With support from

Federal Ministry of Food and Agriculture

by decision of the German Bundestag

German-Ukrainian Agricultural Policy Dialogue

Agro Policy Report

APD/APB/08/2023

DEVELOPMENT OF AGRICULTURAL TRADE BETWEEN UKRAINE AND EU

by Mariia Bogonos and Alla Chmil

July 2023

Implemented by

IAK AGRAR CONSULTING

AFC AGRICULTURE & FINANCE CONSULTANTS

IAMO Leibniz Institut für Agrarentwicklung in Transformationsökonomien

Operating Partner

NOPANA

GFA CONSULTING GROUP
General Agent BMEL
Berlin Office

About the Project "German-Ukrainian Agricultural Policy Dialogue" (APD)

The project "German-Ukrainian Agricultural Policy Dialogue (APD)" has been implemented with the support of the Federal Ministry of Food and Agriculture (BMEL) since 2006 and is currently being implemented until 2024 at its request through the executor of GFA Consulting Group LLC, as well as a consortium consisting of IAK Agrar Consulting, Leibniz Institute for Agricultural Development in Transition Economies and AFC Agriculture and Finance Consultants GmbH. The recipient of the project is the National Association of Agricultural Advisory Services of Ukraine "Dorada". The beneficiary of the project is the Ministry of Agrarian Policy and Food of Ukraine. The project should support Ukraine in the areas of sustainable agriculture, efficient processing industry and international competitiveness in accordance with the principles of market and regulatory policies taking into account the development potential that arises under the Association Agreement between the EU and Ukraine. To meet this goal, the Project should provide information on German experience, in particular, East German, as well as international European experience in development of agrarian and forestry policy framework, as well as on the organization of relevant agrarian and political institutions.

The APD consists of two thematic pillars, one of them – the land component – is managed by BVVG German AgriForest Privatization Agency, a state-owned enterprise that is responsible for the administration of state-owned agricultural and forestry land in (Eastern) Germany. Under the land component, the project offers an exchange of experience and know-how between Ukrainian and German land management experts from BVVG and additional German land management institutions. The land component focusses on political, legal and technical issues related to land management and accompanies the current discussions in Ukraine concerning land market development.

Deutsch-Ukrainischer Agrarpolitischer Dialog

www.apd-ukraine.de

Author:
Mariia Bogonos and Alla Chmil

Disclaimer
This paper is published under the responsibility of the Land Component under the umbrella of the German-Ukrainian Agricultural Policy Dialogue (APD). Any points of view and results, conclusions, suggestions or recommendations mentioned therein belong to the authors and do not necessarily coincide with APD's opinion.

© 2023 German-Ukrainian Agricultural Policy Dialogue
All rights reserved.

TABLE OF CONTENTS

I. TRADE IN AGRICULTURAL GOODS BETWEEN UKRAINE AND EU: 1991-2022

General production and export trends

Since 1992, crops production has dominated Ukrainian agriculture. Although in 1991-2000, grains harvest and export were quite low, starting from 2001 they followed steadily increasing trends. Oilseeds production was on the move upwards since 1991. Whereas production of wheat and maize continue growing, barley quantities seem to remain steady in the last ten years. Oats and rye production decrease. Growth of maize production from 3.8 mil tons to 41.9 mil tons in 2000-2020 demonstrated the responsiveness of Ukrainian agricultural sector to export and domestic (feed) demands and favorable climatic conditions (Bogonos et al. 2023).

Sunflower is the traditional oil crop for Ukraine. Its production has been increasing at high rate and steadily throughout the years. Starting from 2000, sunflower oil production and export stood on the way of rapid development as well. Rapeseed and soya beans, although currently occupy much smaller areas of agricultural land, follow rapid growth (Figure below) (Bogonos et al. 2023).

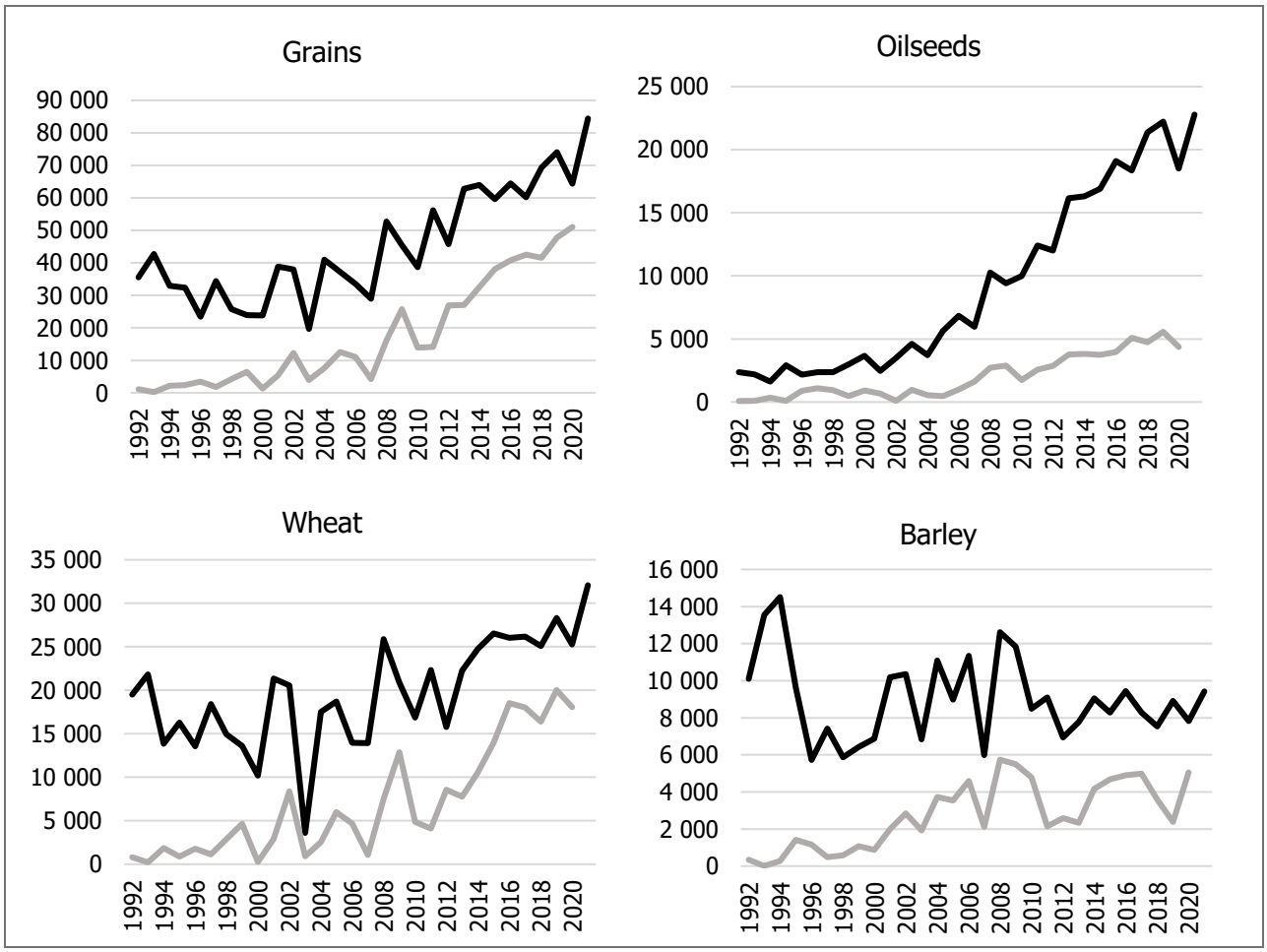


Figure Production (black curve) and export (grey curve) of grains, oilseeds and oils in Ukraine in 1992-2021, thsd tons

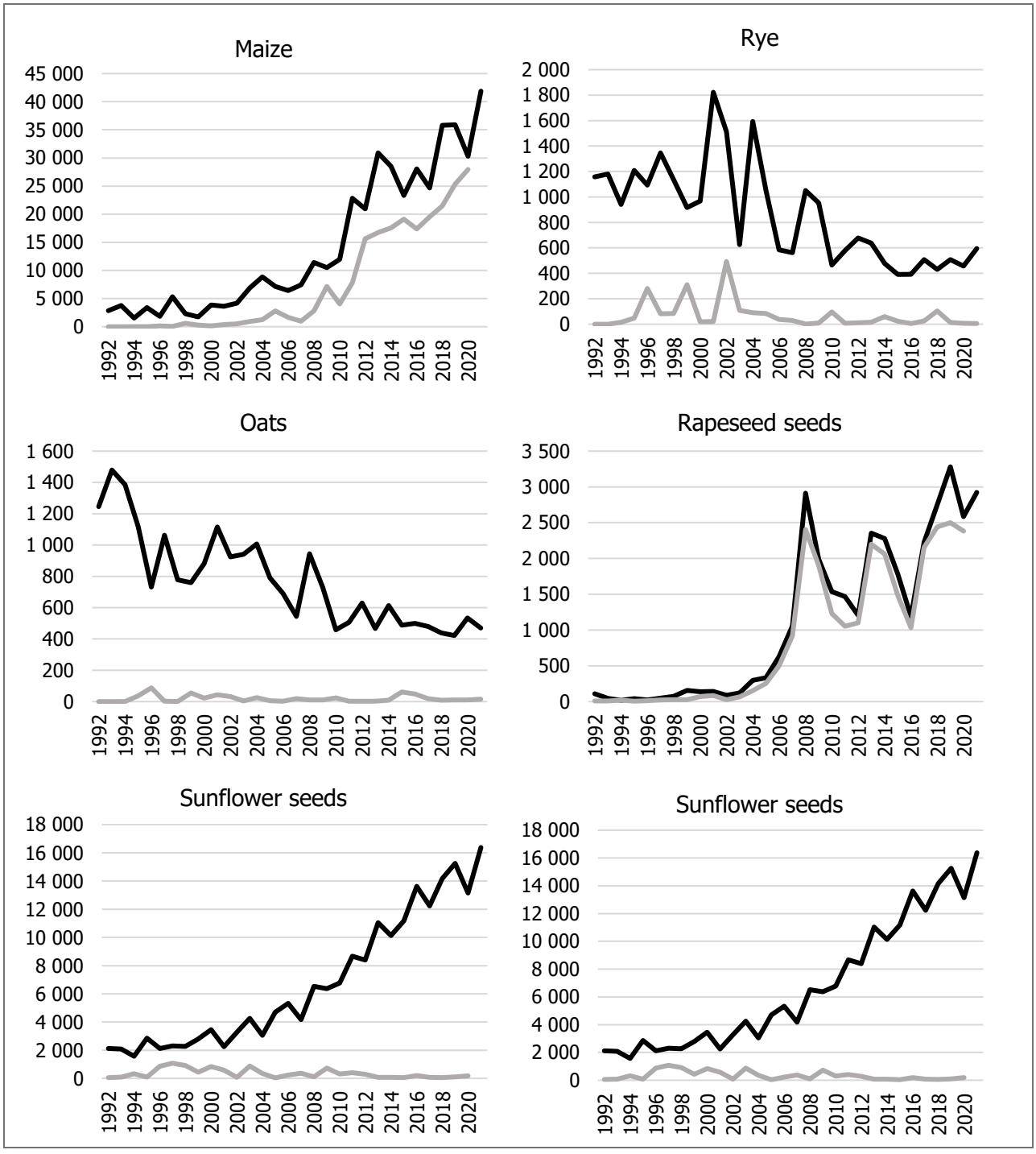


Figure (cont.) Production (black curve) and export (grey curve) of grains, oilseeds and oils in Ukraine in 1992-2021, thsd tons

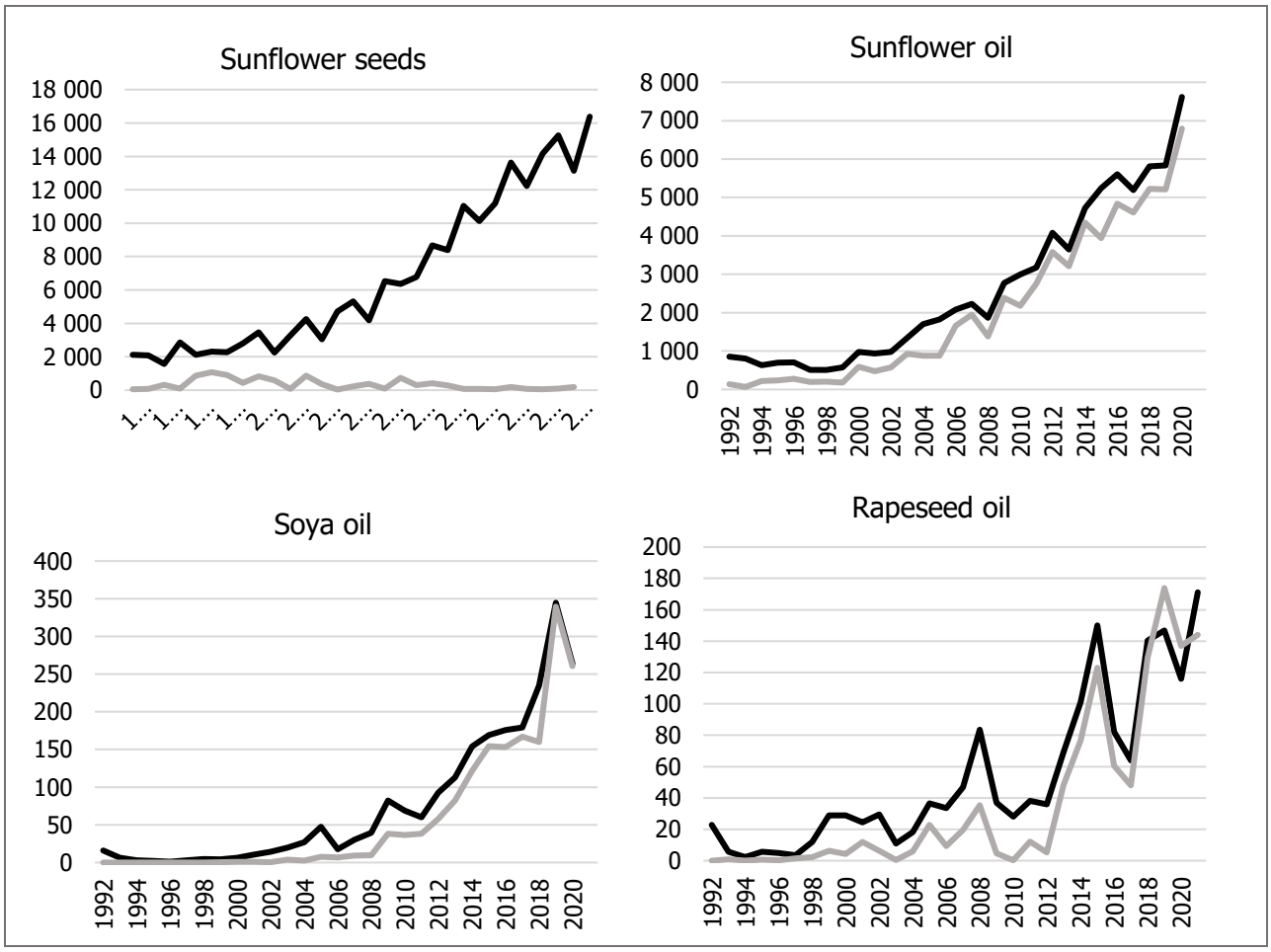


Figure (cont.) Production (black curve) and export (grey curve) of grains, oilseeds and oils in Ukraine in 1992-2021, thsd tons
Source SSSU 2021

In contrast to crops production, production of livestock commodities does not follow a positive trend. Steady reduction in cattle heads since 1992 led to the decrease in beef and veal and milk production. Most of the herd decline took place at the rural households. Although in 2010-2019 cattle slaughter weight increased from 203 to 229 kilograms (further, kg), the impact of herd decline was greater (SSSU 2020b, SSSU 2020c, SSSU 2011). Similarly, milk yield at the agricultural enterprises improved from 4.1 to 6.1 thsd kg per cow and year, and at the rural households from 3.9 to 4.6 thsd kg. Nevertheless, the decline in dairy cows had considerably stronger effect on the negative trend of milk production (Bogonos et al. 2023).

Swine sector in Ukraine is represented by two large groups of producers as well: rural households and agricultural enterprises. In 2019, the respective shares of swine reared by these producer groups were 43.5% and 56.5%. In 1991-2005 the herd decreased tremendously. Starting from 2006, however, the fall slowed down, and by 2021 reached 5.9 thsd heads. Increases in swine slaughter weight allowed to increase and, consequently, stabilize pig meat production at around 700 thsd tons (SSSU 2020b, SSSU 2020c, SSSU 2011). Numbers of sheep and goats as well as their total output (i.e., wool and

milk) were declining steadily (SSSU 2020b, SSSU 2020c, SSSU 2011) (Bogonos et al. 2023).

In 1991-1996, as the rest of livestock commodities, chicken meat and eggs production experienced major decline. Starting from 2000, however, production of both products resumed. Chicken meat production changed from 193 thsd tons in 2000 to 1596 thsd tons in 2021. Chicken eggs production experienced 123.9% growth in 2000-2013, and after the start of the war on the east of Ukraine in 2014, dropped by 28.2%. Agricultural enterprises take the lead in this sector. They produce around 89% of chicken meat and 56.1% of eggs. The remaining 11% and 44%, respectively, are produced by rural households (SSSU 2020c, Tarasevych 2020, SSSU 2020d) (Bogonos et al. 2023).

Quantities of livestock commodities exported from and imported to Ukraine vary. 42.7 thsd tons of cattle meat were exported from, and 1.4 thousand tons imported to Ukraine in 2018. The changes in 2018 as compared to 2010 were, respectively, 221.1% and -43.13%. Quantities of pig meat exported and imported in 2018 were, respectively, 2.2 and 30 thsd tons. The growth rates from 2010 were, respectively, 584.7% and -67.7%. Meat production in Ukraine, despite decreasing and orienting mostly towards the domestic market, nevertheless has positive trade balance in terms of trade volume. Export of butter in 2018 was 28.7% of its total production, and import less than 1%, whereas export of cheese was 6.6% of its total production and import 10.9% (Bogonos et al. 2023).

Net trade of chicken meat and eggs grew rather considerably in 2010-2018. For chicken meat it turned from -96.8 to 213.4 thsd tons, and for eggs from 15.7 to 111.9 thsd tons (FAOSTAT, SSSU 2020b, SSSU 2020c, SSSU 2011) (Bogonos et al. 2023).

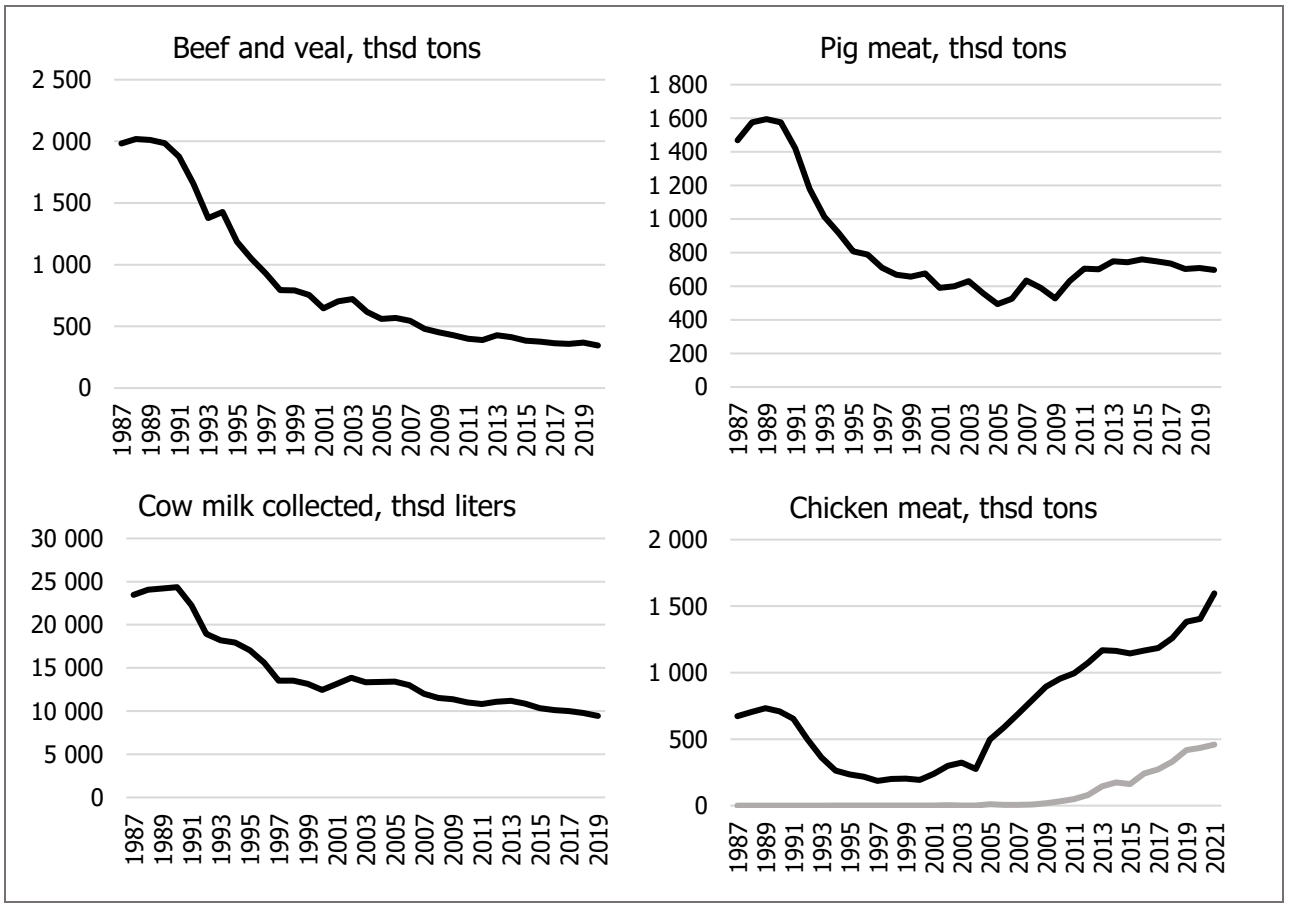


Figure Production (black curve) and export (grey curve) of livestock products in Ukraine until 2021

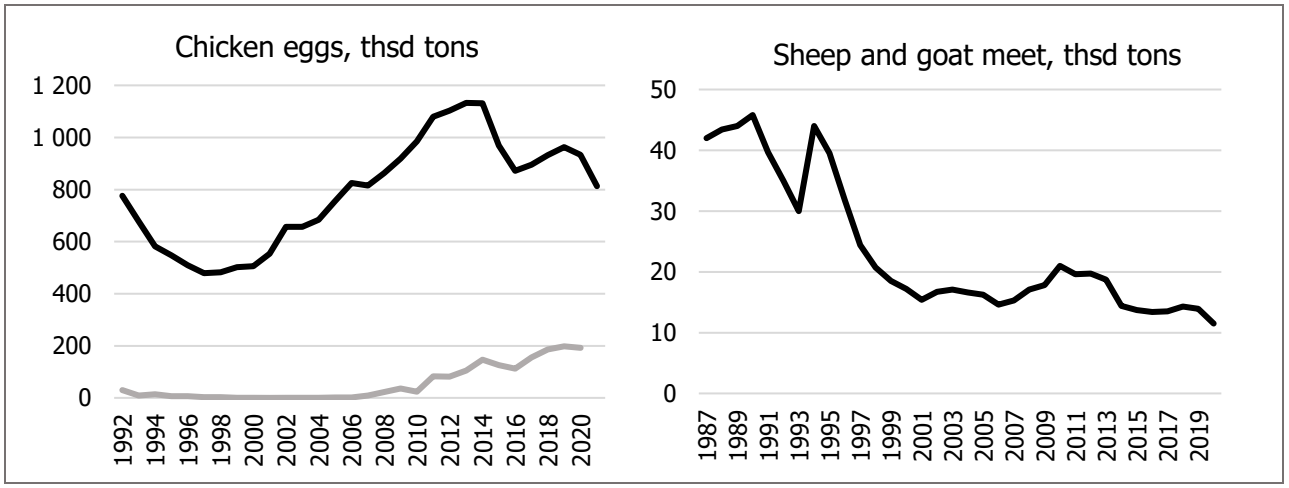


Figure (cont.) Production (black curve) and export (grey curve) of livestock products in Ukraine until 2021
Source SSSU 2021

Export to EU

With the signing in 2016 of the Association Agreement between Ukraine and the European Union (EU) most import duties were abolished or significantly decreased, which made it easier for Ukrainian companies to export to the EU. The figure below demonstrates the trade dynamics between Ukraine and the EU. The EU is one of the main importers of

Ukrainian sunflower oil (about 30% of Ukrainian sunflower oil exports are sold to the EU market). In recent years, the EU's need for sunflower oil has increased to 2 million tons in 2019, of which over 90% is supplied by Ukraine. Exports of rapeseed and soybean oils have been increasing greatly as well, although the quantities are incomparable to those of sunflower oil. Grain export from the EU to Ukraine in 2021 fell by approximately 10% compared to 2015, and corn export decreased by 40%. Exports from Ukraine to EU, on the contrary, increased[1].

[1] The main markets for Ukrainian grains, however, remain in the regions of Central Asia and North Africa.

