴⁰ The World Bank. 2016. *The World Bank in the Kyrgyz Republic: Country Snapshot*. <http://pubdocs.worldbank.org/en/465561475782007362/Kyrgyz-Republic-Snapshot-October2016FINAL-en.pdf>

¹⁴¹ U.S. Commercial Service. 2017. *Kyrgyz Republic - Agricultural Sector*. [online]. [Cited 12 October 2017]. <https://www.export.gov/article?id=Kyrgyz-Republic-Agricultural-Sector>

¹⁴² FAO. 2014. *Eastern Europe and Central Asia Agro-Industry Development Country Brief: Kyrgyz Republic*.

Antimonopoly Policy. Other supporting institutions include, among others, the state enterprise information and marketing centre "Aylmaalymat" under the Ministry of Agriculture and Land Reclamation; the JSC Kyrgyz Agriculture and Food Corporation (established in 2009), which ensures stable functioning of the food market in the interests of producers and meeting public demand for food; the Agribusiness Competitiveness Center (established in 2006), which helps food processors be more efficient and profitable; the state enterprise "Center One-Stop-Shop" in the field of foreign trade under the Ministry of Economy and Antimonopoly Policy; the Rural Advisory Service for extension services; the Kyrgyz Agricultural Market Information System; the Food Security Council (established in 2009); and the Fruit and Vegetable Association.¹⁴³

Relevant activities and programmes in agriculture sector development

A number of international donor organizations support projects that are aimed at improving countries' food security and the agricultural competitiveness of small- and medium-sized producers. The Kyrgyz Agro-Input Enterprise Development project, for example, collaborated with various stakeholders (e.g. dealer networks, farm stores and non-governmental organizations) to increase the availability of inputs and link the relatively small and isolated Kyrgyz input market with reputable international suppliers.¹⁴⁴ The United States Agency for International Development's "Feed the Future" programme works with a large number of smallholder farmers, contributing to improving different aspects of food security in the country. The World Bank is also supporting the Kyrgyz Republic's agriculture sector through several new projects, such as the Agricultural Productivity and Nutrition Improvement Project and the Integrated Dairy Productivity Improvement Project, to promote the development of agriculture value chains as well as the export of agriculture products.

Overview of the main crop and livestock subsectors

Cow's milk, cattle meat, potatoes, sheep meat and tomatoes are among the major agricultural products in terms of value in Kyrgyzstan. Apples, walnuts, cotton and tobacco are important for domestic production.

Grains, oilseeds and pulses are among the major crops grown in the Kyrgyz Republic, along with maize (for grain and silage) and fodder (mainly lucerne and sainfoin). The amount of produced wheat is not sufficient for the country, so imports from Kazakhstan are required. The post-harvest processing of beans has become increasingly mechanized, with more automation.¹⁴⁵

A review of walnut and kernel products on sale in major supermarket chains revealed that only a few processed products were available, which indicates that consumers mainly shop for walnuts or kernels in retail bazaars; there is limited growth or diversification of manufactured walnut products for domestic consumption.

Regarding vegetables, aside from potatoes, six items account for nearly 90 percent of the total output: tomatoes, carrots, watermelons, onions, cabbages and cucumbers. Regarding fruit, apples account for 70 percent or more of the total output of fruit every year, followed by apricots (8

¹⁴³ FAO. 2014. *Eastern Europe and Central Asia Agro-Industry Development Country Brief: Kyrgyz Republic*.

¹⁴⁴ USAID. *KAED project: Kyrgyz Agro-Input Enterprise Development*. <https://www.usaid.gov/kyrgyz-republic/fact-sheets/usaid-kyrgyz-agro-input-enterprise-development-kaed-project>

¹⁴⁵ Tilekeyev, K. 2018. *Bean Value Chain Report (being published)*.

percent), plums, grapes and cherries (3 percent each). Export items are mainly destined for the Russian Federation, with some increase to Kazakhstan in recent years. Processed fruit and vegetables are also heading largely to the Russian Federation and Kazakhstan.

Milk production is concentrated in small farms and households. Ensuring consistency in quality and quantity of raw milk can be difficult, and thus cheese, dry milk and butter production are more suitable options for farmers. A Japan International Cooperation Agency report highlighted that regardless of a company's size, its operating capacity was not fed with sufficient amounts of milk, therefore reducing overall sales (this was true of almost all dairy companies).¹⁴⁶ The International Fund for Agricultural Development assisted with a project on organizing a milk collection centre.

