KSE | Center for Food and Land Use Research at Kyiv School of Economics

Food Processing.

What's next?

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Executive Summary

Food processing industry is an important sector in Ukraine's national economy. The sector is focused mostly on the primary processing of agricultural commodities (especially oilseeds crushing products); its diversification is weak. By contrast, Ukraine imports a variety of processed food products. The country shows high self-sufficiency in raw materials, especially feed grains, vegetables, and oilseeds. However, the marginality of processing is limited since raw commodities are exported actively. Ukraine's food sector is highly integrated into the global value chains. The major categories of imported inputs are palm oil, tropical fruits, nuts, plastics, and packaging materials. The sector of food, beverages, and tobacco production has fiscal costs close to the national average: in the 2018-2021, the tax burden ratio was 25% versus 27% in the whole national economy. However, a large share of sector's tax revenues is generated by excise taxes for beverages and tobacco products. This means that food processing industry excluding beverages and tobacco production is undertaxed. The most perspective groups for food exports with growing international demand are vegetable oils (both refined and unrefined), oilseed meals, poultry meat, and confectionery.

Ukraine has a disproportionally high share of the agricultural sector in GDP and total exports compared to peer countries. However, the share of processed food products is lower than international benchmarks. 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.

The European move towards climate neutrality and shifted consumer preferences create both risks and opportunities for agricultural producers in Ukraine. The risks are mainly connected to the regulations that may limit the access for Ukrainian farmers to the EU-members' markets – both physically if some of them do not meet the requirements and financially because of operational, investment, and transaction costs to comply with environment and food safety regulations.

On the other hand, this opens up additional and significant opportunities for agricultural enterprises in Ukraine. First, EU members' demand for imported food may increase in case of a reduction in their own production due to the implementation of the Farm to Fork strategy. Second, in addition to coercion, the EU also applies methods of stimulating sustainable farming, which also includes the expansion of preferential credit programs and the provision of grants for enterprises that are ready to be the locomotive of the green transformation for organic and healthy food.

However, several caveats should be noted here. Since Ukraine is on the path of integration and becoming a member of the EU, it is appropriate to understand that upon accession, the requirements applicable to members will also apply to Ukrainian enterprises. Therefore, delaying the adjustment of production standards may lead to negative effects on the country's EU membership or if EU directives are more strictly applied to importers. An example of such EU policy for maintaining its domestic competitiveness is the Carbon Border Adjustment Mechanism (CBAM) mechanism, which will at least indirectly affect the costs of agricultural enterprises through a possible change in prices for fertilizers and machinery and, perhaps, directly for agricultural products if such amendments, which have a certain political support in the EU, will be adopted as well.

Ukraine, as a major global producer and exporter of grains and sunflower oil, as well as an exporter of animal products to the EU, can increase its export potential for processed products that have a higher added value compared to the current structure of production and export of the sector. However, in this case, the competitiveness of farmers will be determined not only by the cost of production factors but also by environmental sustainability, and compliance with food safety standards – in particular, food traceability and animal welfare requirements.

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 agrifood products – crop products, livestock products, and processed food products. The Deep and Comprehensive Free Trade Agreement between Ukraine and the EU boosted 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).

Retailers took a large part of Ukraine's food market; the sector consolidated over the last years. Since the two largest retailers (ATB market and Fozzy Group) take 55% of the local food market, this may indicate their market power. Evidence from Ukraine's Chamber of Commerce confirms the discrimination of wholesale food suppliers by retailers. Nevertheless, the analysis of proportions between farm-gate, wholesale, and retail prices shows that a) the share of farm-gate prices in wholesale prices in Ukraine is lower than in the US, and b) the share of wholesale prices in retail prices is higher than in the US. It means that the marketing margin of food retailers in Ukraine is not unusually large; no discriminatory price effects to the upstream sectors are observed.

The evolution of agricultural policy in Ukraine over the last decades reshaped the structure of the food processing industry. Export taxation for sunflower seeds boosted their crushing, but this development was also supported by strong international demand. By contrast, the milling industry stagnated amid unrestricted wheat exports and protected export markets for wheat flour. The soybeans crushing sector faced a similar situation; a large part of beans was exported unprocessed despite the underloaded local crushing plants. This implies the low economic efficiency of the processing industry. The stability of the sugar sector is ensured mostly by protectionist measures. This is also partially true for meat and milk processing; in the last years, these sectors have been vulnerable to competition from imported EU products.

As for the international experience, the effects of direct support measures on the performance of the food processing companies are inconclusive. These effects are likely heterogeneous in time and across different company sizes. Adopting such a support regime to enhance food processing in Ukraine is an

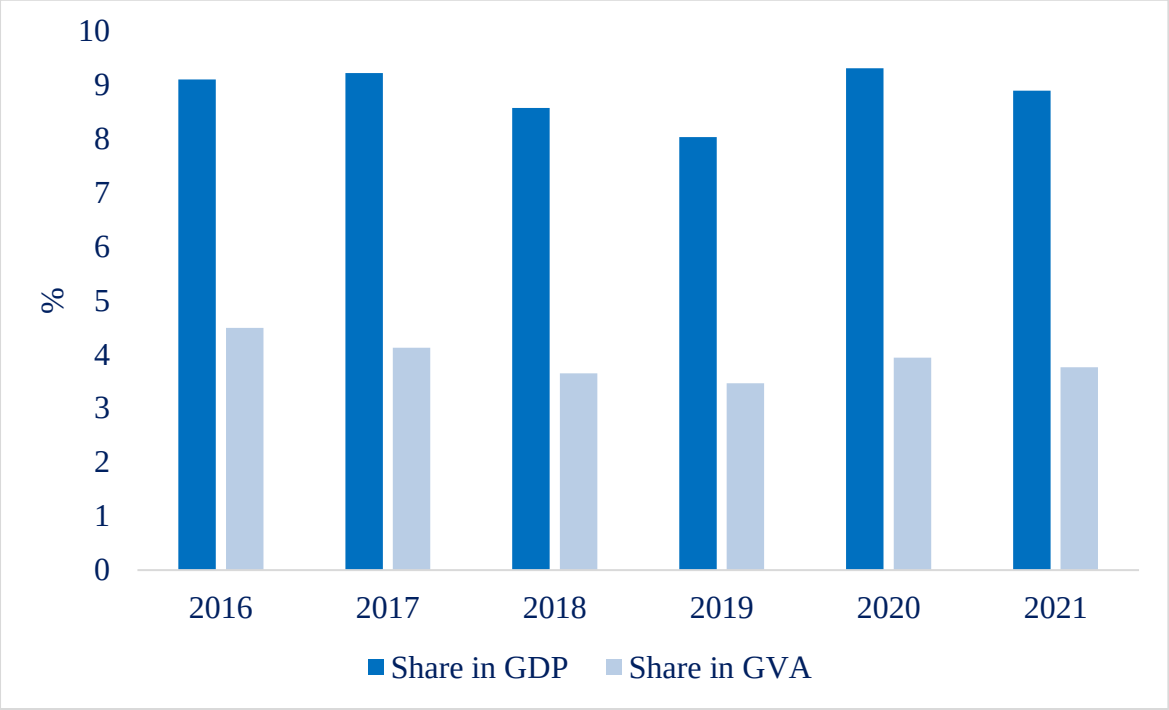
unjustifiably risky decision. Among optimal policies that lead to productivity increase in the sector are policies aimed to expand the potential set of choices for intermediate inputs and policies that encourage communications between market participants.

Chapter A. The current state of the food processing industry in Ukraine

1. Macro-indicators and structure of the food sector

The share of the food processing industry in the national Gross Domestic Product (GDP) and Gross Value Added (GVA) was at stable level over the last years (Figure 1). GVA is calculated as GDP plus subsidies minus taxes. In other words, GVA shows the income of the sector (or the whole economy) with respect to state support. Therefore, the difference between industry's shares in GDP and GVA shows the degree of the sector-specific state support. As Figure 1 indicates, the share of food manufacturing industry (including beverages and tobacco production) in GVA was about twice as low as the share in GDP over the last years. This difference should imply on high taxation and/or low support of Ukraine's food manufacturing. As will be defined later, Ukraine's food, beverages, and tobacco sector has almost the same taxation burden as the rest of the economy (Figure 4). At the same time, around 65% of tax revenues generated by the sector comes from the excise taxes for beverages and tobacco products (Table 21). Given this unproportionally high contribution of beverages and tobacco to the sector's tax revenues, we can state that food processing (without beverages and tobacco production) has low tax burden compared to other industries. In this respect, low share of food manufacturing in GVA implies also on the low level of direct subsidies to the sector.

Figure 1. Share of food processing industry in Gross Domestic Product and Gross Value Added in Ukraine



Source: Ukrstat

Note: Available statistics on Ukrstat does not allow to define GDP/GVA for food production only. Therefore, aggregated data for food, beverages, and tobacco production is used

The nominal values of GDP for primary agriculture and food industry are presented in Table 1:

Table 1. Nominal GDP for primary agriculture and food industry in Ukraine, mln. UAH

	2015	2016	2017	2018	2019	2020	2021
Primary agriculture GDP	249012	288578	314628	373753	368109	410974	625004
Food industry GDP	165391	216988	274871	305076	319489	392967	484762
Overall GDP	1988544	2385367	2981227	3560302	3977198	4222026	5450849

Source: Ukrstat

Note: Available statistics on Ukrstat does not allow to define GDP/GVA for food production only. Therefore, aggregated data for food, beverages, and tobacco production is used

As for the share of the food processing industry in total employment, it was relatively constant at about 2% over the period 2010-2020. Meanwhile, the distribution of the labor force across the subsectors of the food processing industry has become more diversified. The shares of labor-intensive sectors such as Bakery products and Other food products declined from 25 to 23% and from 16 to 14%, respectively. By contrast, the proportion of employees in meat, oils and fats, and beverages production increased to 18%, 8%, and 10%, accordingly (Table 2).

Table 2. Structure of labor force in Ukraine's food processing industry for different subsectors, %

Category	2010	2020
Meat products	12	18
Fish products	2	2
Processed fruits and vegetables	5	3
Oils and fats	5	8
Milk products	15	14
Flour products	5	6
Bakery	25	23
Other food products	16	14
Animal feed	2	2
Beverages	13	10

Source: Ukrstat

The dynamics of the index of industrial production by types of activity are presented in Table 3. The overall «manufacturing of food products» index has not changed over the last 10 years.

The index of «processing and preserving of meat and production of meat products» increased by 30 % for the last decade through the recovery of the poultry sector. Also, the supply of «processing and preserving of fruit and vegetables» increased by 20% due to increased domestic demand and better access to the European markets. The index of «manufacture of vegetable and animal oils and fats» boosted by almost a 60 % from 2012 to 2020 and slightly decreased in 2021, sunflower oil is the leader

in the production. As for dairy products, the production index demonstrated a gradual decrease due to the loss of the market of CIS countries (for butter and cheese products). The «grain mill products, starches, and starch products» production index dropped by 13%, in «manufacture of bakery and farinaceous products» the drop was almost 40%. Finally, the index of production of sugar and sugar confectionary also dropped.

Table 3. Index of industrial production by types of activity, 2012=100%

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Manufacture of food products	96,4	100,8	89,3	97,3	104,2	102,6	106,6	106,1	99,8
Processing and preserving of meat and production of meat products	110,5	111,1	111,3	115,8	120,8	120,7	123,1	123,1	127,9
Processing and preserving of fish, crustaceans and molluscs	105,1	103,7	81,4	104,6	114,2	130,3	135,5	132	147,9
Processing and preserving of fruit and vegetables	99,8	102,7	87	92,2	93,7	103	102,3	108,1	117,6
Manufacture of vegetable and animal oils and fats	92,6	112,5	96,6	114,4	134,5	131,6	149,7	156,8	126,1
Manufacture of dairy products	100,5	100,6	92,3	92	92,7	94,3	89,7	89,8	84,9
Manufacture of grain mill products, starches and starch products	96,7	97,3	98,4	101,4	100,3	89,5	93,1	87,2	87,7
Manufacture of bakery and farinaceous products	96,5	86,4	73,7	71,9	70,8	67,3	63,2	60,5	61,9
Manufacture of other food products	85,5	94,7	73,5	81,8	83,6	82,2	76,8	66,9	73,2
Manufacture of sugar	58,9	98,2	67,9	90,7	91,5	82	67,9	45,5	60
Manufacture of cocoa, chocolate and sugar confectionery	100,5	76,6	63,7	61,9	66	71	79,1	78,1	78,7
Processing of tea and coffee	110,7	117,5	109,9	113,9	108,3	112,6	109,6	102,2	109,1
Manufacture of beverages	90,8	83,3	75,2	72,4	73	73,6	73,3	70,9	71,2

Source: Ukrstat

The monetary structure of the food processing industry is presented in Table 4. Over the 2013-2020 period, the shares of animal products, oils, and fats increased substantially, while the proportions of vegetable products, milk products, and beverages declined.

Table 4. Structure of revenue in Ukraine's food processing industry, %

KVED code	2013	2020
10.1. Animal products	19	21
10.2. Fish products	1	1
10.3. Vegetable products	5	4
10.4. Oils and fats	10	16
10.5. Milk products	16	14
10.6. Flour products	3	4
10.7. Bakery products	9	8
10.8. Sugar products	14	11
10.9. Feeds	4	5
11.0. Beverages	19	16
Total	**100**	**100**

Source: Ukrstat

2. Integration with upstream sectors

Ukraine's food processing industry is very dependent on primary agriculture as an upstream sector. This vertical integration should be analyzed across the main sub-sectors in the food industry.

Milling and bakery sector

Although Ukraine is a net exporter of wheat with relatively low domestic prices, local wheat flour production stagnated over the last years (see FSI consumption in Table 5). The main reason for this decline is a tight competition on the global flour market[1] and the geographical advantages of competitor countries (such as Turkey and Kazakhstan). Besides, domestic flour demand is weak amid demographic changes, shifts in consumer preferences. Therefore, despite the surplus of milling wheat in Ukraine, its price is high for local millers, which face relatively low output prices. As for other types of flour (from rye, rice, and pea), they are not popular in Ukraine; their share does not exceed 5% in total output.

[1] https://www.apk-inform.com/uk/exclusive/opinion/1514249

Table 5. Market balance of wheat in Ukraine, mln. tons

	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Beginning Stocks	5,68	6,59	4,45	3,56	3,07	3,16
Production	26,53	26,04	26,16	24,6	28,32	24,88
Imports	0,03	0,04	0,06	0,08	0,09	0,13
Total Supply	**32,24**	**32,67**	**30,67**	**28,24**	**31,48**	**28,17**
Exports	13,45	17,92	17,31	16,37	20,02	18,05
Feed Dom. Consumption	5,1	3,6	3,3	2,5	2,2	2,6
FSI Consumption	7,1	6,7	6,5	6,3	6,1	6,1
Domestic Consumption	12,2	10,3	9,8	8,8	8,3	8,7
Ending Stocks	6,59	4,45	3,56	3,07	3,16	1,42
Total Distribution	**32,24**	**32,67**	**30,67**	**28,24**	**31,48**	**28,17**

Source: FAO, Ukrstat. Notes: 1. Food, Seed, and Industrial (FSI) Consumption represents the share of supply used for human consumption.2. The share of milling wheat in the total wheat output (wheat and feed) varies between 40% and 60%.

Livestock industry

The segment of feed grains shows a higher surplus than milling grain consumed by the milling industry. Corn is the most popular feed crop; it is also the most exportable crop in Ukraine. Local corn production is constantly increasing, while domestic consumption has remained relatively stable over the last few years (Table 6).

Table 6. Market balance of feed corn in Ukraine, mln. tons

	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Beginning Stocks	1,519	-1,012	2,72	1,876	8,773	5,148
Production	23,333	28,07	24,66	35,8	35,88	30,29
Imports	0,026	0,032	0,036	0,037	0,035	0,021
Total Supply	**24,878**	**27,09**	**27,416**	**37,713**	**44,688**	**35,459**
Exports	19,04	17,27	19,39	21,44	32,34	27,9
Feed Dom. Consumption	5,5	5,8	4,9	6,3	6	5,9
FSI Consumption	1,35	1,3	1,25	1,2	1,2	1,2
Domestic Consumption	6,85	7,1	6,15	7,5	7,2	7,1
Ending Stocks	-1,012	2,72	1,876	8,773	5,148	0,459
Total Distribution	**24,878**	**27,09**	**27,416**	**37,713**	**44,688**	**35,459**

Source: FAO, Ukrstat

Feed wheat is the second major feed crop in Ukraine. Its production volumes depend not only on planting areas and yields but also on crop quality determined by climate. The share of feed wheat in the total harvest of wheat is high in unfavorable seasons with cold climates and excessive rainfalls. Generally, the proportion between milling and feed grades of wheat in harvest varies from 60:40 to

40:60 depending on climate conditions[2]. The other important feed crop is barley. Production and export volumes of this crop have been relatively constant over the last few years (Table 7).