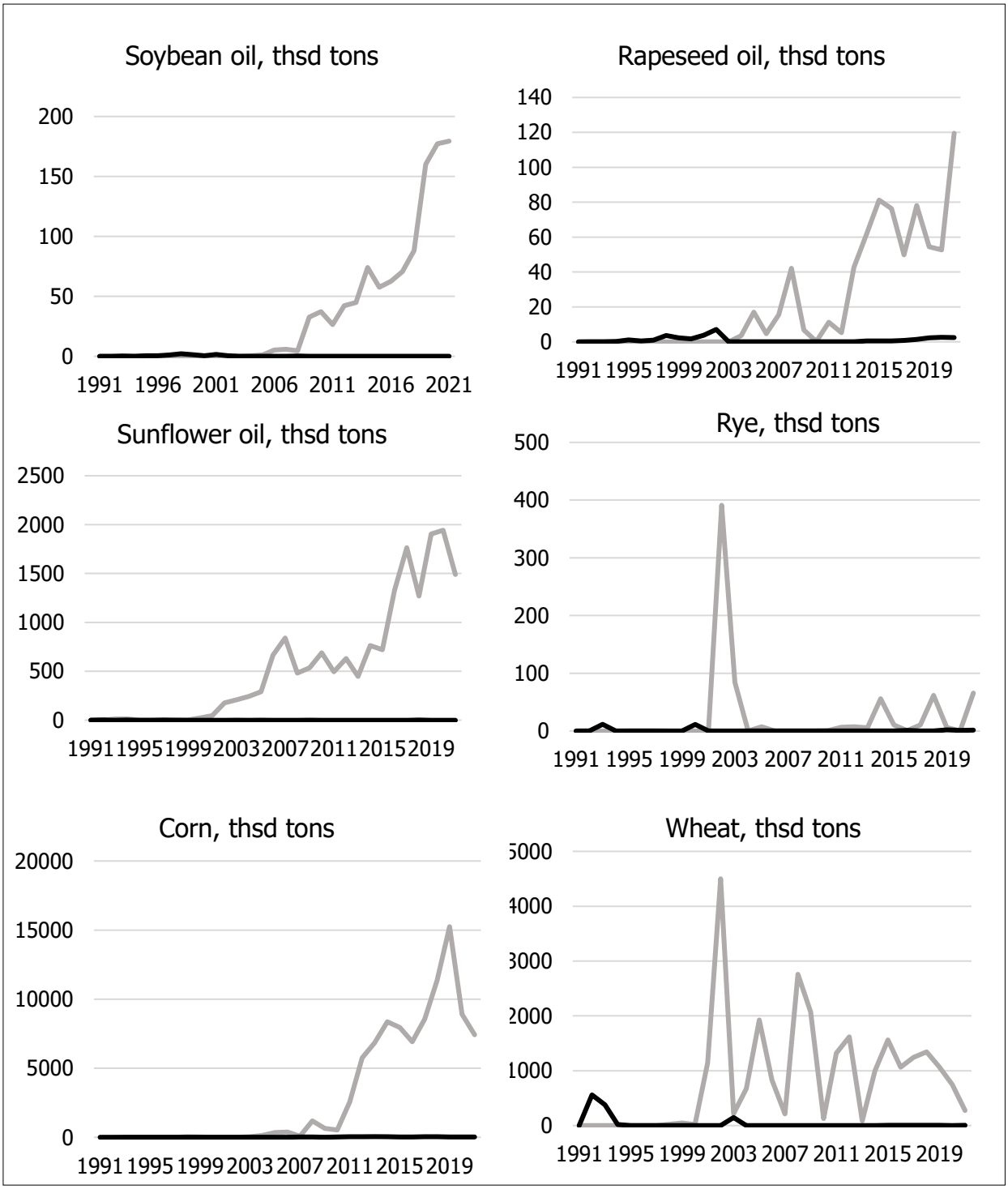


Figure Import (black line) to Ukraine from EU and export (gray line) from Ukraine to EU of oilseed oils and grains for the period 1991-2021
Source EUROSTAT 2022

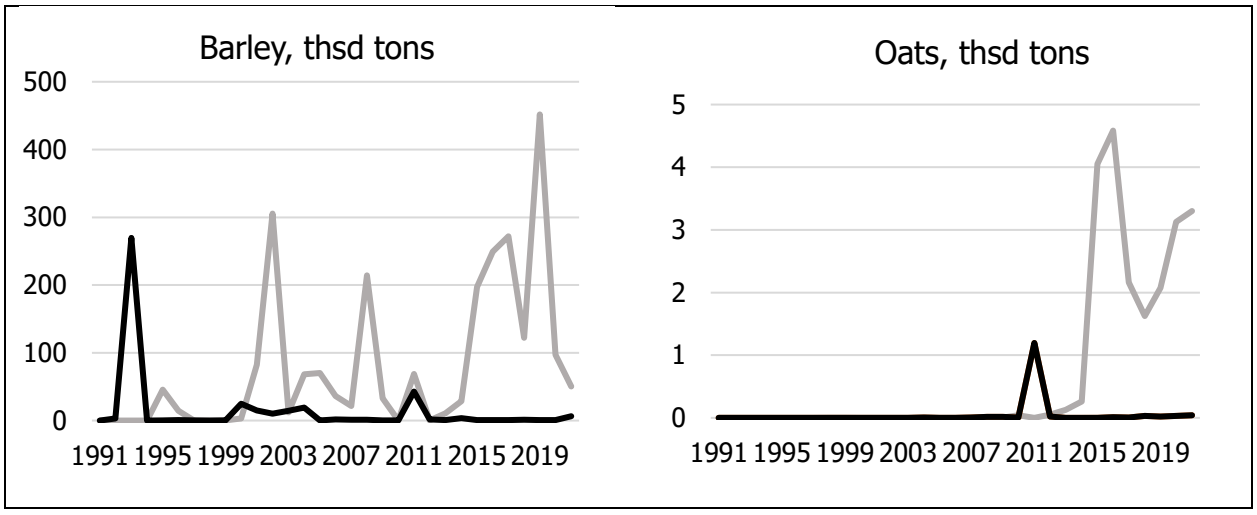


Figure (cont.) Import (black line) to Ukraine from EU and export (gray line) from Ukraine to EU of oilseed oils and grains for the period 1991-2021
Source EUROSTAT 2022

The EU applies tariff quotas to 36 main groups (beef; pork, lamb; poultry and processed poultry; milk, cream, condensed milk and yogurts; milk powder; butter and milk pastes; eggs and albumins ; honey; garlic; sugar; other sugar; sugar syrups; soft wheat, wheat flour and granules; barley, barley flour and granules; oats; maize, maize flour and granules; barley groats and flour, cereal grains processed in other ways ; malt and wheat gluten; starch; processed starch; bran, waste and residues; mushrooms; processed tomatoes; grape and apple juices; processed milk products; processed butter products; sweet corn; processed sugar products; processed cereal products; processed milk cream products; food products; ethanol; cigarettes and cigarillos; sorbitol mannitol; malt and starch processing products) and 4 additional (mushrooms; pork; eggs and albumins; poultry meat and semi-finished products with poultry meat) agro-food products.

In recent years, Ukraine has completely exhausted its quotas for: honey, processed tomatoes, apple and grape juice, eggs, corn, poultry meat, starch, as well as grain processing products. Exports carried out in excess of the quota require the payment of EU import duty under general conditions on the principle of "first come, first served".

The figure below shows the impact of the FTA on the egg market. Since 2015, there has been a strong increase in export of eggs from Ukraine to the EU due to the granting of duty free quotas to Ukraine. The prefix code 0407 and 0408 of the Harmonized Tariff System (HTS) was chosen for the construction of the Figure for eggs.

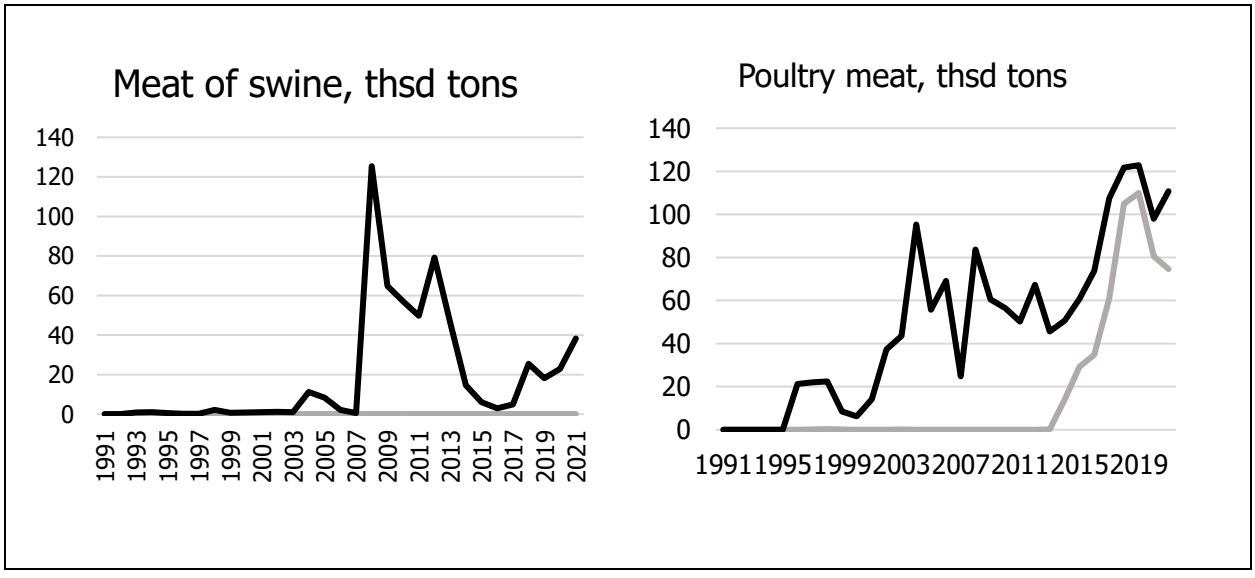
After signing of the FTA, Ukraine gained access to the EU market for dairy products. The export of milk and cream from the EU to Ukraine also began to grow rapidly (for this figure, the amounts under codes 0401 Milk and cream, uncondensed and not with added sugar or other sweetening matter and 0402 Milk and cream, condensed or containing added sugar or other sweetening matter were summed). In accordance with the terms of the FTA between Ukraine and the EU, the EU import duty rate for part of Group 04

dairy products (including cheeses of all types and sour milk cheese, whey) was reduced to 0%. Ukraine started using the tariff quota for butter in 2016. The quota for butter is usually fulfilled for butter by 46%, and for milk powder for 30%. In 2017, Ukrainian exporters also started using the duty-free export quota for milk, cream, condensed milk, and yogurt.

As part of the Free Trade Agreement, Ukraine also has quotas for the export of cattle meat to the EU. But Ukraine is not an authorized operator for the export of beef due to the lack of state monitoring system for the spread of bovine spongiform encephalopathy. That is why the graph shows the import of cattle meat, which has been increasing since 2013, and the export of cattle meat from Ukraine to the EU is completely absent.

The growth of poultry exports from Ukraine to the EU began in 2013. Since 2016, due to the signing of the FTA, the rate of growth increased and continued until 2019. Then there was a decline, due to the fact that on 01.22.2020 the EU temporarily suspended the import of poultry meat, poultry meat products, as well as thermally of unprocessed products due to an outbreak of bird flu in the Vinnytsia region. In addition, certain export difficulties were also caused by supply disruptions due to the coronavirus pandemic. According to export data of the EU, Ukraine ranked 2nd in poultry meat imports into the EU in 2021, preceded by Brazil (EU 2022).

As for the situation with the amount of poultry that Ukraine imports from the European Union, it exceeds the export figures. For this indicator, we took the sum of the following four six-digit prefix codes of the Harmonized Tariff System (HTS): 020711 for whole fresh or chilled chicken, 020713 for trimmed fresh or chilled chicken, and offal, 020712 for whole frozen chicken and 020714 for frozen chicken cuts and offal. In absolute terms, according to Eurostat, the total amount of imports of poultry meat to Ukraine from the EU in 2021 is 110.76 thousand tons, and 97.96 thousand tons in 2020, that is, the volume of imports increased by 13%. Ukraine is the 3rd largest importer of the EU poultry meat, following Ghana and Congo (EU 2022).



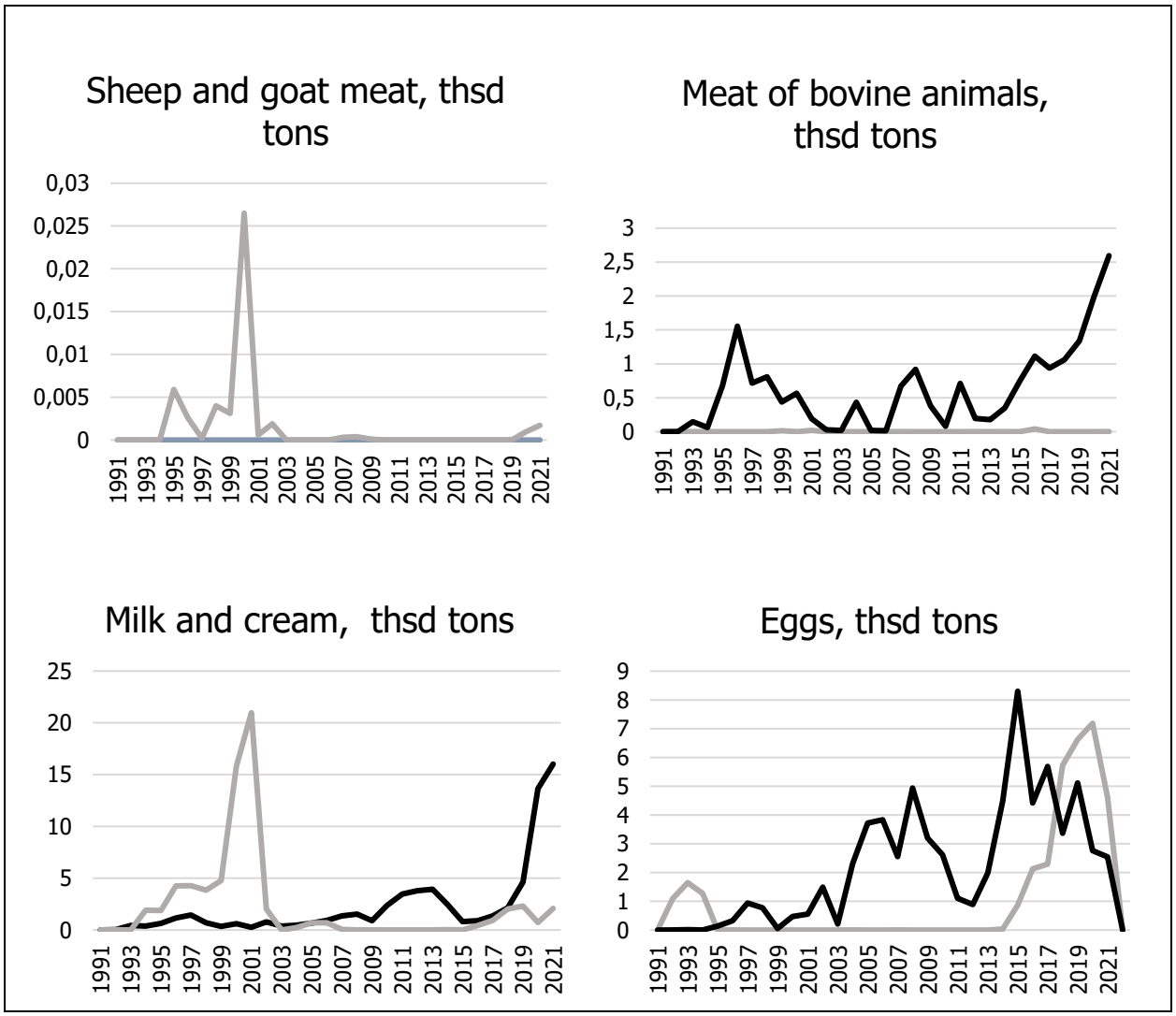


Figure Import (black line) from EU to Ukraine and export (gray line) from Ukraine to EU of livestock commodities for the period 1991-2021
Source EUROSTAT 2022

According to the Ministry of Economy of Ukraine, the total import of agricultural and food industry products for the first half of 2021 amounted to 3,633.2 million USD, which represents 11.6% of the total import structure of Ukraine. (MEU 2022c)

In the first half of 2021, the share of agricultural products and food industry in the structure of imports of goods to Ukraine from EU countries was 13.4%, and 1,735.5 million USD. Among the goods whose import has decreased are: butter and other fats produced from milk (-16.7 million USD), coleseed or rapeseed (-7.7 million USD) and tomatoes (-6.6 million USD).

The total export of agricultural and food industry products for the same period amounted to 36.1%, which in monetary terms equals 10,811.9 million USD. So, for example, the export of sunflower oil for the first half of 2021 increased by 365.4 million USD, and corn by 116.5 million USD, compared to the same indicator last year. Exports of agro-industrial complex and food industry products to EU countries (EU-27) in the first half of 2021

amounted to 2,933.8 million USD, which corresponds to a share of 24.7% in the total structure of Ukraine-EU exports. The goods whose export volume decreased include: sunflower oil and its fractions (-24.5 million USD), fruit or vegetable juices (-8.7 million USD), leguminous vegetables (-8.4 million USD), grain sorghum (-8.3 million USD), barley (-7.8 million USD) and wheat and a mixture of wheat and rye (meslin) (-5.8 million USD) (MEU 2022d).

In 2022, the RF full-scale military invasion of Ukraine led to the blockade of sea ports. Therefore, the only export channels became border crossing points with Romania, Slovakia, Hungary, and Poland, which led to an increase in the share of exports to the EU and a decrease in the total volume of exports by almost six times (data of the Ministry of Economy of Ukraine 2022). In 2021, Ukraine completely closed quotas for exports to the EU for such products as: honey; cereals and flour; starch; processed starch; processed tomatoes; grape and apple juices; eggs, poultry meat; processed grain products.

Some of the quotas are closed instantly. Such a situation is observed for honey, for which the quota was completely exhausted at the beginning of January 2022, the same was true in 2020. Also, the quarterly quota for poultry meat and eggs was used for January 2022.

II. UKRAINE-EU AGRICULTURAL TRADE POLICY

Status-quo of agricultural trade between Ukraine and EU (in Ukrainian)

On January 1, 2016, the agreement on the Deep and Comprehensive Free Trade Area (DCFTA) between Ukraine and the European Union entered into force. The temporary application of the economic part of Chapter IV of the Association Agreement (which covers the Deep and Comprehensive Free Trade Area) began unilaterally on April 23, 2014, i.e. Ukraine had the right to use quotas for duty-free export of products to the EU, in turn, EU countries supplied products to Ukraine on general terms. Only from January 2016, the Agreement began to operate bilaterally (MEU 2022).

From October 2017 and from January 2018, along with the main quotas, eight additional quotas for duty-free export to the EU for honey, cereals and flour, processed tomatoes, grape and apple juice, cereals (oats, wheat, corn and barley) began to operate (UCAB 2021).

In June 2022, after the invasion of the Russian Federation into the territory of Ukraine, the European Union, in accordance with Regulation (EU) 2022/870 of the European Parliament and of the Council of 30 May 2022 on temporary trade-liberalisation measures supplementing trade concessions applicable to Ukrainian products under the Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part (EU 2022a) canceled all duties and fees on Ukrainian exports to the European market. These rules entered into force on 04.06.2022 and will be valid, so far, until 05.06.2023. The main goal is to help Ukrainian manufacturers and exporters withstand the burden of the war (EU 2022a; EU 2022b)

Now the tariffs specified in the Agreement will be temporarily suspended. These are the tariffs for industrial products, suspension of the application of the input price system for fruits and vegetables, suspension of all tariff quotas for agricultural products, suspension of anti-dumping duties on imports of goods originating in Ukraine and suspension of the application of general protective measures for Ukrainian goods. In turn, the liberalization of trade relations assumes that Ukraine will comply with the European rules: the origin of goods and relevant procedures within the framework of the Association Agreement, refraining from any new restrictions on imports from the EU, Ukraine's respect for democratic principles, human rights and fundamental freedoms, rule of law, fight against corruption (EU 2022a).

After the EU abolished all duties and taxes on Ukrainian exports, an increase in the volume of exports of value-added products is expected. After all, if grains and oilseeds were previously exported without restrictions, then quotas for a whole range of products were exhausted in a few months - mostly, the restrictions concerned primarily value-added products (KMU 2022).

From October 1, the provisions of the international Conventions on the common transit procedure (NCTS) and on the simplification of formalities in trade in goods (VRU 2022a; VRU 2022b) entered into force for Ukraine. According to the regulations, a single transit document is submitted for the delivery of goods from one country to another: from the customs office of departure to the customs office of the destination. This speeds up customs formalities at the border and reduces related costs for businesses.

DCFTA

According to the results of independent expert monitoring, for the period 2014-2021, Ukraine's level of implementation of the Association Agreement is 49% of all obligations. In the sector of agriculture and rural development, the implementation of commitments is 44% for all years: 10% of commitments implementation has not started, early stage of implementation – 55%, advanced stage of implementation – 25%, perfect implementation – 10%. For example, in the field of quality policy, the fulfillment of obligations is 40%, genetically modified grains - 30%, organic farming - 70%, biodiversity - 30%, standards of trade in plants, plant seeds, products obtained from plants, fruits and vegetables – 53.8%, standards of trade in live animals and livestock products – 32%. For agriculture such sectors as sanitary and phytosanitary measures, where implementation is 50.1%, customs issues and trade promotion with 43% of implementation for all years, are very important as well (NAVIGATOR 2022).

Prospects for the development of agricultural trade between Ukraine and EU

In June 2022, the member states of the European Union voted to grant Ukraine the status of a candidate country for joining the European Union. However, this status is just the first step. On the way to accession, Ukraine needs to carry out a number of reforms and adapt Ukrainian legislation to the European criteria. An important element that should be taken into account in the development of trade relations is the current EU agricultural policy strategies, in particular the Green Deal and the "Farm to Fork" strategy. These strategies have ambitious goals that should be taken into account by the EU's trading partners, as well as adopted in the long term by candidate countries such as Ukraine.

Climatic neutrality

The EU has committed to achieving climate neutrality by 2050, fulfilling its obligations under the international Paris Agreement (EU 2022c). The European Green Deal is the EU's strategy for achieving the climate goal by 2050. It is accompanied by the legislative package "Fit for 55" (EU 2019). The package is a set of proposals to review legislation related to climate, energy and transport and to introduce new legislative initiatives to bring EU legislation in line with the EU's climate goals (EU 2022d).

The European Climate Law Regulation turns the political ambition to achieve climate neutrality by 2050 into a legal obligation for the EU. By adopting it, the EU and its member states committed to reducing net EU greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. This objective is legally binding and is based on an impact

assessment carried out by the Commission. The main actions included in the regulatory act are: mapping of emission reduction rates until 2050 to provide predictability to businesses, stakeholders and citizens; development of a system for monitoring and reporting on progress achieved on the way to the goal; ensuring an economically efficient and socially just green transition. Following an interim agreement reached with the European Parliament in April 2021, the Council approved the agreement in May 2021 (EU 2021).

In June 2021, EU environment ministers approved a new EU climate change adaptation strategy. The strategy outlines the EU's long-term vision to become a climate-resilient society by 2050 that fully adapts to the inevitable consequences of climate change (EU 2021a).

Actions outlined in the strategy include: better data collection and sharing to improve access and sharing of knowledge about climate impacts; nature-based solutions to help build resilience to climate change and protect ecosystems; integration of adaptation into macro-fiscal policy.

In March 2022, the Council adopted conclusions calling for the adaptation of civil protection to extreme weather events caused by climate change. The ministers called for the adaptation of civil defense systems with an emphasis on: prevention; preparedness; reply and recovery (EU 2022e).

Other strategies for future changes in agricultural trade include "the EU Biodiversity Strategy", "Farm to Fork", "the EU Forestry Strategy 2030" and "the Circular Economy Action Plan".

EU Biodiversity Strategy

The EU Biodiversity Strategy 2030 aims to help restore Europe's biodiversity by 2030. This would benefit people, the climate and the planet. Actions outlined in the strategy include: expansion of protected land and marine areas in Europe; restoration of degraded ecosystems by reducing the use and harmfulness of pesticides; increased funding and better monitoring of progress. In October 2020, the Environment Council adopted the EU Biodiversity Strategy Objectives for 2030 (EU 2022f; EU 2020).

From farm to fork

The Commission's farm-to-fork strategy aims to help the EU achieve climate neutrality by 2050 by shifting the current EU food system towards a sustainable model. In addition to food security and safety, the main objectives of the strategy are: to ensure sufficient, affordable and nutritious food within planetary boundaries; support for sustainable food production; promote more sustainable food consumption and healthy eating. In October 2020, the Council adopted the goal of developing a sustainable European food system (EU 2020a).

Forest strategy of the EU 2030

The new Forest Strategy of the European Union until 2030 is a component of the "European Green Course". It is based on the Biodiversity Strategy, linked to the EU's plan to achieve climate neutrality by 2050, the plan to reduce greenhouse gas emissions by 55% by 2030, as well as the European climate law. (EU 2021).