Sheep rearing is one of the traditional practices and one of the most important branches of agriculture in Kyrgyzstan. The sector employs nearly the entire rural population of the country.¹⁴⁷ According to the study, it used to be difficult to integrate farmers into groups. Now, however, farmers are doing that more readily after they have started to realize the importance of combined efforts. One of the projects that facilitated this process was implemented by HELVETAS Swiss Intercooperation and the Dutch Interchurch Organisation for Development Cooperation. Despite the fact that livestock is one of the major parts of the rural economy in Kyrgyzstan and that 87 percent of the territory is occupied by pastures, the meat industry is not well-developed.¹⁴⁸

The fisheries sector is not very well-developed in Kyrgyzstan. Several aquaculture farms exist in the country, but according to the country fisheries profile prepared by the FAO in 2014, there was still a lack of promotion of the use of non-productive oligotrophic lakes for fish production rather than for irrigation systems.¹⁴⁹

Status of agro-processing sector development

Most food-processing companies are involved in wheat processing and milk processing, with smaller shares in fruit and vegetable processing. The manufacturing sector is dominated by labour-intensive activities with low value-added produce. The meat industry remains underdeveloped.¹⁵⁰ Targeted efforts are needed in order to develop warehouse facilities and modernize existing harvesting and post-harvesting activities.

The post-harvest storage and processing infrastructure is concentrated mainly in the Chui/Bishkek and Issyk-Kul regions of Kyrgyzstan, and the sector needs upgrading and modernization.¹⁵¹ Regarding the interconnections among actors in the market, according to a study on processor-driven integration of small-scale farmers into value chains of larger processing enterprises, despite the need for raw materials there were difficulties in integrating smallholder farmers due to their lack of commitment.¹⁵²

¹⁴⁶ JICA. 2013. *Kyrgyzstan Agricultural export promotion*.

¹⁴⁷ "Sheep Meat Production Value Chains in the Kyrgyz Republic and Export Capacity to the EAEU Member States," University of Central Asia's Institute of Public Policy and Administration Working Paper No. 36, Bishkek, «V.R.S. Company», 2016. 60 pp.

¹⁴⁸ FAO. 2014. *Eastern Europe and Central Asia Agro-Industry Development Country Brief: Kyrgyz Republic*.

¹⁴⁹ FAO. 2014. *Fisheries Kyrgyzstan country brief*. <http://www.fao.org/fishery/facp/KGZ/en#CountrySector-Overview>

¹⁵⁰ UNECE. 2015. *Regulatory and Procedural Barriers to Trade in Kyrgyzstan*.

¹⁵¹ USAID. 2016. *AgroHorizon Project*. http://pdf.usaid.gov/pdf_docs/PA00MFMJ.pdf

¹⁵² Kaseeva, G. 2013. *Processor driven integration of small-scale farmers into value chains in Kyrgyzstan*. FAO. <http://www.fao.org/3/a-au849e.pdf>

Value chain development activities

Value chain studies and assessments have been conducted by various organizations in recent years, with some projects targeting value chain development as the primary focus. FAO's value chain gap analysis initiative preliminarily concluded that relations in the market chain are not optimal. There is a lack of functioning market infrastructure in the country. Few innovative technologies are being utilized, and few scientific and research principles are being adopted. The processing sector is not sufficiently developed, leading to a loss of potential income for the farmers.

Food loss and waste

While some projects conducted in the country address post-harvest management, according to a 2016 report focused on improving the capacities of trade-logistical centres, their capacities still vary.¹⁵³ The authors of that report highlighted that capacities have to be improved. While the accessibility of most trade-logistics centres is quite good, better access and connections with potential clients are needed. A new AgroHorizon project supported by USAID is dedicated to reducing post-harvest losses, assessing storage and processing facilities, and upgrading facilities.

¹⁵³ CAI Consulting. 2016. *Report on the status of logistical centres in the Osh and Jalalabad regions of the Kyrgyz Republic.*

Tajikistan

Overview of the agriculture sector and food systems in Tajikistan

Tajikistan is a low-income, land-locked country in Central Asia. A large percentage of the country's territory lies at high elevations, restricting the area usable for agricultural production. In almost all agro-climatic zones, only a single crop per year can be grown. However, in some areas cultivation of early maturing cultures (e.g. winter wheat) can allow for second crops with short vegetation periods (e.g. melons or buckwheat). Major agricultural products include cotton, grain, dried and fresh fruits, vegetables, cattle, sheep, goats, and meat products.

Some of the challenges of the food system in the country include disproportionate undernourishment of women and still-prevailing child stunting. The country also largely depends on international trade of foodstuffs to meet its internal food needs, e.g. wheat from Kazakhstan. Another challenge that the country continuously faces is low agricultural productivity compared to other countries in the region.