Table 7. Market balance of feed barley in Ukraine, mln. tons

	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Beginning Stocks	1,565	1,09	1,244	1,444	1,073	1,541
Production	8,29	9,44	8,28	7,349	8,91	7,64
Imports	0,015	0,014	0,02	0,01	0,048	0,023
Total Supply	**9,87**	**10,544**	**9,544**	**8,803**	**10,031**	**9,204**
Exports	4,68	4,9	4,99	3,63	4,25	5,12
Feed Dom. Consumption	2,6	3	1,71	2,8	3,04	1,71
FSI Consumption	1,5	1,4	1,4	1,3	1,2	1,2
Domestic Consumption	4,1	4,4	3,11	4,1	4,24	2,91
Ending Stocks	1,09	1,244	1,444	1,073	1,541	1,174
Total Distribution	**9,87**	**10,544**	**9,544**	**8,803**	**10,031**	**9,204**

Source: FAO, Ukrstat

Vegetable oils sector

In contrast to the milling sector, the production of vegetable oils in Ukraine actively progressed over the last two decades with respect to strong international demand. Imposing a 23% export tax for sunflower seeds in 1999[3] boosted the construction of new oilseed crushing plants. As Table 8 indicates, almost all output of sunflower seeds is crushed domestically.

Table 8. Market balance of sunflower seed in Ukraine, mln. tons

	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Beginning Stocks	0,15	0,009	0,089	-0,32	-0,509	0,242
Production	11,18	13,63	12,23	14,16	15,25	13,11
Imports	0,014	0,024	0,025	0,03	0,023	0,021
Total Supply	**11,344**	**13,663**	**12,344**	**13,87**	**14,764**	**13,373**
Exports	0,048	0,2	0,073	0,059	0,082	0,19
Crush	11,13	13,2	12,43	14,17	14,3	14,05
Food Use Domestic Consumption	0,037	0,044	0,021	0,05	0,05	0,05
Food Waste Domestic Consumption	0,12	0,13	0,14	0,1	0,09	0,05
Domestic Consumption	11,287	13,374	12,591	14,32	14,44	14,15
Ending Stocks	0,009	0,089	-0,32	-0,509	0,242	-0,967

[2] https://uga.ua/meanings/kachestvo-pshenitsy-urozhaya-2018-perspektivy-eksporta-zerna-muki-szhs-ukraina/

[3] https://zakon.rada.gov.ua/laws/show/1033-14#Text

Total Distribution	**11,344**	**13,663**	**12,344**	**13,87**	**14,764**	**13,373**

Source: FAO, Ukrstat

Soybean is the second main oilseed used by the local oil sector. In contrast to sunflowers, the essential part of this crop is exported in raw form (Table 9). The cancellation of VAT refunds for soybeans export (so-called «soybean amendments») in 2017 and the abolishment of this policy in 2020 led to a drop in both production and soybean processing volumes. Production in 2020/2021 decreased by 33%, processing by 27%. According to estimates, producers lost more than 10 dollars[4] on each ton of sold products due to "soy amendments".

Table 9. Market balance of soybeans in Ukraine, mln. tons

	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Beginning stocks	0,166	0,112	0,149	0,08	0,227	0,191
Production	3,93	4,28	3,9	4,46	3,7	2,8
Imports	0,006	0,007	0,011	0,007	0,005	0,026
Total supply	**4,102**	**4,399**	**4,06**	**4,547**	**3,932**	**3,017**
Exports	2,2	2,74	2,87	2,24	3,62	1,79
Crush	1,119	0,959	0,859	1,804	0,05	0,864
Food use domestic consumption	0,001	0,001	0,001	0,001	0,001	0,001
Food waste domestic consumption	0,67	0,55	0,25	0,275	0,17	0,175
Domestic consumption	1,79	1,51	1,11	2,08	0,121	1,04
Ending stocks	0,112	0,149	0,08	0,227	0,191	0,187
Total distribution	**4,102**	**4,399**	**4,06**	**4,547**	**3,932**	**3,017**

Source: FAO, Ukrstat

As for the third main oilseed crop – rapeseed – it is mostly exported to the EU for further crushing. The volumes of domestic crush are low (Table 10) but have the potential for expansion[5].

[4] https://landlord.ua/news/soievi-pravky-iak-tse-vdarylo-po-ahrarnomu-biznesu/

[5] http://agro-business.com.ua/agro/ekonomichnyi-hektar/item/18109-industriia-vyrobnytstva-i-pererobky-ripaku-mozhlyvosti-perspektyvy.html

Table 10. Market balance of rapeseed in Ukraine, mln. tons

	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Beginning Stocks	0,018	-0,038	-0,139	-0,246	-0,252	-0,459
Production	1,781	1,12	2,22	2,78	3,32	2,57
Imports	0,003	0,007	0,009	0,013	0,011	0,014
Total Supply	**1,802**	**1,089**	**2,09**	**2,547**	**3,079**	**2,125**
Exports	1,481	1,031	2,163	2,46	3,184	2,405
Crush	0,357	0,195	0,153	0,335	0,35	0,32
Food Use Domestic Consumption	0	0	0	0	0	0
Food Waste Domestic Consumption	0,002	0,002	0,02	0,004	0,004	0,004
Domestic Consumption	0,359	0,197	0,173	0,339	0,354	0,324
Ending Stocks	-0,038	-0,139	-0,246	-0,252	-0,459	-0,604
Total Distribution	**1,802**	**1,089**	**2,09**	**2,547**	**3,079**	**2,125**

Source: FAO, Ukrstat

Despite the active expansion of the vegetable oils sector, its total output is still below the potential level. According to the Ukroliaprom association, crushing capacities for oilseeds were at 24 mln. tons in 2021[6] including 18 mln. tons for sunflower and 6 mln. tons for soybeans[7]. Meanwhile, actual crushing volumes stood at just around 15 mln. tons; many crushing plants are underloaded.

In general, Ukraine's vegetable oils sector has the same problem as the milling sector since prices of raw commodities approach export parities and limit processing margin. But this sector benefits from strong international demand and export tax for sunflower seeds.

Meat processing sector

The meat processing industry in Ukraine consumes mostly locally produced meat; the share of imported products is relatively low (Table 11). In general, meat production shows a positive trade balance amid the large supply of poultry meat to foreign markets. At the same time, Ukraine imports some types of pork and beef, particularly meat offal and trimmings, which are then processed into sausages. Both production and consumption volumes of meat were relatively stable over the last years.

[6] https://agravery.com/uk/posts/show/lovi-moment-ak-zarobiti-na-sonasniku

[7] https://agrotimes.ua/agromarket/osnovna-pererobka-soyevyh-bobiv-zoseredzhena-u-troh-oblastyah-ukrayiny/

Table 11. Market balance of meat in Ukraine, thds. tons

	2000	2005	2010	2015	2017	2018	2019	2020
Production	1663	1597	2059	2323	2318	2355	2492	2478
Change of stocks	-82	-11	-3	-1	-5	-3	4	-15
Import	38	325	378	158	233	283	261	230
Total supply	**1783**	**1933**	**2440**	**2482**	**2556**	**2641**	**2749**	**2723**
Export	163	82	48	245	351	399	487	473
Expenditures on the fodder, losses and wastes, etc.	9	7	8	8	10	10	10	6
Domestic consumption	1611	1844	2384	2179	2195	2232	2252	2244
Total distribution	**1783**	**1933**	**2440**	**2482**	**2556**	**2641**	**2749**	**2723**

Source: Ukrstat

Poultry meat has a dominant position in the sector (Table 12). The share of poultry has the potential for a further increase due to a number of factors: a) large export markets; b) strong domestic consumption (population switches own preferences from red meat to cheaper white poultry meat); c) short production cycle in poultry sector that ensures high liquidity; d) pronounced scale effect (Ukraine's poultry sector is presented by a few large players which benefit from the large-scale production and lobby in the government[8]).

Table 12. Market balance of different kinds of meat in Ukraine in 2020, thds. tons

	Meat	Including			
		Beef and veal	Pork	Meat of poultry	Other kinds of meat
Production	2478	345	697	1405	31
Change of stocks	-15	-2	-4	-9	0
Import	230	18	96	113	3
Total supply	**2723**	**365**	**797**	**1527**	**34**
Export	473	27	10	435	1
Expenditures on the fodder, losses and wastes, etc.	6	1	1	3	1
Domestic consumption	2244	337	786	1089	32
Total distribution	**2723**	**365**	**797**	**1527**	**34**

Source: Ukrstat

By contrast, Ukraine's beef production stagnated over the last decade. Given the weak traditions of growing meat breeds of cattle, beef produced in Ukraine is just a byproduct of milk production. The local market of high-quality beef is restricted by slack domestic demand and limited access to export

[8] https://agropolit.com/spetsproekty/386-hto-naklyuye-na-dotatsiyi-u-novomu-rotsi

markets. Meanwhile, the development of the pork sector is pressured by high dependence on local feed grains, prices for which depend on the world market and the hryvnia exchange rate. Besides, the permanent outbreaks of African swine fever (ASF) in Ukraine cause massive slaughtering of pig herds and limited export opportunities for Ukrainian pork[9]. Both beef and pork sectors in Ukraine are depressed by underfinancing and a lack of capital investments.

In general, the supply of domestic meat to the local food processing industry is sufficient for the current level of meat processing, but the opportunities for the further increase are dubious. While the beef and pork sector are stagnating, the fast-growing poultry sector has a tendency to become more export-oriented.

Milk processing sector

Production of milk products in Ukraine shows a clear negative trend in the last decade with the deterioration of net exports (Table 13). Slack domestic consumption, loss of export markets, and eased barriers for imported milk products were major drivers of this decline. A steady decline of cattle numbers in Ukraine and poor milk yields per cow result in the deficit of raw milk on the domestic market and strong competition among milk processors[10]. At the same time, Ukraine's milk processing sector suffers from the growing import of the EU milk products[11].

Table 13. Market balance of milk and milk products in Ukraine, thds. tons

	2000	**2005**	**2010**	**2015**	**2017**	**2018**	**2019**	**2020**
Production	12658	13714	11249	10615	10281	10064	9663	9264
Change of stocks	-394	27	-11	-41	33	74	-1	-171
Import	50	112	273	78	132	180	337	691
Total supply	**13102**	**13799**	**11533**	**10734**	**10380**	**10170**	**10001**	**9784**
Export	1100	1901	956	464	835	807	593	440
Expenditures on the fodder	2203	1270	1099	1097	1036	996	969	904
Losses	10	3	8	15	13	12	11	10
Domestic consumption	9789	10625	9470	8995	8496	8355	8428	8430
Total distribution	**13102**	**13799**	**11533**	**10734**	**10380**	**10170**	**10001**	**9784**

Source: Ukrstat. Note: Volumes of milk products are presented as the raw milk equivalent.

Sugar

Since the start of independence in 1991, Ukraine has lost a major part of the local sugar sector due to limited export opportunities. At the same time, the local sugar market was protected by a tariff rate quota for imports of raw cane sugar. As of 2020, Ukraine's sugar market is balanced: a major part of domestic output is consumed inside the country (Table 14). Ukraine is a net exporter of white beet sugar, but a share of exports in total production is relatively low.

[9] https://agropolit.com/news/5456-nazvano-prichini-znijennya-pogolivya-sviney-v-ukrayini

[10] https://kse.ua/wp-content/uploads/2022/09/Chapter_2_Agrocenter.pdf

[11] https://www.ukrinform.ua/rubric-economy/3213934-import-molocnih-produktiv-ci-bude-ukraina-z-ukrainskim-molokom.html

Table 14. Market balance of sugar in Ukraine, thds. tons

	2005	2010	2015	2017	2018	2019	2020
Production	2139	1805	1459	2043	1754	1490	982
Change of stocks	247	32	-463	72	-167	-31	-400
Import	177	90	4	7	3	4	4
Total supply	**2069**	**1863**	**1926**	**1978**	**1924**	**1525**	**1386**
Export	154	65	153	617	594	248	170
Expenditures on fodder, losses, and wastes, etc.	120	94	105	71	70	65	55
Domestic consumption	1795	1704	1528	1290	1260	1212	1161
Total distribution	**2069**	**1863**	**1926**	**1978**	**1924**	**1525**	**1386**

Source: Ukrstat

Ukraine has the infrastructural potential to recover the refinery sector. However, the major challenge for the industry is the low profitability of sugar beets growing compared to other crops. Experts indicate that this can be resolved only by state support for sugar beets growing[12].

Vegetable processing sector

Although Ukraine shows growth in production and imports of vegetables (Table 15), local processing volumes are progressing slowly. First, the potential export markets for canned and processed vegetables (particularly, in the EU) are highly competitive[13]. Second, the vertical integration between canned factories privatized during the independence period and vegetable farmers is relatively weak[14]; the quality of produced vegetables often does not fit domestic and international standards. Therefore, a large share of vegetables is consumed locally or exported in raw form. There are, however, some exceptions, such as the production of canned tomatoes and tomato paste. This sector benefits from the large supply of local raw tomatoes and strong demand in the EU[15]. In general, Ukraine faces increased export and import of vegetables.

Table 15. Market balance of vegetables, watermelons, melons, and gourds in Ukraine, thds. tons

	2000	2005	2010	2015	2017	2018	2019	2020
Production	6195	7606	8873	9792	9721	9940	10244	10148
Change of stocks	-201	-196	-22	-213	-39	-78	-451	-437
Import	29	100	311	95	129	188	313	292
Total supply	**6023**	**7510**	**9206**	**10100**	**9889**	**10050**	**10106**	**10003**
Export	30	150	335	212	444	434	284	297

[12] https://agropolit.com/spetsproekty/857-tsukrova-galuz-na-meji-kolapsu-operatsiya-reanimatsiya-abo-yak-ne-pidsaditi-ukrayintsiv-na-golku-importnogo-tsukru

[13] https://uhbdp.org/article/pererobka-ovochiv-i-fruktiv-tse-ne-pro-2-ta-3-gatunok

[14] http://sophus.at.ua/publ/2016_03_31_lviv/sekcija_section_5_2016_03_31/ovochepererobna_galuz_ukrajini_stan_tendenciji_ta_perspektivi_rozvitku/119-1-0-1766

[15] https://kurkul.com/spetsproekty/1188-ovochi-ta-ovochevi-produkti-geografiya-prodajiv-importeri-obsyag-eksportu-i-virobnitstva

Expenditures on the fodder	728	1214	1337	1564	1503	1525	1535	1512
Expenditures от sowing	86	90	118	110	109	112	111	110
Loses and wastes	177	393	835	1203	1050	1052	1252	1238
Domestic consumption	5002	5663	6581	6890	6783	6927	6924	6846
Total distribution	**6023**	**7510**	**9206**	**10100**	**9889**	**10050**	**10106**	**10003**

Source: Ukrstat

Processing of fruits and berries

The sector was growing over the last decade amidst a high supply of local fruits (based on high yields rather than expanded areas) and firm domestic demand (Table 16). Nevertheless, imports increased faster than exports due to the solid growth in domestic consumption. Over the last few years, Ukraine's fruit production has focused more on apples and plums at the expense of other fruits (pears, apricots, cherries).

Table 16. Market balance of fruits, berries, and grapes in Ukraine, thds. tons

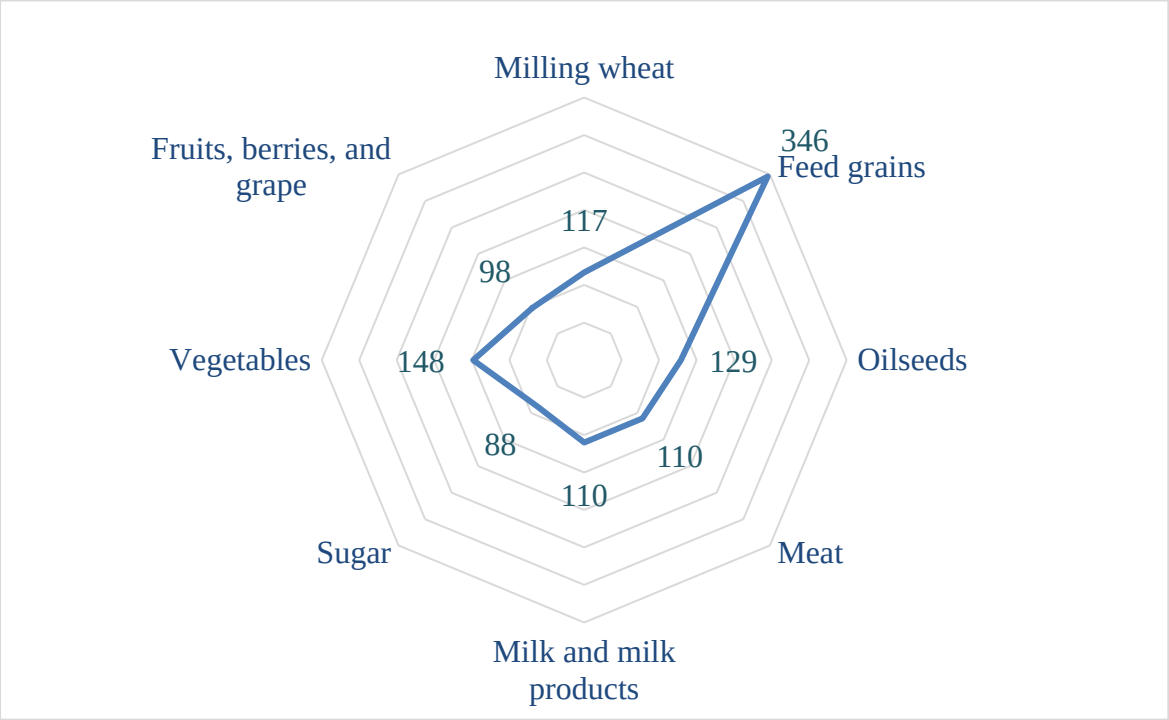
	2000	**2005**	**2010**	**2015**	**2017**	**2018**	**2019**	**2020**
Production	1966	2133	2154	2539	2458	3039	2485	2305
Change of stocks	-201	-297	-10	-31	-22	-259	-76	-145
Import	179	860	1130	588	819	878	1052	1150
Total supply	**1944**	**2696**	**3274**	**3096**	**3255**	**3658**	**3613**	**3310**
Export	88	305	353	324	291	331	433	272
Expenditures of fodder and loses	81	191	170	218	225	285	231	230
Processing on the vine	336	450	548	355	497	597	480	451
Domestic consumption	1439	1750	2203	2179	2242	2445	2469	2357
Total demand	**1944**	**2696**	**3274**	**3096**	**3255**	**3658**	**3613**	**3310**

Source: Ukrstat

The level of **self-sufficiency** by main agricultural commodities (output to domestic use) is summarized in Figure 2. The highest self-sufficiency level is observed for feed grains (346%), in particular, corn, wheat, and barley. Despite the output of feed grains exceeding domestic consumption by 3,5 times, local livestock industry suffers from high prices for feed grains. It is explained by the developed grain export capacities, which strengthen the competition between traders and livestock farmers for feed grain. Vegetables are in second place in self-sufficiency (148%). Oilseeds take third place (129%); Ukraine has essential potential for domestic crushing of soybean and rapeseed. Milling wheat shows a self-sufficiency level of 117%. Despite the positioning of Ukraine as «the breadbasket of Europe,» the surplus of high-quality milling grain is much lower than feed crops. Milk and milk products have

similar self-sufficiency levels (110%). Domestic production of fruits, berries, and grape is close to the consumption level (98%). Meanwhile, low self-sufficiency of sugar (88%) in 2020 is non-representative due to the essential adjustment of stocks in that year (Table 13). Generally, sugar self-sufficiency in Ukraine is higher.