The main provisions of the new EU Forestry Strategy are:

- strategic vision and specific actions regarding the quantity and quality of forests in the EU, strengthening their protection, restoration and sustainability;
- measures to adapt European forests to new conditions, extreme and unpredictable weather conditions caused by climate change;
- popularization and support of forest management methods aimed at increasing biodiversity, climate protection, strong and sustainable forest bioeconomy;
- optimizing the use of wood in accordance with the cascade principle, with priority given to wood products that can replace analogues based on fossil materials, with a special emphasis on durable wood products;
- stimulating the development of the non-timber forest economy, including ecotourism and ecosystem services;
- a commitment to strictly protect the last old-growth and primary forests in the EU to ensure the preservation of key biodiversity reservoirs and important carbon stocks for future generations;
- measures to improve the concept of sustainable forest management related to climate and biodiversity, implementation of the most climate- and biodiversity-friendly forest management practices, establishment of mandatory nature restoration goals for forests in the future EU Nature Restoration Act;
- developing payment schemes to forest owners and managers for providing ecosystem services (for example, by preserving intact parts of their forests), covering costs and lost income and accelerating the implementation of carbon farming practices (a dedicated initiative on carbon farming will be presented by the Commission at the end of 2021);
- a number of measures to improve the quality of forest management - from research to staff training and advisory services;
- updating the system of forest monitoring in the EU and strengthening the legal framework for the implementation of EU legislation on forest protection and timber sales;

- a roadmap for planting three billion additional trees across Europe by 2030 in full compliance with ecological principles – the right tree in the right place for the right purpose. (EU 2021).

The main causes of forest decline include: human activity, climate change, air and water pollution, urban development, etc. Climate change is a particularly serious factor, because the increase in average annual temperature, the invasion of bark beetles, droughts, and forest fires have already led to the loss of significant areas of forests.

The new Forest Strategy is designed to ensure optimal forest use. The EU should focus on innovative products and move from short-term to long-term use of wood (EU 2021).

Circular economy action plan

The circular economy is a resource management concept that is rapidly gaining global popularity and is recognized as one of the key drivers for achieving the goals of the Paris Agreement. The circular economy gained particular popularity and awareness of its importance for achieving sustainable development after its introduction in the EU (EU 2015; WEF 2014).

On March 11, 2020, the European Commission adopted the Circular Economy Action Plan. It is an important component of the agenda of the strategy of the European "green" course (European Green Deal). The aim of this Plan is to reduce consumption in the EU and double the reuse of resources in the coming decades, while promoting economic growth (EU 2020).

The action plan includes actions for the entire life cycle of goods - from design and manufacture, to repair, consumption, use, recycling or reuse, and finally to returning funds back into the economy. After all, now many goods are disposable, or with a very short life cycle, that is, they cannot be used for a long time, reused, recycled or repaired.

According to the new EU Circular Economy Action Plan, instead of increasing the harvest of wood from forests, the priority should be to better use, reuse and recycle all wood-based products. The main areas of implementation are: supporting the production of durable products; strengthening the possibilities of consumers and public procurement; increasing the reuse of resources in industry.

What's in Ukraine

In Ukraine, in the field of climate policy, the following documents are important: the National Waste Management Strategy until 2030, the National Waste Management Plan until 2030, the State Environmental Policy Strategy of Ukraine for the period until 2030, the Concept of State Policy Implementation in the Field of Climate Change for the Period until 2030 and the plan for its implementation, Strategy of low-carbon development of Ukraine until 2050.

The National Waste Management Strategy (KMU 2017) was approved in 2017 with the aim of reforms to approximate EU directives in the field of waste management.

The National Waste Management Plan 2030 (KMU 2019) was approved in 2019. It is a road map for the National Strategy, which aims to build a waste management system in Ukraine in accordance with EU standards and a circular economy.

The strategy of the state environmental policy until 2030 (KMU 2019a), which was approved in 2019, should contribute to overcoming the consequences of environmental problems and eliminate the causes of their occurrence. It was based on a strategy that operates in EU countries and should form a resource-efficient, circular and low-carbon economy.

The concept of implementation of state policy in the field of climate change for the period until 2030 (KMU 2016) was approved in 2016 with the aim of achieving sustainable development and creating prerequisites for a gradual transition to low-carbon development under conditions of economic, energy and environmental security.

The low-carbon development strategy of Ukraine until 2050 (KMU 2017), provides for reducing emissions and increasing the absorption of greenhouse gases, the development of environmentally safe production using "green" technologies.

Conclusions

Unfortunately, despite a large number of important program documents in Ukraine, there is still no clear policy to support the circular economy. Since the most important issue of the circular economy is waste management, Ukraine is not yet ready to ensure "circularity". Also, the problem of the transition to a circular economy is in the public procurement sector, because there the cheapest position is chosen without taking into account its environmental friendliness. That is, more ecological goods or services, which are almost always more expensive than products that were produced without observing ecological standards, have no chance of winning.

For the EU, the issue of climate change is very important. That is, Ukraine needs to clearly develop a climate policy within the framework of obligations under the Paris Agreement, taking into account climate change in all sectors.

Through the "industrial visa-free" in Ukraine, opportunities are opening up for the integration of EU industrial processes into Ukrainian production. So, for example, new niches can be created for Ukrainian manufacturers. In the field of agriculture, it is possible to work on the development of organic production (Andrusevich et al. 2020)

In turn, the strengthening of requirements for the quality of goods within the framework of the "industrial visa-free" will create an additional burden on manufacturers due to outdated and energy-intensive equipment and outdated production processes. Higher quality requirements for food products and compliance with environmental standards in

their production may become an obstacle for the further development of export of Ukrainian agricultural products to the EU market.

Effective internal reforms in the areas related to EU integration and climate change are a prerequisite for using opportunities and reducing the likelihood or consequences of threats arising from the EEC for Ukraine. An absolute priority is the effective approximation of Ukrainian legislation to the requirements of EU legislation in all areas provided for by the Association Agreement.

III. QUANTITATIVE ANALYSIS OF TRADE SCENARIOS BETWEEN UKRAINE AND EU

To perform the quantitative analysis of EU-Ukraine trade scenarios we use AGMEMOD model. We adapt it to fit the scenarios and update the database.

General description of the methodology

AGMEMOD is an econometric, dynamic, partial-equilibrium, multi-country, multi-market model. It covers all EU Members States, some non-EU countries (e.g., Balkan countries, Ukraine, Kazakhstan, Russian Federation, some African countries) and a stylised version of the rest of the world (RoW). The model provides annual projections (currently) until the year 2030 for markets of the main agricultural commodities at national and aggregated EU levels. AGMEMOD is based on a set of commodity-specific model templates and country-specific models. The template approach facilitates aggregation of the simulation results, analytical consistency across countries and comparison of policy impacts. The model does not only provide baseline projections, but as well allows analysing impacts of countries' agricultural policies (e.g., CAP) and macroeconomic changes on the agricultural markets (Salamon et al., 2019).

The commodity markets in AGMEMOD are represented by equations for supply and demand, stocks, international trade and market prices. They represent behavioural responses of economic agents to changes in prices and exogenous variables such as agricultural policy instruments, GDP, currency exchange rate, tariff rate quotas etc. The equations' parameters are usually estimated as time series regressions from the AGMEMOD database. The latter contains annual observations on the endogenous and exogenous variables. Depending on the country, these data range from 1973 until the latest available year. Most of the data is obtained from national statistics, Eurostat, Short-term Outlook and Commodity price dashboard of the European Commission (Salamon et al., 2017; Chantreuil et al., 2012).

Following the partial equilibrium approach, commodity prices adjust to clear each commodity market considered in AGMEMOD. Lagged endogenous variables introduce (recursive) dynamic behaviour when entered as determinants in the next period's equilibrium supply and/or demand. Closing of global commodity balances in AGMEMOD is achieved by forming world market prices in the RoW model. Commodity markets in a country are linked to each other by substitution or complementary parameters on the supply or demand side. Interactions between the crops and livestock sub-models are captured via the derived demand for feed. The various meat types, dairy products and crops are partly substitutes in demand, while cattle, pig, sheep and goat, and poultry compete for feed (Salamon et al., 2017; Chantreuil et al., 2012).

Each country model comprises markets for its main agricultural commodities. These commodities usually include six types of cereals, three types of oilseeds and their processed

products (oil and meal), sugar beet and sugar, protein crops, potatoes, live animals such as cattle, sheep and goats, pigs and poultry and their products such as meat, milk, dairy and eggs. The projections for the crops sector cover area harvested, yield per hectare, total production as a product of area harvested and yield, domestic use, quantities imported and exported, stocks and domestic market price. Crops area is defined following the top-down approach. In particular, the total country land area is divided into woods, usable agricultural area (UAA) and other areas. UAA is split into permanent grassland, kitchen gardens, arable land, land under permanent crops, fodder from arable land and vegetable area.

The livestock sector in AGMEMOD comprises a complex system of total animal numbers, numbers of dairy and suckler cows, sows and ewes, livestock reproduction rates, total number of slaughtered animals, slaughter weight, death loss, numbers imported and exported. Meat production is determined by the number of slaughtered animals and their slaughter weight. Markets of milk and dairy products include milk delivered to dairies, consumed at the farm level and for human consumption, and milk fat and protein coefficients which are used in the equations of production of butter, cream, cheese, whole and skimmed milk powder (Salamon et al., 2017; Chantreuil et al., 2012).

The AGMEMOD model produces market projections based on the functions representing behavior of the market agents and equalities. The latter are computations which represent production or market balances in equilibrium. For example, quantity of total milk produced equals the number of dairy cows times their productivity. The behavioral equations, on the contrary, are estimated econometrically and refer to such variables as, for example, market prices, consumption per capita, quantities exported and imported, crop yields and areas, processing coefficients, number of livestock slaughtered and discarded, number of young animals and production of eggs and poultry meat. In the current study the behavioral functions of imports and exports for all the commodities in the Ukraine country model are split into EU-Ukraine and Ukraine flows (Nykolyuk et al. 2021).

To estimate the equations that represent trade, time series data were used. These data included observations for the period of 1992-2021. The equations were estimated as linear regressions with OLS in R statistical software. Data processing preceded the estimation. It included detection of inconsistencies and outliers. The regressions fitting followed four steps. First, the hypotheses on the potential relationship between the dependent and explanatory variables were formed based on microeconomic theory and sector characteristics. Next, these relationships were analyzed graphically. At the third stage, the variables were tested for autocorrelation. Fourth, the estimation results were analyzed for general fit of the model, statistical significance and compliance with the economic theory. Based on this analysis, the equations with greater statistical reliability and which better described the current trends of the dependent variables were introduced into the AGMEMOD model (Nykolyuk et al. 2021).

Real costs for producing crop and livestock commodities are included in the behavioural equations, which represent the supply side of the agricultural markets. These costs comprise payments for rented land and property, labour, fodder, seeds, fertilizers, fuel, depreciation, as well as expenses on additional materials such as disinfectants, services and veterinary treatment.

Database update

The database of the Ukraine country-model starts from 1992. For the current study it has been updated until 2021 and, where possible, 2022. The series include observations on production (e.g., crops yields and area harvested, livestock number and crop, slaughter weight, production of oilseed oils and meals), domestic use (e.g., use for feed, human consumption and processing, losses), prices, change in stocks, import and export. Observations on most of the domestic market prices and supply components were obtained from the State Statistics Service of Ukraine. For quantities exported and imported, components of domestic use and domestic prices for oilseed oils and meals, FAOSTAT and statistics of the International Trade Centre were used. Data for 2022 were obtained from publicly available database of commodities prices and reports of the Ministry for Agrarian and Food Policy of Ukraine.

The projections of the agricultural commodity balances in AGMEMOD are based on the number of factors, including agricultural and trade policies, production costs, world market prices of the agricultural commodities, and macroeconomic indicators such as, for example, national GDP, GDP deflator, currency exchange rate and population. These are exogenous variables, i.e. variables that are not computed or projected by the model. Their observed and projected values are collected from various external sources and implemented into the model as a separate component representing modelling assumptions.

Although the model allows for running simulations for the values of the world market prices, the current study is conducted within the general frameworks of the OECD-FAO and the EU Agricultural Outlooks. Accordingly, the historical and projected values of the world market prices for the commodities analysed correspond to those of the EU Agricultural Outlook (see table above). Table below provides with sources for a selected set of variables:

Table III-1 sources for the selected set of variables

Domestic market prices in 2022	June 2022, open sources data June 2022, producers' questionnaire
Domestic market prices in 2023–2030	Defined by the model
World market prices in 2022–2030	OECD-FAO Outlook 2022
GDP projections 2022-2030 *IMF, April 2022* *SSSU projections* *Growth rate projected by USDA in 2021*	 *2022-2023: - 35% compared to 2021* *2024: rebound by 12.5%*

	2025-2030: +3.1% annually
GDP deflator *As of July 2022, according to the National Bank of Ukraine* *According to the USDA 2021 projections*	*2022: 30* *2023–2030: +5% annual growth*
UAH/USD currency exchange rate *As of July 2022, according to the National Bank of Ukraine* *According to the USDA 2021 projections*	*2022–2023: 36.6* *2024–2030: +0.2% annual growth*
Population *Assuming 4 mil people left Ukraine considering 2021 USDA projections until 2030* *Return of all the war refugees, according to 2021 USDA projections until 2030*	*2022-2023: -4 mil from the projected number* *2024-2030: according to the former projections*

Source: adapted from KSE Agrocenter 2022d

The agricultural trade policy of 2017 and beyond is represented in the database with FTA agreements, e.g., with the EU and Canada (FTA, 2017; FTA, 2014), and the law of Ukraine on customs duties (LoU, 2020d). Other factors such as, for example, values of foreign investments in agriculture and socio-political conditions are not directly represented in the model. Instead, their impacts are partially captured by the estimates of time series regressions, representing the behaviour of economic agents in agriculture.

Agricultural policy support in Ukraine targets specific farming/entrepreneurial activities (e.g., the partial refunding of interest paid for agricultural loans) or specific sectors or types of agricultural producers (e.g., payments to newly established farms and support of livestock production) (see section 3). Because the targets of this support have changed rather often (LoU, 2020c; LoU, 2019; LoU, 2018b; LoU, 2017), medium- and long-term effectiveness of such support may be limited, and conducting of the respective impact analysis merely possible. Furthermore, as some of the payments refer to rather specific farming activities and the respective data are not available at the commodity level, their quantification for the use in the model may be prone to considerable errors. Finally, according to OECD (2020), the producer support estimate (PSE) in Ukraine in 2011-2020 ranged from -3.86% to 2.96% of gross farm receipts. This is low compared to other countries, especially when compared to the PSE of the same period in the EU, which ranged from a minimum of 17.27% to a maximum of 19.66%, and in 'the OECD total', which ranged between 16.36% to 18.72%. Therefore, direct monetary support to the Ukrainian producers has not been included in the modelling assumptions, neither has been explicitly accounted for when estimating the equations.

Scenarios description

Two scenarios are designed for the current study. The first scenario (scenario DCFTA) models the impacts of Deep and Comprehensive Free Trade Agreement between Ukraine and EU on trade of agricultural commodities between Ukraine and EU and Ukraine and

RoW annually until 2030. And the second scenario (scenario Free) analyses the impacts of completely barrier-free markets between EU and Ukraine. In both scenarios the war and post-war recovery periods are taken into account. The tables below present the scenarios. The first table presents general assumptions such as on duration of war, and the second table presents the assumptions regarding the trade barriers. In 2022, for example, Ukraine experiences the abolishment of all quotas and tariffs from the EU side for both scenarios. In 2023-2030 in scenario DCFTA we follow the conditions of the Deep and Comprehensive Free Trade Agreement between Ukraine and EU, and in scenario FREE all of the trade barriers are abolished. The commodities selected are wheat, barley, corn, beef, pork, sheep and goat meat, beef, poultry/chicken meat, eggs and butter. These the commodities present in AGMEMOD model and exported from Ukraine to the EU quantities.

Table III-2 Selected set of model adaptations

Assumptions	**Values**
Level of export	2023 as of today, 2024-2026 – only Odesa and Danube ports, 2027-2030 – all ports are available except of the Azov sea ports
Duration of war	2022-2023
Reduction of grains area due to occupation and active fighting in 2022-2023	-13% from the 2021 grains area harvested in 2021
Reduction of oilseeds area due to occupation and active fighting in 2022-2023	-20% from the 2021 oilseeds area harvested in 2021
Production costs	
Availability of financial resources for variable costs	the producers get the profit just to cover their expenses in 2023-2024, return to normal in 2025
Increase in fuel expenses compared to 2021	following annual average crude oil price change in 2022-2023 and projection for 2024 based on World Energy Outlook. For further years adjusted to inflation.
Increase in fertilizer expenses compared to 2021	80% increase in 2022 and 30% increase in 2023, further changes is annual inflation adjustment
Decrease in labor availability, and the resulting change in labor costs, due to mobilization, migration and war-related death*	in 2023-2024 30% less, starting from 2025 - gradual return to 2021 level*
Additional area of uncultivated arable land as an effect of increased production costs	-5%
World market prices in 2022–2030	OECD-FAO Outlook 2022
Crops storage assumption	Storage available
GDP projections 2022-2030 *IMF, April 2022* *SSSU projections* *Growth rate projected by USDA in 2021*	 *2022-2023: - 35% compared to 2021* *2024: rebound by 12.5%* *2025-2030: +3.1% annually*

GDP deflator *As of July 2022, according to the National Bank of Ukraine* *According to the USDA 2021 projections*	- *2022: 30* *2023–2030: +5% annual growth*
UAH/USD currency exchange rate *As of July 2022, according to the National Bank of Ukraine* *According to the USDA 2021 projections*	- *2022–2023: 36.6* *2024–2030: +0.2% annual growth*
Population *Assuming 4 mil people left Ukraine considering 2021 USDA projections until 2030* *Return of all the war refugees, according to 2021 USDA projections until 2030*	- *2022-2023: -4 mil from the projected number* *2024-2030: according to the former projections*

Source: adapted from KSE Agrocenter 2022d

Table III-23 DCFTA specific scenario assumptions

Commodity and tariff/quota	**Unit of measure**	**Source**	**Export from Ukraine to EU**			**Export from EU to Ukraine**		
			scenarios					
			DCFTA & Free	DCFTA	Free	DCFTA & Free	DCFTA	Free
			modelling years					
			2022	'23-'30	'23-'30	2022	'16-'30	'23-'30
Soft wheat								
TRQ Quota	t	CAPRI database	0	1000000	0	0	0	0
MFN tariff Ad-valorem: out-of-quota	EUR/t	ITC macmap	0	95	0	0	0	0
Barley								
TRQ Quota	t	CAPRI database	0	357800	0	0	0	0
MFN tariff Ad-valorem: out-of-quota	%	ITC macmap	0	4.5	0	0	0	0
Maize, flour and pellets								
TRQ Quota	t	CAPRI database	0	650000	0	0	0	0

Commodity and tariff/quota	Unit of measure	Source	Export from Ukraine to EU			Export from EU to Ukraine		
			scenarios					
			DCFTA & Free	DCFTA	Free	DCFTA & Free	DCFTA	Free
			modelling years					
			2022	'23-'30	'23-'30	2022	'16-'30	'23-'30
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	7.7	0	0	0	0
Beef								
TRQ Quota	t in carcass weight	CAPRI data-base	0	1560	0	0	0	0
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	12.8	0	0	0	0
Poultry meat and poultry preparations								
TRQ Quota	t in carcass weight	CAPRI data-base	0	28000	0	20000	20000	0
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	15.5	0	0.12	0.12	0
Chicken								
TRQ Quota	t in carcass weight	CAPRI data-base	0	28000	0	20000	20000	0
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	15.5	0	0.12	0.12	0
Sheep meat								
TRQ Quota	t in carcass weight	CAPRI data-base	0	4072.5	0	0	0	0
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	0.128	0	0.10	0.10	0
Pigmeat								

Commodity and tariff/quota	Unit of measure	Source	Export from Ukraine to EU			Export from EU to Ukraine		
			scenarios					
			DCFTA & Free	DCFTA	Free	DCFTA & Free	DCFTA	Free
			modelling years					
			2022	'23-'30	'23-'30	2022	'16-'30	'23-'30
TRQ Quota	t in carcass weight	CAPRI data-base	0	24000	0	20000	20000	0
MFN tariff Ad-val-orem: out-of-quota	EUR/kg	ITC mac-map	0	53.6	0	0.12	0.12	0
Eggs								
TRQ Quota	t	CAPRI data-base	0	3000	0	0	0	0
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	2.3	0	0	0	0
Butter								
TRQ Quota	t	CAPRI data-base	0	3250	0	0	0	0
MFN tariff Ad-val-orem: out-of-quota	%	ITC mac-map	0	27.8	0	0	0	0

Source: Authors' elaboration based on FTA (2014)

In order to introduce access to ports into the model, we assume the maximum export capacity in 2023-2024 to equal the quantity exported during March 2022-March 2023, which is 54.6 million tonnes. The Odesa port is assumed to be able to transport 6.4 million tonnes of agricultural commodities, and Azov ports are assumed to be able to transport up to 2.4 million tonnes of agricultural commodities.

Scenarios results in the context of impact on economic indicators of the agricultural sector

During the war, in 2022-2023, the production of the cereals modelled drops. In DCFTA scenario, starting from the first post-war year, assumed 2024, the production will be recovering but at different levels. Although acreage of maize is expected to prevail, due to the yield differences, Ukraine will still produce more of wheat than of all other commodities. Maize, however, will be its major competitor. Although maize experiences major

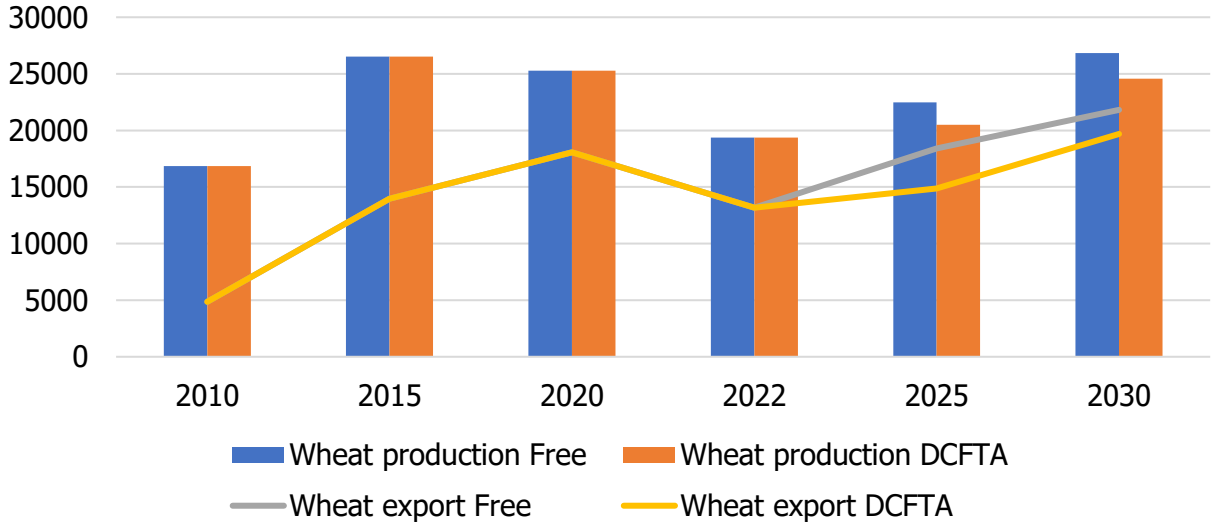
shock during the war time, it recovers very quickly. Quantity produced of wheat and of barley is affected by war less, and thus the recovery rates are less dramatic. Rye and oats are impacted severely as well. Their recovery rate is projected as rather smooth. Wheat, rye and oats do not seem to reach the pre-war production levels, whereas maize and barley are projected to recover. The Free scenario shows better recovery rates. Wheat production recovers to the pre-war level by 2030 and the quantity produced under Free scenario is 9.2% greater than in DCFTA scenario. Production of rye in 2030 is 1.6% higher under Free scenario than under DCFTA scenario, of oats 32.9% higher, of barley 1.9% higher, whereas of maize 4.9% lower. Production of maize, however, grows in both scenarios. Exports of cereals grow with respect to production, as it has been observed in the pre-war situation. In Free scenario, however, the speed of such growth is stronger, even for domestic market-oriented crops (see the Figure below). In particular, in 2030 quantity of wheat exported under DCFTA scenario is 9% greater than in 2020, and under Free scenario 20.8% greater. Quantity of maize exported under DCFTA scenario is 42.2% lower than in 2020, and under Free scenario 15.7% lower; quantity of barley exported under DCFTA scenario is 2.2% lower than in 2020, and under Free scenario 48% greater; quantity of rye exported under DCFTA scenario is 21.1% greater than in 2020, and under Free scenario 29.1% greater; quantity of oats exported under DCFTA scenario is 3.8% lower than in 2020, and under Free scenario 0.4% lower. The table below summarizes the results.