The agriculture sector contributes about a quarter of the gross domestic product. Some of the difficulties in conducting business in the country that impede growth in the agriculture sector include, among others, poor consumer and business purchasing power, an underdeveloped banking and insurance sector, difficulty in obtaining loans, and an unpredictable investment climate.

Significant investments in transportation and storage infrastructure are needed. Integrating smallholder producers into agricultural value chains is important for increasing export volumes. New export opportunities include Afghanistan, China, India and Turkey. Improved rail connections and integration into regional infrastructure networks are crucial for strengthening the country's positions in these markets.

The government's priority is food security, but other activities in the agriculture development sector are supported as well. The FAO Country Programming Framework for Tajikistan is dedicated to the following activities: sustainable food security and nutrition through institutional reforms, capacity building and support for the development and implementation of national food-security policies; sustainable management of natural resources and improved resilience to climate change, with a clear emphasis on tackling land degradation as well as the application of a landscape and watershed management approach; and sustainable agricultural productivity and competitiveness, concentrating on livestock production and health, along with intensification of crop production.

Stakeholders engaged in agriculture and value chain development

The National Association of Small and Medium Business of Tajikistan and the National Association of Dekhan Farmers are involved in various roles at the production and further stages. International development organizations are quite active in supporting agriculture sector development in the country. The United States Agency for International Development, for example, has been conducting a number of projects dedicated to improving primary production, agriculture competitiveness and food security. The German Agency for International Cooperation, the Austrian Development Agency, the International Fund for Agricultural Development, the World Bank and others are engaged in agricultural value chain development as well. The Asian Development Bank has developed a country cooperation strategy until 2020

in which it will focus on sustainable and inclusive food security as well as enhanced water resources management through a river basin approach.¹⁵⁴

Relevant activities and programmes in agriculture sector development

Through the Feed the Future initiative, USAID helps farmers increase production of profitable crops while teaching families about proper nutrition.¹⁵⁵ This programme aims to support and encourage the development and creation of cooperative unions, leading to the establishment of national structures that can represent the interests of their shareholders at all levels of agricultural management.¹⁵⁶ Activities targeted at delivering basic services by the state are also increasingly supported by international organizations, as Tajikistan still lags behind other countries in the region in terms of human development. Continuing development of cooperation and strengthening of agricultural production are among the priorities of international donors.

Overview of the main crop and livestock subsectors

The agricultural products are produced by three types of farm categories, including agricultural enterprises, dehkan farms, and household producers. Tajikistan depends heavily on imports of food products, including wheat and sugar.

Crop production in Tajikistan is primarily represented by cereals (mainly wheat, which is grown in almost every region of the country) and cotton. Cropping patterns are largely represented by cereals and some legumes. Kitchen and presidential (i.e. allocated by presidential decree) plots account for 33 percent of the area planted with wheat, and about two-thirds of the area planted with potatoes and vegetables. Low productivity is characteristic of the sector.

The sown area for fruit and vegetables represents about 6 percent of the total sown area. Tajikistan is among Central Asian leaders in fruit and vegetable production, including seed and stone fruits such as apricots, apples, peaches, cherries and grapes. Historically, Tajikistan has grown and produced apricots and dried apricots for both domestic consumption and export. Although apple production volume is high, the processing of apples is yet to be developed, and exports are not common. In the vegetable subsector, potatoes represent the main roots and tubers commodity group. The production of potatoes has been growing steadily, as have the agricultural areas occupied by this crop.

Livestock and livestock products have positive perspectives for market growth. The highest shares within meat products in 2011 were beef (almost 40 percent), mutton and goat meat (more than 50 percent), pork, poultry, and other meat. In the dairy sector, opportunities exist for growth in the country. Milk and dairy products in rural areas are largely produced by smallholder livestock holders. There are two channels of milk distribution: noncorporate from smallholders, and corporate (large enterprises). Large processors, such as Dushanbe Milk Factory, Saodat Milk Factory and Afzali Sughd, require tens of tonnes of milk per day. They have invested in milk collection points.

¹⁵⁴ Asian Development Bank. *Country Partnership Strategy: Tajikistan, 2016–2020*.

<https://www.adb.org/sites/default/files/linked-documents/cps-taj-2016-2020-ssa-03.pdf>

¹⁵⁵ USAID. *Tajikistan*. [online]. <https://www.usaid.gov/tajikistan>

¹⁵⁶ Agricultural Reforms Programme (2015–2020) http://moa.tj/wp-content/Program_Taj_Rus_Eng_ready.pdf - in Russian

Status of agro-processing sector development

Agricultural production is fragmented, with very few large farms. The food and beverage industry forms a small part of the economy, but it is the second-largest contributor to gross industrial output.¹⁵⁷ Farm input markets are very weak, limiting the opportunities for purchasing high-quality inputs in the country.