Figure 2. Ukraine's self-sufficiency by main foodstuffs in 2020



Source: calculated by the authors using data from Ukrstat and USDA Note: In 2020, the share of milling wheat in the total wheat production in Ukraine was around 40%[16]. Therefore, the categories «Milling wheat» and «Feed grains» include 40% and 60% of total wheat production, respectively.

Although Figure 4 shows the potential for domestic processing of the main food products in Ukraine, it does not consider the profitability of processing. For a number of commodities (for example, soybeans and rapeseed), it is more profitable to export them than process them locally. In this case, the indicators of self-sufficiency can show misleading results.

3. International trade of processed food products

According to the mirrored data from ITC Trade map and Ukrstat from 2021, Ukraine's exports of processed food was 11,4 bln. USD or 43% of agri-food exports. Meanwhile, imports of processed food was 4,9 bln. USD or 65% of agri-food imports.

The structure of Ukraine's **exports** of processed food products shows a) a high level of specialization; b) the dominant role of primary processing products. The share of sunflower oil took half of processed food export revenues in 2012; in 2021, it increased to 60% (Table 17). Oilcakes and soybean oil are

[16] https://www.apk-inform.com/uk/exclusive/opinion/1514247

also popular export categories. The shares of other food items (chocolate, confectionery, bakery, beverages) were low in 2012; they decreased during the 2012-2021 period.

Table 17. Shares of top-10 categories in Ukraine's processed food exports in 2012 and 2021, %

Product group	2012	2021
Sunflower-seed, safflower or cotton-seed oil and its fractions	50	60
Oilcake from the extraction of vegetable fats or oils	10	12
Soya-bean oil and its fractions	-	3
Oilcake from the extraction of soya-bean oil	-	2
Bread, pastry, cakes, biscuits and other bakers' wares	4	2
Sugar confectionery not containing cocoa	2	2
Chocolate and other food preparations containing cocoa	8	2
Rape, colza or mustard oil and fractions	-	2
Waters and other non-alcoholic beverages	-	1
Fruit juices	2	1
Cheese and curd	5	-
Ethyl alcohol, liqueurs and other spirituous beverages	2	-
Cane or beet sugar and chemically pure sucrose	1	-
Beer made from malt	1	-
Other food products	15	13
Total	**100**	**100**

Source: ITC Trade Map
Note: Top-10 product groups are ranged in descending order for 2021.

Meanwhile, the geographical distribution of Ukraine's food exports faced essential changes (Table 18). Although Russia accounted for 20% of exports in 2012, it disappeared as the primary trade partner in 2021. The role of India – the major consumer of Ukrainian sunflower oil – remained essential over the last decade, while the role of China and EU countries increased. Generally, the geographical structure of food exports became more diversified.

Table 18. Shares of top-10 trading partners in Ukraine's processed food exports in 2012 and 2021, %

Country	2012	2021
India	15	18
China	-	16
Netherlands	-	7
Poland	5	7
Spain	3	4
Italy	-	3
Iraq	-	3
France	3	3
Turkey	5	3
Belarus	4	3

Russian Federation	20	-
Egypt	6	-
Iran	4	-
Kazakhstan	4	-
Other countries	31	33
Total	**100**	**100**

Source: ITC Trade Map

Note: Top-10 trading partners are ranged in descending order for 2021.

As for food **imports**, they have a much more diversified structure than exports (Table 19). The main importing categories include prepared food, alcoholic products, palm oil, cheeses, and animal feed. Over the last decade, the shares of milk products and wines increased, while margarine disappeared from the list of top imported food products.

Table 19. Shares of top-10 categories in Ukraine's processed food imports in 2012 and 2021, %

Product group	**2012**	**2021**
Food prepaprations	9	9
Preparations used in animal feeding	8	8
Undenatured ethyl alcohol, liqueurs and other spirituous beverages	9	8
Palm oil and its fractions, whether or not refined	6	7
Cheese and curd	3	7
Chocolate and other food preparations containing cocoa	6	6
Wine of fresh grapes	3	6
Extracts, essences and concentrates of coffee or tea	8	3
Bread, pastry, cakes, biscuits and other bakers' wares	-	3
Fruits, nuts and other edible parts of plants, prepared or preserved	-	3
Margarine, other edible preparations of animal or vegetable fats or oils	4	-
Cocoa powder, not containing added sugar	3	-
Other food products	41	40
Total	**100**	**100**

Source: ITC Trade Map

Note: Top-10 product groups are ranged in descending order for 2021.

The geographical structure of Ukraine's food imports changed with a higher orientation towards the EU countries (Table 20). While the Russian Federation was the leading partner in 2012 (17% of imports), Poland took this place in 2021 (15%). Ukraine also increased imports from Indonesia and China.

Table 20. Shares of top-10 trading partners in Ukraine's processed food imports in 2012 and 2021, %

Country	2012	2021
Poland	7	15
Germany	10	10
Indonesia	5	8
Italy	4	7
France	4	4
Netherlands	4	4
China	-	3
Spain	-	3
United Kingdom	-	3
Georgia	3	3
Russian Federation	17	-
Cote d'Ivoire	4	-
Malaysia	3	-
Other countries	39	40
Total	**100**	**100**

Source: ITC Trade Map
Note: Top-10 trading partners are ranged in descending order for 2021.

4. The comparative advantage of Ukrainian food products on the global market

To measure Ukraine's specialization in the world food market, we calculated its Revealed Comparative Advantage (RCA). In particular, the relative export advantage (RXA) index was estimated using the following formula:

$$RXA_{ict} = \frac{\frac{X_{ict}}{X_{iwt}}}{\frac{XT_{ct}}{XT_{wt}}}$$

where RXA_{ict} – the relative export advantage index of industry i, country c in period t.

X_{ict} – the export value of industry i, country c in period t.

X_{iwt} – the export value of industry i of the world w in total in period t.

XT_{ct} – the total export value of all industries of country c in period t.

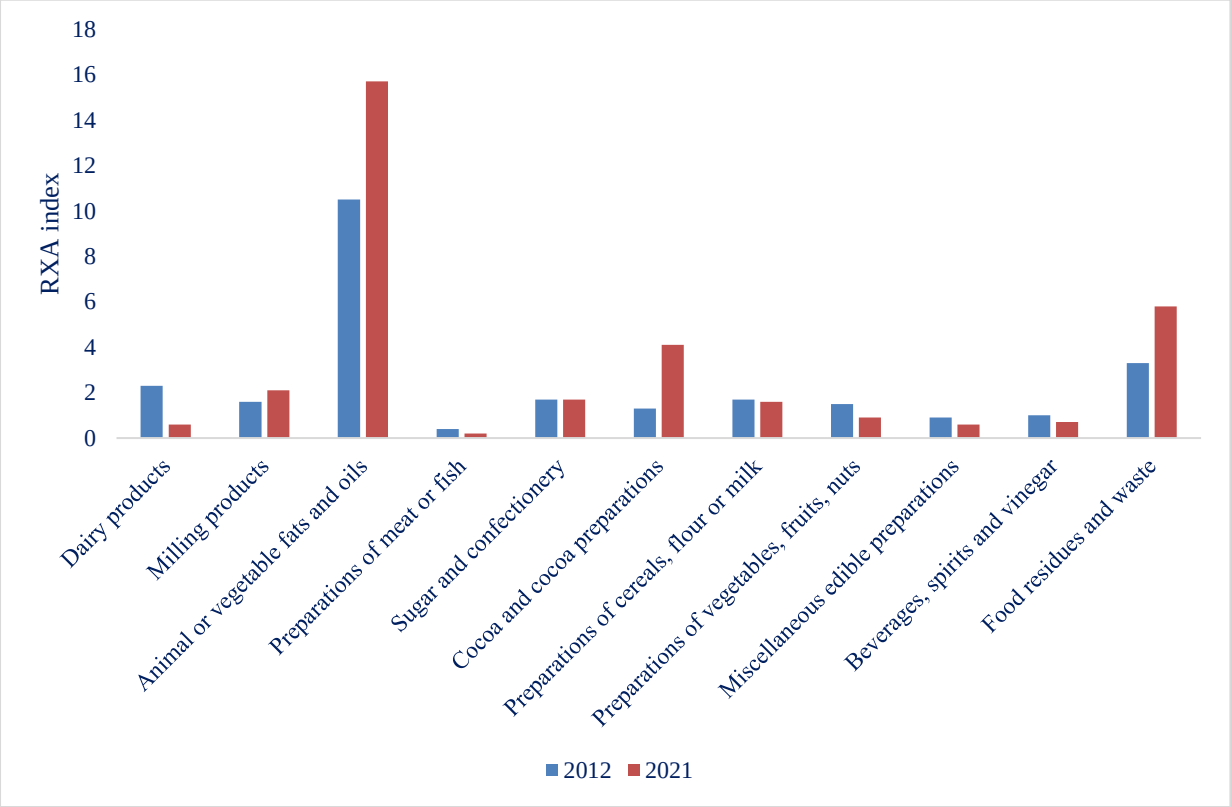
XT_{wt} – the total export value of all industries of the world w in total in period t.

The interpretation of the RXA index is quite intuitive. When the index increases above 1, this means that the share of a certain country on the global market for some commodity is higher than its share on the global market for all commodities. Therefore, the country is highly specialized in exports of the

commodity. By contrast, when the RXA index decreases below 1, this means that country has not advantages for the exports of a certain commodity and, therefore, is not specialized on its exports.

Figure 3 shows that Ukraine has a higher RXA index for the product group «Animal or vegetable fats and oils»; in 2021, the index is lower than in 2012 but remains at a high level. Such values are explained by the emergence of Ukraine as a major sunflower oil exporter. In 2012, the group «Cocoa and cocoa preparations» took second place, but it lost this rank until 2021. Instead, the second place in 2021 was for the group «Food residues and waste ». Also, we can see a strong deterioration of comparative advantage for group «Dairy products». Almost all other product groups faced a decrease in RXA index over the 2012-2021 period except the group «Milling products». The product groups «Preparations of meat or fish» and «Miscellaneous edible preparations» have RXA index below 1 in both the 2012 and 2021 years.

Figure 3. The relative export advantage (RXA) index for the main subsectors of Ukraine's food industry



Source: ITC Trade Map

Participation in global value chains

Despite the high level of self-sufficiency in main food products, Ukraine's food industry is closely integrated into **global value chains (GVC).** All imported inputs used by the sector can be separated into two main groups: a) nutritional (food origin); b) non-nutritional (industrial origin). The main category of **nutritional inputs** is palm oil and its fractions (Table 21), which is actively used in confectionery, bakery, milk sector, and in other industries. This commodity has a lower price than other vegetable oils. However, the high content of this oil in food products may have a negative effect on human health. Palm oil is actively used in the low-price segment of finished food products; besides,

all fake milk products are based on the intensive use of palm oil[17]. From an economic perspective, palm oil reduces production costs for many processed food products and makes them more competitive against imported goods.

Fruits, nuts, and other edible parts of plants are in second place. They mostly include tropical goods that cannot be produced in Ukraine. This category is an essential input for the canning industry, confectionery, and production of jams, muesli, and yogurts. Cane or beet sugar and chemically pure sucrose take the third place; they are consumed by all industries that require cheap added sugar in the production process; brown cane sugar is also often used as raffinate.

The other categories of inputs are mostly presented by three groups: a) fats and oils (olive, coconut, rapeseed); b) flours and starches; c) ingredients for fermentation (malt and its extracts, yeasts, whey). The main industries dependent on the import of nutritional inputs are confectionery, bakery, and milk sectors, production of alcoholic drinks, and finished food products. By contrast, vegetable oil production and processing of meat and vegetables are not so integrated into the global value chains.

Table 21. Top-20 imported food inputs for Ukraine's food processing industry

№	Harmonized System (HS) Code	Import volumes, thds. USD	Respective outputs
1	1511. Palm oil and its fractions, whether or not refined (excluding chemically modified)	277323	Confectionery, bakery, milk products, margarine, crisps, dry porridge, other finished and semi-finished products.
2	2008. Fruits, nuts, and other edible parts of plants, prepared or preserved	98891	Canned fruits, confectionery, jams, muesli, yogurts.
3	1701. Cane or beet sugar and chemically pure sucrose, in solid form	80753	All products containing sugar.
4	1901. Malt extract; food preparations of flour, groats, meal, starch or malt extract	71684	Alcoholic drinks, finished food products.
5	1804. Cocoa butter, fat and oil	70756	Confectionery, bakery, milk products.
6	1805. Cocoa powder, not containing added sugar or other sweetening matter	38591	Confectionery, bakery.
7	1516. Animal or vegetable fats and oils and their fractions, partly or wholly hydrogenated, inter-esterified	34439	Confectionery, bakery, milk products.
8	1513. Coconut copra, palm kernel or babassu oil and fractions thereof, whether or not refined	25489	Confectionery, bakery.
9	1702. Other sugars, incl. chemically pure lactose, maltose, glucose and fructose, in solid form	18620	All products containing sugar.
10	1509. Olive oil and its fractions obtained from the fruit of the olive tree solely by mechanical or other physical means	16877	Confectionery, bakery, other finished and semi-finished products.
11	2301. Flours, meals and pellets, of meat or meat offal, of fish or of crustaceans, molluscs	16840	Feeds.
12	1107. Malt, whether or not roasted	15241	Alcoholic drinks.
13	0404. Whey, whether or not concentrated or containing added sugar or other sweetening matter	11770	Confectionery, bakery, milk products, other finished and semi-finished products.
14	2102. Yeasts, active or inactive; other dead single-cell micro-organisms, prepared baking powders	8527	Alcoholic drinks, confectionery, bakery, milk products.

[17] http://milkua.info/uk/post/vidmova-vid-palmovogo-masla-v-molocnij-produkcii-dozvolit-ocistiti-galuz-vid-falsifikatu-dumka

15	2001. Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved by vinegar	8237	Canned fruits, confectionery, jams, muesli, yogurts.
16	1520. Glycerol, crude; glycerol waters and glycerol lyes	6314	Alcoholic drinks, confectionery, bakery, milk products, other finished and semi-finished products.
17	1515. Fixed vegetable fats and oils, incl. jojoba oil, and their fractions	5202	Confectionery, bakery, milk products, other finished and semi-finished products.
18	1101. Wheat or meslin flour	4563	Confectionery, bakery.
19	1108. Starches; inulin	4483	Confectionery, bakery, other finished and semi-finished products.
20	1514. Rape, colza or mustard oil and fractions thereof, whether or not refined	4279	Confectionery, bakery, milk products, other finished and semi-finished products.