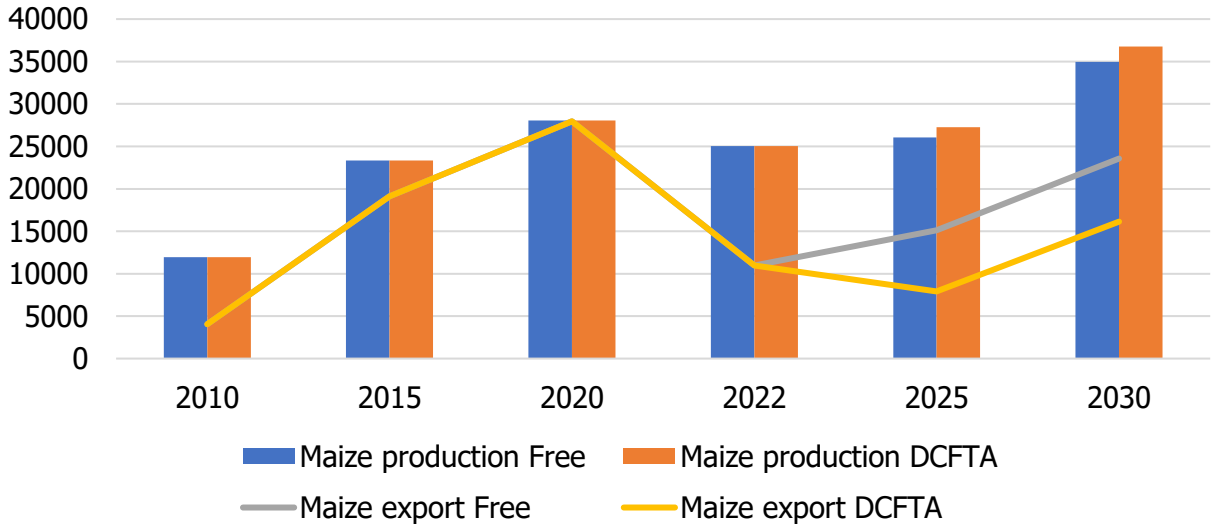
Table: Summary of the modelling results for cereals, 1000 t and %

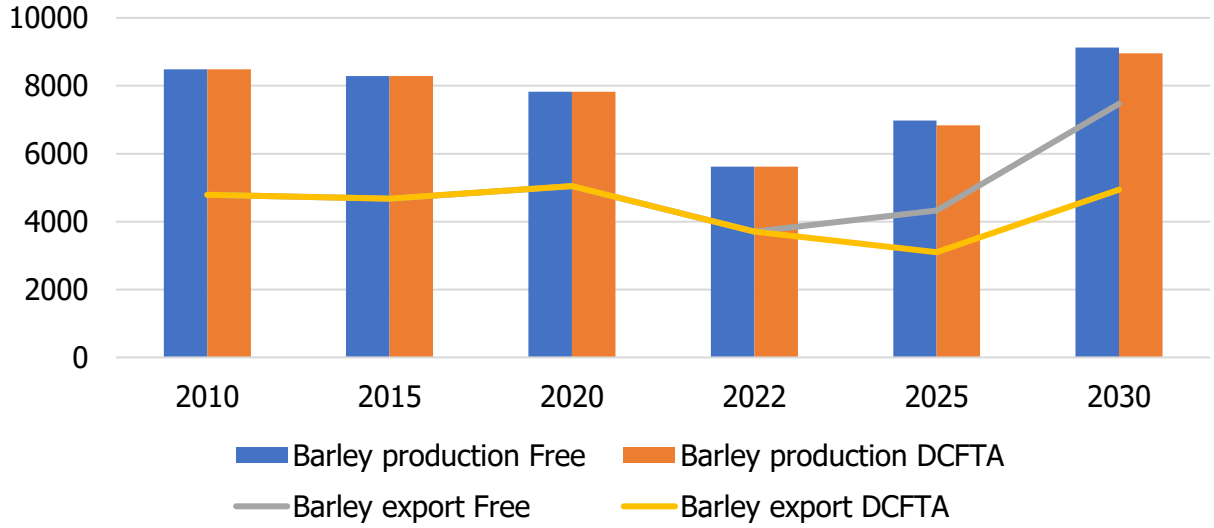
Commodity and activity	Scenario	2020	2025	2030	Free/DCFTA in 2025	Free/DCFTA in 2030	2030/2020 change
Wheat production	Free	25279.8	22471.8	26842.6	9.6%	9.2%	6.2%
	DCFTA	25279.8	20502.7	24581.5			-2.8%
Wheat export	Free	18055.7	18399.6	21815.8	23.7%	10.8%	20.8%
	DCFTA	18055.7	14880.1	19688.3			9.0%
Maize production	Free	28036.9	26059.2	34951.8	-4.3%	-4.9%	24.7%
	DCFTA	28036.9	27242.6	36767.1			31.1%
Maize export	Free	27952.5	15134.4	23569.5	91.0%	46.0%	-15.7%
	DCFTA	27952.5	7922.8	16145.7			-42.2%
Barley production	Free	7826.3	6979.6	9129.3	2.2%	1.9%	16.6%
	DCFTA	7826.3	6831.9	8960.6			14.5%
Barley export	Free	5046.4	4330.9	7470.5	39.8%	51.3%	48.0%
	DCFTA	5046.4	3097.6	4937.0			-2.2%
Rye production	Free	456.7	292.5	392.6	2.4%	1.6%	-14.0%
	DCFTA	456.7	285.5	386.5			-15.4%
Rye export	Free	70.9	81.2	91.5	3.6%	6.6%	29.1%
	DCFTA	70.9	78.4	85.8			21.1%
Oats production	Free	534.8	342.6	451.8	18.4%	32.9%	-15.5%
	DCFTA	534.8	289.4	339.9			-36.4%

Oats export	Free	46.4	46.3	46.2	1.8%	3.6%	-0.4%
	DCFTA	46.4	45.5	44.6			-3.8%

Source: 2020 – SSSU, 2025-2030 – own estimation







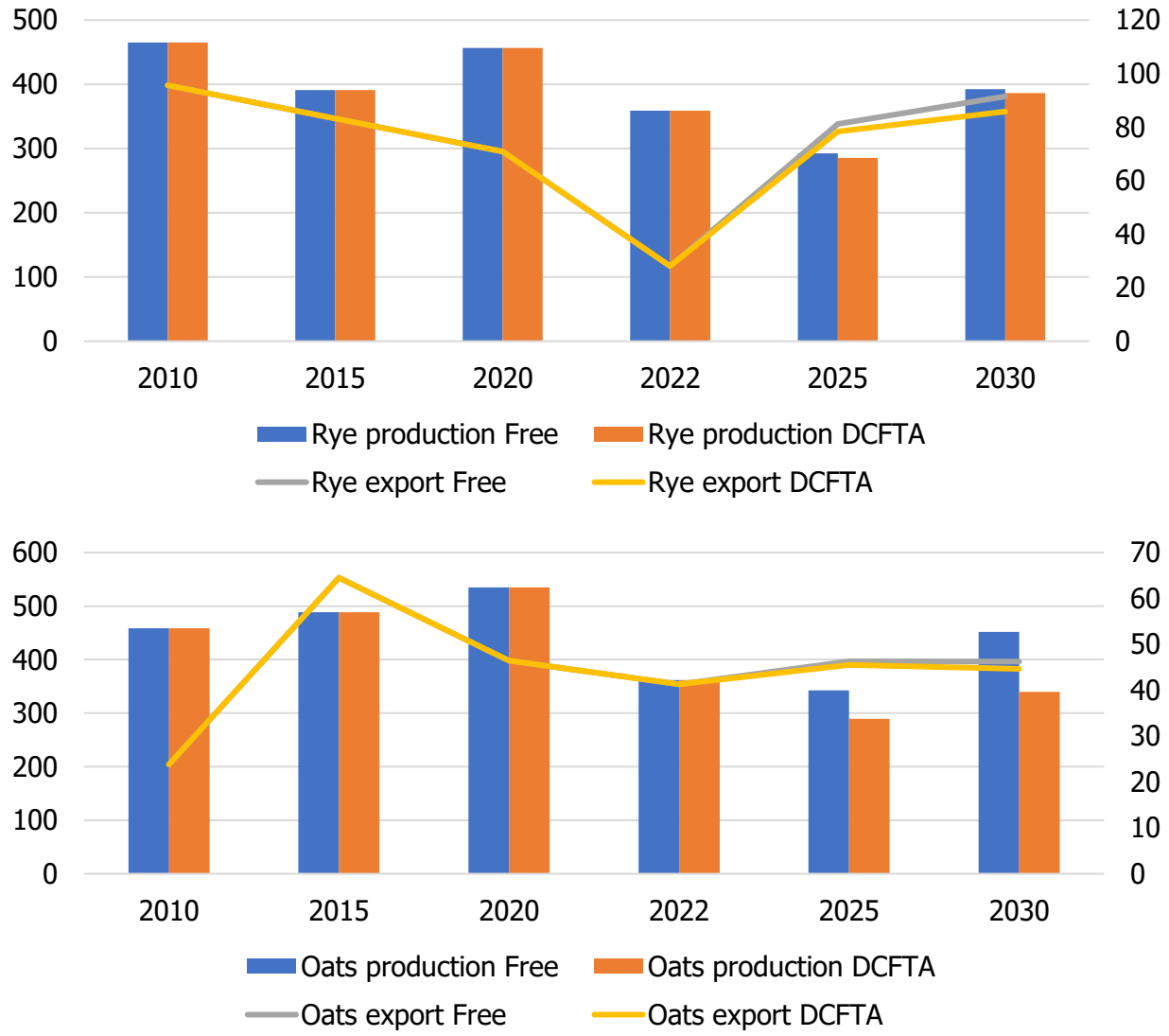


Figure: Production and export of cereals in Free and DCFTA scenarios in 2010-2030
Source: SSSU until 2022 and own projections
Note: Axes on the right are scales for export quantities

Production of sunflower seeds is expected to recover rather quickly as well at the expense of rapeseed and soya beans areas. The production and export of sunflower oil and meal will increase quickly as well. Production of rapeseed seeds will be growing and is expected to catch up with the pre-war trend under DCFTA and Free scenarios. On the contrary, production and export of soya beans is modelled to stagnate. Under DCFTA and Free scenarios the growth/recovery rates of sunflower seeds, oil and meal production range from 50% to 90% when compared to 2020. Export of sunflower seeds drops: the seeds are further processed into oil which is exported. Production of rapeseed in 2030 grows under Free scenario by 9.9% and under DCFTA by 43% as compared to 2020. Respectively, production of oil and meal under Free scenario drops by 16%. Production of rapeseed oil and meal under DCFTA scenario increases by 6%. Export of rapeseed seeds under Free scenario drops by 2.8% and under DCFTA scenario increases by 49.7%. Export of oil and meal under Free scenario drops and under DCFTA scenario increases by

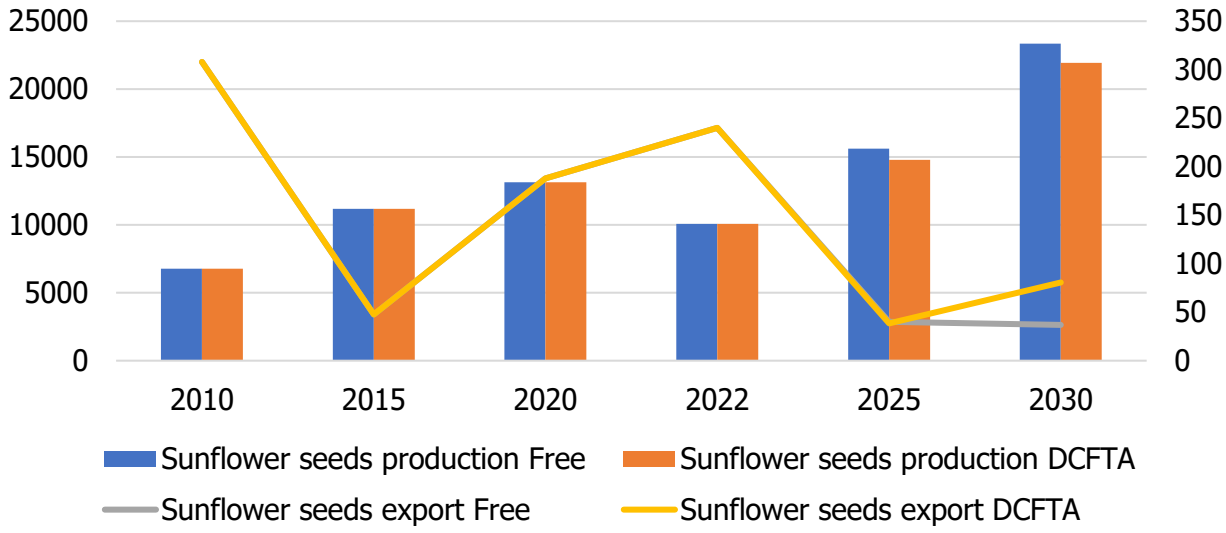
6.4%. Production of soya beans in 2030 under DCFTA and Free scenarios drops by 36.9% and 51%, respectively, when compared to 2020. Production of oil and meals, as well as the exports decrease accordingly. The main driver behind such results is the relative profitability of crops, which in turn depends on production costs and prices received by the producers. In DCFTA scenario the Ukrainian domestic commodity prices are integrated with the world market prices, whereas in Free scenario the link is stronger with the European prices. The latter affects the export demand for specific crops. Thus, the producers react to the market incentives and substitute the crops with each other. The table below summarizes the modelling results for oilseeds.

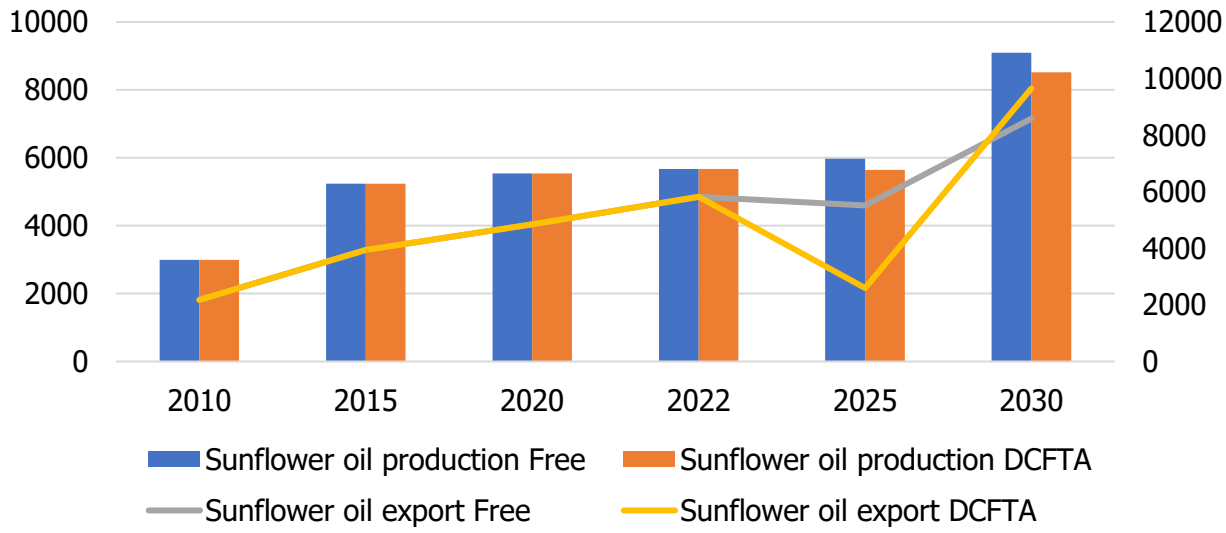
Table: Summary of the modelling results for oilseeds, oils and meals, 1000 t and %

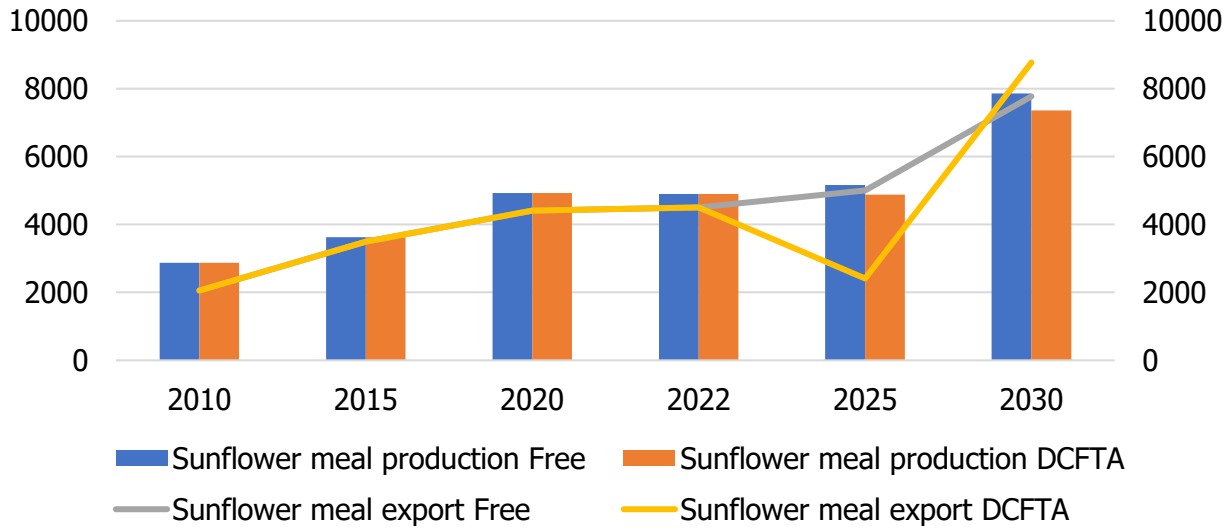
Commodity and activity	Scenario	2020	2025	2030	Free/DCFTA in 2025	Free/DCFTA in 2030	2030/2020 change
Sunflower seeds production	Free	13145.5	15604.5	23354.1	5.5%	6.5%	77.7%
	DCFTA	13145.5	14789.8	21927.9			66.8%
Sunflower seeds export	Free	187.9	40.0	36.9	4.0%	-54.3%	-80.4%
	DCFTA	187.9	38.5	80.6			-57.1%
Sunflower oil production	Free	5538.2	5975.2	9097.2	5.8%	6.7%	64.3%
	DCFTA	5538.2	5646.8	8522.4			53.9%
Sunflower oil export	Free	4847.0	5511.4	8585.8	112.1%	-11.1%	77.1%
	DCFTA	4847.0	2599.1	9653.5			99.2%
Sunflower meal production	Free	4931.2	5160.5	7856.9	5.8%	6.7%	59.3%
	DCFTA	4931.2	4876.9	7360.5			49.3%
Sunflower meal export	Free	4405.5	5000.0	7773.1	107.7%	-11.4%	76.4%
	DCFTA	4405.5	2407.8	8771.9			99.1%
Rapeseed seeds production	Free	2585.5	1996.9	2841.6	-24.0%	-23.1%	9.9%
	DCFTA	2585.5	2629.0	3697.5			43.0%
Rapeseed seeds export	Free	2616.6	1794.6	2543.4	685.2%	-35.1%	-2.8%
	DCFTA	2616.6	2362.6	3916.9			49.7%
Rapeseed oil production	Free	130.7	72.2	109.8	-19.7%	-21.0%	-16.0%
	DCFTA	130.7	90.0	139.0			6.4%
Rapeseed oil export	Free	112.8	62.4	94.8	-19.7%	-21.0%	-16.0%
	DCFTA	112.8	77.7	120.0			6.4%
Rapeseed meal production	Free	189.6	104.8	159.2	-19.7%	-21.0%	-16.0%
	DCFTA	189.6	130.5	201.6			6.3%
Rapeseed meal export	Free	147.3	81.4	123.6	-19.7%	-21.0%	-16.0%
	DCFTA	147.3	101.3	156.6			6.3%
Soya beans production	Free	2765.5	2085.8	1356.4	-2.8%	-22.3%	-51.0%
	DCFTA	2765.5	2145.7	1746.1			-36.9%
Soya beans export	Free	1277.1	963.2	626.4	-2.8%	-22.3%	-51.0%
	DCFTA	1277.1	990.9	806.4			-36.9%
Soya oil production	Free	116.8	90.0	59.5	-2.7%	-21.5%	-49.1%
	DCFTA	116.8	92.5	75.8			-35.1%

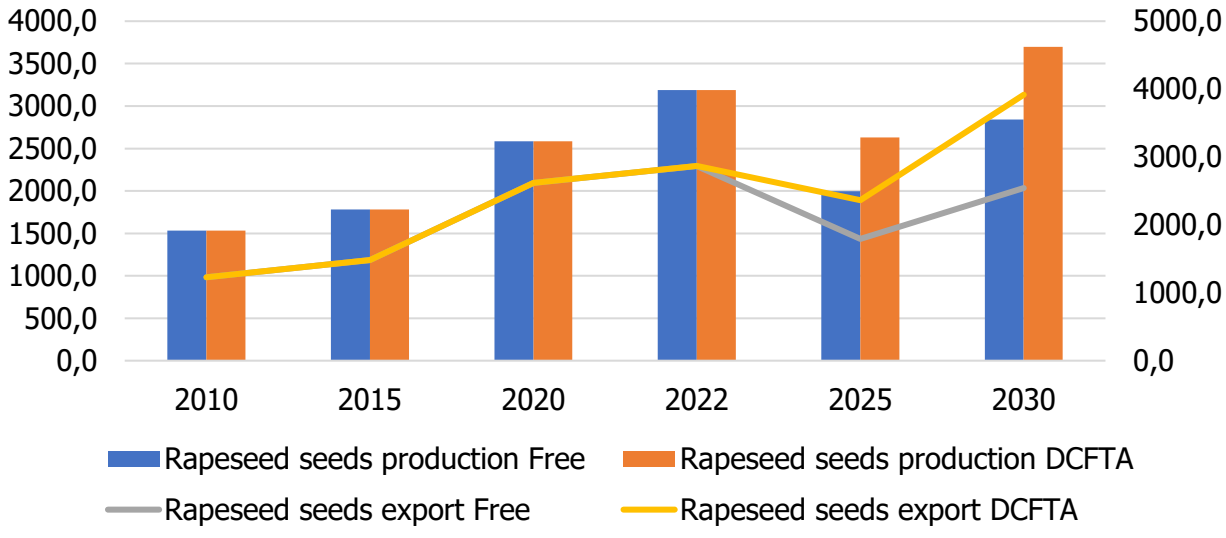
Soya oil export	Free	106.6	82.1	54.3	-2.7%	-21.5%	-49.1%
	DCFTA	106.6	84.4	69.2			-35.1%
Soya meal production	Free	532.9	405.0	267.7	-2.7%	-21.5%	-49.8%
	DCFTA	532.9	416.3	341.1			-36.0%
Soya meal export	Free	177.9	135.2	89.4	-2.7%	-21.5%	-49.8%
	DCFTA	177.9	139.0	113.9			-36.0%

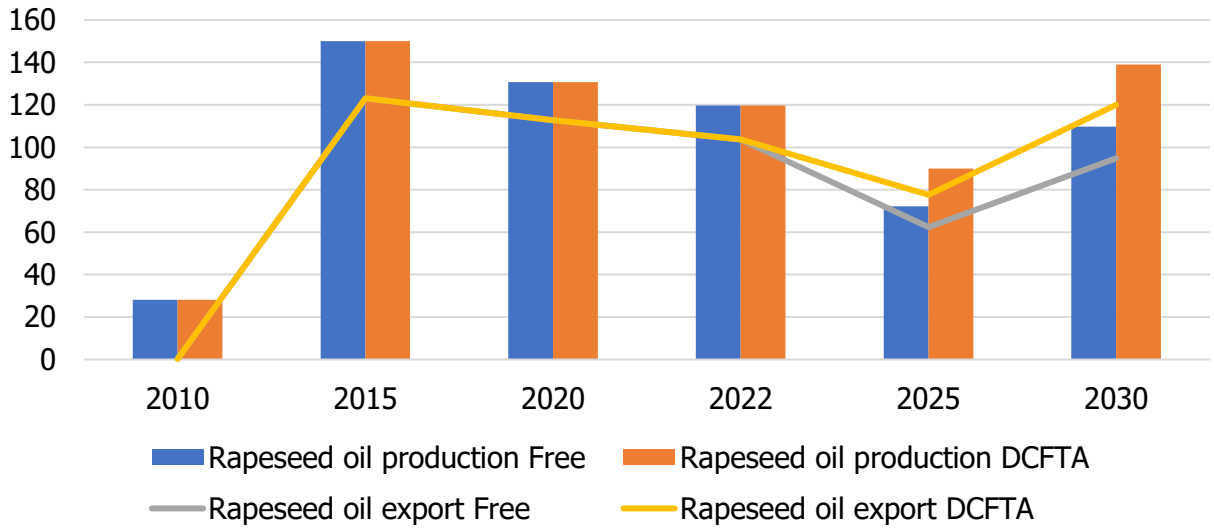
Source: 2020 – SSSU, 2025-2030 – own estimation


25000
20000
15000
10000
5000
0
350
300
250
200
150
100
50
0
2010
2015
2020
2022
2025
2030
Sunflower seeds production Free
Sunflower seeds production DCFTA
Sunflower seeds export Free
Sunflower seeds export DCFTA


10000
8000
6000
4000
2000
0
12000
10000
8000
6000
4000
2000
0
2010
2015
2020
2022
2025
2030
Sunflower oil production Free
Sunflower oil production DCFTA
Sunflower oil export Free
Sunflower oil export DCFTA


10000
8000
6000
4000
2000
0
10000
8000
6000
4000
2000
0
2010
2015
2020
2022
2025
2030
Sunflower meal production Free
Sunflower meal production DCFTA
Sunflower meal export Free
Sunflower meal export DCFTA


4000,0
3500,0
3000,0
2500,0
2000,0
1500,0
1000,0
500,0
0,0
5000,0
4000,0
3000,0
2000,0
1000,0
0,0
2010
2015
2020
2022
2025
2030
Rapeseed seeds production Free
Rapeseed seeds production DCFTA
Rapeseed seeds export Free
Rapeseed seeds export DCFTA


160
140
120
100
80
60
40
20
0
2010
2015
2020
2022
2025
2030
Rapeseed oil production Free
Rapeseed oil production DCFTA
Rapeseed oil export Free
Rapeseed oil export DCFTA