According to the Agro-Industry Brief compiled in 2014 for Tajikistan,¹⁵⁸ the food-processing sector in Tajikistan had 21 subsectors, including flour, macaroni, canned vegetables, canned fruits, fresh and dry fruits, meat and dairy processing, feed and confectionary production, and tobacco and alcohol production. The dairy and meat sectors were underdeveloped. The performance of the food and beverage industry was described as not stable over time in terms of output and employment share. The industry has a strong demand for capital investments. Opportunities exist in fruit and vegetable processing, vegetable oil and food-organic production, and the development of the fish and wine industries.

Value chain development activities

Value chain development activities are implemented by several organizations and focus on technical and financial aspects. Small producers are united with other market participants, including service providers.

Welthungerhilfe, for example, is targeting participation in its work on the potato value chain.¹⁵⁹ The Financial Transactions and Reports Analysis Centre of Canada has been supporting activities in the tomato and onion subsectors, among others.¹⁶⁰

Businesses in Tajikistan have been reported to have difficulty gaining access to credit because of high interest rates. Food processing companies need support in adopting international quality standards and certification and in forming cooperatives to build and operate storehouses and invest in equipment.

One of the subsectors in which multiple donors have been conducting value chain development activities is in fruit, in particular development of the dried fruit sector (e.g. the CANDY project by the Austrian Agency Hilfswerk International).

Food loss and waste

A number of studies have indicated that losses of several foods with high nutritional and economic value are very common in Tajikistan. Reduction of losses in these foods is a potentially efficient measure to improve nutrition and increase income for the rural poor.

An assessment of food losses and waste was performed in 2014 and included the wheat, potato, onion and dried fruit supply chains and their respective critical loss points.

¹⁵⁷ FAO. 2014. *Agro-Industry Brief for Tajikistan*.

http://www.fao.org/fileadmin/user_upload/Europe/documents/Publications/AI_briefs/AI_briefs2014/AI_Brief_Tajikistan_new.pdf

¹⁵⁸ FAO. 2014. *Agro-Industry Brief for Tajikistan*.

http://www.fao.org/fileadmin/user_upload/Europe/documents/Publications/AI_briefs/AI_briefs2014/AI_Brief_Tajikistan_new.pdf

¹⁵⁹ CAC Program. http://www.cac-program.org/files/wokring_paper_14_ru.pdf

¹⁶⁰ USAID. 2014. *AgTCA Tajikistan: Agricultural Technology Commercialization Assessment*. http://eatproject.org/docs/EAT_AgTCA_Tajikistan_Report.pdf

The study found that the stage that had the most food loss and waste across all value chains was agricultural production, with food loss and waste ranging from 4.9 to 20 percent. Reasons for high food loss and waste in the agricultural production stage included lack of advanced agronomic knowledge and innovative skills, unwillingness to use agricultural extension services, lack of professional services, poor pest and disease control, traditional harvesting methods, and outdated agricultural tools and technology in all commodity groups. The highest percentage was reported in dried apricots (20 percent) and the lowest in potatoes (4.9 percent). These are associated with perishability, old-fashioned methods of picking, scarcity of machinery, and bad weather conditions at harvest.

Food loss and waste in cereal grains and milk ranked second in the agricultural production stage, constituting 7.3 percent and 7.2 percent, respectively. The reasons included use of obsolete and outdated combines such as the Niva, which leave a lot of grain in the field. For milk and milk products, it is due to the absence of feed and grass during winter, leading to disease and premature deaths. Onion and potato losses were comparatively lower among commodity groups at this stage, at 5.3 percent and 4.9 percent, respectively. Losses that occur in the other stages were relatively smaller than those occurring in the agricultural production stage.

An inception mission undertaken by Bin Liu and Alexandra Tung in November 2017 additionally highlighted several reasons for food loss and waste in selected value chains. The common major gaps (which are probably also the major causes of losses) in Tajikistan's apricot and tomato supply chains included:

- a lack of suitable market outlets for both fresh and processed products;
- outdated processing equipment and technologies, which substantially diminish the competitiveness of Tajik products in the international market;
- high transportation cost, poor road conditions, and the impassability of roads during winter months, which limit the marketing options for products and reduce the quality of products that reach the market;
- lack the knowledge and capacity of farmers about proper crop production and post-harvest processing; and
- few existing smallholder farmers' associations.