Source: ITC Trade Map

Meanwhile, Table A1 in the Annex provides insights regarding the structure of **non-nutritional inputs** to the food industry imported to Ukraine. First, imports of packaging materials from paper and plastic remained relatively stable over the last decade, while imports of bottles, jars and other glass containers dropped essentially. Second, the structure of HS code 8438, «Machinery for the industrial preparation or manufacture of food or drink» shows that the largest imported categories are the machinery used for the industrial preparation of bakery products, meat, and meat products, prepared foodstuffs, and drinks. Since 2021, imports of machinery for the preparation or manufacture of confectionery, cocoa, or chocolate dropped in six times, while imports of machinery for processing fruits, nuts, or vegetables increased more than twofold. Machinery for brewery and sugar manufacture show low import volumes compared to other industries. In the sugar sector, the slow modernization of machinery by using imported items is explained, in particular, by the 10% import duty[18].

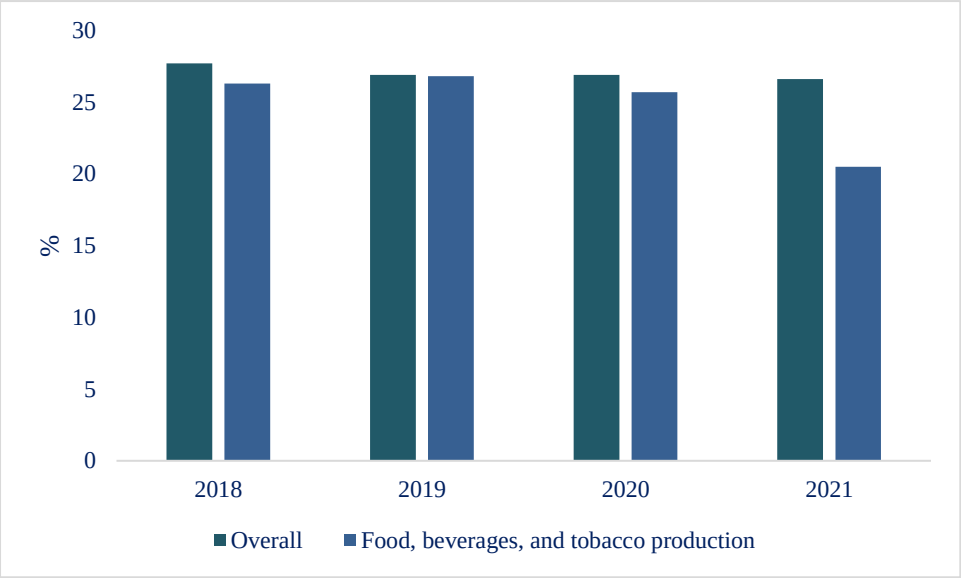
Third, over the last decade, Ukraine decreased imports of ovens, industrial refrigerators, machinery for cleaning or drying bottles or other containers, and machinery for extracting or preparing animal or fixed vegetable or microbial fats or oils. Growth in imports was observed for heat pumps, packing or wrapping machinery, and industrial dishwashing machines.

5. Fiscal costs

The assessment of the **tax regime** for the food industry allows us to define whether this sector benefits from the current taxation system. Figure 4 shows that the food, beverages, and tobacco sector's tax burden ratio (ratio of tax revenues to GDP) was close to the level in the whole national economy in 2018-2020. However, in 2021, the tax burden ratio for food, beverages, and tobacco production went noticeably below the national average (20.5% versus 26.6%) for the undefined reasons.

[18] https://agropolit.com/spetsproekty/857-tsukrova-galuz-na-meji-kolapsu-operatsiya-reanimatsiya-abo-yak-ne-pidsaditi-ukrayintsiv-na-golku-importnogo-tsukru

Figure 4. Tax burden ratio in Ukraine's food, beverages, and tobacco industry and in the whole economy



Source: Ukrstat

Note: Available statistics on Ukrstat does not allow to define GDP for food production only. Therefore, aggregated data for food, beverages, and tobacco production is used.

The structure of tax revenues in Ukraine's food industry is different from the structure of overall tax revenues (Table 22). In 2021, food production (KVED 10. Food products) had a higher share of individual income tax (40%) and corporate income tax (17%) in tax revenues compared to the whole economy. Proportions of value-added tax (38%) and property tax (4%) in the sector and the whole economy were almost the same. Meanwhile, shares of excise taxes were below the average level in the national economy; this is because processed food products imported from the EU are not subject to these taxes, according to the DCFTA agreement. The different picture is for the food industry including beverages and tobacco production (KVED 10-12. Food products, beverages, and tobacco), where 65% of all tax revenues are based on excise tax on excise goods produced in Ukraine. This is because alcoholic drinks and cigarettes are subject to high excise taxes. As for the shares of VAT and individual income tax, they are low (19% and 9%, respectively).

Table 22. Structure of tax revenues in Ukraine's food industry and in the whole economy in 2021

Tax	KVED 10. Food products	KVED 10-12. Food products, beverages, and tobacco	Overall economy (consolidated budget)
Individual income tax	40	9	24
Corporate income tax	17	5	11
Rent for special use of forest resources	0	0	0
Rent for special use of water resources	0	0	0
Rent for use of subsoil	0	0	6
Value-added tax	38	19	37
Excise tax on excise goods produced in Ukraine	0	65	0
Excise tax on excise goods imported into the customs territory of Ukraine	0	0	6

Excise tax on the sale of excisable goods by entities managing retail trade	0	0	1
Property tax	4	1	3
Single tax	1	0	3
Ecological tax	0	0	0
Other taxes	0	1	6
Total	**100**	**100**	**100**

Source: Ukrstat. Note: 0% denotes that tax accounts for more than 0% but less than 0.5% of the tax structure.

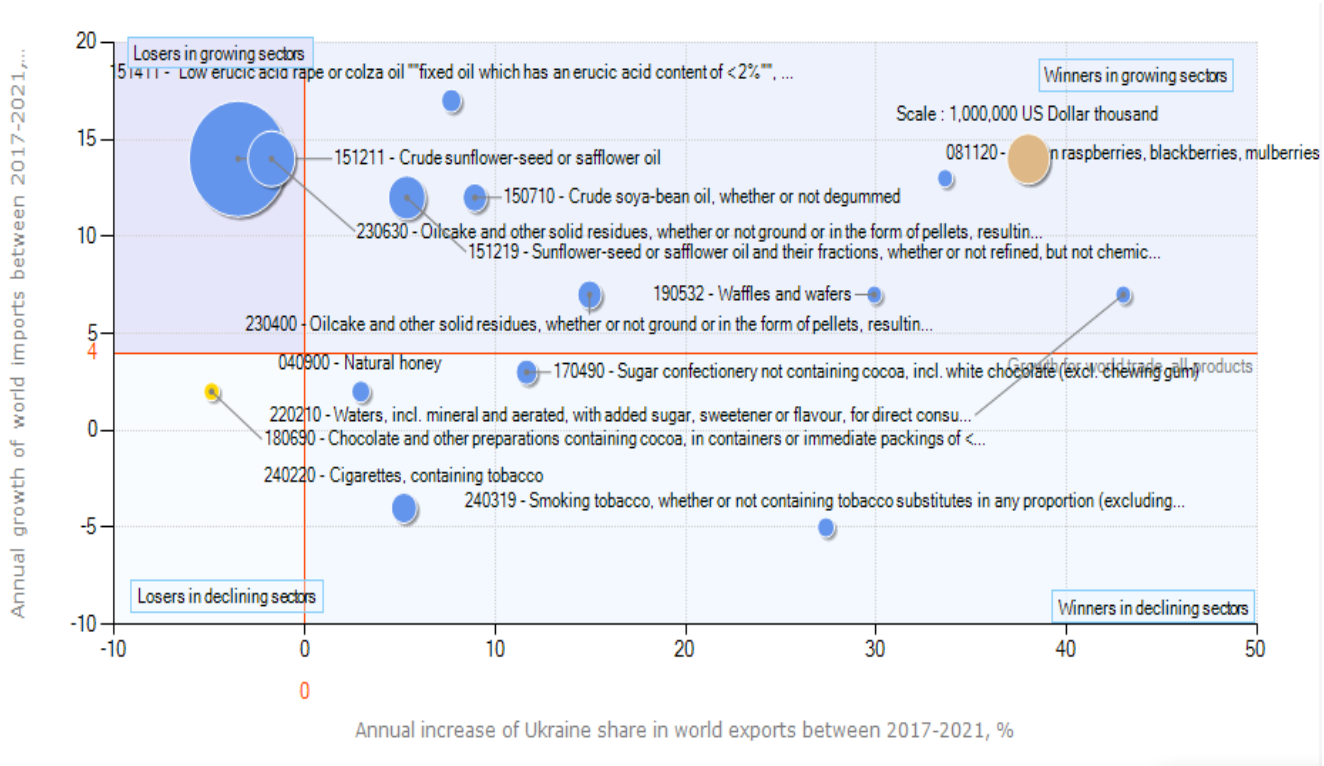
As was mentioned previously, the inclusion of excise taxes for beverages and tobacco distorts the general picture of taxation for food industry. Tax revenues used for calculation of tax burden ratio indicated in Figure 4 include high revenues from these excise taxes. We cannot define precisely the tax burden ratio for KVED 10 since the disaggregated GDP and GVA data for this sector is absent in Ukraine's state statistics. However, we can conclude that food production without beverages and tobacco products (KVED 10. Food products) faces low taxation compared to other sectors.

6. Perspective markets for processed food products

The ITC trade map allows us to define the market potential for Ukraine's food products. For this purpose, products are classified by two criteria: a) annual increase of Ukraine's share in global exports; b) annual growth of world imports. For better interpretation, we highlighted the top-15 food products exported from Ukraine. Figure 5 indicates that the share of Ukraine in food exports grew in the 2017-2021 period (the annual increase of shares was above zero), while the annual growth of food imports was 4%. The major export product – crude sunflower oil – is in the **Losers in the growing sector group** category. This means that Ukraine's export of this product grows more slowly than global imports, and competitors increase their own presence on the global market of sunflower oil. The same picture is observed for the oilcake.

The group **Losers in declining sectors** contain only one product line – chocolate and other preparations containing cocoa. Note that international demand for this product increases by over 2% annually; therefore, this market is not shrinking in absolute terms. Besides, Ukraine's share in global export decreases by 4%. This implies that Ukraine's export of chocolate is decreasing due to strong competition from other countries rather than due to slack demand. The sector **Winners in declining sectors** encompass product groups that are very competitive and are actively exported despite weak global demand: natural honey, sugar confectionery not containing cocoa, water, cigarettes, and tobacco. The largest group is **the Winners in the growing sectors**. It includes crude soybean oil, refined sunflower oil, rape oil, a number of berries, and waffles.

Figure 5. Growth of national supply and international demand for processed food products exported by Ukraine in 2021



Source: ITC Trade Map

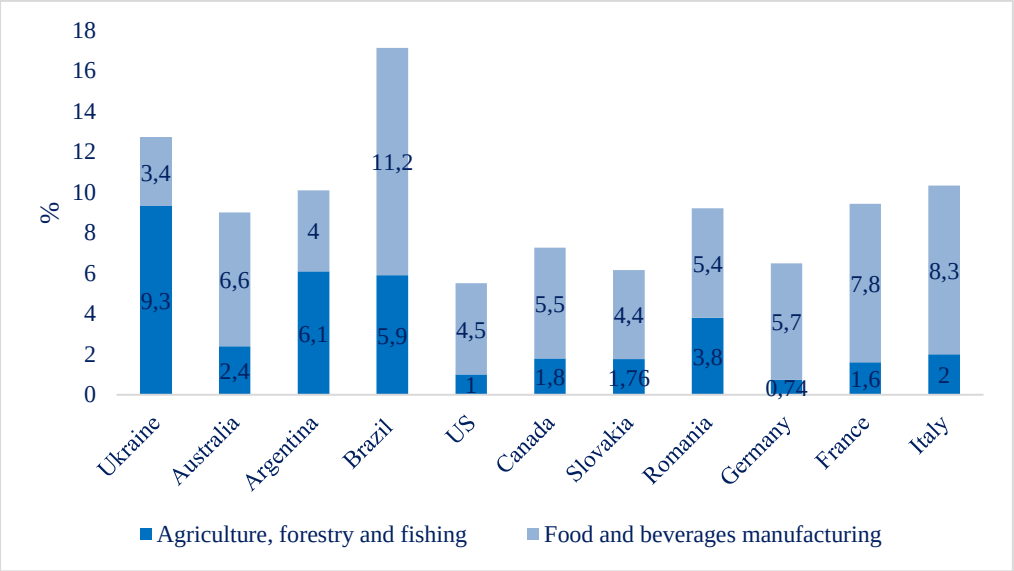
Summary of Chapter A. Food processing industry is an important sector in Ukraine's national economy, but its share in GDP gradually declines. The sector is focused mostly on the primary processing of agricultural commodities (especially oilseeds crush); its diversification is weak. By contrast, Ukraine imports a variety of processed food products. The country shows high self-sufficiency in raw materials, especially feed grains, vegetables, and oilseeds. However, the marginality of processing is limited since raw commodities are exported actively. Ukraine's food sector is highly integrated into the global value chains. The major categories of imported inputs are palm oil, tropical fruits, nuts, plastics, and packaging materials. The sector has fiscal costs close to the national average: in the 2018-2021, the tax burden ratio was 25% versus 27% in the whole national economy. However, a large share of sector's tax revenues is generated by excise taxes for beverages and tobacco products. This means that food processing industry excluding beverages and tobacco production is undertaxed. The most perspective groups for food exports with growing international demand are vegetable oils (refined and unrefined), oilcake, and confectionery.

Chapter B. Comparison of the role of Ukraine's food processing industry in the economy vis-à-vis selected peers

To understand the potential for the development of Ukraine's food processing industry, we compare macro-indicators of the sector with international benchmarks. A set of selected peer countries with developed agri-food sectors includes some EU members (Slovakia, Romania, Germany, France, Italy) and non-EU states (Argentina, Australia, Brazil, the US, and Canada).

As Figure 6 indicates, Ukraine had the highest share of the agri-food sector in GDP (19%) in 2020. Brazil took second place with 17,1%. The share of primary agriculture in Ukraine's GDP was the highest among the selected countries (9,7%); the share of food manufacturing was 9,3%, which is second place after Brazil (11,2%). Among the analyzed countries, Ukraine and Argentina are the only countries in which primary agriculture has a higher share of GDP than food manufacturing. This implies the essential potential of local food processing.

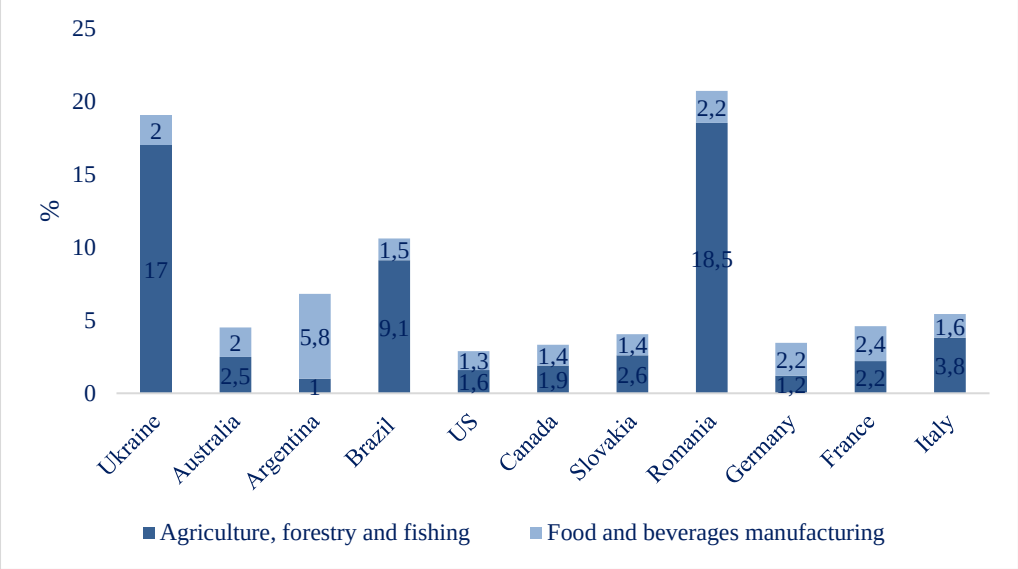
Figure 6. Share of primary agriculture and food manufacturing in GDP in 2020



Sources: Ukrstat, Eurostat, US Bureau of Economic Analysis, Statcan, OECD, World Bank

Regarding the proportion of the agri-food sector in gross value added, Ukraine was the leader in 2020 with 14,7% (Figure 7). In most of selected countries proportions of the sector in GVA are below the proportions in GDP. This means that in the majority of analyzed countries, the agri-food sector is less supported by the government compared to the whole national economies. Also, shares of primary agriculture in GVA are much higher than the shares of food manufacturing. Therefore, on average, agriculture is comparatively more supported by the government than food processing. Germany and France are the exceptions; in these countries, the proportions of food manufacturing in GVA are higher than primary agriculture.