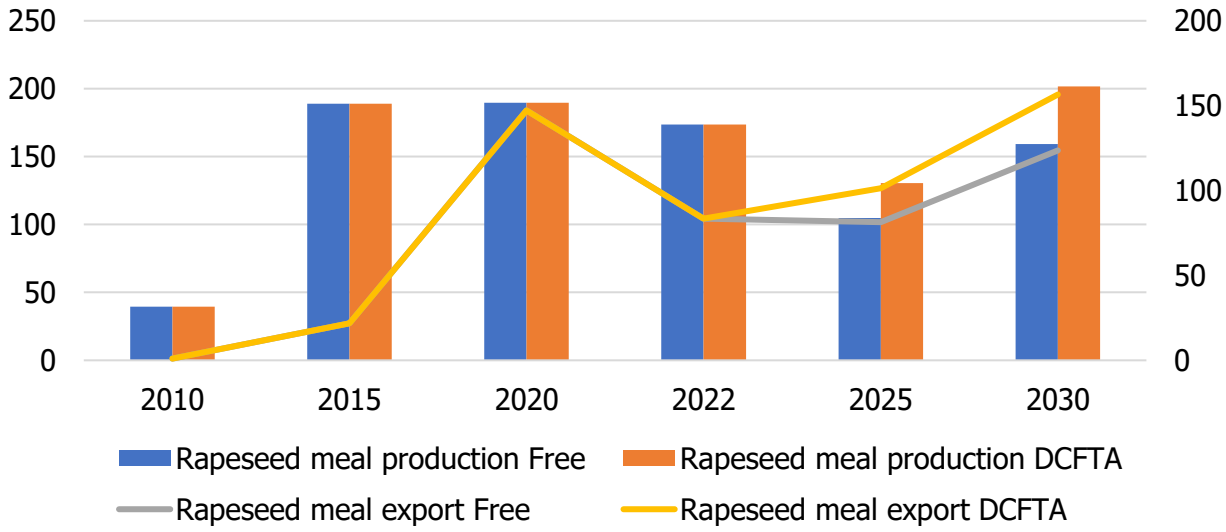
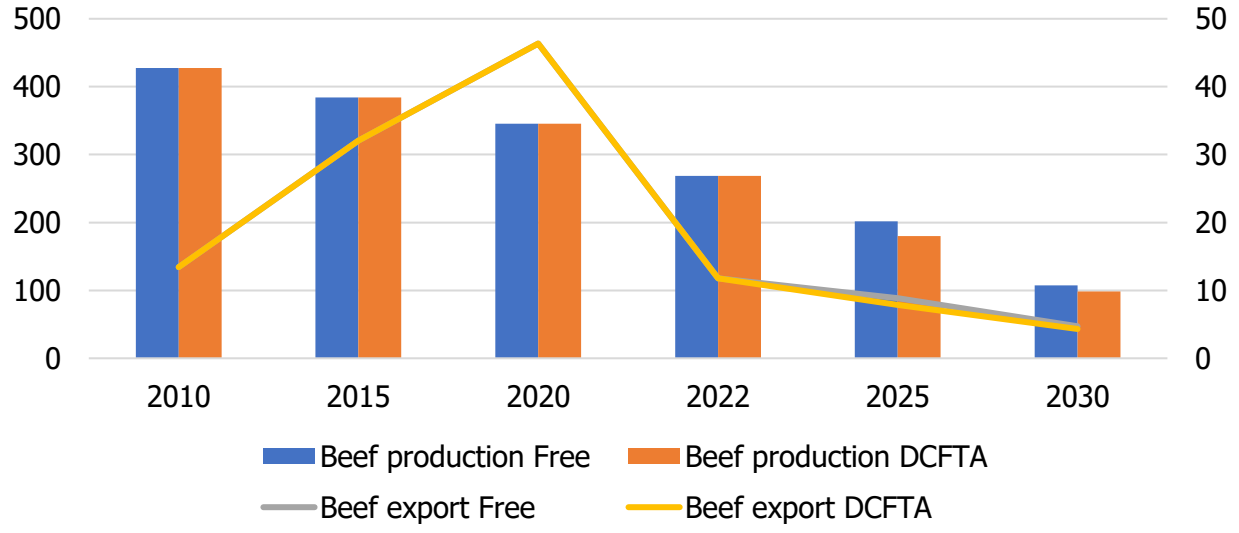

250
200
150
100
50
0
200
150
100
50
0
2010
2015
2020
2022
2025
2030
Rapeseed meal production Free
Rapeseed meal production DCFTA
Rapeseed meal export Free
Rapeseed meal export DCFTA

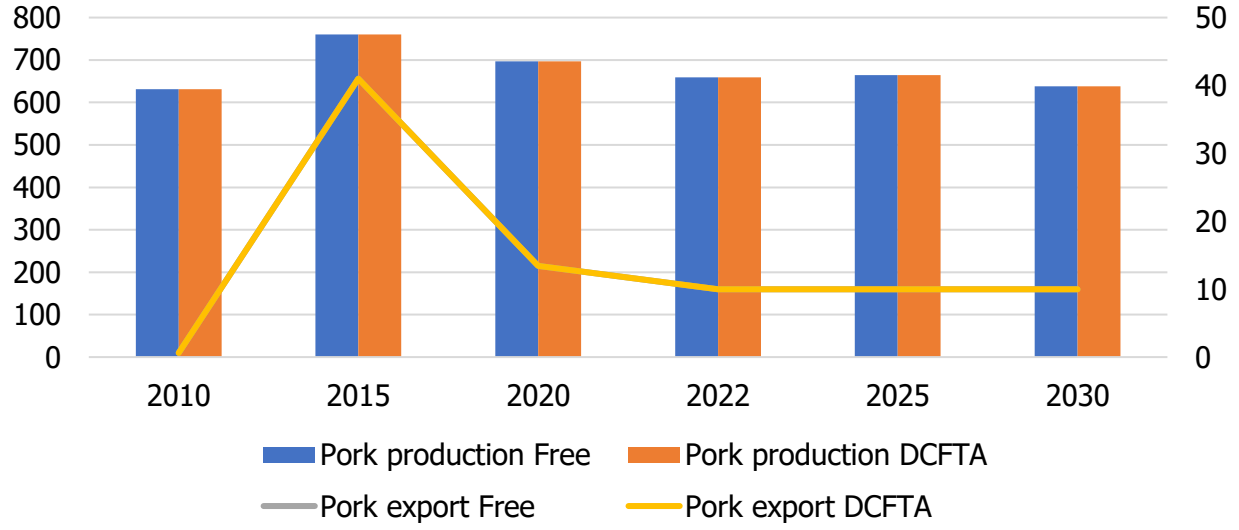
Figure: Production and export of oilseeds, oils and meals in Free and DCFTA scenarios in 2010-2030

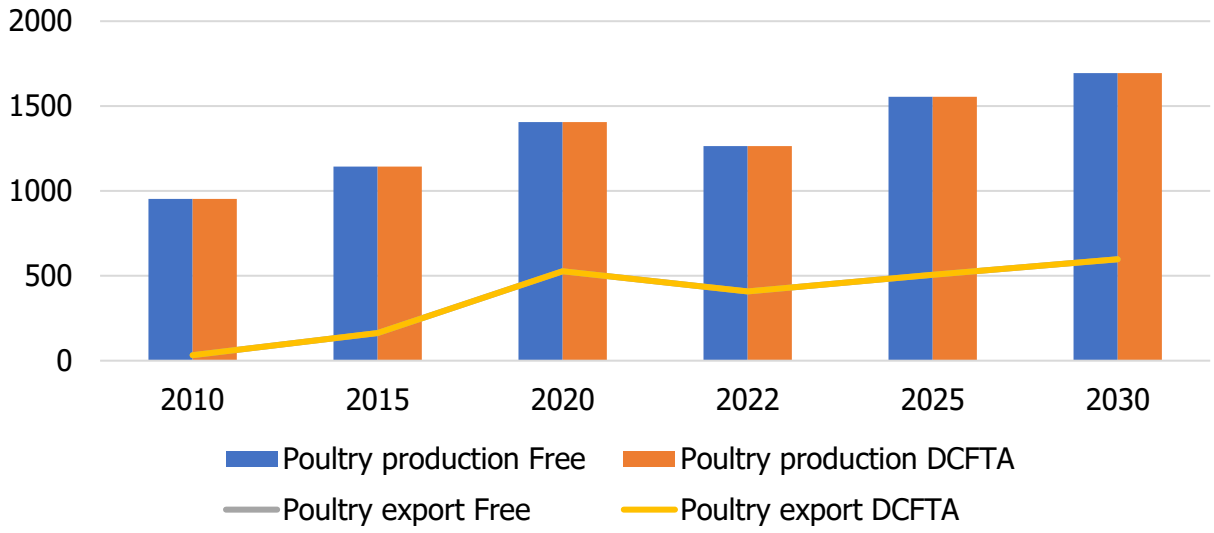
Source: SSSU until 2022 and own projections

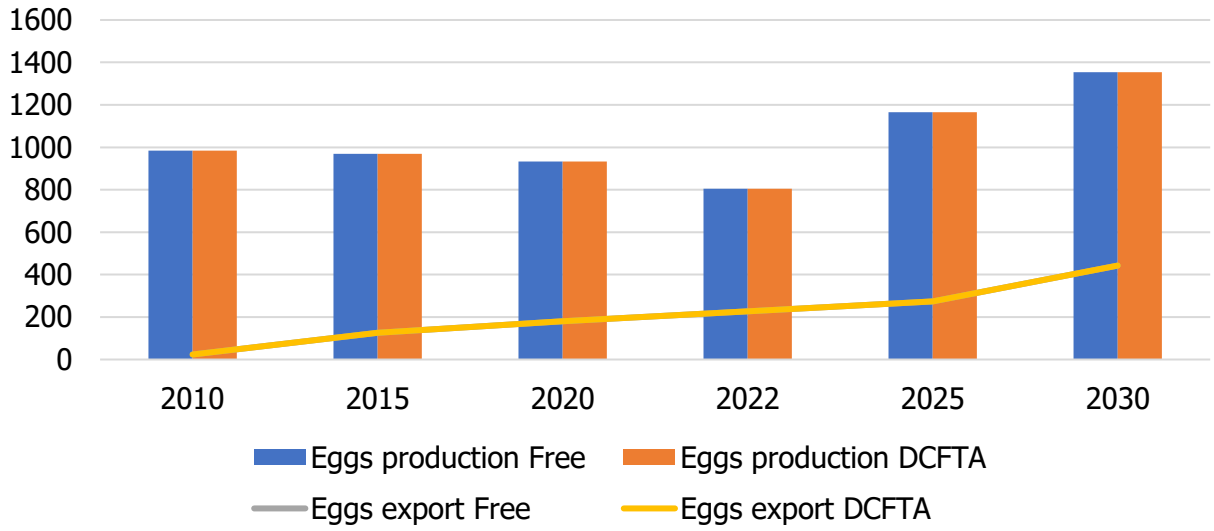
Note: Axes on the right are scales for export quantities

The Ukrainian livestock sector is not expected to be driven by lift of the export restrictions. Both scenarios produce similar projections, where production of beef, pork, whole milk powder and butter drops. Production and export of poultry, eggs and cheese are expected to grow in 2030 compared to 2020. This growth, however, is the response to domestic and global demand rather than demand from the EU countries. The figure below demonstrates the growth rates. Thus, the production of beef is expected to follow the pre-war trends with further reduction of already negligible quantities exported. Production and export of pork is modelled to remain relatively stable. Production of poultry and eggs is expected to have a very strong recovery rate: 20.6% in 2030 compared to 2020. Production and export of whole milk powder, cheese and of butter are expected to follow the pre-war trends. Table below summarizes the projections.






2000
1500
1000
500
0
2010
2015
2020
2022
2025
2030
Poultry production Free
Poultry production DCFTA
Poultry export Free
Poultry export DCFTA


1600
1400
1200
1000
800
600
400
200
0
2010
2015
2020
2022
2025
2030
Eggs production Free
Eggs production DCFTA
Eggs export Free
Eggs export DCFTA

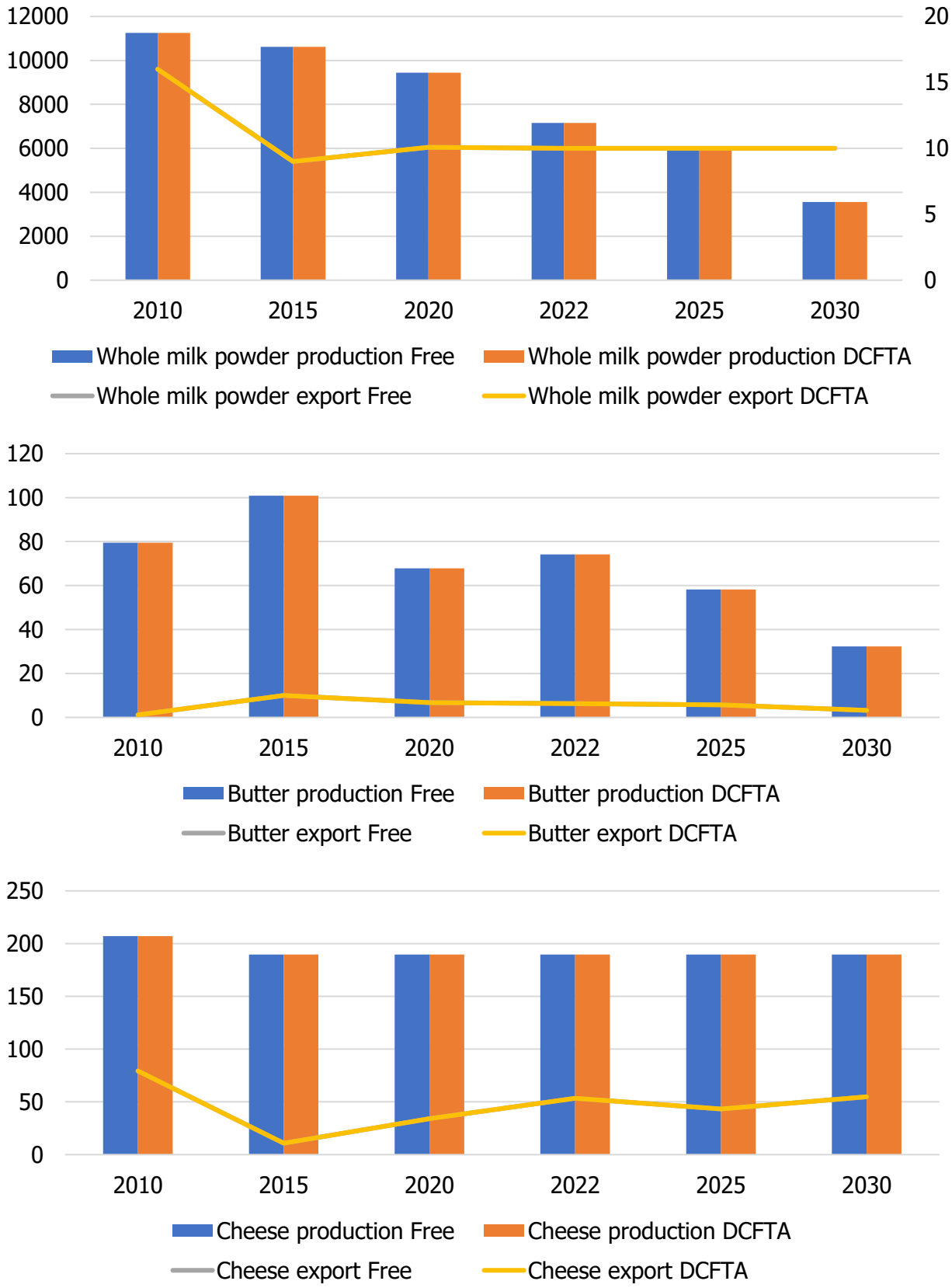


Figure: Production and export of livestock commodities in Free and DCFTA scenarios in 2010-2030

Source: SSSU until 2022 and own projections

Note: Axes on the right are scales for export quantities

Table: Summary of the modelling results for livestock commodities, 1000 t and %

Commodity and activity	Scenario	2020	2025	2030	Free/DCFTA in 2025	Free/DCFTA in 2030	2030/2020 change
Beef production	Free	345.4	201.7	107.6	12.2%	9.2%	-68.9%
	DCFTA	345.4	179.7	98.5			-71.5%
Beef export	Free	46.3	8.8	4.7	0.0%	0.0%	-100.0%
	DCFTA	46.3	7.9	4.3			-100.0%
Pork production	Free	697.2	664.5	638.0	0.0%	0.0%	-8.5%
	DCFTA	697.2	664.5	638.0			-8.5%
Pork export	Free	13.4	10.0	10.0	0.0%	0.0%	-25.6%
	DCFTA	13.4	10.0	10.0			-25.6%
Poultry production	Free	1404.7	1555.0	1694.7	0.0%	0.0%	20.6%
	DCFTA	1404.7	1555.0	1694.7			20.6%
Poultry export	Free	526.9	505.9	597.6	0.0%	0.0%	13.4%
	DCFTA	526.9	505.9	597.6			13.4%
Eggs production	Free	933.7	1165.7	1354.2	0.0%	0.0%	45.0%
	DCFTA	933.7	1165.7	1354.2			45.0%
Eggs export	Free	179.7	273.9	442.6	0.0%	0.0%	146.3%
	DCFTA	179.7	273.9	442.6			146.3%
Whole milk powder production	Free	9436.8	5990.4	3551.8	0.0%	0.0%	-62.4%
	DCFTA	9436.8	5990.4	3551.8			-62.4%
Whole milk powder export	Free	10.1	10.0	10.0	0.0%	0.0%	-0.7%
	DCFTA	10.1	10.0	10.0			-0.7%
Butter production	Free	67.9	58.2	32.3	0.0%	0.0%	-52.4%
	DCFTA	67.9	58.2	32.3			-52.4%
Butter export	Free	6.7	5.8	3.2	0.0%	0.0%	-52.4%
	DCFTA	6.7	5.8	3.2			-52.4%
Cheese production	Free	189.7	189.7	189.7	0.0%	0.0%	0.0%
	DCFTA	189.7	189.7	189.7			0.0%
Cheese export	Free	34.2	43.3	54.9	0.0%	0.0%	60.6%
	DCFTA	34.2	43.3	54.9			60.6%

Source: 2020 – SSSU, 2025-2030 – own estimation

Theoretical analysis of the results of the scenarios in the context of impact on processing and development of value added and the impact on rural development

Rural development is closely interlinked with agricultural production, hence agricultural business. This relationship can be described in several ways. In particular, agriculture is the primary economic activity in rural areas in Ukraine. As a result, the success and growth of agricultural businesses directly impact the local economy. When agricultural businesses thrive, they create job opportunities for rural residents, boost income levels, and stimulate economic activities in related sectors, such as transportation, processing,

and retail. Agricultural businesses require significant infrastructure, such as roads, storage facilities, irrigation systems, and processing plants. The development and improvement of these infrastructures not only support agricultural activities but also benefit the overall rural community by enhancing connectivity, accessibility, and quality of life. As agricultural businesses modernize and adopt advanced technologies, rural areas experience a transfer of knowledge and skills. This includes the use of improved farming techniques, precision agriculture, and more efficient machinery. Technology adoption can lead to increased productivity and income for farmers, positively impacting the overall rural development. Increased agricultural productivity leads to greater exports, contributing to a country's overall economic growth. A well-developed agricultural sector helps mitigate the impact of food crises and price fluctuations.

Furthermore, farmers often explore new business opportunities, such as agro-processing, value-added products, agritourism, and organic farming. These ventures not only diversify the rural economy but also attract investment and promote entrepreneurship. Furthermore, responsible agricultural businesses implement practices that protect natural resources, conserve biodiversity, and reduce environmental degradation. This ensures the preservation of rural landscapes and ecosystems, promoting the overall well-being of rural communities.

The modelling results show growth in cereal and oilseeds production and export. Potentially, produced wheat could be more processed into flour and exported. Thus, the export of wheat as a row commodity would be lower, instead wheat could be exported. Following the most recent discussions at the level of the Government, in the conditions of russia's full-scale military invasion into Ukraine and blockades of grains export, it seems that Ukraine may be testing a course towards strengthening its agri-food processing sector. According to the study by Martyshev et al. (2023)[2] "The market access is not homogeneous across different agrifood subsectors. While we have not found any significant differences between non-tariff measures applied to the products with a lower degree of processing (livestock products and crop products) and processed food products – the difference in tariff measures is both statistically and economically significant. The weighted average effective tariff rate for crop products is 5.8%, and for livestock products it is 9.4%. The effective tariff rate for processed food is 31.7%, which is almost six times the crop products' rate and more than three times the rate for livestock products. At the same time, 77% of the world market for processed food products has effective rates below 10% for Ukrainian food imports and 42% of the world market has effective rates below 3.5%. The free trade agreements with partner economies can lower the effective tariff rates and potentially increase export revenues for all three categories of analyzed agri-food products – crop products, livestock products, and processed food products. The Deep and Comprehensive Free Trade Agreement between Ukraine and the EU boosted

[2] Martyshev, P., Neyter R., Piddubnyi I. (2023): Food Processing. What's next? Working Paper of Center for Food and Land Use Research at Kyiv School of Economics. Available online at: https://kse.ua/wp-content/uploads/2023/06/Food-Processing.-Whats-next.pdf

the export of livestock products to the EU by 43% (the overall export growth for these categories was 7%), the export of crop products by 20% (the export growth was 11.2%), and the export of processed food by 1% (amid 10.1% decline in the overall export over the same period)." Furthermore, the authors of the study note: "A high proportion of agriculture in total employment implies low productivity in the sector. Meanwhile, the share of food manufacturing is low; this means that the sector is more capital intensive than primary agriculture. Also, the high presence of processed products in Ukraine's agri-food imports shows the essential potential for the development of the local food processing industry." Overall, the study points out that with proper trade agreements and insurance of return to investments through at least stable agricultural policy, Ukraine has a great potential to boost its processing sector. Combined with the modelling results, the largest potential is present in processing wheat into flour, hence development of wheat milling industry, in sunflower oil production, hence further development of oilseeds crushing capacities, egg-based and poultry-based foods.

IV. QUANTITATIVE ANALYSIS OF THE POTENTIAL, CHALLENGES AND BARRIERS IN THE DEVELOPMENT OF TRADE RELATIONS IN THE CONTEXT OF GREEN DEAL AND FARM-TO-FORK STRATEGIES

The EU Green Deal aims at transforming "the EU into a modern, resource-efficient and competitive economy, ensuring: no net emissions of greenhouse gases by 2050, economic growth decoupled from resource use and no person and no place left behind" (https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en#thematicareas).

The Green Deal contains actions, most of which will directly or indirectly affect agricultural sector. Among the actions affecting agriculture the most are:

- Clean energy (wind, solar, biomethane)
- Biodiversity Strategy for 2030
- Circular economy action plan
- Chemicals strategy for sustainability
- Organic action plan
- 8th Environment Action Programme
- Blue economy strategy
- Zero pollution action plan
- Waste and recycling
- "Farm to Fork" strategy
- Common Fisheries Policy and
- Climate Action Plan

Adaptation of clean energy technologies and curbing the use of fossil fuels, constraints to agricultural production arising from biodiversity, climate and environmental requirements, as well as from greater efforts of waste recycling and of generating less waste, reduction in the use of fertilizers and pollution, increase of land under organic cultivation and of circular production will result in increase of per unit of output agricultural production costs at least in the short- and medium-runs. In the long run, technology development shall improve cost efficiency of such production.

Barriers and challenges

The challenges and barriers in trade for Ukrainian agricultural producers arising from the Green Deal and Farm-to-Fork strategies are related to ignoring the new production standards. EU farmers have a strong voice of concern about imported commodities of less stringent production standards creating unfair competition at the domestic markets. It will, sooner or later, be reflected in the trade policy. Thus, Ukrainian agricultural producers may lose the EU market (currently, around 40% of Ukrainian agri-food commodities

are exported to the EU). Consequently, they shall consider investing into new technologies with the donor and public support after the war.

Quantitative analysis

We analyze the impacts of adaptation of the EU "Farm-to-fork" strategy by the Ukrainian producers on the agricultural sector. In particular, the adaptation is represented by the changes in production costs due to such measures as reduction in fertilizer and pesticide use, increase of organic farming, green energy, etc. We perform sensitivity analysis by doubling the productions in order to identify thresholds at which the sector begins to stagnate. The analysis is conducted "on top" of the DCFTA and Free scenarios. In particular, Free*2 and DCFTA*2 assume doubled production costs in addition to the assumptions for Free and DCFTA. The table below summarizes the results for cereals.