The major gaps in Tajikistan's milk value chains included:

- a lack of milk collection centres at village level to collect milk from smallholder farmers; and
- a lack of cold transportation equipment to satisfy the needs of smallholders.

There is a need for better understanding of reasons for food loss and waste and for addressing the issues to tackle food security in the country and improve agriculture sector performance.

Turkmenistan

Overview of the agriculture sector and food systems in Turkmenistan

Turkmenistan is a lower-middle-income country in Central Asia rich in natural resources, with natural gas being the main export product. The country is affected by drought and desertification, with almost 80 percent of its territory lacking a constant source of surface water flow. The situation is also further aggravated by the increasing effects of climate change, which are threatening food and nutrition security.

According to information from export.gov, which is run by the United States of America's Department of Commerce, the government provides substantial state subsidies to the general public, as well as to specific sectors such as agriculture; however, in the current economic and financial downturn, these subsidies are under threat.¹⁶¹

The country is still at an early stage of transition. According to the World Bank, the public sector continues to play a significant role in economic activity in the country, impeding private sector development. Tight administrative control is another challenge that affects private sector growth.

There are few Turkmen-processed food products on the market – mostly sausages, processed fish, alcohol, soft drinks, dairy products, processed tomatoes, vegetable oil (cottonseed and sesame), breads, pastries, and confectionery goods. Local fresh produce is available in season, and during the off-season, most produce comes from the Islamic Republic of Iran, Pakistan and Turkey.

In an effort to become self-sufficient in foodstuffs, Turkmenistan has been increasing domestic production of meat, dairy products, wheat and vegetables. In March 2013, the government introduced soft loans for private producers to improve their ability to purchase agricultural and irrigation equipment. The loans have favourable terms, including a 1-percent annual interest rate and a ten-year repayment period. The government also authorized banks to issue loans to finance projects supporting the development of the poultry and livestock industries. However, the lack of established rule of law, inconsistent regulatory practices, unconvertible currency, and unfamiliarity with international business norms remain among the major disincentives to foreign investment in general.¹⁶²

Stakeholders engaged in agriculture and value chain development

The Ministry of Agriculture and Turkmen Agricultural University are the main state stakeholders supporting agricultural development and research in Turkmenistan. FAO supports sustainable agricultural development, focusing on inclusive and sustainable economic growth, based on diversification and increased competitiveness.¹⁶³

United States Agency for International Development programmes improve the productivity of livestock, both dairy cattle and meat-producing stock, by offering technical assistance to livestock producers to breed healthier, more productive cattle. Greenhouse horticulture is also supported,

¹⁶¹ U.S. Commercial Service. 2017. *Turkmenistan - Market Overview*. [online]. [Cited 31 October 2017]. <https://www.export.gov/article?id=Turkmenistan-Market-Overview>

¹⁶² U.S. Commercial Service. 2017. *Turkmenistan - Executive Summary*. [online]. [Cited 31 October 2017]. <https://www.export.gov/article?id=Turkmenistan-Executive-Summary>

¹⁶³ FAO. 2015. *Turkmenistan and FAO: Partnering for resilient livelihoods and adaptation to climate change*. <http://www.fao.org/3/a-au976e.pdf>

helping high-value fruit and vegetable growers, processors and marketing specialists connect with local and international markets.

Relevant activities and programmes in agriculture sector development

Ongoing support by FAO will focus on capacity development, with attention to the enhancement of skills among government staff. Mainstreaming gender approaches and issues into rural areas' development projects was identified as a crosscutting issue throughout the implementation of the Country Programming Framework. The Asian Development Bank and the World Bank support infrastructure development and reforms in the country. USAID's Agriculture Technology Programme in Turkmenistan 2010–2015 focused on providing consulting services to help support the rebuilding of the capacity of cattle artificial insemination services in Turkmenistan. The work also aimed to increase farmer incomes by improving dairy genetics, providing education and extension services, tripling the yield of crops and livestock produced by private farmers, and achieving a 50-percent increase in areas for cultivation of crops other than wheat and cotton.¹⁶⁴

Overview of the main crop and livestock subsectors

Grains and cotton are the two main subsectors of the agriculture sector mostly intended for national consumption, with limited production of fruit and vegetables. In part, this is because of the country's arid climate, but it's mainly due to competition with staple crops for cultivatable land. Turkmenistan produces about 620 000 tonnes of vegetables (compared to more than 6 million tonnes in Uzbekistan) and scarce quantities of fruits (150 000 tonnes, as compared to 2.2 million tonnes in Uzbekistan), although melons and grapes are more common.