Figure 7. Share of primary agriculture and food manufacturing in GVA in 2020

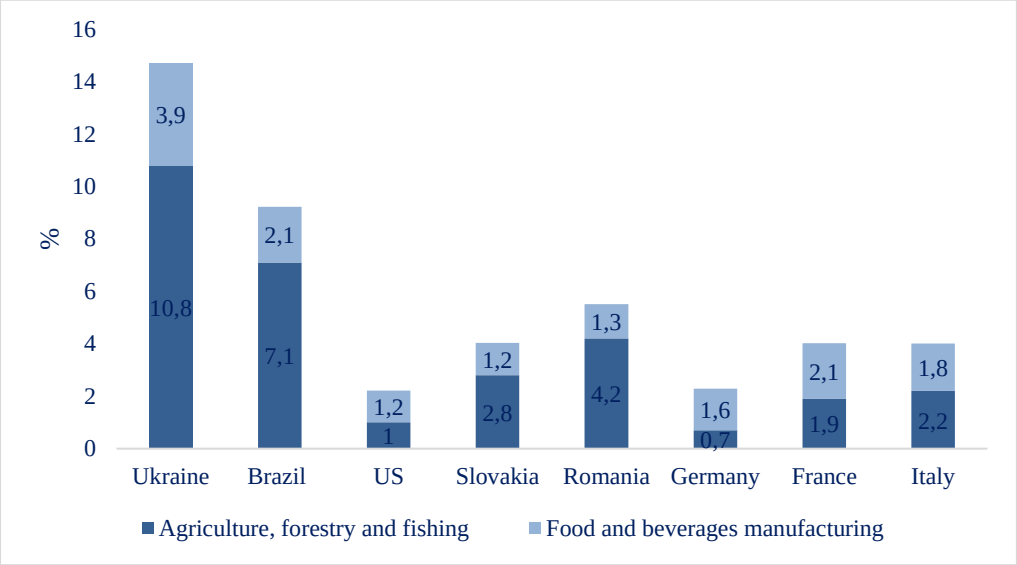


Sources: Ukrstat, Eurostat, US Bureau of Economic Analysis, Statcan, OECD, World Bank

Ukraine's proportion of the agri-food sector in total employment was 19% in 2020, although in Romania, this number was 20,7% (Figure 8). In both countries, local agricultural sectors take the lion's share of this employment despite the fact that they are specialized in capital-intensive crop production. This indicates low agricultural production productivity in Ukraine and Romania. A similar trend is observed in Brazil, while Argentina shows an opposite situation: less than 1% of the national labor force is engaged in primary agriculture, and 5,8% work in food manufacturing. Such disbalance can be explained by Argentina's economic policy, which stimulates domestic food processing via direct subsidies and export taxes for agricultural commodities[19]. In other countries, the shares of the labor force in the agri-food sector do not exceed 5%; within this share, the proportions between primary agriculture and food manufacturing are close to each other. The exception is Italy, where local agriculture is characterized by a large number of small farms engaged in labor-intensive sectors.

[19] https://www.oecd-ilibrary.org/sites/4e0e6eaf-en/index.html?itemId=/content/component/4e0e6eaf-en

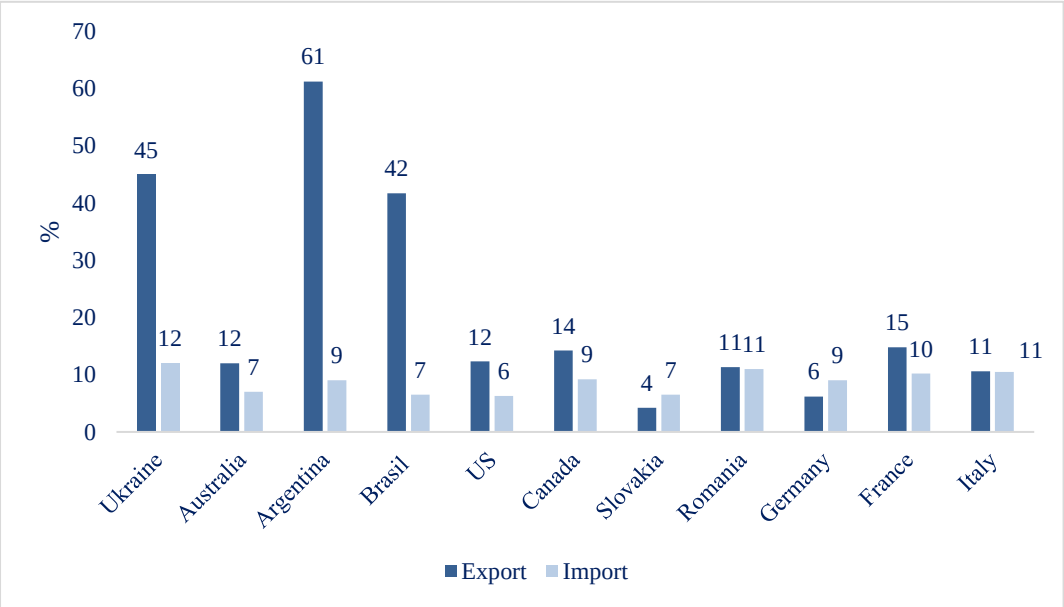
Figure 8. Share of primary agriculture and food manufacturing in total employment in 2020



Sources: Ukrstat, Eurostat, US Bureau of Economic Analysis, Statcan, OECD, World Bank

Argentina has the highest share of agri-food exports in total export revenues (61% in 2020), followed by Ukraine and Brazil with 45% and 42%, respectively (Figure 9). Meanwhile, in developed countries, these proportions range from 5% to 15%. Such results correspond with the common economic logic that developed economies focus on more value-added sectors such as services and industrial manufacturing. The share of agri-food in total imports is lower compared to exports. In Ukraine, this share is the highest (12%). Therefore, Ukraine has essential potential for import substitution in the food sector. In other countries, the proportion of food products in imports is usually below 10%, which shows the intentions of local authorities to increase their own food self-sufficiency.

Figure 9. Share of agri-food trade in total trade volumes in 2020



Sources: Ukrstat, Eurostat, US Bureau of Economic Analysis, Statcan, OECD, World Bank

Figure 10 shows that Ukraine's proportion of processed food products in agri-food exports is low compared to the peer countries. Only Romania has a lower value (36%) due to the orientation to the export of raw agricultural commodities. At the same time, the US and Italy have the highest proportions (79% for both). Despite intense stimulation of domestic processing, Argentina shows a moderate proportion of processed products in agri-food exports compared to the peer countries (58%). In Brazil, this share is 47%; this is explained by a quite liberal agricultural policy[20].

The table below shows the monetary structure of Ukraine's agri-food exports, where 6 from the top-10 categories are processed food products. Particularly, the share of 43% for processed products in agri-food exports are based on the high share of vegetable oils (26% in 2020).

Table. Top-10 categories of Ukraine's agri-food exports, thds. USD

Harmonized System (HS) Code	**2018**	**2019**	**2020**
10. Cereals	7240558	9633332	9417292
15. Animal or vegetable fats and oils	4496511	4732236	5759568
12. Oil seeds and oleaginous fruits	1954150	2563243	1842435
23. Residues and waste from the food industries; prepared animal fodder	1224764	1486235	1576501
02. Meat and edible meat offal	645939	711894	651745
24. Tobacco and manufactured tobacco substitutes	398709	437606	441336
19. Preparations of cereals, flour, starch or milk; pastrycooks' products	268304	269366	312953
04. Dairy produce; birds' eggs; natural honey; edible products of animal origin	480945	453876	426353
08. Edible fruit and nuts; peel of citrus fruit or melons	228558	260108	238301
22. Beverages, spirits and vinegar	229634	210821	223570
Other	**1443433**	**1385434**	**1307276**
Total	**18611505**	**22144151**	**22197330**

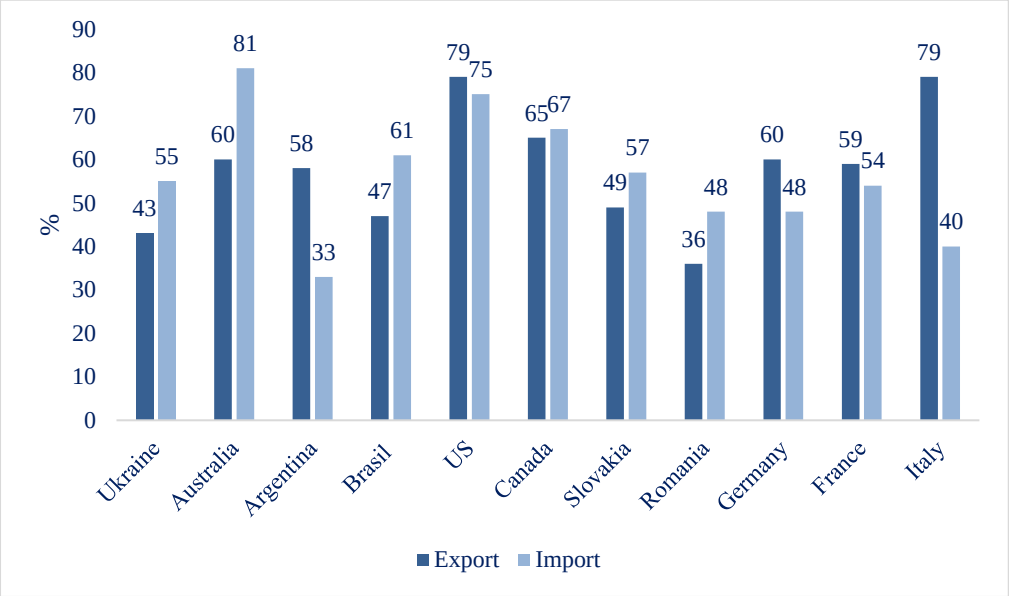
Source: ITC Trade map

Note: Products groups are ranged in the descending order for 2020.

Figure 10 also shows that the share of processed food products in imports is the highest in Australia (81%) and the US (75%). The low shares in Argentina (33%) and Italy (40%) indicate that local processing sectors are developed and actively use imported inputs. Ukraine shows the average value among the analyzed countries (55%).

[20] https://www.oecd-ilibrary.org/sites/0bc93a26-en/index.html?itemId=/content/component/0bc93a26-en

Figure 10. The proportion of processed food products in agri-food trade in 2020



Sources: Ukrstat, Eurostat, US Bureau of Economic Analysis, Statcan, OECD, World Bank

Summary of Chapter B. Ukraine has a disproportionally high share of the agricultural sector in GDP and exports compared to peer countries. However, the share of processed food products is lower than international benchmarks. 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.

Chapter C. Key determinants of global competitiveness of food industry subsectors in Ukraine with selected peers

1. Intro

Population growth and climate change are the core drivers of agricultural production developments. Meanwhile, the factors that determine the competitiveness of agricultural producers on the food market largely depend on consumer preferences. During the last decades, these preferences have changed under the influence of worsening health problems from nutrition habits and product quality risks, as well as changing consumer culture.

Europeans increasingly purchase food products from retail chains[21] and meals outside[22]. Moreover, there is a significant role of ultra-processed foods (primarily fine bakery wares, sausages, composite dishes, margarine, sauces, sweetened/flavored dairy products, and breakfast cereals), constituting 12% of daily food diet proportion and 27% of daily energy intake among European adults[23].

On the other hand, according to the Special Eurobarometer survey on food safety in 2022, European consumers value the safety of food as much as its price and taste[24]. The factors of animal welfare, as well as environmental issues, seem to be less important for the buyers but still play a role for many of them. For instance, 15% of Germans deem animal welfare, religion, and environmental impact as the first factor to consider when buying food products. High consumer interest in health risks, as well as the greater importance of environmental impact and animal treatment factors, challenge both manufacturers and distributors[25] to adjust their policies and processes in response to these trends.

2. Food safety

Food safety in this context means a set of policies that are aimed at lowering the health risks associated with food consumption. This may be attributed to the identification and registration of animals, sanitation measures, food traceability systems, veterinary medicines import standards, prohibition of hormones, setting a maximum level of specific contaminants or radioactive contamination in food, obligatory fertilizer planning, requirements on minimum storage capacity, light, air, and ventilation standards, quarantine facilities requirements, etc.

The legislative framework on EU food safety is constituted basically from EU Directives and Regulations, as well the good agricultural and environmental conditions (GAEGs). The core them are listed in Table 23.

[21] https://ec.europa.eu/competition/publications/KD0214955ENN.pdf

[22] https://www.cambridge.org/core/journals/public-health-nutrition/article/household-availability-of-ultraprocessed-foods-and-obesity-in-nineteen-european-countries/D63EF7095E8EFE72BD825AFC2F331149

[23] https://link.springer.com/content/pdf/10.1007/s00394-021-02733-7.pdf?pdf=button

[24] https://www.efsa.europa.eu/sites/default/files/2022-09/EB97.2-food-safety-in-the-EU_report.pdf

[25] https://valumics.eu/wp-content/uploads/2021/06/Valumics-Report-1-_Mapping-Behaviours.pdf

Table 23. Selected EU Directives and Regulations, as well as the GAECs on food safety.

Legislation	Dairy	Beef meat	Broiler meat	Pork meat	Wheat
Directive on Control of classical swine fever (2003/85/EC)				X	
Directive on Control of footand-mouth disease (2001/89/EC)				X	
Directive on Control of swine vesicular disease (92/119/EEC)				X	
Directive on Medicated feedstuffs (90/167/EEC)	X	X	X	X	
Directive on Prevention of avian influenza (2005/94/EC)				X	
Directive on Prevention of foot-and-mouth disease (2003/85/EC)					
Directive on Prevention of Newcastle disease (92/66/EEC)			X		
Directive on Prevention of zoonoses and zoonotic agents (2003/99/EC)	X	X	X	X	
Directive on prohibition of hormonal substances (96/22/EC)	X	X		X	
Directive on Undesirable substances in animal feed (2002/32/EC)	X	X	X	X	
Regulation on Additives for use in animal nutrition (1831/2003)	X	X	X	X	
Regulation on Animal byproducts not intended for human consumption (1774/2002)			X	X	
Regulation on Feed hygiene (183/2005)	X			X	
Regulation on General principles and requirements of food law (178/2002)	X	X			X
Regulation on Hygiene of foodstuffs (852/2004)					X
Regulation on Hygiene rules for food of animal origin (853/2004)	X				
Regulation on identification and registration of bovine animals (1760/2000)	X	X			
Regulation on Marketing and use of feed (767/2009)	X				
Regulation on Maximum residue levels of pesticides in or on food and feed of plant and animal origin (396/2005)					X
Regulation on Placing on the market and use of feed (767/2009)		X	X	X	
Regulation on Prevention of Salmonella (2160/2003)			X		
Regulation on Prevention of TSE (999/2001)	X	X			
Regulation on Requirements for feed hygiene (183/2005)		X	X		
Regulation on Traceability requirements set by Regulation 178/2002 (931/2011)	X	X			

Source: Assessing farmers' cost of compliance with EU legislation in the fields of environment, animal welfare, and food safety. European Commission. 2014. https://agriculture.ec.europa.eu/system/files/2019-12/ext-study-farmer-costs-fulltext_2014_en_0.pdf

Compliance with these regulations introduces additional costs for agricultural producers. These costs may be divided into the following groups[26]:

– **Operational costs.** Additional costs from using more organic fertilizers, manure processing, maintenance costs for machinery or equipment that was purchased due to the regulations, veterinary and laboratory tests costs, and costs on food safety management system.

– **Investment costs.** Purchase and installation of new machinery or equipment (antimicrobial equipment, mechanical weeder, new milk tank), or disinvestments in the machinery and equipment that can't be used in the production anymore due to the regulation as well.

– **Opportunity costs.** Costs that arise due to the foregone revenues and profits due to the regulation.

[26] https://agriculture.ec.europa.eu/system/files/2019-12/ext-study-farmer-costs-fulltext_2014_en_0.pdf

– **Transaction costs.** Costs from gathering information on legislation, negotiating legislative and regulation changes, legal defense in case of imposition of liability for non-compliance with the norms, supply search, and monitoring.

A case study of the EU food safety regulations' effect on agricultural producers' costs shows an increase in total costs due to the food safety regulations[27]. Increase in total costs due to the compliance with food safety and animal health legislation for milk producers is estimated to vary in the range of 0.24-1.46% for selected EU-members[28], with the highest effect in Finland due to the regulation requiring the installation of shower facilities to prevent zoonotic agents' spreading.

For beef producers in selected European countries[29] food safety regulations add up 0.6-1.02% to the total costs. In comparison, it may rise up to almost 5% for the farms where legislation does not prohibit hormone use (the case of Brazil), demanding to spend more in order to be able to export to the developed markets.

Wheat producers experience less impact from food safety measures, although other regulations, like environmental regulations, may add up to 3.4% to the total production cost. Moreover, a case study shows that food safety compliance costs for Ukrainian wheat farmers could be 3-10 times higher compared to the developed European countries, even though it is well below 1 €/t. This basically comes from the cost of hazard containment analysis. However, it may further increase if wheat or processed goods are exported to EU countries.

Ukraine's broiler meat export may also experience barriers due to the standards concerning feed mills directives and disease anti-spread regulations. For instance, for typical big farms in Germany, the increase in total cost reaches almost 3%

However, other empirical evidence shows that food safety measures may put a substantial financial burden on small- and medium-sized farmers. Investments cost for complying with regulations may reach more than half of the total firm's sales in Eastern European developing countries[30]. Such barriers may restrain many producers from entering developed markets with high standards, affecting the whole sector, particularly resulting in higher unemployment in agriculture.