Table: Summary of the modelling results for cereals, 1000 t and %

Commodity and activity	Scenario	2020	2025	2030	/*2 in 2025	/*2 in 2030	2030/2020 change
Wheat production	Free	25279.8	22471.8	26842.6			6.2%
	Free*2	25279.8	16980.8	16749.6	-24.4%	-37.6%	-33.7%
	DCFTA	25279.8	20502.7	24581.5			-2.8%
	DCFTA*2	25279.8	14450.2	14651.4	-29.5%	-40.4%	-42.0%
Wheat export	Free	18055.7	18399.6	21815.8			20.8%
	Free*2	18055.7	10566.7	12013.7	-42.6%	-44.9%	-33.5%
	DCFTA	18055.7	14880.1	19688.3			9.0%
	DCFTA*2	18055.7	9563.7	9922.7	-35.7%	-49.6%	-45.0%
Maize production	Free	28036.9	26059.2	34951.8			24.7%
	Free*2	28036.9	18542.8	23374.5	-28.8%	-33.1%	-16.6%
	DCFTA	28036.9	27242.6	36767.1			31.1%
	DCFTA*2	28036.9	18825.8	24194.1	-30.9%	-34.2%	-13.7%
Maize export	Free	27952.5	15134.4	23569.5			-15.7%
	Free*2	27952.5	8225.8	12593.4	-45.6%	-46.6%	-54.9%
	DCFTA	27952.5	7922.8	16145.7			-42.2%
	DCFTA*2	27952.5	8448.6	13342.8	6.6%	-17.4%	-52.3%
Barley production	Free	7826.3	6979.6	9129.3			16.6%
	Free*2	7826.3	8008.0	9534.0	14.7%	4.4%	21.8%
	DCFTA	7826.3	6831.9	8960.6			14.5%
	DCFTA*2	7826.3	7522.9	9018.7	10.1%	0.6%	15.2%
Barley export	Free	5046.4	4330.9	7470.5			48.0%
	Free*2	5046.4	4141.1	7973.5	-4.4%	6.7%	58.0%
	DCFTA	5046.4	3097.6	4937.0			-2.2%
	DCFTA*2	5046.4	4107.5	7444.3	32.6%	50.8%	47.5%
Rye production	Free	456.7	292.5	392.6			-14.0%
	Free*2	456.7	220.9	230.2	-24.5%	-41.4%	-49.6%

	DCFTA	456.7	285.5	386.5			-15.4%
	DCFTA*2	456.7	218.8	228.9	-23.4%	-40.8%	-49.9%
Rye export	Free	70.9	81.2	91.5			29.1%
	Free*2	70.9	1.0	1.0	-100.0%	-100.0%	-100.0%
	DCFTA	70.9	78.4	85.8			21.1%
	DCFTA*2	70.9	1.0	1.0	-100.0%	-100.0%	-100.0%
Oats production	Free	534.8	342.6	451.8			-15.5%
	Free*2	534.8	206.0	200.3	-39.9%	-55.7%	-62.5%
	DCFTA	534.8	289.4	339.9			-36.4%
	DCFTA*2	534.8	170.9	162.6	-40.9%	-52.2%	-69.6%
Oats export	Free	46.4	46.3	46.2			-0.4%
	Free*2	46.4	2.6	1.1	-94.4%	-97.7%	-97.7%
	DCFTA	46.4	45.5	44.6			-3.8%
	DCFTA*2	46.4	1.0	1.0	-97.8%	-97.8%	-97.8%

Source: 2020 – SSSU, 2025-2030 – own estimation

The results indicate that when the production costs for cereals double, quantities produced of wheat, maize, oats and rye decrease from around 20% to around 55% depending on the crop and scenario. In the Free scenario the effect is relatively less severe when compared to 2020, indicating that free trade incentivizes production even under severe production rules. Quantities exported drop accordingly. The positive effect on barley production is explained by relative profitability. The combined impact of market prices and production costs motivates the producers to substitute crops with barley. In addition, barley production in Ukraine seems to be less cost intensive compared to wheat and corn, therefore, costs increase has lower impact.

The impact on the oilseeds sector is estimated to be different. Whereas the total production of cereals in 2030 decreases by around 30% in both scenarios, the production of oilseeds grows by around 40%. Due to larger quantities of cereals produced, total quantity produced of cereals and oilseeds, however, decreases by around 10%. Despite considerable impacts on yields, oilseeds' area grows due to the reduction of cereals area. Thus, oilseeds production becomes less intensive. Not all oilseeds' production grows. Whereas sunflower and soya beans show positive effects, rapeseed production negatively reacts on the costs increase. Once again, relative profitability plays the major role. Thus, increase in sunflower seeds production in 2030 in scenarios *2 is around 50% compared to Free and DCFTA scenarios, and of soya beans production by around 40%. Production of rapeseed drops by around 50%.

Table: Summary of the modelling results for oilseeds, 1000 t and %

Commodity and activity	Scenario	2020	2025	2030	/*2 in 2025	/*2 in 2030	2030/2020 change
Sunflower seeds production	Free	13145.5	15604.5	23354.1			77.7%
	Free*2	13145.5	29611.5	35698.2	89.8%	52.9%	171.6%
	DCFTA	13145.5	14789.8	21927.9			66.8%
	DCFTA*2	13145.5	28267.9	33645.9	91.1%	53.4%	156.0%

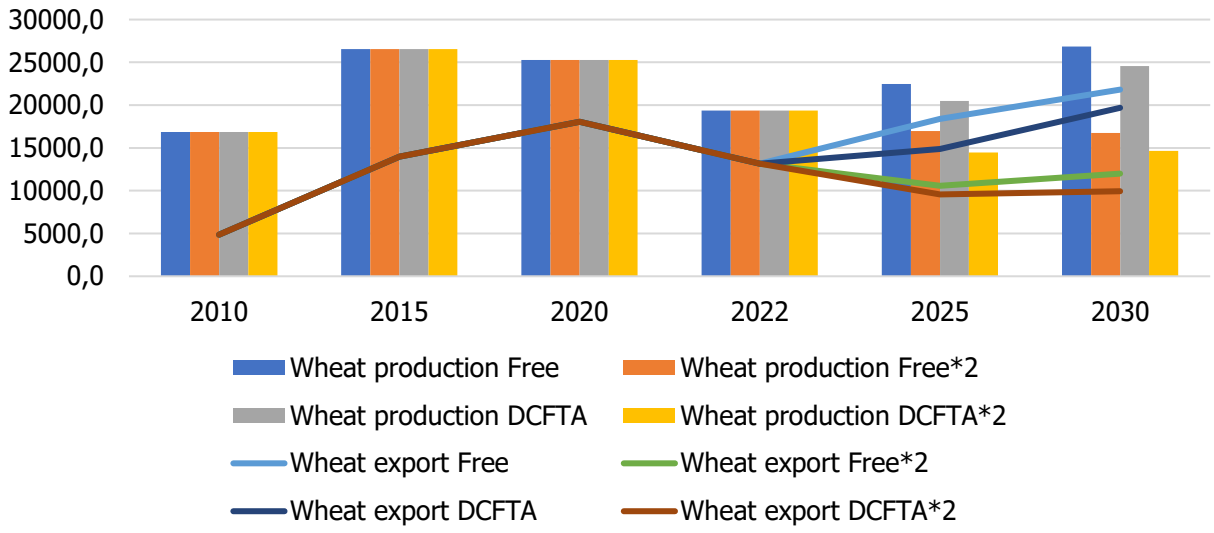
Sunflower seeds export	Free	187.9	40.0	36.9			-80.4%
	Free*2	187.9	40.0	36.9	0.0%	0.0%	-80.4%
	DCFTA	187.9	38.5	80.6			-57.1%
	DCFTA*2	187.9	38.5	80.6	0.0%	0.0%	-57.1%
Sunflower oil production	Free	5538.2	5975.2	9097.2			64.3%
	Free*2	5538.2	11620.0	14071.9	94.5%	54.7%	154.1%
	DCFTA	5538.2	5646.8	8522.4			53.9%
	DCFTA*2	5538.2	11078.5	13244.8	96.2%	55.4%	139.2%
Sunflower oil export	Free	4847.0	5511.4	8585.8			77.1%
	Free*2	4847.0	11156.2	13560.5	102.4%	57.9%	179.8%
	DCFTA	4847.0	2599.1	9653.5			99.2%
	DCFTA*2	4847.0	10614.7	12733.4	308.4%	31.9%	162.7%
Sunflower meal production	Free	4931.2	5160.5	7856.9			59.3%
	Free*2	4931.2	10035.7	12153.3	94.5%	54.7%	146.5%
	DCFTA	4931.2	4876.9	7360.5			49.3%
	DCFTA*2	4931.2	9568.0	11438.9	96.2%	55.4%	132.0%
Sunflower meal export	Free	4405.5	5000.0	7773.1			76.4%
	Free*2	4405.5	9875.2	12069.5	97.5%	55.3%	174.0%
	DCFTA	4405.5	2407.8	8771.9			99.1%
	DCFTA*2	4405.5	9407.5	11355.2	290.7%	29.4%	157.8%
Rapeseed seeds production	Free	2585.5	1996.9	2841.6			9.9%
	Free*2	2585.5	1123.2	1396.7	-43.8%	-50.8%	-46.0%
	DCFTA	2585.5	2629.0	3697.5			43.0%
	DCFTA*2	2585.5	1590.3	1994.0	-39.5%	-46.1%	-22.9%
Rapeseed seeds export	Free	2616.6	1794.6	2543.4			-2.8%
	Free*2	2616.6	990.1	1213.5	-44.8%	-52.3%	-53.6%
	DCFTA	2616.6	2362.6	3916.9			49.7%
	DCFTA*2	2616.6	1427.6	1752.8	-39.6%	-55.3%	-33.0%
Rapeseed oil production	Free	130.7	72.2	109.8			-16.0%
	Free*2	130.7	44.3	63.4	-38.7%	-42.3%	-51.5%
	DCFTA	130.7	90.0	139.0			6.4%
	DCFTA*2	130.7	53.2	83.9	-40.9%	-39.6%	-35.8%
Rapeseed oil export	Free	112.8	62.4	94.8			-16.0%
	Free*2	112.8	26.8	46.4	-57.0%	-51.1%	-58.9%
	DCFTA	112.8	77.7	120.0			6.4%
	DCFTA*2	112.8	35.7	66.9	-54.0%	-44.2%	-40.7%
Rapeseed meal production	Free	189.6	104.8	159.2			-16.0%
	Free*2	189.6	64.3	91.9	-38.7%	-42.3%	-51.5%
	DCFTA	189.6	130.5	201.6			6.3%
	DCFTA*2	189.6	77.1	121.7	-40.9%	-39.6%	-35.8%
Rapeseed meal export	Free	147.3	81.4	123.6			-16.0%
	Free*2	147.3	47.1	74.8	-42.1%	-39.5%	-49.2%
	DCFTA	147.3	101.3	156.6			6.3%
	DCFTA*2	147.3	60.0	104.6	-40.8%	-33.2%	-29.0%
Soya beans production	Free	2765.5	2085.8	1356.4			-51.0%
	Free*2	2765.5	3600.5	1864.0	72.6%	37.4%	-32.6%

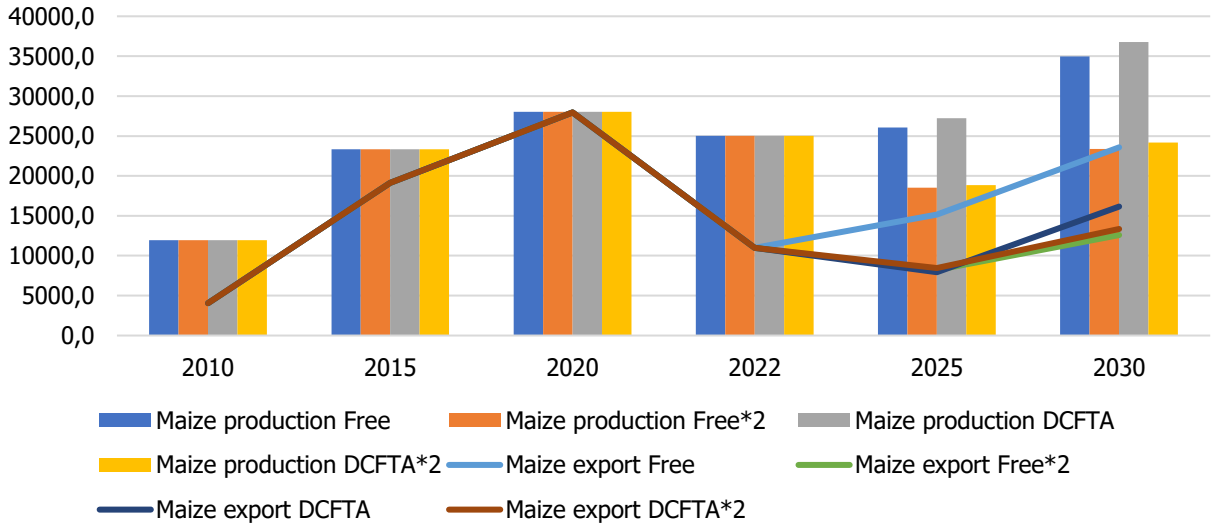
	DCFTA	2765.5	2145.7	1746.1			-36.9%
	DCFTA*2	2765.5	3737.1	2456.7	74.2%	40.7%	-11.2%
Soya beans export	Free	1277.1	963.2	626.4			-51.0%
	Free*2	1277.1	1854.5	538.8	92.5%	-14.0%	-57.8%
	DCFTA	1277.1	990.9	806.4			-36.9%
	DCFTA*2	1277.1	1953.1	963.3	97.1%	19.5%	-24.6%
Soya oil production	Free	116.8	90.0	59.5			-49.1%
	Free*2	116.8	153.3	80.7	70.4%	35.7%	-30.9%
	DCFTA	116.8	92.5	75.8			-35.1%
	DCFTA*2	116.8	159.0	105.5	71.9%	39.2%	-9.7%
Soya oil export	Free	106.6	82.1	54.3			-49.1%
	Free*2	106.6	122.4	44.8	49.1%	-17.4%	-57.9%
	DCFTA	106.6	84.4	69.2			-35.1%
	DCFTA*2	106.6	128.2	69.6	51.8%	0.6%	-34.7%
Soya meal production	Free	532.9	405.0	267.7			-49.8%
	Free*2	532.9	690.1	363.3	70.4%	35.7%	-31.8%
	DCFTA	532.9	416.3	341.1			-36.0%
	DCFTA*2	532.9	715.8	474.8	71.9%	39.2%	-10.9%
Soya meal export	Free	177.9	135.2	89.4			-49.8%
	Free*2	177.9	1.0	1.0	-99.3%	-98.9%	-99.4%
	DCFTA	177.9	139.0	113.9			-36.0%
	DCFTA*2	177.9	1.0	1.0	-99.3%	-99.1%	-99.4%

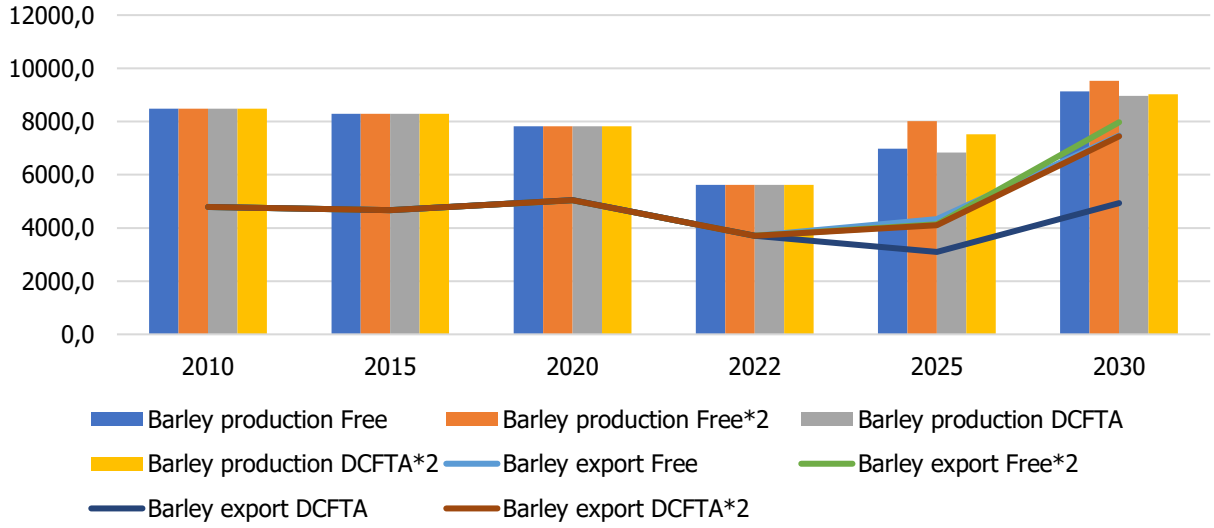
Source: 2020 – SSSU, 2025-2030 – own estimation

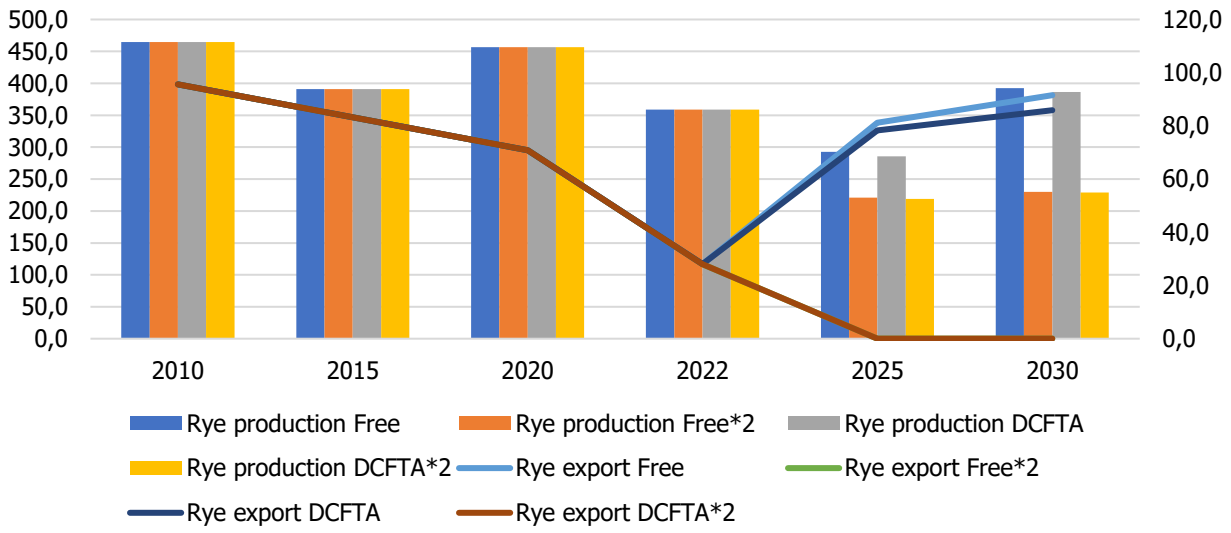
Note: red color indicates positive impacts

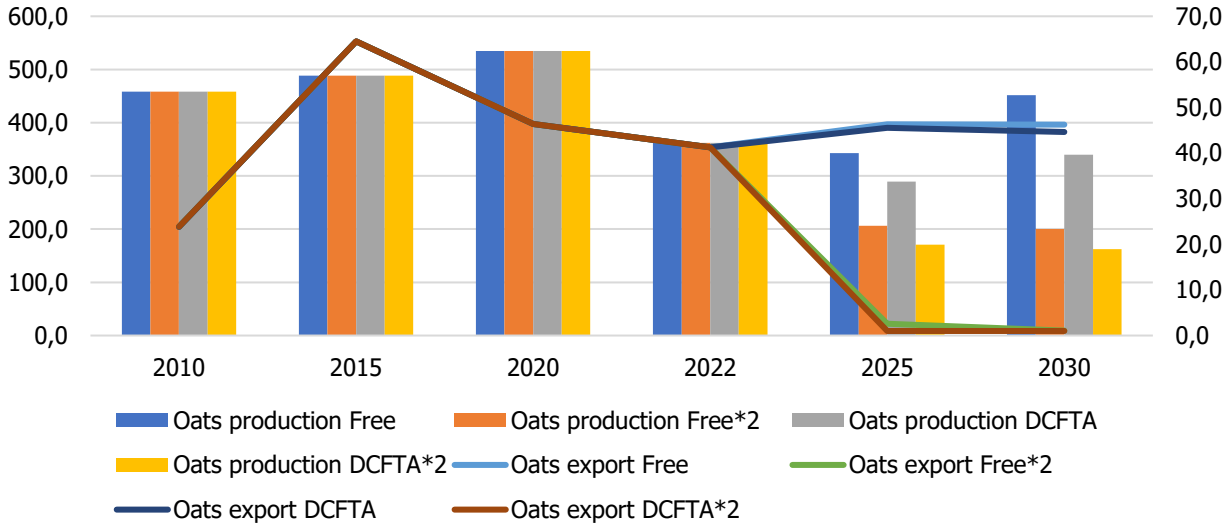
The graphs below visualize the analysis. In conclusion, it should be noted that even when the production costs double, the Ukrainian crops sector will remain abundant and strong. There will be, however, a very considerable substitution effect: cereals will be replaced by sunflower mostly. The total crops output will decrease by 10%, and the production will become far less intense.

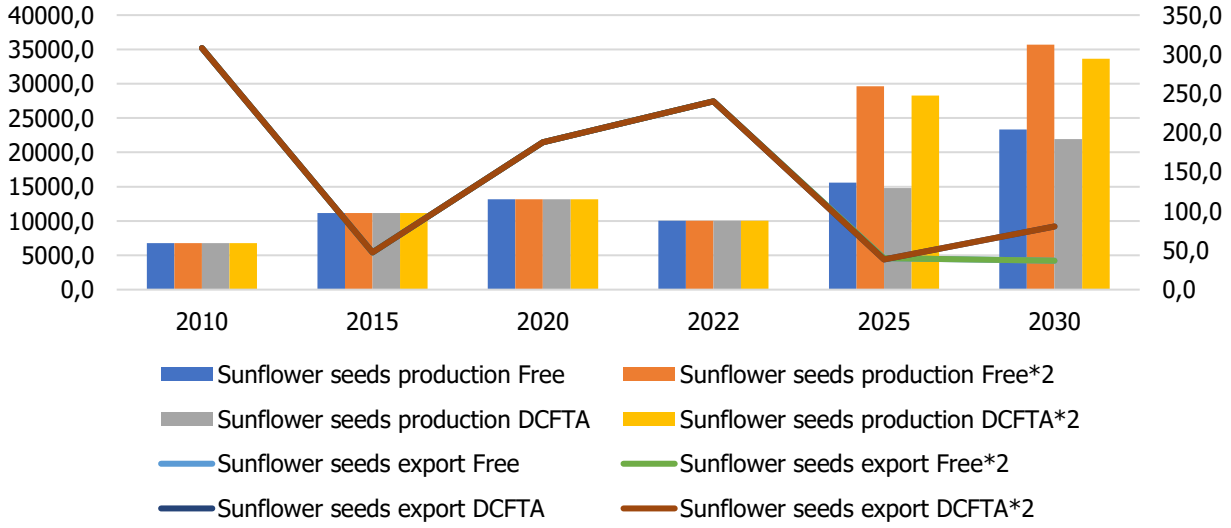

30000,0
25000,0
20000,0
15000,0
10000,0
5000,0
0,0
2010
2015
2020
2022
2025
2030
Wheat production Free
Wheat production Free*2
Wheat production DCFTA
Wheat production DCFTA*2
Wheat export Free
Wheat export Free*2
Wheat export DCFTA
Wheat export DCFTA*2

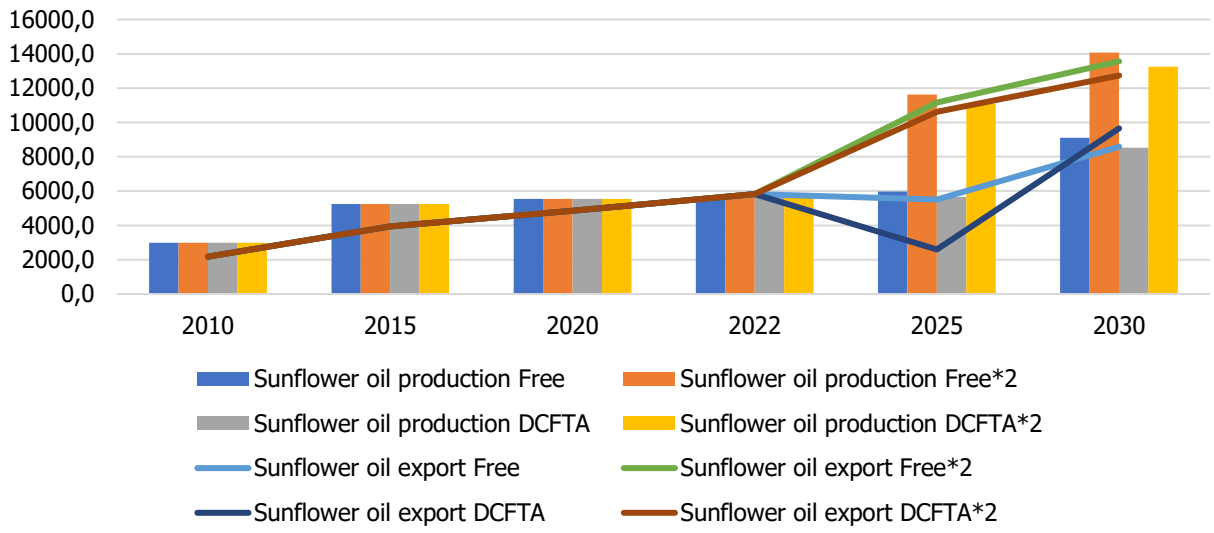

40000,0
35000,0
30000,0
25000,0
20000,0
15000,0
10000,0
5000,0
0,0
2010
2015
2020
2022
2025
2030
Maize production Free
Maize production Free*2
Maize production DCFTA
Maize production DCFTA*2
Maize export Free
Maize export Free*2
Maize export DCFTA
Maize export DCFTA*2