Crop production is under strong state control. Unlike other Commonwealth of Independent States countries, Turkmenistan has almost no large agricultural enterprises engaged in primary production.¹⁶⁵ The large structures of the Soviet period were transformed into peasant associations consisting of individual leaseholders. Peasant associations are subject to state orders; they are obliged to sell their output and buy their inputs through state channels. This is particularly true for crop production, which is heavily controlled by the state.

Livestock production operates on a more private basis. In the period following the transition after the Soviet Union breakup, livestock production as well as milk production have grown, in part including advances in productivity. However, the output of both sectors is still rather low and has a predominantly subsistence nature.

¹⁶⁴ Crown Agents. *Linking producers and markets to fight hunger*.

<http://www.crownagents.com/docs/default-source/publications/capstats/capstats-uk/crown-agents-food-security.pdf?sfvrsn=2>

¹⁶⁵ FAO. 2012. *Turkmenistan: Agricultural sector review*. FAO TCI and EBRD.

<http://www.fao.org/3/a-i2911e.pdf>

Status of agro-processing sector development

Little value is added in the food chain.¹⁶⁶ The food-processing industry in Turkmenistan accounted for 9 to 10 percent of the gross domestic product, according to the FAO report.¹⁶⁷ Since the general production decline of the early 1990s, only the production of bread products and flour, processed fruits and vegetables and non-alcoholic beverages has increased significantly compared to pre-reform levels of output. The output of the meat and dairy industry was described as rather low.

The large structures of the Soviet period were transformed into peasant associations consisting of individual leaseholders.¹⁶⁸ According to the findings of the report, although the food-processing companies of the pre-Soviet period were not privatized during the transition period, private processors – predominantly small-scale – have emerged in most sectors of the food-processing industry, including meat, dairy, vegetable canning and bakery. While flour and other milled products are controlled by state processors, the share of private processing ranges from 30 to 50 percent for meat and dairy products and 80 to 90 percent for bread and canned vegetables.

Value chain development activities

There are few information sources available, with no specific mentioning of value chain development. However, the Crown Agents international development company supported a food security programme in Turkmenistan.¹⁶⁹ There are few other activities dedicated to development of the fruit and vegetable subsectors (e.g. greenhouse vegetables).

Food loss and waste

There is no available data referring to food loss and waste in the country. An initial study to estimate the extent and relevance of the issue is much needed.

¹⁶⁶ FAO. 2012. *Turkmenistan: Agricultural sector review*. FAO TCI and EBRD. <http://www.fao.org/3/a-i2911e.pdf>

¹⁶⁷ Ibid.

¹⁶⁸ Ibid.

¹⁶⁹ Crown Agents. *Linking producers and markets to fight hunger*. <http://www.crownagents.com/docs/default-source/publications/capstats/capstats-uk/crown-agents-food-security.pdf?sfvrsn=2>

Uzbekistan

Overview of the agriculture sector and food systems in Uzbekistan

Uzbekistan is a lower-middle-income, land-locked country in Central Asia. Agricultural land occupies more than 60 percent of its territory. Cotton and grain are the major crops in the country's economy, accounting for approximately 17 percent of its gross domestic product and 15 percent of its exports. It employs about 26 percent of the labour force.¹⁷⁰ Half of the country's population is concentrated in rural areas, with the largest share in the fertile Fergana Valley.

Important agricultural commodities (besides cotton) are wheat, cattle meat, cow's milk, tomatoes, cherries, grapes, melons and watermelons, as well as stone fruits and nuts (pistachios, hazelnuts and walnuts). To improve the country's food security, the Government of Uzbekistan has emphasized wheat production and supported poultry and animal farming over the past few years. The profitability of fresh fruits and vegetables has increased in recent years, and plans are being developed to improve export competitiveness.

The government plans to diversify the agriculture sector, with support of international donor efforts. Private sector agriculture now includes leasehold farms made available under the Government of Uzbekistan's land reform and rural restructuring policies. Agriculture and food industry development are priority directions for the economy of Uzbekistan, providing necessary foodstuffs and raw materials. Construction and modernization projects in the country's production facilities have been initiated in recent years. In future years, the production of convenience foods using freeze-dried fruits and vegetables will be launched, along with a confectionery factory with cocoa bean processing facilities.