On the other hand, investments in food safety also should be considered as investments that may pay back. Ukrainian meat processing producer Globino invested nearly $140,000 in integrating Hazard Analysis and Critical Control Point (HACCP) analytical and control system[31] for the company. After receiving an international certificate of compliance with the foods safety standards, the company could enter new markets, which allowed it to increase sales by $34 million (30% increase) in the first year, and an additional $100 million within the next three years[32]. Savings for the production were also

[27] https://agriculture.ec.europa.eu/system/files/2019-12/ext-study-farmer-costs-fulltext_2014_en_0.pdf

[28] Finland, Germany, Ireland, Netherlands, and Poland.

[29] France, Italy, United Kingdom.

[30] Maskus, K., T. Otsuki, and J. S. Wilson. 2005. The cost of compliance with product standards for firms in developing countries: An econometric study. Policy Research Working Paper No. 3590, World Bank, Washington DC.

[31] https://www.fda.gov/food/guidance-regulation-food-and-dietary-supplements/hazard-analysis-critical-control-point-haccp#:~:text=HACCP%20is%20a%20management%20system,consumption%20of%20the%20finished%20product.

[32] https://www.ifc.org/wps/wcm/connect/98b91088-575d-4702-a004-feb6b0090713/ECAAGRIInvestWiselyENGApril2016.pdf?MOD=AJPERES&CVID=lLQ8HZI

estimated at the level of $45,000. In addition, the company received better access to international financing, which is important for producers in emerging and developing markets with high-interest rates.

3. Food Traceability

Food traceability is an integral part of the food safety policy in Europe. In the EU legislative framework, food traceability means the ability to trace and follow all the components that are used during food production, processing, and distribution[33]. This track is determined to be performed for both food and feed, ensuring that most of the potential health risks for consumers are mitigated. In the EU, food traceability is regulated by the Regulation on Traceability requirements (931/2011)[34]. The standards are common for all kinds of food of animal origin (meat and meat products, milk, cheese, eggs, etc.). This may include requirements for product and all ingredients labeling with special codes that would contain the company name, batch ID, microbiological tests, etc.

The particular technology tracking solutions for the food industry are radio frequency identification (RFID), and more modern wireless sensor networks (WSN)[35]. The costs of such systems can be discouraging. In the US, RFID ear tags for cattle farmers cost $0.4-6 per head for installation and maintenance, depending on the number of animals

However, the costs of not introducing traceability as well as sanitary regulations may also lead to significant losses. In 2003, the spread of BSE or mad cow disease in Canada (even though nearly 88% of farmers use legally purchased milk[36]) led to an export halt, resulting in huge losses the beef producers of more than $5 billion dollars for in 2004[37].

4. Animal welfare

Animal welfare is another concept that is used in food market regulation. This term encompasses the practices on how the animals are treated during their lifetime as well as their killing procedure[38]. The EU legislation follows this principle with main regulations like Directive on Protection of animals kept for farming purposes (98/58/EC), Directive on Chickens kept for meat production (2007/43/EC), Directive on Protection of calves (2008/119/EC), Directive on Protection of pigs (2008/120/EC).

Animal welfare regulations may concern veterinarian services, anesthetic and analgesic agents use, feed, air temperature and cleanliness of pens, stocking rate, sex grouping, and treatment during the killing procedure. Because regulations may cause the need for additional equipment, management practices, and compliance activities, it also leads to increased costs for producers. For instance, calf requirements (i.e., minimum space for the livestock, no isolation after the first weeks since birth, and period for the lights to be turned on in the stall) regulated by the Directive on Protection of calves (2008/119/EC) was found to increase total milk producers' costs in European countries by up to €0.5 per 100 kg of milk. The case study of the implementation of pig treatment regulations regarding the housing of sows and the introduction of enrichment material had a relevant impact on total costs,

[33] https://food.ec.europa.eu/horizontal-topics/general-food-law/food-law-general-requirements_en

[34] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:242:0002:0003:EN:PDF

[35] https://sciendo.com/pdf/10.2478/cqpi-2019-0076

[36] https://www.sciencedirect.com/science/article/pii/S0022030215001198#bib0400

[37] https://www.sciencedirect.com/science/article/pii/S0022030215001198

[38] https://www.europarl.europa.eu/RegData/etudes/STUD/2017/583114/IPOL_STU(2017)583114_EN.pdf

increasing them by more than 3.5% in small-sized farms in Poland and by 2% for medium-sized farms in Germany[39].

However, apart from the increased costs, strict following the animal welfare requirements could also serve as an additional marketing feature for the producers since the animal welfare issue is highly ranked by European consumers. A recent survey of German consumers revealed that 79% of the respondents are willing to pay more for products of animal origin if the producers adhere to the best animal welfare practices[40].

5. European Green Deal

Climate change action focused on reducing greenhouse gas emissions became one of the key factors of the development of agricultural policies and support in developed countries, especially in the EU. The European Green Deal[41], a strategic plan of the EU for reaching climate neutrality (net-zero greenhouse gas emissions) by 2050, sets ambitious targets for Industry, Energy, Transport, Agriculture, and other sectors to achieve its strategic goal – reaching climate neutrality by the EU-members by 2050. Policy framework for the EU Agriculture's contribution to the environmental transition comprises particularly the Common Agricultural Policy (CAP) reform[42] and the Farm to Fork Strategy[43]. The latter is aimed at accelerating the transition of the food system in the EU countries to sustainability, which, among other things, implies a shift in agricultural production.

By the year 2030, the following objectives of the Green Deal are set to be achieved by the EU farmers, with a strong potential to affect the food systems:

- Decrease the use of pesticides by 50%;
- Decrease the use of fertilizers by at least 20%, and antimicrobials by at least 50%;
- Reach 25% of organic farming in total agricultural land, up from the current 8%;
- Reduce the use of farmland for agricultural production by 10%;
- Expansion of the protected areas to 30% of the EU members' territory;
- Reforesting European territory with 3 billion trees, and restoring 25 thousand km of the river areas[44].

A number of legislations and policies are being revised by the European authorities in order to reach these goals. For instance, in 2022, farmers meet new requirements on fertilizer use according to the Fertilizing Products Regulation (EU 2019/1009)[45]. This regulation, on the one hand, creates opportunities for organic fertilizers development, formulating the conditions for European Single Market access. On the other hand, it introduces more strict safety and quality requirements for both fertilizers and their components and new limits on the contaminants (Cadmium) content. These

[39] https://agriculture.ec.europa.eu/system/files/2019-12/ext-study-farmer-costs-fulltext_2014_en_0.pdf

[40] https://www.euractiv.com/section/agriculture-food/news/germany-eyes-new-animal-welfare-levy-to-help-raise-standards-in-livestock-farming/

[41] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

[42] https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_en

[43] https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en

[44] https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf

[45] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R1009

standards do not yet become obligatory, meaning non-complying products can still enter the market, but in this case, they will not be CE marked.

Empirical evidence shows that reaching some of the EU-target on green transition may lead to a substantial decrease in production for EU members. If the regulations affect not only the EU producers but all exporters to the EU – they will see a decrease in export as well. The estimated production decrease is -20% for beef, -6% for milk as well as -21% for cereals, and -20% for oilseeds[46]. Researchers at Wageningen University & Research estimate that the Green Deal implementation as of now may lead to an average crop production decline of 10-20% in the EU[47]. It means that in case of environmental requirements will not be applied to farms outside the Union, European countries would increase the demand for imported agricultural goods. Europe's corn and rapeseed net imports are projected to increase by 209% and 98%, respectively, and prices on the market could increase by more than 5% for both crops. However, given the fact that Ukraine seeks the EU-membership in the upcoming years, gaining more confidence after an approved membership-candidate status, these negative production effects may be even more impactful to Ukraine if compared to the current EU countries.

6. Carbon Border Adjustment Mechanism

Moreover, the EU is on track to finalize the Carbon Border Adjustment Mechanism (CBAM)[48], aimed to make fair competition between European businesses and Union's importers in the context of being under control for greenhouse gas emissions via the Emissions Trading System (EU ETS). Under CBAM, countries that export selected goods[49] to the EU will have to buy special carbon certificates, which are priced based on the carbon pricing in the EU ETS. To import to the EU, one will have to buy special carbon certificates, which are directly connected to the carbon pricing in the EU ETS. If the country of exporter's origin introduces mechanisms similar to ETS, the payments that were paid in the country of origin could be counted as a 'discount' for buying the certificates under the CBAM. The CBAM is expected to enter a transitional phase starting in 2023 and finishing at the end of 2025, meaning in 2026, under the mechanism, exporters will have to pay for the emissions.

Even though currently, the CBAM doesn't cover agricultural goods and food products directly, there are certain initiatives towards such extension. The Committee on Agriculture and Rural Development of the European Parliament suggested to the European Commission that "the scope of the CBAM should be extended to agricultural products after the phasing-in period."[50]. However, as long as fertilizers as energy-intensive products are subject to the CBAM, agricultural producers will not be unaffected by the mechanism. Moreover, there are rising concerns about an indirect increase in input prices due to the CBAM. Among such concerns, there are voices alarming about the potential price increase for agricultural machinery. CEMA, the association of the European agricultural machinery

[46] Henning, C. et al. (2021) Ökonomische und Ökologische Auswirkungen des Green Deals in der Agrarwirtschaft (Economic and Environmental impacts of the Green Deal on the Agricultural Economy: A Simulation Study of the Impact of the F2F-Strategy on Production, Trade, Welfare and the Environment based on the CAPRI-Model - English summary). Kiel and Bonn: Institut für Agrarökonomie, Abteilung Agrarpolitik, Christian-Albrechts-Universität and Eurocare.

[47] https://croplifeeurope.eu/wp-content/uploads/2022/01/impact_assessment_of_ec_green_deal_targets_for_su-wageningen_university_and_research_558517.pdf

[48] https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661

[49] As agreed by the EC list of goods includes cement, aluminum, fertilizers, electric energy production, iron, and steel.

[50] https://www.europarl.europa.eu/doceo/document/AGRI-AD-699239_EN.pdf

industry, warns the European Commission on the negative impact of CBAM on their production since steel (also subject to the CBAM) constitutes, on average, 30-40% of the production costs.

7. Ukraine's competitiveness

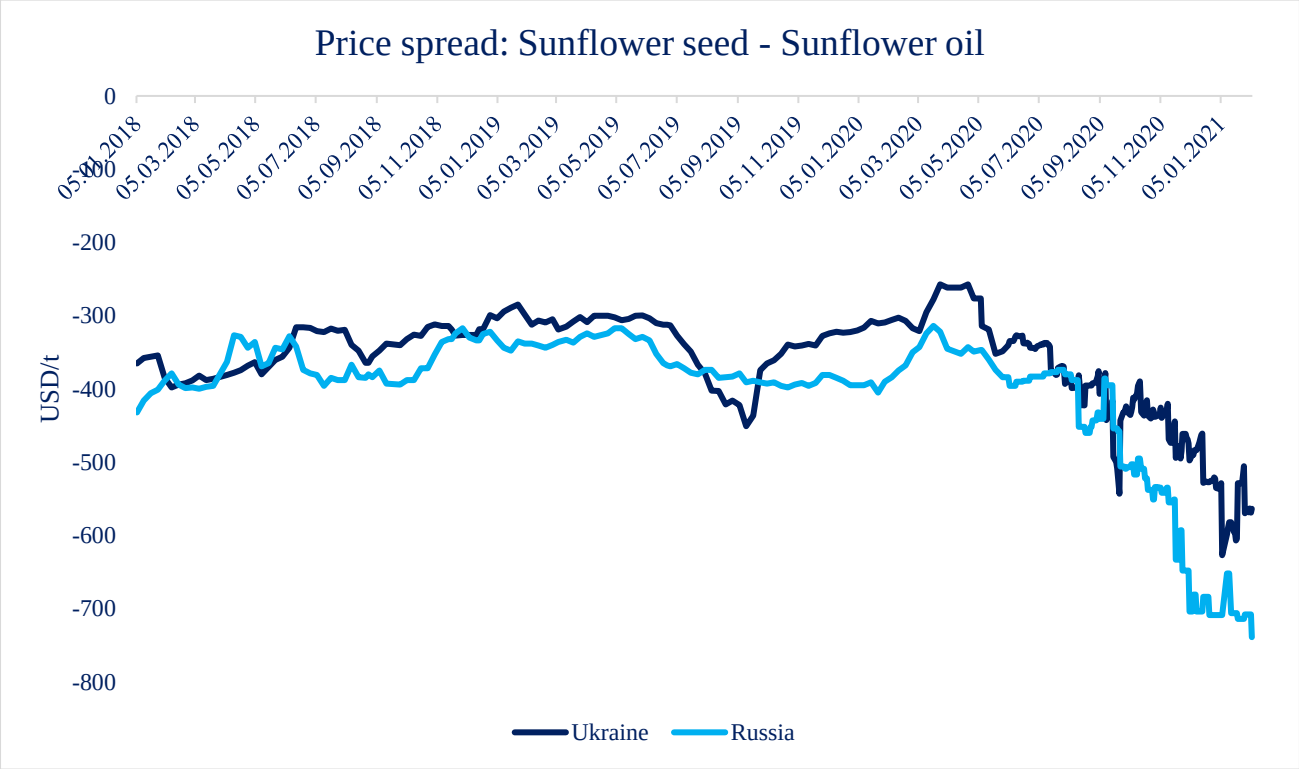
The **efficiency of value-added chains** in the food industry across different countries can be assessed through the analysis of input-output price spreads and ratios. In this respect, it is crucial to ensure the comparability of prices: they should show similar specifications (quality, processing stage, delivery points, terms of payment). Otherwise, processing margins can be distorted by the premium for quality, costs for storage, and transportation.

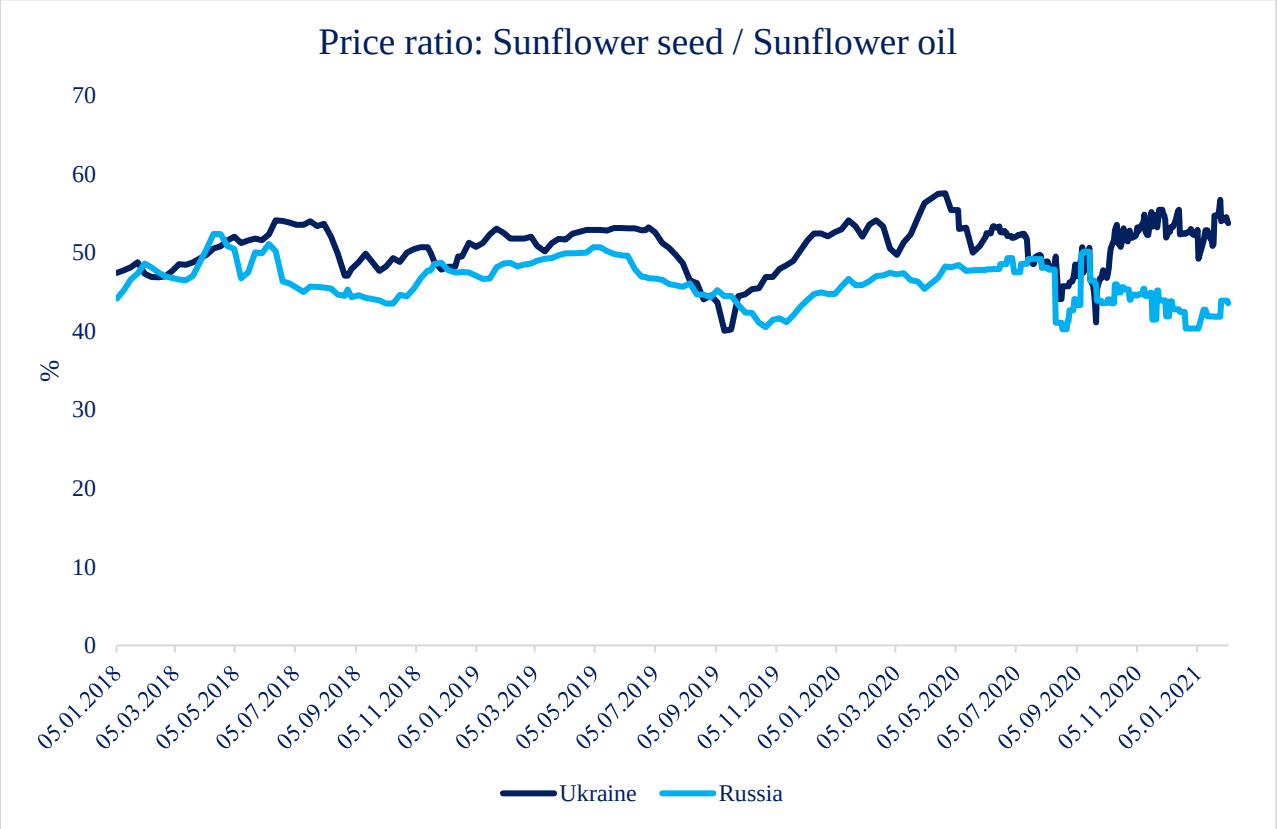
We highlighted four sectors in which the processing margin in Ukraine can be compared with similar processing margins in other countries. All price series exclude VAT.