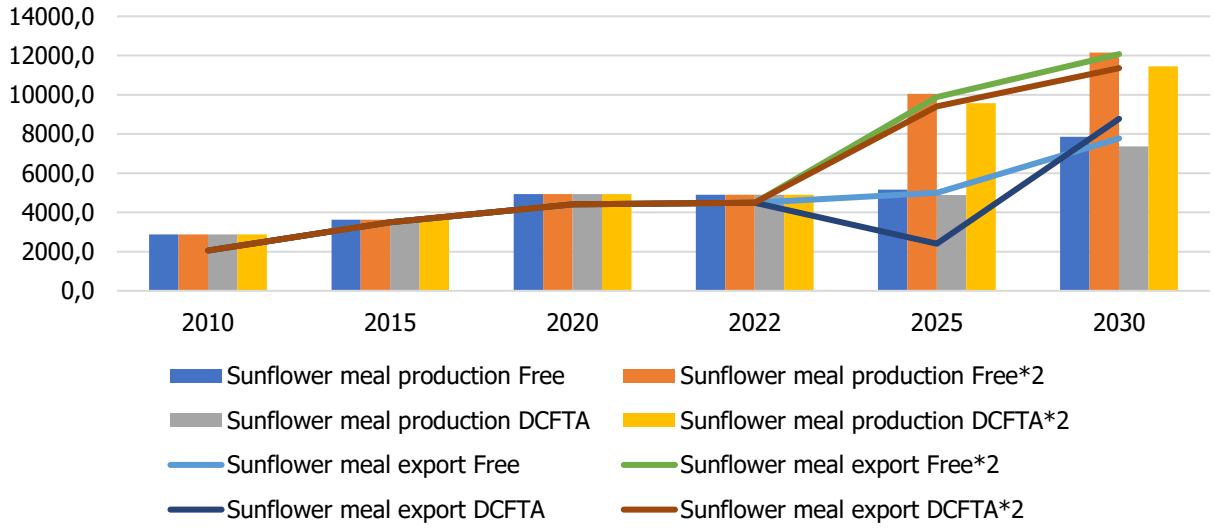

12000,0
10000,0
8000,0
6000,0
4000,0
2000,0
0,0
2010
2015
2020
2022
2025
2030
Barley production Free
Barley production Free*2
Barley production DCFTA
Barley production DCFTA*2
Barley export Free
Barley export Free*2
Barley export DCFTA
Barley export DCFTA*2

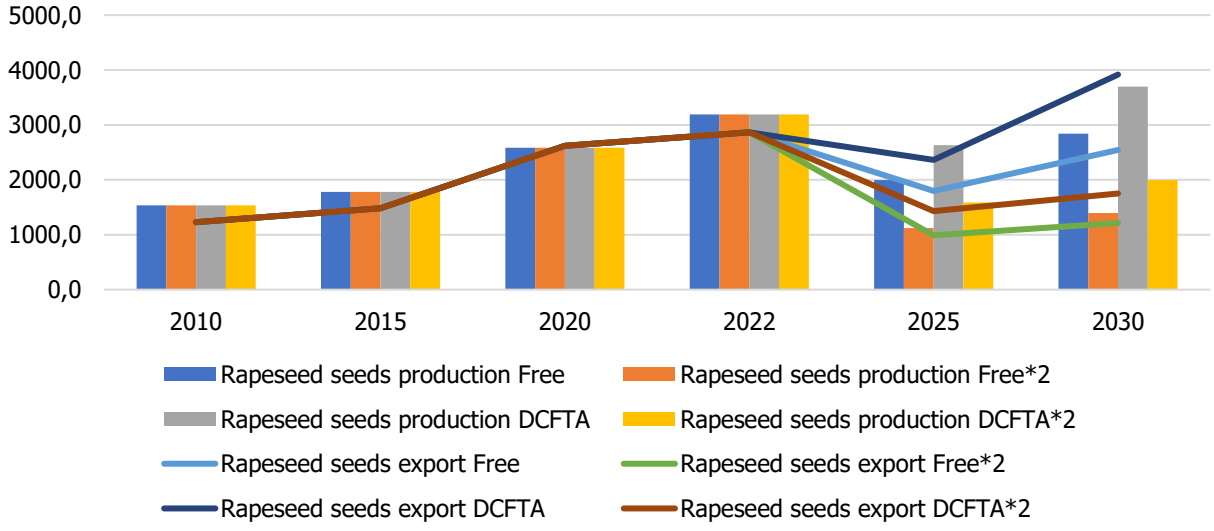

500,0
450,0
400,0
350,0
300,0
250,0
200,0
150,0
100,0
50,0
0,0
120,0
100,0
80,0
60,0
40,0
20,0
0,0
2010
2015
2020
2022
2025
2030
Rye production Free
Rye production Free*2
Rye production DCFTA
Rye production DCFTA*2
Rye export Free
Rye export Free*2
Rye export DCFTA
Rye export DCFTA*2

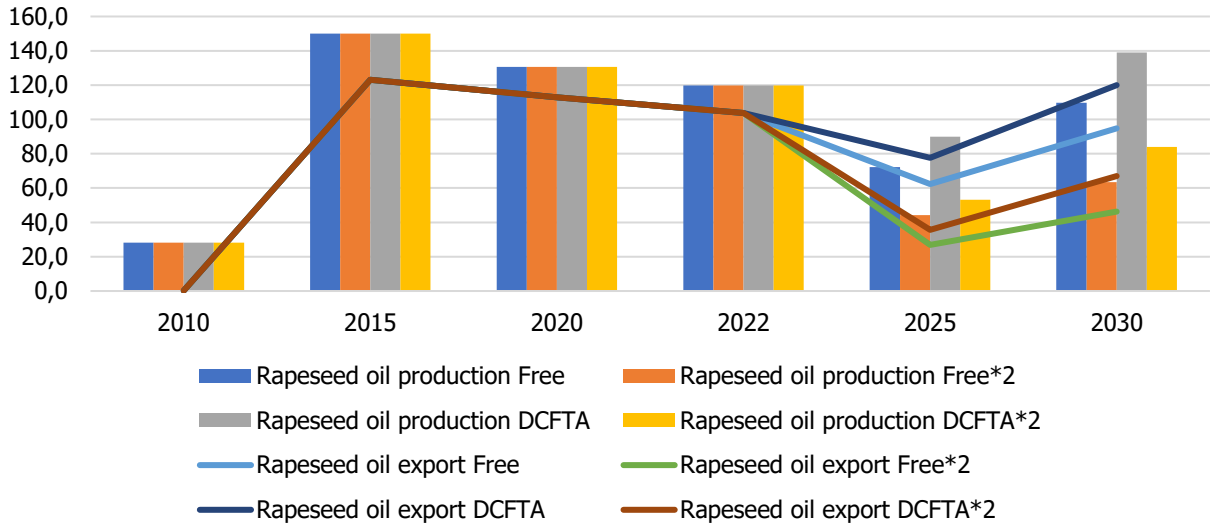

600,0
500,0
400,0
300,0
200,0
100,0
0,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
2010
2015
2020
2022
2025
2030
Oats production Free
Oats production Free*2
Oats production DCFTA
Oats production DCFTA*2
Oats export Free
Oats export Free*2
Oats export DCFTA
Oats export DCFTA*2

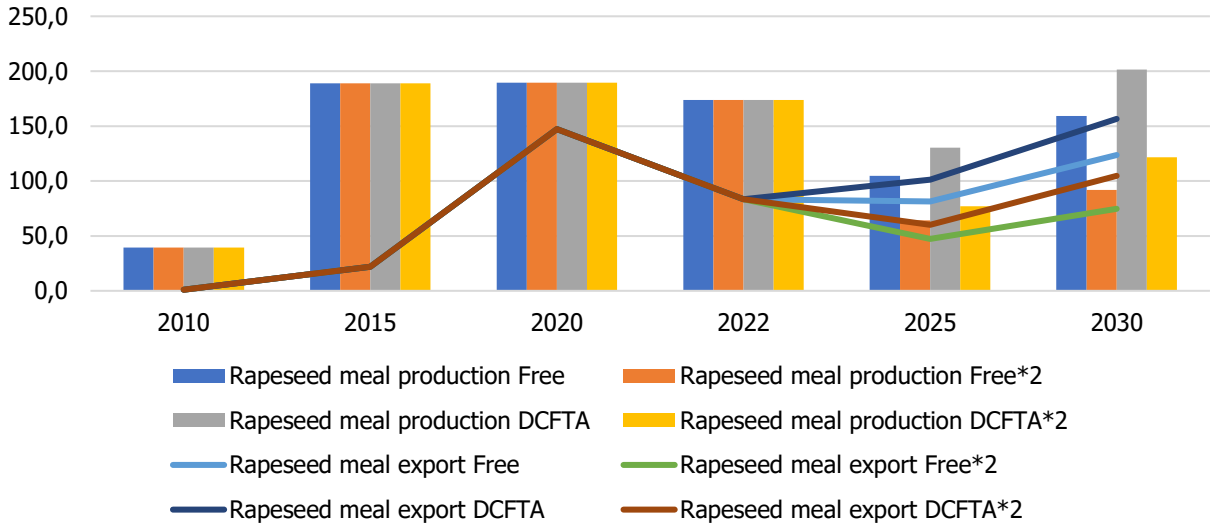

40000,0
35000,0
30000,0
25000,0
20000,0
15000,0
10000,0
5000,0
0,0
350,0
300,0
250,0
200,0
150,0
100,0
50,0
0,0
2010
2015
2020
2022
2025
2030
Sunflower seeds production Free
Sunflower seeds production Free*2
Sunflower seeds production DCFTA
Sunflower seeds production DCFTA*2
Sunflower seeds export Free
Sunflower seeds export Free*2
Sunflower seeds export DCFTA
Sunflower seeds export DCFTA*2


16000,0
14000,0
12000,0
10000,0
8000,0
6000,0
4000,0
2000,0
0,0
2010
2015
2020
2022
2025
2030
Sunflower oil production Free
Sunflower oil production Free*2
Sunflower oil production DCFTA
Sunflower oil production DCFTA*2
Sunflower oil export Free
Sunflower oil export Free*2
Sunflower oil export DCFTA
Sunflower oil export DCFTA*2


14000,0
12000,0
10000,0
8000,0
6000,0
4000,0
2000,0
0,0
2010
2015
2020
2022
2025
2030
Sunflower meal production Free
Sunflower meal production Free*2
Sunflower meal production DCFTA
Sunflower meal production DCFTA*2
Sunflower meal export Free
Sunflower meal export Free*2
Sunflower meal export DCFTA
Sunflower meal export DCFTA*2


5000,0
4000,0
3000,0
2000,0
1000,0
0,0
2010
2015
2020
2022
2025
2030
Rapeseed seeds production Free
Rapeseed seeds production Free*2
Rapeseed seeds production DCFTA
Rapeseed seeds production DCFTA*2
Rapeseed seeds export Free
Rapeseed seeds export Free*2
Rapeseed seeds export DCFTA
Rapeseed seeds export DCFTA*2


160,0
140,0
120,0
100,0
80,0
60,0
40,0
20,0
0,0
2010
2015
2020
2022
2025
2030
Rapeseed oil production Free
Rapeseed oil production Free*2
Rapeseed oil production DCFTA
Rapeseed oil production DCFTA*2
Rapeseed oil export Free
Rapeseed oil export Free*2
Rapeseed oil export DCFTA
Rapeseed oil export DCFTA*2


250,0
200,0
150,0
100,0
50,0
0,0
2010
2015
2020
2022
2025
2030
Rapeseed meal production Free
Rapeseed meal production Free*2
Rapeseed meal production DCFTA
Rapeseed meal production DCFTA*2
Rapeseed meal export Free
Rapeseed meal export Free*2
Rapeseed meal export DCFTA
Rapeseed meal export DCFTA*2

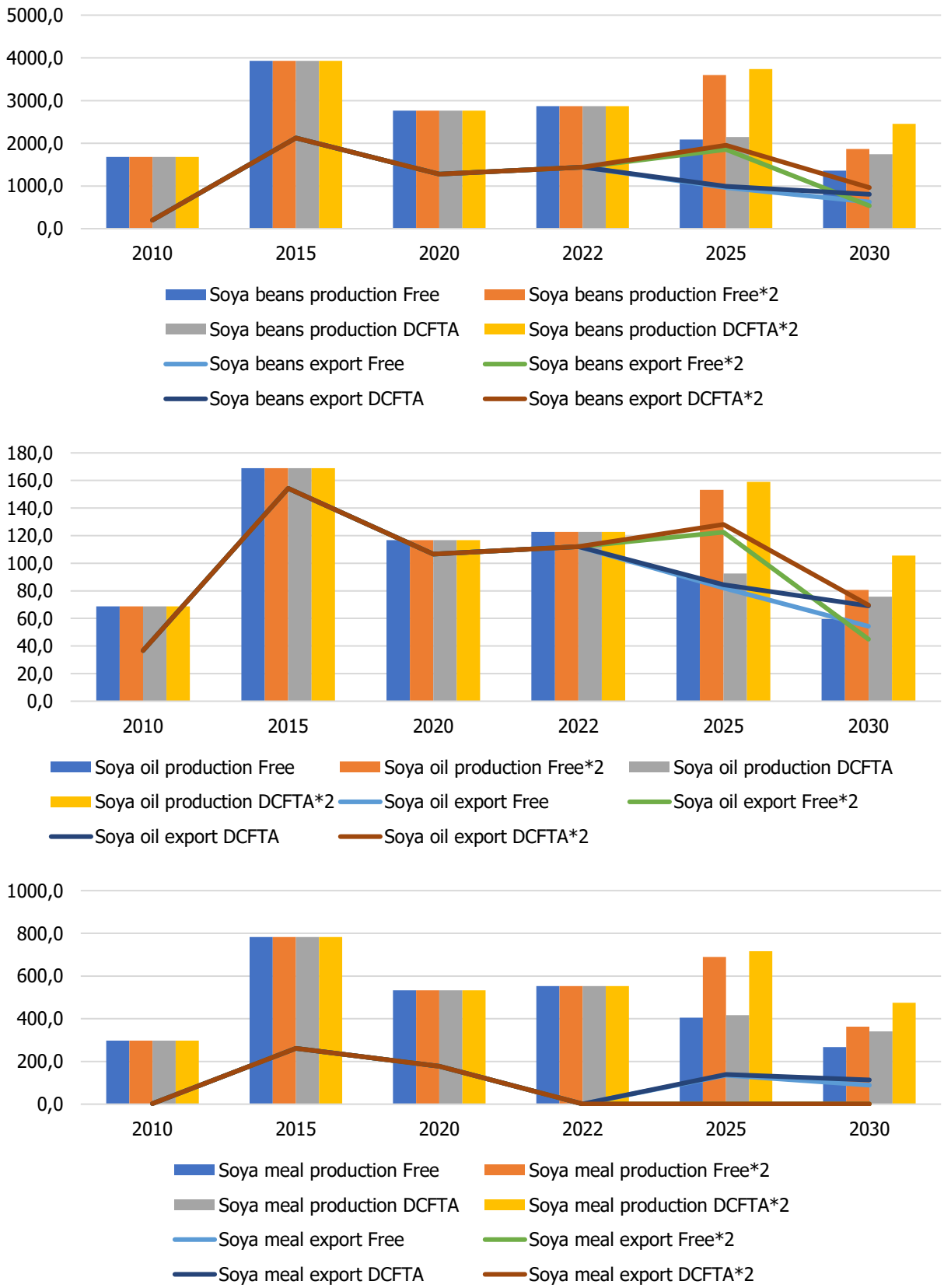


Figure: Production and export of livestock commodities in Free and DCFTA scenarios in 2010-2030

Source: SSSU until 2022 and own projections

Note: Axes on the right are scales for export quantities

The costs increase in the livestock sector will have devastating effects on beef and dairy sectors. Pork sector will be affected as well but to a lesser degree. Poultry and eggs production will be barely affected.

Table: Summary of the modelling results for oilseeds, 1000 t and %

Commodity and activity	Scenario	2020	2025	2030	/*2 in 2025	/*2 in 2030	2030/2020 change
Beef production	Free	345.4	201.7	107.6			-68.9%
	Free*2	345.4	92.5	1.0	-54.1%	-99.1%	-99.7%
	DCFTA	345.4	179.7	98.5			-71.5%
	DCFTA*2	345.4	82.6	1.0	-54.1%	-99.0%	-99.7%
Beef export	Free	46.3	8.8	4.7			-89.8%
	Free*2	46.3	0.0	0.0	-100.0%	-100.0%	-100.0%
	DCFTA	46.3	7.9	4.3			-90.7%
	DCFTA*2	46.3	0.0	0.0	-100.0%	-100.0%	-100.0%
Pork production	Free	697.2	664.5	638.0			-8.5%
	Free*2	697.2	488.0	457.5	-26.6%	-28.3%	-34.4%
	DCFTA	697.2	664.5	638.0			-8.5%
	DCFTA*2	697.2	505.3	477.7	-24.0%	-25.1%	-31.5%
Pork export	Free	13.4	10.0	10.0			-25.6%
	Free*2	13.4	10.0	10.0	0.0%	0.0%	-25.6%
	DCFTA	13.4	10.0	10.0			-25.6%
	DCFTA*2	13.4	10.0	10.0	0.0%	0.0%	-25.6%
Poultry production	Free	1404.7	1555.0	1694.7			20.6%
	Free*2	1404.7	1547.7	1687.5	-0.5%	-0.4%	20.1%
	DCFTA	1404.7	1555.0	1694.7			20.6%
	DCFTA*2	1404.7	1547.7	1687.5	-0.5%	-0.4%	20.1%
Poultry export	Free	526.9	505.9	597.6			13.4%
	Free*2	526.9	343.8	461.1	-32.0%	-22.8%	-12.5%
	DCFTA	526.9	505.9	597.6			13.4%
	DCFTA*2	526.9	504.0	595.6	-0.4%	-0.3%	13.0%
Eggs production	Free	933.7	1165.7	1354.2			45.0%
	Free*2	933.7	1165.7	1354.2	0.0%	0.0%	45.0%
	DCFTA	933.7	1165.7	1354.2			45.0%
	DCFTA*2	933.7	1165.7	1354.2	0.0%	0.0%	45.0%
Eggs export	Free	179.7	273.9	442.6			146.3%
	Free*2	179.7	273.9	442.6	0.0%	0.0%	146.3%
	DCFTA	179.7	273.9	442.6			146.3%
	DCFTA*2	179.7	273.9	442.6	0.0%	0.0%	146.3%
Whole milk powder production	Free	9436.8	5990.4	3551.8			-62.4%
	Free*2	9436.8	1.0	1.0	-100.0%	-100.0%	-100.0%
	DCFTA	9436.8	5990.4	3551.8			-62.4%
	DCFTA*2	9436.8	1.0	1.0	-100.0%	-100.0%	-100.0%
Whole milk powder export	Free	10.1	10.0	10.0			-0.7%
	Free*2	10.1	1.0	1.0	-90.0%	-90.0%	-90.1%
	DCFTA	10.1	10.0	10.0			-0.7%

	DCFTA*2	10.1	1.0	1.0	-90.0%	-90.0%	-90.1%
Butter production	Free	67.9	58.2	32.3			-52.4%
	Free*2	67.9	1.0	1.0	-98.3%	-96.9%	-98.5%
	DCFTA	67.9	58.2	32.3			-52.4%
	DCFTA*2	67.9	4.1	1.1	-93.0%	-96.5%	-98.3%
Butter export	Free	6.7	5.8	3.2			-52.4%
	Free*2	6.7	1.0	1.0	-82.7%	-68.8%	-85.1%
	DCFTA	6.7	5.8	3.2			-52.4%
	DCFTA*2	6.7	1.0	1.0	-82.7%	-68.8%	-85.1%

Source: 2020 – SSSU, 2025-2030 – own estimation
Note: red color indicates positive impacts

Potential

Agricultural producers in Ukraine have the chance to benefit from such EU policy. If they comply with the EU production standards specified in the "Farm-to-Fork" strategy they will have better access to the EU markets and with proper labelling will be able to ask for better price at other markets. The latter is because the commodities are produced with higher production standards. At the same time, such commodities will not be able to get better price at the markets where environmental production standards are not appreciated. In such case, the producers will experience a relative loss.

In the post-war recovery, agri-food commodity producers shall receive compensation for rebuilding damaged assets and for economic losses. These funds shall come from the Ukrainian government as agricultural policy payments and from the donors. Following the principle Build-Back-Better, these funds shall be used to adopt climate- and environmentally-friendly, more cost-efficient production technologies. Overall, due to beneficial for agriculture soil and climate conditions and high level of agricultural sector development before the war, there is a potential to create environmentally and socially fair agricultural sector while maintaining comparative advantage at the world markets.

V. THEORETICAL ANALYSIS OF THE IMPACT OF SUPPORT PROGRAMS (DIRECT AND INDIRECT) ON THE DEVELOPMENT OF THE AGRICULTURAL SECTOR DURING THE POST-WAR RECOVERY

Agricultural policy and support 1991-2022

Agricultural support programs in Ukraine have long and volatile history. Until 1995, the state regulated the economy. It materialized in controlling supply channels, performing stock interventions, capping prices for agri-food commodities at around 10% of the respective world market prices and limiting agricultural exports with quotas. These measures, although retaining agri-food production at certain required by the domestic demand level, severely discouraged the development of the sector in general.

In 1995, export quotas were cancelled, and privatization of the food processing industry began. Instead of the quotas, however, minimum export prices were introduced. Furthermore, major food production enterprises were excluded from the privatization. Thus, Ukrainian grains and oilseeds producers were left with around 40% of export FOB price which led to the inability to pay for the production factors. Consequently, by 1999 production by the agricultural enterprises dropped to 50% of the pre-independence level.

In 2000 tax benefits for the producers of agricultural commodities were introduced. They were represented by the so-called single tax of the simplified taxation system (further, STS) and a special value-added tax (further, VAT). STS replaced about twelve other taxes and fees, and special VAT regime implied the right to withhold VAT received and reimburse it onto the production factors. This system made the agricultural sector nearly tax-free. Such decisions resulted in a lot more investments into the sector in 2000, positive (for the first time in several years) profitability of the sector and doubling of agricultural exports.

Bad harvests in 2000 and 2003, and at times occurring unfavorable conditions at the world and domestic markets, resulted in some de-liberalization measures. These measures included certification of grains exported, mandatory crop insurance, capping of consumer prices for bread, minimum prices for sugar, wheat-price pledging, 23% (later 17%) export tax on sunflower seeds and abolishment of VAT compensation for commodities exported. These slowed down the production and export growth. To avoid export quotas as a measure to secure supply to the domestic market, in 2011, the agricultural producers reached an agreement with the Government that each year their total exports of grains and oilseeds would not exceed 80% of the expected harvest (Bogonos et al. 2023).

Starting from 2014, the reforms in agriculture of Ukraine were driven by the agenda of Association Agreement (further, AA) with European Union (further, EU). The AA entails a comprehensive program of market and institutional reforms, whereas its trade component, Deep and Comprehensive Free Trade Area (further, DCFTA), defines the stages of

trade liberalization and institutional convergence between EU and Ukraine. In 2014-2015, the central role to the changes in agricultural policy of Ukraine belonged to the, so-called, decentralization and deregulation measures. Overall, 56 agricultural permits and procedures were cancelled in 2014-2016. For example, grain quality certificates, mandatory certification of warehouses, and licensing of import of plant protection products were abolished; issuing of phytosanitary certificates was accelerated and the registration of nitrogen fertilizers simplified. Various other permits regarding transportation of plant products, importing of chemical products for agricultural sector, livestock certification, food safety, fisheries etc. were as well abolished. A considerable amount of effort has been invested into harmonization of the Ukrainian agricultural and food legislation with the respective EU legislation. Consequently, a number of laws were adopted such as, for example, on food safety, feed quality control, identification and registration of animals, on animal by-products and seeds. This resulted in access of Ukrainian milk and egg products to the EU market. One of the prominent side-effects of this process was facilitation of successful negotiations with Chinese authorities on access of the Ukrainian milk products to the Chinese market. Future prospects of the legislation harmonization include access of pork and beef products to the EU market (Bogonos and Stepaniuk 2017).

Support to agricultural producers in Ukraine, measured by the producer support estimate (PSE), is generally low compared to other countries (OECD 2020). Nonetheless, there are several programs that are worth mentioning. To enhance the development of the agricultural sector, financial support programs have been implemented. In 2019, 24 different programs existed, and included, among others, the partial refunding of interest paid for agricultural loans, partial compensation of expenses on advisory services, seeds, seedlings and agricultural machinery and equipment produced in Ukraine, direct payments per hectare of cultivated land to newly established farms, as well as production support to livestock, aquaculture, horticulture, hops and other sectors with smaller shares in gross agricultural product (Agro, 2019). The budget for such programs is formed annually and must comply with the general framework of Ukraine's state budget, which is as well formed annually (LoU, 2021a). In 2019, for example, the support programs to agriculture valued 230.8 million USD, of which 58.7% were directed to support the development of livestock production, 13.4% to partial compensation of expenses on agricultural machinery and equipment produced in Ukraine and 14.9% to financial support of development of family farms (Agro, 2019). Because the agricultural policy budget is adjusted each year, its size, as well as the size of the support programs vary. For example, in 2018 the total budget was 157.5 million USD and the main programs included: 56.1% for support of the development of livestock production, 22.4% to partial compensation of expenses on agricultural machinery and equipment produced in Ukraine and 4.9% to financial support of development of family farms (Agro, 2018). Another relevant aspect in supporting agricultural producers in Ukraine is the specific taxation policy. Although this policy has undergone changes throughout the years, it has remained an important support and regulatory instrument. For example, in 1997-2010 agricultural commodities were generally exempted from VAT (LoU, 1997). Currently only the exported products are exempted

from this tax, whereas products marketed domestically are levied with the reduced rate, i.e., 14% as opposed to the usual 20% (LoU, 2021b; LoU, 2018a; LoU, 2020b) (Nykolyuk et al. 2021).