Stakeholders engaged in agriculture and value chain development

The main state bodies related to agriculture and agro-industry support and control in Uzbekistan are the Ministry of Agriculture and Water Resources and the Ministry of Foreign Economic Relations, Investments and Trade. The Ministry of Agriculture and Water Resources is focusing on the development of integrated targeted, sectoral and territorial programmes aimed at ensuring dynamic and balanced development of agriculture, improving the country's food security, increasing the level of employment and income of the rural population, and maintaining a stable level of valuable food products in the domestic market. A number of international stakeholders, including FAO, the World Bank, the United States Agency for International Development and others, have been supporting agricultural development programmes in the country.

Relevant activities and programmes in agriculture sector development

FAO's assistance in Uzbekistan focuses on five thematic priority areas: diversification of cropping systems and sustainable production intensification; promotion of efficient locust control techniques, integrated pest management, conservation agriculture and other good agricultural practices; livestock production, disease control and beekeeping; aquaculture and inland fisheries development; and sustainable natural resource management. In July 2015, the World Bank

¹⁷⁰ U.S. Commercial Service. 2017. *Uzbekistan - Agricultural Sectors*. [online]. [Cited October 2017]. <https://www.export.gov/article?id=Uzbekistan-Agricultural-Sectors>

launched its USD 150-million Horticulture Development Project in Uzbekistan (of which USD 120 million is for low-interest agricultural credit and USD 30 million for technical assistance). In 2014, the International Fund for Agricultural Development began a new USD 30-million project to support horticulture in Surkhandarya oblast. The International Finance Corporation is providing training programmes on GlobalGap and hazard analysis and critical control points in Uzbekistan. The German Agency for International Cooperation built two demo sites for high-intensity orchards in Surkhandarya oblast and in Khorezm. The European Union is planning a new USD 10-million horticulture assistance project in Uzbekistan. The European Commission published a new manual in 2014 to educate Uzbekistan exporters on how to export to the European Union.

Overview of the main crop and livestock subsectors

Crop production in Uzbekistan is represented by cotton, grain and horticulture subsectors. Grains are grown on almost half of agricultural lands (47 percent), followed by cotton (37 percent). Produced wheat is collected by the state and is separated based on gluten content before being stored in large silos.¹⁷¹ Stored wheat is distributed to mills in large quantities. It is also certified based on the quality. The certification process is carried out based on properties such as test weight, gluten content, etc. The state also determines the volumes of flour to be milled by flour mills.

Horticulture is a significant component of the agriculture sector in the country, although the subsector accounts for only about 16 percent of aggregate arable lands. However, recently, with a growing domestic and export market, the horticulture subsector has been steadily increasing, primarily by displacing land used to grow cotton.

Uzbekistan's horticulture subsector is also an important source of income for the 4.7 million households that operate dekhan farms in rural and poor communities. Horticultural products are also grown on larger private farms.

Uzbekistan has lately transitioned to being one of the world's major producers of horticultural products. In 2014, it was the largest producer of apricots, the eighth largest producer of cherries, and 15th in apple production, according to the World Bank. In 2016, the country exported more than 800 000 tons of fresh and processed fruits, vegetables and grapes to 43 countries. The country's main export markets are its neighbours, in particular the Russian Federation and Kazakhstan, as well as some European and Asian countries. Although lending for agriculture has increased, the demand is considerably greater. It is estimated that the investment needs in the horticulture sector are more than USD 1 billion.

Development of the livestock subsector is supported by several international organizations, such as the International Fund for Agricultural Development's Dairy Value Chains Development Programme.¹⁷² Both the quantity and quality of produced milk are targeted, including reducing milk losses during storage and transportation, minimizing seasonal supply fluctuations and increasing product diversification.

¹⁷¹ Miller Magazine. 2018. *Grain and Flour Market in Uzbekistan*.

<http://www.millermagazine.com/english/grain-and-flour-market-in-uzbekistan/>

¹⁷² IFAD. 2015. *Dairy Value Chains Development Programme: Design completion report*.

<https://webapps.ifad.org/members/eb/115/docs/EB-2015-115-R-14-Project-design-report.pdf>

Status of agro-processing sector development

Important subsectors include vegetable oil, flour, fruit and vegetables, meat, and dairy processing. Trends are expected towards the manufacture of such things as infant foodstuffs, dry breakfasts, confectionery, cheese, and sausage products. Domestic agriculture and food processing cannot fully satisfy the demand for a range of commodities such as vegetable oil and high-value grocery products. However, the Food Agroprocessing Association has released a brochure listing a number of food-processing enterprises to be established in the near future, which suggests high growth potential in the food-processing industry.