Sunflower oil production

The major rival origin to Ukraine's sunflower oil is Russian. In 2020, price spreads between a sunflower seed and unrefined sunflower oil were similar in these two countries (Figure 11). Ukraine's spread was lower, which implies on more efficient crushing compared to Russia. Also, the share of sunflower seeds in the price of sunflower oil is higher in Ukraine than in Russia (53% versus 47%).

Figure 11. Price spread and the ratio between a sunflower seed and unrefined sunflower oil in Ukraine and Russia



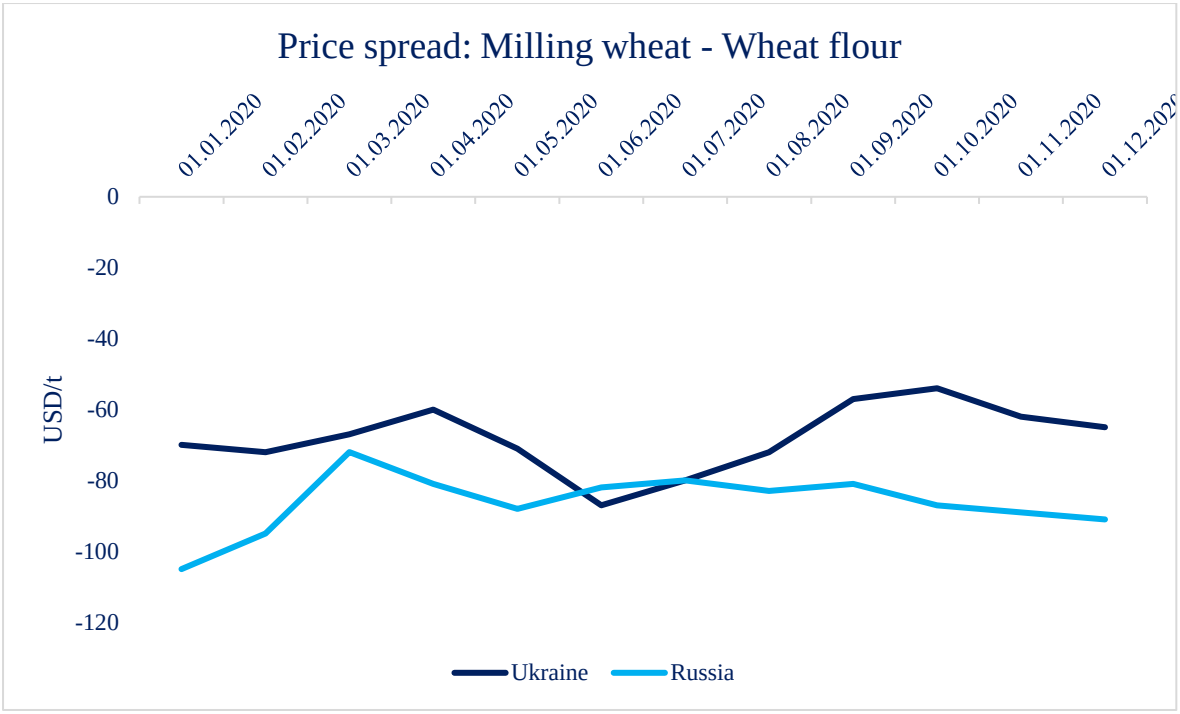


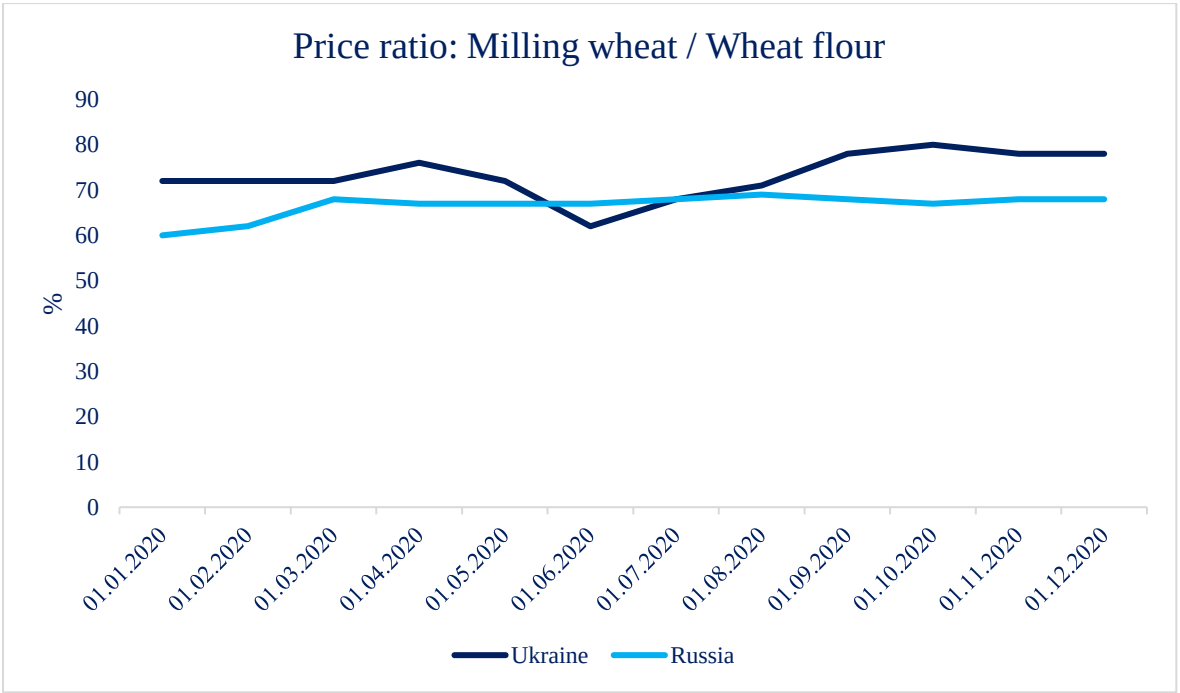
Source: APK-Inform agency. Note: The delivery basis for Ukraine is CPT Odesa port. The delivery basis for Russia is CPT Novorossiysk port.

Wheat flour production

Since Russia and Ukraine are competitors in the global wheat market, we compare the profitability of the milling industry in these countries. As Figure 12 shows, Ukraine has a lower processing margin than Russia. This may also indicate the lower profitability of Ukraine's milling industry.

Figure 12. Price spread and the ratio between milling wheat and wheat flour in Ukraine and Russia



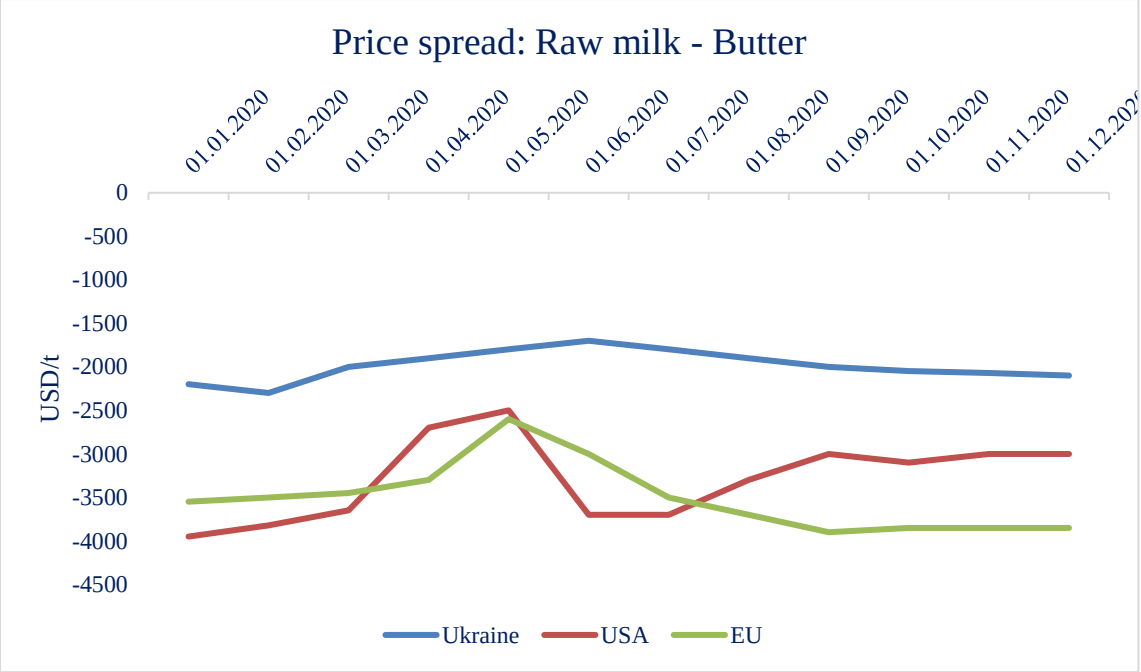


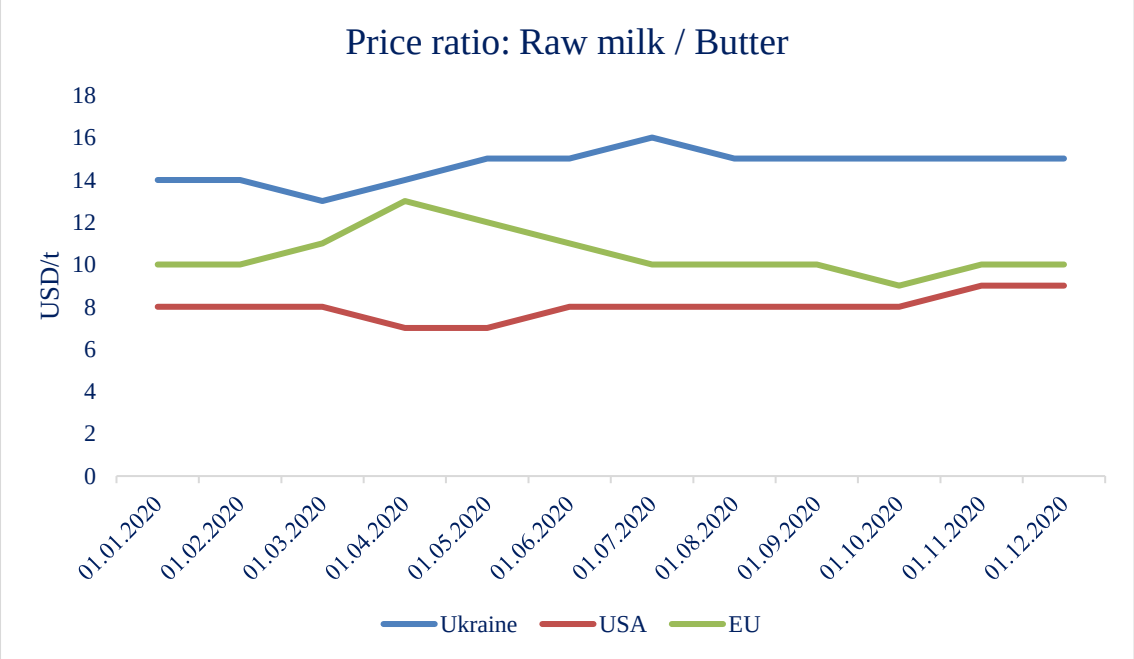
Sources: Ukrstat, Rosstat. Note: Prices are aggregated average prices of producers. Wheat flour price is a weighted average of prices of the first, second, and premium classes of wheat flour.

Butter production

Figure 13 shows that the price spread between raw milk and butter prices in Ukraine is lower compared to the benchmarks from the USA and EU. Also, the milk/butter price ratio in Ukraine is higher (around 15%). This may indicate lower processing costs in Ukraine due to lower wages or protection of European and US butter markets. Besides, Ukrainian butter prices might be low due to damping from the fake milk products based on palm oil.

Figure 13. Price spread and the ratio between raw milk and butter prices in Ukraine, the USA, and the EU





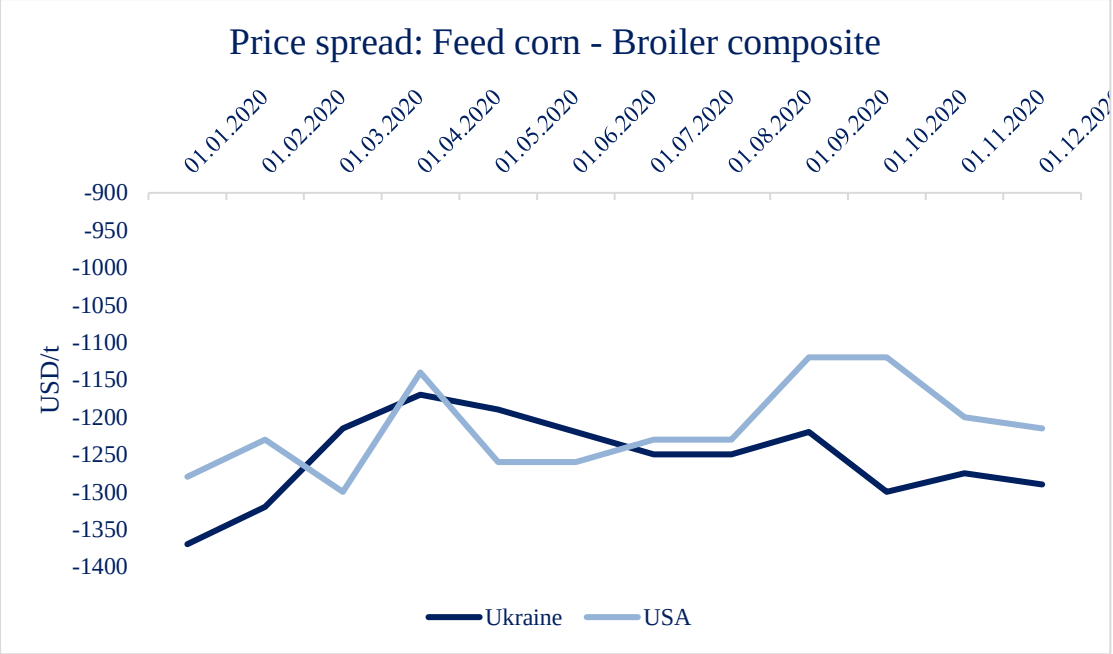
Sources: Ukrstat, CME, EEX. Note: Prices for the USA are futures prices on the Chicago Mercantile Exchange (CME) for milk class IV and cash-settled butter prices. EU prices are weekly spot indices calculated on the European Energy Exchange (EEX)[51].

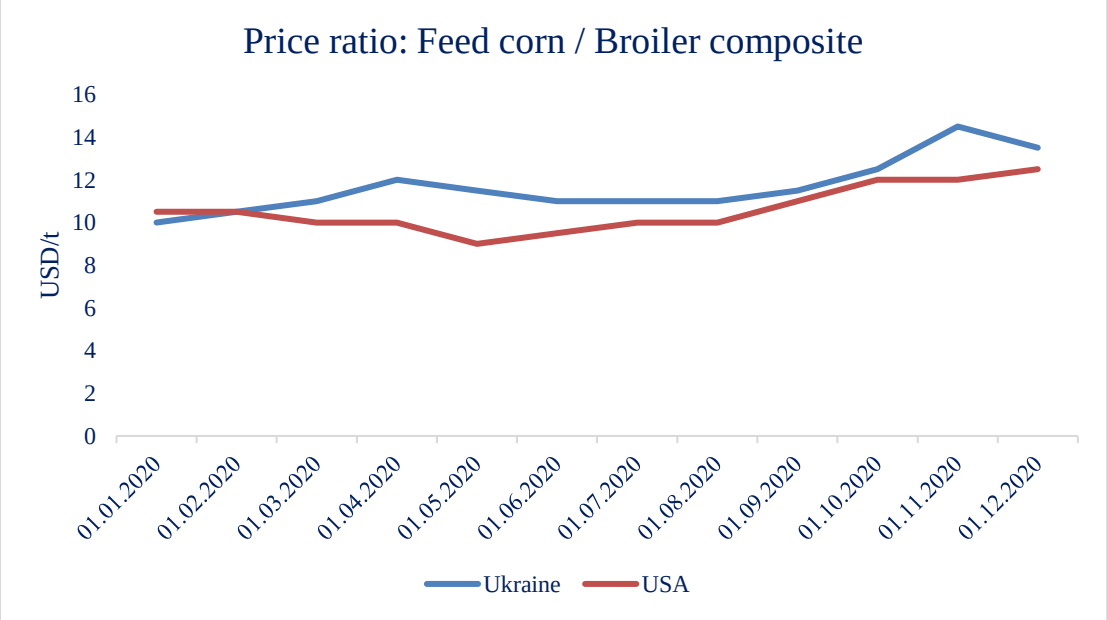
[51] https://www.eex.com/en/markets/agricultural-markets/dairy-products

Broiler feeding

The efficiency of meat processing also depends on livestock feeding margins, which determine the availability of inputs for the local food manufacturing sector. According to Figure 14, price spreads and ratios between feed corn and broiler price are similar in Ukraine and the USA. It means that both countries have an efficient and competitive poultry sector.

Figure 14. Price spread and the ratio between feed corn and broiler price in Ukraine and the USA





Sources: Ukrstat, APK-Inform, CME, USDANote: Broiler prices are on the wholesale level. Corn prices are adjusted to the EXW delivery basis.