In 2021 the agricultural sector of Ukraine was supported via the following programs with the total budget of 4.6 billion UAH:

- State support for the development of livestock production and processing of agricultural products
- Partial reimbursement of the cost of domestically produced agriculture machinery and equipment
- Financial support for horticulture, viticulture and hop development
- Financial support for the development of individual farms
- Compensation for lost crops
- State support for potato producers
- State support for niche crops
- Support for the use of reclaimed land

With the full-scale military invasion of RF, the total support budget became smaller – 4.4 billion UAH. In addition to the programs of 2021, agri-food producers started receiving support for concessional credits (the "5-7-9 loans program") and lending under government guarantees (portfolio guarantees 80%). Crop producers receive 3100 UAH per ha of arable land, (restricted to 120 ha) and cattle producers – 5300 UAH per head of cattle for holdings with 3 to 100 animals. The producers are as well provided with temporary grain storage facilities (sleeves) with a capacity of 200 tons per "sleeve" (KSE Agrocenter 2022a). Table below summarizes policy measures applied since 1991 and their impacts on the sector.

Table V-1 policy measures applied since 1991 and their impact on agricultural sector

Policy measure	Impact on the agricultural sector
Control of supply channels Stock interventions Price caps Export quotas	*Hindered sector development*
Minimum export prices Major food production enterprises excluded from privatization	*Hindered sector development*
Tax benefits	*Boosted sector development*
Certification of grains exported Mandatory crop insurance Capping of consumer prices for bread Minimum prices for sugar Wheat-price pledging Export tax on sunflower seeds	*Slowed down sector development*

Abolishment of VAT compensation for commodities exported	
Decentralization and deregulation measures Harmonization with the EU standards Liberalization of trade with the EU	*Boosted sector development*
State support for the development of livestock production and processing of agricultural products Partial reimbursement of the cost of domestically produced agriculture machinery and equipment Financial support for horticulture, viticulture and hop development Financial support for the development of individual farms Compensation for lost crops State support for potato producers State support for niche crops Support for the use of reclaimed land	*Supports sector development*
State support for the development of livestock production and processing of agricultural products Partial reimbursement of the cost of domestically produced agriculture machinery and equipment Financial support for horticulture, viticulture and hop development Financial support for the development of individual farms Compensation for lost crops State support for potato producers State support for niche crops Support for the use of reclaimed land Support for concessional credits Lending under government guarantees Per ha of land and per head of cattle payments Storage facilities	*Supports sector development*

Source: authors' elaboration

Post-war support programs and their impacts on agriculture

Recovery program after liberation of Ukrainian territories and ending of the war should entail three important aspects: addressing food security, supporting the development/restoration of agribusiness, and enhancing the social welfare of rural communities. According to the estimates conducted by KSE Agrocenter in March-August 2022, food affordability in Ukraine decreased by around 11-40% from the beginning of the war, depending on the period and income level (KSE Agrocenter 2022c). As of July 1, the agricultural sector of Ukraine lost around 15% of its assets and hundreds of hectares of agricultural land is under mine pollution (KSE Agrocenter 2022b). Furthermore, communities which were or still are (by the time of conducting this study) in the zones of active firefights and those under occupation suffer tremendous damages. The authorities and witnesses report murdered civil population, destruction of houses and social infrastructure such as schools, municipal buildings, supermarkets, electricity plants etc., waste from destroyed buildings, severe damages of roads, mined public territories, etc.

Improving food security has two dimensions: improvement of the population's income and of the agri-food system. For the first dimension, the short-term support includes food and money aids to the population in need. In the longer term, provision of employment possibilities, curbing inflation, improvement of investment climate, enhancing international trade through bi- and multilateral trade contracts, harmonization of food quality standards with those of the EU (as one of the highest quality standards in the world) and development of support programs for sensitive population groups such as tax and fee benefits are key to improve the population's expenditure on food.

Food security, agri-food system, and rural welfare are related. Agriculture plays a prominent role in Ukrainian economy. It supplies around 10% of the country's GDP and 20% of employment. Therefore, supporting restoration and development of the sector entails improving food security and rural welfare. It should, however, be noted that only with accordingly designed policy and/or donor support, the synergies with food security and rural welfare can be achieved. Thus, the support programs to

- restore ponds (for fishery),
- clear the fields from mine pollution,
- physically restore the fields after the bombings,
- provide access to knowledge and training,
- provide training in processing, storage, marketing and business development,
- provide productive assets (tools, seeds, fertiliser etc.),
- provide grants for starting and restoring a farm,
- provide access to market for smallholder farmers by encouraging the cooperation with the retailers, processing industry and trading companies,
- micro-credit programs,
- and general support of credit

will not only allow for supporting of post-war farming business but also establish new farms which would provide employment in rural communities and monetary inflows into

the local budgets. Higher (and more efficiently distributed) local budgets result in improvement of communities' welfare. Restoration of roads is another very important aspect in supporting agriculture.

Efforts to simply restore the sector to its previous state will ultimately fail in the long term if they do not address reforms that were urgently needed before the conflict (RFSAN, 2016, p. 2). Therefore, it is important to have a coherent national strategy of sector development based on a thorough understanding of conditions in the country and of the strategic needs of the sector. Respectively, policy and donor support may include (Rohwerder 2017)

- using climate/nature smart agricultural practices,
- developing processing,
- developing value chains and markets,
- 'pro-small/micro' farming strategies designed to enhance rural communities,
- developing research institutions to strengthen agriculture,
- and agroecological approach to farming to encourage localization of resource management, a broader and more diverse range of local opportunities (including higher labor requirements), a more localized food security system, and stabilization of the natural resource base' (Roberts & Wright, 2012, p. 253).

Table below analyses the impacts on agricultural sector of the support measures mentioned in this section.

Table V-2 Policy measures in post-war ukraine and their impact on agriculture

Support measure	Impact on the agricultural sector
Food and money aids to the population in need	Positive in the short-term, if the food is obtained from the domestic producers and the money spent at the domestic market
Provision of employment possibilities by creating favorable conditions for business establishment. The conditions include: easing bureaucratic procedures, providing tax benefits and strengthening the rule of law	Positive, if the employment possibilities are created within the sector Negative to positive, if the employment is created outside the agricultural sector: positive effects come from general improvement of the economy; negative effect is the result of competition for qualified labor between the sector
Curbing inflation	
Improvement of investment climate by easing bureaucratic procedures, providing tax benefits and strengthening the rule of law	
Enhancing international trade through bi- and multilateral trade contracts	

Harmonization of food quality standards with those of the EU (as one of the highest quality standards in the world)	
Tax and fee benefits for sensitive population groups	Increases the domestic consumption, thus the domestic demand for agri-food goods. The impact on the sector at national level is marginally positive, because the size of this population group and the respective demand shift is small relatively to the entire population. The effect may be positive at selected local levels.
Support to restore ponds (for fishery)	
Support to clear the fields and sea from mine pollution	
Provide access to market for smallholder farmers by encouraging the cooperation with the retailers, processing industry and trading companies. Cooperation encouragement via "get-to-know" campaigns, smallholder farmers entering cooperatives and unions for creating of larger product batches and increasing marketing efforts.	The impact is positive. However, the exact outcome is difficult to quantify
Support to physically restore the fields after the bombings	
Micro-credit support programs	The impact is positive. However, the exact outcome is difficult to quantify
General support of credit	The impact is positive. However, the exact outcome is difficult to quantify
Provide access to knowledge and training	The impact is positive. However, the exact outcome is difficult to quantify
Provide grants for starting and restoring a farm	The impact is positive. However, the exact outcome is difficult to quantify
Provide training in processing, storage, marketing and business development	The impact is positive. However, the exact outcome is difficult to quantify
Provide productive assets (tools, seeds, fertilizer etc.)	The impact is positive. However, the exact outcome is difficult to quantify
Support to using climate/nature smart agricultural practices	The impacts are diverse. Improvement of environmental impact of agriculture at the expense of yield is possible
Support to developing processing	The impacts are positive

Developing value chains and markets	The impacts are positive
'Pro-small/micro' farming strategies	The impacts are positive. They are usually long-term and it is difficult to single out the impact of the strategy from other factors.
Support to developing research institutions	The impact is positive in the long- and medium-terms, and supported by the experience in developed countries. However, the exact outcome is difficult to quantify
Support to agroecological approach to farming	The impacts are diverse. Improvement of environmental impact of agriculture at the expense of yield is possible

Source: authors' elaboration

VI. WAY FORWARD

1. Exports of cereals and oilseeds will increase the most with abolishment of trade barriers. Poultry and eggs will grow as well, but at a lesser degree. Therefore, trade liberalization will enhance production and export of the classic raw commodities from Ukraine. Honey will gain its momentum in EU exports as well. Although other commodities are not modelled, we may suggest that those filling the EU export quotas quickly will be impacted. Such commodities are processed products: fruit juices, wheat flour, barley porridge, processed tomatoes, sugar and starch. In particular, quick filling of the quotas demonstrates certain level of production development and competitiveness of these products. Thus, with trade liberalization its hindering effect will be lifted and industries producing these commodities may grow further very quickly.

The situation with swine and cattle meat in Ukraine remains challenging. These investment-intensive sectors have been declining for over a decade due to the poor investment climate. Improving the latter should give incentives for these sectors to grow.

Production of niche, more labor-intensive products such as nuts, berries, fruits and vegetables, as well as of other processed products such as cheese, wine and vegetable salads (e.g., long-term storage salads) should be supported. On one hand, they have the potential to increase production and export to the EU. On the other hand, they provide employment and motivate development of accompanying businesses (processing, packaging, transportation, marketing, service, training etc.).

2. Increase in production, motivated by improved export possibilities have the potential to positively impact rural livelihoods. With "pro-smaller farming" policy, the growth in production shall to a larger extent originate from more small- and medium-scale producers entering the agricultural sector. These market players are the major employment providers to the rural population. Even if they are well-equipped with machinery, the total number of employees hired by a number of these producers is greater than hired by a large producer of equivalent specialization and size. Apart from employment, development of small-scale farming motivates creation of regional markets and accompanying businesses, which, in turn, create employment as well. These accompanying businesses are processing and packaging facilities, machinery reparation services, agricultural input retail etc. Furthermore, small-scale farming are usually locally registered business that means that they pay taxes to the local budgets. The latter results in better public services in the community.
If "pro-smaller farming" policy is not present, large producers will grow further. This will result in continuation of the trend of rural population reduction observed until 2022, and in limited additional employment opportunities.

Apart from social impacts of trade liberalization, the latter will have an impact on the environment as well. Continuation of application of currently widespread cultivation practices while increasing production will result in further environmental deterioration. To avoid this, agricultural policy should encourage both, smaller and larger producers, using nature- and climate-friendly production approaches. Such an encouragement

may come from the EU as well: by liberalizing trade only for those producers, who comply with specific environment-related production requirements. As a part of post-war recovery, following the principle "build-back-better", the restoration of damaged agricultural assets shall comply with higher environmental standards, as well as environmentally-friendly production practices shall receive larger support.

In the context of post-war recovery, additional export opportunities created by the liberalized trade with the EU shall capitalize in small-scale environmentally-friendly agricultural producers. "pro-smaller and pro-green" agricultural policy will play the major role in making this happen.

3. Any agricultural policy is an intervention into market that results in changing of what could have been a pure market outcome. As the latter are efficient, policy should have clear long-term goals and be strategic to improve and not to deteriorate these market outcomes. In this respect, policy programs require longevity so that the market reacts and produces the desired outcome. This been said, if with liberalized trade between Ukraine and EU, post-war agricultural policy will aim at supporting small-scale environmentally-friendly agricultural producers and at increasing their number, special attention must be paid at delivering to such producers an insurance of long-term support. Usually, smaller producers and those applying nature-based solutions in agriculture face great financial risks, are quite sensitive to market fluctuations and access markets with greater efforts due to smaller production batches and greater unit costs. That is why assurance considerable support longevity will attract more producers to start/rebuild their small-scale business.

Furthermore, special attention of the policy programs must be paid at the functioning of the entire food production value chain. On one hand, post-war recovery will require revitalization of logistics and re-establishing of connections between the market agents. On the other hand, input markets, logistics, storage, processing and output markets should be equally accessible for larger and smaller agricultural producers. This means that the task of the agricultural policy is, among else, to provide market access support to smaller and environmentally-friendly producers, if the latter have limited access as compared to the larger producers.

Long-term support and equal access to markets are the key risk areas in success of the agricultural policy.

4. International trade opens new markets, exposes the country to goods and services at better prices or unavailable in its domestic economy. Although trade agreements facilitate such exposure, allow for better competitiveness of the domestic businesses abroad, strengthen the economy and create jobs, the competition they bring may be damaging to small, domestic industries. Therefore, trade agreements shall support the overall strategy of the agricultural policy of the country, create fair market environment and project Ukraine's rules and values. For example, if the agricultural policy aims at developing small-scale farming, access to exporting of these small produces must be ensured and support shall be provided for facilitating their competitiveness, such as for example, compensation of technological changes at the farm aiming at productivity increase. Fair market environment may be facilitated through proper

packaging of products (imported and domestically produced) of different quality, and equal access to retailers of small producers and importers. Projection of values and rules implies, for example, special trade conditions with countries of authoritarian regimes, trade with RF, with countries with high shares of child labor, with environmentally damaging production practices, with unfair labor conditions, countries with high number of food insecure or people etc. Furthermore, previous agreements and obligations shall not be neglected in the new trade agreements. For example, because Ukraine is a WTO member, its trade policy shall aim at "WTO green box": export subsidies, production-related subsidies (e.g., direct payment per unit of output), etc. shall be avoided.

Goals of the agricultural policy, assurance of fair markets, Ukraine's values and rules, WTO membership obligations and previous trade agreements shall be considered when developing new trade agreements.

REFERENCES

Agro (2019): The state of financing of the agricultural sector and industry in 2019. The portal of information and analytics for agricultural sector and industry in Ukraine, the Ministry of development of economics, trade and agriculture of Ukraine, 2019 (translated from Ukrainian: Стан фінансування АПК у 2019 році. Державна підтримка АПК у 2019 році. Інформаційно-аналітичний портал АПК України, Міністерство розвитки економіки, торгівлі та сільського господарства Укрїани, 2019). LoU, 2021a

Agro (2018): The state of financing of the agricultural sector and industry in 2018. The portal of information and analytics for agricultural sector and industry in Ukraine, the Ministry of development of economics, trade and agriculture of Ukraine, 2019 (translated from Ukrainian: Стан фінансування АПК у 2018 році. Державна підтримка АПК у 2018 році. Інформаційно-аналітичний портал АПК України, Міністерство розвитки економіки, торгівлі та сільського господарства Укрїани, 2019).LoU, 1997

Andrusevich et al. (2020): The European Green Deal: Opportunities and Threats for Ukraine https://dixigroup.org/storage/files/2020-05-26/european-green-dealwebfinal.pdf

Bogonos, M., V. Litvinov, P. Martyshev, R. Neyter, O. Nivievskyi, I. Piddubnyi, H. Stolnikovych (2023): Beyond survival: farming chronicles, outlook and strategies for Ukrainian agriculture following the 2022 Russian Invasion. Paper under submission to Agricultural and Applied Economics Association

Bogonos, M., O. Stepaniuk (2017): Agricultural Outlook Ukraine 2017-2030. Baseline: projection of development of the agricultural sector in current economic and political

frameworks and absent monetary state support. Agricultural Policy Report APD/APR/06/2017, German-Ukrainian Agricultural Policy Dialogue, Kyiv. OECD 2020

Chantreuil, F., K. Hanrahan, M. van Leeuwen (Eds.) (2012): The future of EU agricultural markets by AGMEMOD. Springer, Dordrecht, 2012.

EU (2022): European Commission Poultry Dashboard https://agriculture.ec.europa.eu/system/files/2022-11/poultry-meat-dashboard_en.pdf

EU (2022a): Regulation(EU) 2022/870 of the European Parliament and of the Council of 30 May 2022 on temporary trade-liberalisation measures supplementing trade concessions applicable to Ukrainian products under the Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2022.152.01.0103.01.ENG&toc=OJ%3AL%3A2022%3A152%

EU (2022b): From farm to fork https://www.consilium.europa.eu/en/policies/from-farm-to-fork/

EU (2022c): European Green Deal https://www.consilium.europa.eu/en/policies/green-deal/

EU (2022d): Fit for 55 https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

EU (2022e): Civil protection work in view of climate change: Council adopts conclusions https://www.consilium.europa.eu/en/press/press-releases/2022/03/03/making-civil-protection-ready-for-climate-change-council-adopts-conclusions/

EU (2022f): Biodiversity: how the EU protects nature https://www.consilium.europa.eu/en/policies/biodiversity/

EU (2021): European climate law: Council and Parliament reach provisional agreement https://www.consilium.europa.eu/en/press/press-releases/2021/05/05/european-climate-law-council-and-parliament-reach-provisional-agreement/

EU (2021a): Council endorses new EU strategy on adaptation to climate change https://www.consilium.europa.eu/en/press/press-releases/2021/06/10/council-endorses-new-eu-strategy-on-adaptation-to-climate-change/

EU (2021b): Questions and Answers: European Green Deal: new EU Forest Strategy for 2030 https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3548

EU (2020): Environment Council, 23 October 2020 https://www.consilium.europa.eu/en/meetings/env/2020/10/23/

EU (2020a): Council prioritises actions for sustainable food systems: conclusions on the farm to fork strategy https://www.consilium.europa.eu/en/press/press-releases/2020/10/19/council-prioritises-actions-for-sustainable-food-systems-conclusions-on-the-farm-to-fork-strategy/

EU (2020b): Changing how we produce and consume: New Circular Economy Action Plan shows the way to a climate-neutral, competitive economy of empowered consumers https://ec.europa.eu/commission/presscorner/detail/en/ip_20_420

EU 2015: Closing the Loop – An EU Action Plan for the Circular Economy. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52015DC0614

EU (2019): European Council, 12-13 December 2019 https://www.consilium.europa.eu/en/meetings/european-council/2019/12/12-13/

EUROSTAT (2022): EURUSTAT DATABASE https://ec.europa.eu/eurostat/web/main/data/database

FTA (2014): Association Agreement between the European Union and its Member States, of the one part, and Ukraine, of the other part. Official EN Journal of the European Union, 161, p. 3–2137, 2014.

KMU (2022): Taras Vysotskyi: Ukraine will be able to increase exports to the EU at the expense of agricultural products with added value https://www.kmu.gov.ua/news/taras-visockij-ukrayina-zmozhe-narostiti-eksport-v-yes-za-rahunok-sg-produkciyi-z-dodanoyu-vartistyu

KMU (2019): National waste management plan until 2030. https://zakon.rada.gov.ua/laws/show/2697-19#Text

KMU (2019a): On the approval of the Concept of implementation of state policy in the field of climate change for the period up to 2030 https://www.kmu.gov.ua/npas/249573705

KMU (2017): National waste management plan until 2030. https://www.kmu.gov.ua/npas/pro-zatverdzhennya-nacionalnogo-planu-upravlinnya-vidhodami-do-2030-roku

KMU (2017a): Plan of measures for the implementation of the Concept of implementation of state policy in the field of climate change for the period up to 2030 https://zakon.rada.gov.ua/laws/show/878-2017-%D1%80#n8

KSE Agrocenter (2022a): Agricultural policy of Ukraine 2022. Unpublished report. Center for Food and Land Use Research. https://agrocenter.kse.ua

KSE Agrocenter (2022b): Agricultural war damages review Ukraine Rapid Damage Assessment. Center for Food and Land Use Research. https://agrocenter.kse.ua

KSE Agrocenter (2022c): Food security in Ukraine in the six months of war. Unpublished report. Center for Food and Land Use Research. https://agrocenter.kse.ua

KSE Agrocenter (2022d): Agricultural outlook Ukraine. Scenarios: projections for open & blocked export. KSE Agrocenter Working Paper. https://agrocenter.kse.ua

LoU (2021b): Law of Ukraine on Introduction of changes to the Tax code of Ukraine regarding the value added tax on some types of agricultural commodities. News of the Parliament of Ukraine, 2021, No. 12, p.96 (translated from Ukrainian: Закон України Про внесення змін до Податкового кодексу України щодо ставки податку на додану вартість з операцій з постачання окремих видів сільськогосподарської продукції. Відомості Верховної Ради України (ВВР), 2021, № 12, ст.96)

LoU (2020b): Law of Ukraine On amendments to the Tax Code of Ukraine to improve tax administration. News of the Parliament of Ukraine, 2020, No. 32, p.227 (translated from Ukrainian: Закон України Про внесення змін до Податкового кодексу України щодо вдосконалення адміністрування податків. Відомості Верховної Ради (ВВР), 2020, № 32, ст.227)

LoU (2018a): Law of Ukraine on Modification of subsection 2 of section XX "Transitional provisions" of the Tax code of Ukraine concerning some aspects of taxation of value added of exports of oilseeds. News of the Parliament of Ukraine, 2018, No. 39, p.284 (translated from Ukrainian: Закон України Про внесення зміни до підрозділу 2 розділу XX "Перехідні положення" Податкового кодексу України щодо деяких питань оподаткування податком на додану вартість операцій з вивезення за межі митної території України олійних культур. Відомості Верховної Ради (ВВР), 2018, № 39, ст.284).

Martyshev, P., Neyter R., Piddubnyi I. (2023): Food Processing. What's next? Working Paper of Center for Food and Land Use Research at Kyiv School of Economics. Available online at: https://kse.ua/wp-content/uploads/2023/06/Food-Processing.-Whats-next.pdf

MEU (2022a): Statistics of Ukrainian exports in October https://me.gov.ua/News/Detail?lang=uk-UA&id=136f85ec-07be-40a5-baab-5667bab77d7a&title=Statistika

MEU (2022b): Tariff quotas within the framework of the FTA; Department of international cooperation in the field of economy, trade and agriculture.https://www.me.gov.ua/Documents/Detail?lang=uk-UA&id=f5cea3c3-d7e0-4e49-994d-f87089e3d3fc&title=TarifniKvotiVRamkakhPvzvt&isSpecial=true

MEU (2022c): Infographics of the Ministry of Economy of Ukraine on imports https://me.gov.ua/Documents/Download?id=08e0efd1-7752-47c7-a48f-9b1c591e5ca3

MEU (2022d): Infographics of the Ministry of Economy of Ukraine regarding exports https://www.me.gov.ua/Documents/Download?id=a6578d24-5be7-4024-a177-d5ee65745113

MEU (2022e): Ukrainian export statistics in October according to the Ministry of Economy of Ukraine https://me.gov.ua/News/Detail?lang=uk-UA&id=136f85ec-07be-40a5-baab-5667bab77d7a&title=Statistika

NAVIGATOR (2022): Agreement navigator. Assessment of progress and number of commitments https://navigator.eurointegration.com.ua/

Nykolyuk, O., Pyvovar, P., Chmil, A., Bogonos, M., Topolnyckyi, P., Cheban, I. and Fellmann, T. (2021): Agricultural markets in Ukraine: current situation and market outlook until 2030, EUR 30874 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-42649-3 (online), doi:10.2760/669345 (online), JRC126768.

Regional Food Security Analysis Network (RFSAN). (2016). The Impact of ISIS on Iraq's Agricultural Sector. RFSAN. https://reliefweb.int/sites/reliefweb.int/files/resources/07122016_IRQ_Iraq_Agri_Brefing_V2.pdf

Roberts, R., & Wright, J. (2012). Concluding Remarks: Looking to the Future – Agriculture Postconflict. In A. Özerdem, & R. Roberts (eds). (2012). Challenging Post-conflict Environments: Sustainable Agriculture. Taylor and Francis.

Rohwerder, B. (2017). Supporting agriculture in protracted crises and rebuilding agriculture after conflict and disasters. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies. https://gsdrc.org/wp-content/uploads/2017/12/245-258-Supporting-agriculture-in-protracted-crises-and-rebuilding-agriculture-after-conflict-and-disasters.pdf

Salamon, P., M. Banse, T. Donnellan, M. Haß, R. Jongeneel, V. Laquai, M. van Leeuwen, I. Reziti, G. Salputra, M-E Zirngibl (2019): AGMEMOD outlook for agricultural and food markets in EU member states 2018-2030. Thünen Working Paper, No. 114, Johann Heinrich von Thünen-Institut, Braunschweig, 2019.

Salamon, P., M. Banse, J. Barreiro-Hurlé, O. Chaloupka, T. Donnellan, E. Erjavec, T. Fellmann, K. Hanrahan, M. Hass, R. Jongeneel, V. Laquai, M. van Leeuwen, A. Molnár, M. Pechrová, G. Salputra, W. Baltussen, J. Efken, S. Hélaine, J. Jungehülsing, O. von Ledebur, I. Rac, F. Santini (2017): Unveiling diversity in agricultural markets projections: from EU to Member States. A medium-term outlook with the AGMEMOD model.

Eds.: G. Salputra, P. Salamon, R. Jongeneel, M. van Leeuwen, M. Banse. JRC Technical Reports, EUR 29025 EN, Luxembourg (Luxembourg): Publications Office of the European Union, 2017.

UCAB (2021): The Association "Ukrainian Agribusiness Club" http://ucab.ua/ua/doing_agribusiness/zovnishni_rinki/zona_vilnoi_torgivli_z_es_dcfta

VRU 2022a: Convention on the joint transit procedure/ Document 994_001-87, dated 08/30/2022, basis - 2555-IX https://zakon.rada.gov.ua/laws/show/994_001-87#Text

VRU 2022b: Convention on simplification of formalities in trade in goods/ Document 987_012, Accession dated 30.08.2022, basis - 2554-IX https://zakon.rada.gov.ua/laws/show/987_012#Text

WEF 2014: Towards the Circular Economy: Accelerating the scaleup across global supply chains. World Economic Forum. Geneva, Switzerland