Value chain development activities

The United States Agency for International Development's value chain development work in the country includes four activity components, which are: improving the quality and volume of agricultural production; improving post-harvest handling and production; facilitating market linkages; and linking educational institutions with private sector demand.¹⁷³

DAI is developing work plans to support value chain development in Uzbekistan. Preliminarily, DAI has chosen the following agricultural value chains for assessment, including for both fresh and processed markets: grapes (table and raisins), cherries, apricots, peaches, plums, apples, melons and berries (new fruit crops), and high-value-added vegetable crops (tomatoes and onions).

Food loss and waste

One of the major problems existing in Uzbekistan's fruit and vegetable sector are post-harvest losses resulting from improper harvesting (damage during harvesting), poor handling, poor hygiene in packaging (wooden pallets not being disinfected) and inadequate storage after harvesting.¹⁷⁴ There are also other challenges to be addressed, such as increasing cold storage capacity.¹⁷⁵ Most small farmers drive 100 km to the nearest market with a car packed with onions or watermelons. Traders are virtually absent; they would normally buy raw material, cold-store it, and resell it to exporters, local markets or processors at a later time for a higher price.

The World Bank's analysis of the value chain suggests that there are ample opportunities but that there are bottlenecks as well. The analysis identified opportunities for reducing costs related to transportation and product loss. It was highlighted that investments will be needed, largely from the private sector, starting with farm-level modernizing investments to limit post-harvest losses. In addition, while current policies favour the subsector overall, some policies undercut efforts to build export markets based on a reputation for quality and reliability. One of the examples is the need to seek export permission. Using informal market channels remains a prevailing practice.

¹⁷³ USAID. 2016. *USAID Agricultural Value Chains (AVC) Activity*.

http://pdf.usaid.gov/pdf_docs/PA00KRT8.pdf

¹⁷⁴ Yuldashbaev, N. 2014. *Uzbekistan Fresh Deciduous and Stone Fruits*. USDA Foreign Agricultural Service.

https://www.ekonomi.gov.tr/portal/content/conn/UCM/uuid/dDocName:EK-203130;jsessionid=oqbzAKYEhBLmJ6UI04yPblsMIy14f0R6tcNR43eoORy01G_vp68!1579184086

¹⁷⁵ FAO. 2009. *Agribusiness Handbook: Fruit and Vegetable Processing*.

http://www.eastagri.org/docs/group/431/9_Fruit&Vegetables_web3.pdf

CONCLUDING REMARKS

More research and data collection are needed to understand the extent of food loss and waste at regional and national levels. Many countries in the region have experienced political and economic changes in the years since the last regional agro-industry briefs were compiled by FAO in 2014. It is important to capture and describe these developments. An update of those briefs and addition of the information on value chain development and food waste and loss, more specifically, would be beneficial for understanding trends in the agriculture sector and improvements in food security.

Value-generating sectors have been receiving wide attention more recently within projects aiming at improving agricultural competitiveness in countries of the Europe and Central Asia region. Yet, existing information on the agro-industry sector in the region is still quite disaggregated. Encouraging better dissemination and sharing of results from partner organizations' work on value chains, post-harvest handling, agro-processing and particularly food loss and waste activities is important.

Stakeholders in this space are often represented by international non-governmental organizations and development agencies implementing value chain development projects. It is not always clear whether such projects directly address the aspect of food loss reduction along the value chain. Some results indicate that post-harvest reduction strategies have been included in these projects, but the information is difficult to locate.

Currently, food loss and waste in the Europe and Central Asia region is not addressed in a uniform way. Some value chain development projects mention relevant activities. Since the FAO assessment of food loss and waste in certain countries of the region, there have been only certain improvements observed in selected countries (e.g. Ukraine and Georgia).

From the available literature, some recommendations can be drawn. Farmers' trainings are crucial to improve harvesting techniques and improve access to infrastructure and markets (especially for smallholders). Handling and increasing capacities of companies and service providers in cold value chains are particularly important, as current capacities at this stage of value chains are limited. Connecting rural producers with logistics centres is still sometimes challenging. Low food storage capacities, in particular in cold storage facilities, seems to be an issue in many countries in the region. On a positive note, retail chains in many countries are expanding their reach by adding their own storage facilities. At this stage, there is not much information on this aspect available for the Europe and Central Asia region.

Overall, improving supply chains is a relevant topic in the region. Often, small companies tend not to have their own production and rely instead on purchasing raw materials for their operations from primary producers. If such demand is not met, they have to import or buy the foodstuffs elsewhere. Therefore, better integration of smallholder farmers into value chains is needed. Improving the enabling environment is crucial and will depend on enhancing the capacity of supporting institutions, including better understandings of current situations and challenges in order to provide countries and relevant stakeholders with solutions on improving effectiveness of value chains, including measures to reduce food loss and waste at all stages of the value chain.

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