We can conclude that Ukraine's sunflower and wheat processing are quite competitive. Butter production shows unusually low margins, which indicates problems in the milk processing industry. Meanwhile, poultry feeding has a similar marginality as in peer countries.

Summary of Chapter C. The European move towards climate neutrality and shifted consumer preferences create both risks and opportunities for agricultural producers in Ukraine. The risks are mainly connected to the regulations that may limit the access for Ukrainian farmers to the EU-members' markets – both physically if some of them do not meet the requirements and financially because of operational, investment, and transaction costs to comply with environment and food safety regulations.

On the other hand, this opens up additional and significant opportunities for agricultural enterprises in Ukraine. Firstly, EU members' demand for imported food may increase in case of a reduction in their own production due to the implementation of the Farm to Fork strategy. Secondly, in addition to coercion, the EU also applies methods of stimulating sustainable farming, which also includes the expansion of preferential credit programs and the provision of grants for enterprises that are ready to be the locomotive of the green transformation for organic and healthy food. Even a decade ago, Ukrainian agricultural enterprises and farmers from other emerging and developing markets demonstrated financially successful cases of implementing high standards of food safety and sustainability. Now such possibilities are becoming more and more common.

However, several caveats should be noted here. Since Ukraine is on the path of integration and becoming a member of the EU, it is appropriate to understand that upon accession, the requirements applicable to members will also apply to Ukrainian enterprises. Therefore, delaying the adjustment of production standards may lead to negative effects on the country's EU membership or in the event that EU directives are more strictly applied to importers. An example of such EU policy for maintaining its domestic competitiveness is the CBAM mechanism, which will at least indirectly affect the costs of agricultural enterprises through a possible change in prices for fertilizers and machinery and, perhaps, directly for agricultural products if such amendments, which have certain political support in the EU, will be adopted as well.

Ukraine, as a major global producer and exporter of wheat, barley, corn, and sunflower oil, as well as an exporter to the EU of animal products, can increase its export potential for processed products that have a higher added value compared to the current structure of production and export of the sector. However, in this case, the competitiveness of farmers will be determined not only by the cost of production factors but also by environmental sustainability, and compliance with food safety standards – in particular, food traceability and animal welfare requirements.

Chapter D. Market access for Ukraine's agrifood export

1. Introduction

Market access is one of the factors that can significantly alter bilateral trade and be a major impediment to the expansion of cross-border trading of agricultural products, particularly – processed food[52]. In

[52] Regmi, A., Gehlhar, M. J., Wainio, J., Vollrath, T. L., Johnston, P. V., & Kathuria, N. (2005). *Market access for high-value foods* (No. 1473-2016-120705).

this chapter of the report, we analyze the terms of trade of key importers of agriculture-related products. We identify the major importers of crop products, livestock products, and processed food products and provide a review of the trade barriers employed by these players. The key goal of this chapter is to discuss whether the increase in the complexity of processing correlates with the corresponding increase in trade barriers. We add to this production by comparing the trade measures applied to the low-processing agricultural products (crops, livestock) versus the trade measures applied to processed food. These trade barriers include both – tariff measures and non-tariff measures.

2. Market access - The non-tariff measures

The non-tariff measures (NTMs) were initially introduced and perceived as valid instruments to correct market failures and externalities. Most of the NTMs were initially designed to combat factors such as the asymmetry of information and ensure the safety of the products and the sustainability of the development. At the same time, there is a rise in the NTMs that creates policy concerns. The rise of the NTMs can lead to the creation of new barriers to trade[53]. These concerns are fueled by the growing trade costs associated with NTMS, which are estimated to be currently more than double the costs of tariffs[54]. In this section, we identify the biggest importers of food products and review their approaches to the NTMs.

2.1. The number of products affected by NTMs

The departing point in our analysis is the identification of the biggest importers of agrifood products. For the purposes of our analysis, we decided to aggregate the agrifood products into three broad categories based on the Harmonized Commodity Description and Coding Systems (HS)[55].

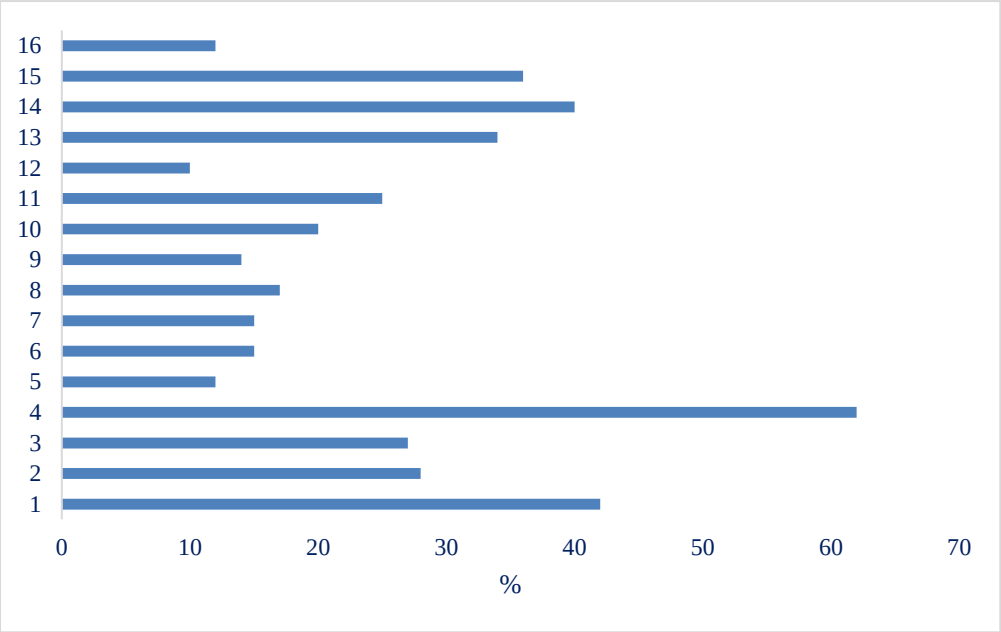
The first category is livestock products, which includes all products with HS2 codes falling into the intervals from 01 to 05. It includes live animals, meat, fish, and primary livestock production, such as milk, eggs, honey, and other non-processed animal-originated products. The second category is crop products and includes all primary crop products, from grain and oilseeds to vegetables, coffee, and fruits. In the HS classification – the crop products category includes all HS2 codes ranging from 06 to 15. The third category is our primary category of interest and includes all processed food products, with the HS2 codes ranging from 16 to 24, and includes prepared meats, sugars, cocoa, cereals, processed vegetables, beverages, and other processed food products. As a base of comparison, we will use the category “all imports” – all products that can be imported to the countries (Figure 15).

[53] Amanta, F. (2021). *The cost of non-tariff measures on food and agriculture in Indonesia* (No. 36). Policy Paper.

[54] United Nations. (2019). Navigating Non-tariff Measures towards Sustainable Development. *In Asia-Pacific Trade and Investment Report 2019*. United Nations.

[55] UN Statistics, *Harmonized Commodity Description and Coding Systems*, https://unstats.un.org/wiki/pages/viewpage.action?pageId=87426301

Figure 15. The average share of products in the categories affected by the corresponding number of NTMs



Source: WITS database, https://wits.worldbank.org/tariff/non-tariff-measures/en/ntm-datadownload

We then used the WITS database to collect information on the average share of products in each category affected by the corresponding number of NTMs for 75 countries from different regions of the world.

At such an aggregated level, we can already conclude that agriculture-related products are more affected by the non-tariff measures compared to the whole import. Generally, among 75 analyzed countries, on average, 61% of all imported goods were imported without any NTMs applied. This share is substantially lower for agrifood products. The livestock products turned out to be the category of agrifood products that was least affected by the NTMs. On average, 41% of the livestock products were imported without NTMs. The mean share of products not affected by NTMs is only 24.7% for crop products and 23.1% for food products. This difference between the crop and food products is not statistically significant, with the corresponding 95% confidence intervals being 18.5%-30.9% and 16.8%-29.4%, accordingly.

However, the detailed analysis of the countries – largest importers of agrifood products reveals a noticeable heterogeneity between countries' policies on the product's coverage by NTMs. To conduct a country-level analysis, we constructed the list of the top 20 importers of the selected three product categories (in monetary terms). We then constructed a list of 25 respondents that are included as the top 20 importers in at least one of our three categories of interest (Table 24).

Table 24. The largest importers of agrifood products

Importer	Total import, m. USD			
	Food products	Crop products	Livestock products	*Total agrifood imports*
European Union (28)	247 255	213 364	140 468	*601 087*
USA	77 403	58 545	33 648	*169 596*

China	27 949	83 033	51 320	*162 302*
Japan	25 966	20 883	22 943	*69 792*
Canada	20 135	13 857	5 452	*39 444*
Rep. of Korea	10 875	10 663	11 005	*32 543*
Australia	10 371	3 667	2 612	*16 650*
Russian Federation	10 356	12 380	6 278	*29 014*
Indonesia	8 171	7 391	2 744	*18 306*
China, Hong Kong SAR	7 876	6 436	10 780	*25 092*
Saudi Arabia	7 245	8 530	4 997	*20 772*
Viet Nam	7 150	9 090	4 661	*20 901*
Mexico	7 113	12 705	6 329	*26 147*
Switzerland	6 800	4 975	2 176	*13 951*
Singapore	6 506	3 997	2 955	*13 458*
Malaysia	6 438	7 416	2 936	*16 790*
United Arab Emirates	6 137	6 800	4 205	*17 142*
Philippines	5 588	5 234	2 734	*13 556*
Thailand	5 447	6 506	4 222	*16 175*
Turkey	4 943	9 426	845	*15 214*
Brazil	3 125	6 269	1 986	*11 380*
Nigeria	2 763	3 432	2 207	*8 402*
India	2 745	17 623	215	*20 583*
Egypt	1 626	9 097	3 216	*13 939*
Pakistan	606	6 245	115	*6 966*

Source: UN Comtrade database for the year 2020, https://comtrade.un.org/data

The largest importer from our list is also one of the principal trade partners of Ukraine – the European Union. The combined value of agrifood imports to the EU exceeds 600 billion USD. In contrast, the second largest importer of agrifood products is the USA, with the combined value of agrifood imports approaching 170 billion USD. The information for the European Union in this dataset also includes the UK to ensure the cross-compatibility between UN Comtrade and WITs databases. Unfortunately, only for 21 of the selected 25 countries-largest importers – the information on the NTMs is available. The detailed statistics on the share of products within product categories affected by the NTMs are available in the Annex to this report, in tables D1-D4.

The country-level analysis suggests that the extensity of NTMs application to the agrifood products by the top importers is even greater than on average. Over 90% of all agrifood products are subject to at least two types of NTMs in the EU and the US. At the same time, the overall rate of NTMs application to imported products is substantially lower. Only 39.3% of all imported products are subject to at least two types of NTMs in the EU and only 28.9% in the US. At the same time, we cannot observe a significant difference in the frequency of NTMs application to food processing compared to the less complex agrifood products. In most countries, the share of food products subjected to at least two types of NTMs is not drastically higher than for crop products. In some cases such as India, the

share of food products subjected to more than two types of NTMs is even lower compared to the crop products. The most prominent example of such a practice is the United Arab Emirates, a country that exports more than 6.1 bln. USD of food products annually. While 97.6% of all livestock products and 97.2% of all crop products are subject to at least two types of NTMs – this share for food products is substantially lower, only 34.1%. Thus, at least judging by the coverage of the products within the product categories, we cannot confidently conclude that the NTMs disproportionately affect processed food products compared to crop products. The livestock products, on the other hand, are subjected to, on average, a lesser number of types of NTMs, compared to the crop products and processed food products.

2.2. Types of NTMs employed by major importers of agrifood products

One of the crucial drawbacks of using the share of the products affected by the NTMs is that this indicator alone might be deceptive. There are two primary reasons for it. The first one – apart from the simple product count, it is also necessary to look at the share of imports from the relevant category affected by the NTM. A relatively small share of the products affected by the NTM might also constitute the lion's share of the overall import of this category. The second reason why the indicator from the previous section might be misleading – is the large heterogeneity in the potential effects of the NTMs. The list of NTMs includes both – the regulations on the labeling requirements as well as the full prohibition of certain products for the technical barriers to trade (TBT) or sanitary and phytosanitary (SPS) reasons. The list of TBT reasons typically includes national security requirements, the prevention of deceptive practices, the protection of human health or safety, animal or plant life or health, or the environment.

To test our hypothesis on the potential increase in the NTMs with the increase in complexity of food processing – we decided to analyze the share of import (in monetary terms) affected by the NTMs for each of the already established categories – livestock products, crop products, and processed food products. As an example for this exercise, we selected the European Union (including the UK), the largest trade partner of Ukraine. The full list of the NTMs and the coverage of the corresponding NTMs is presented in Table 25 below.

Table 25. Share of the import (in monetary terms) affected by the non-tariff measures

NTM code	NTM description	Coverage of the NTM, % of affected import to all import		
		Livestock	Crop	Processed food
	All measures	99,9	99,9	99,8
A	Sanitary and phytosanitary measures	99,9	99,1	91,8
A120	Geographical restrictions on eligibility	99,9	72,1	33,7
A130	Systems Approach	0,0	94,5	68,9
A140	Special Authorization requirement for SPS reasons	21,9	70,6	9,2
A150	Registration requirements for importers	0,2	98,4	68,9
A190	Prohibitions/restrictions of imports for SPS reasons n.e.s.	0,2	56,5	22,9

A210	Tolerance limits for residues of or contamination by certain (non-microbiological) substances	99,7	86,5	61,3
A220	Restricted use of certain substances in foods and feeds and their contact materials	1,6	94,5	68,9
A310	Labelling requirements	96,6	95,1	90,8
A320	Marking requirements	15,1	35,7	22,9
A330	Packaging requirements	71,5	95,0	78,1
A400	Hygienic requirements	97,7	1,5	20,7
A410	Microbiological criteria of the final product	71,5	95,0	78,1
A420	Hygienic practices during production	0,0	94,5	68,9
A590	Treatment for elimination of plant and animal pests and disease-causing organisms in the final product, n.e.s.	0,0	0,0	0,8
A600	Other requirements on production or post-production processes	0,0	1,2	0,0
A630	Food and feed processing	26,2	94,7	73,5
A640	Storage and transport conditions	2,9	0,0	0,0
A820	Testing requirement	97,7	2,0	21,3
A830	Certification requirement	99,9	44,5	28,1
A840	Inspection requirement	99,9	35,1	22,0
A850	Traceability requirements	97,7	86,2	63,0
A851	Origin of materials and parts	0,0	85,7	47,1
A852	Processing history	0,0	94,5	68,9
A853	Distribution and location of products after delivery	0,0	85,7	47,1
B	Technical barriers to trade	99,3	99,9	99,8
B110	Prohibition for TBT reasons	71,9	17,1	19,9
B140	Authorization requirement for TBT reasons	98,6	99,6	97,2
B150	Registration requirement for importers for TBT reasons	0,0	17,1	9,2
B210	Tolerance limits for residues of or contamination by certain substances	0,0	0,5	0,0
B220	Restricted use of certain substances	0,0	0,0	0,6
B310	Labelling requirements	99,3	99,9	99,8
B320	Marking requirements	15,1	16,8	0,0
B330	Packaging requirements	71,7	17,1	25,1
B600	Product identity requirement	0,0	0,0	5,2
B700	Product quality or performance requirement	0,0	36,5	1,3
B810	Product registration requirement	0,0	2,0	4,2
B820	Testing requirement	0,0	3,2	4,8
B830	Certification requirement	68,3	0,1	8,5
B840	Inspection requirement	0,0	33,3	8,5
B850	Traceability information requirements	0,0	0,0	0,6
C	Pre-shipment inspection and other formalities	6,4	0,0	4,9
C400	Import monitoring and surveillance requirements and other automatic licensing measures	6,4	0,0	4,9

E	Licences, quotas, prohibitions and other quantity control measures	9,8	10,7	12,2
E100	Non-automatic import licensing procedures other than authorizations for SPS or TBT reasons	9,8	10,7	12,2
G	Finance measures	9,8	10,2	12,2
G110	Advance import deposit	9,8	10,2	12,2

Source: WITS database

The coverage of different NTMs for the selected categories of products does not suggest that there is significant discrimination between the processed food products compared to the primary agriculture products – crop and livestock products. The number of NTMs, where the share of affected imports is higher for food products than for livestock and crop products, is negligible, and even in such cases – less than 13% of processed food imports is affected. While there is evidence in the literature on the product level that there is a correlation between the occurrence of NTMs, their trade coverage, and the incidence of trade frictions for these products[56] and it might be the case for certain processed food products – we cannot make a generalized conclusion on the relationship between the complexity of the processing and the NTMs.

At the same time, certain NTMs are extremely widely used in the EU, although they might not be binding and trade-altering. Examples of such NTMs include labeling & packaging requirements and authorization requirements (need to receive authorization, permit, or approval).

3. Market access - The tariff measures

While the NTMs could alter the trade indirectly – by restricting certain product groups and regions or by increasing the production costs needed to comply with the regulations – the tariff measures directly affect bilateral trade by altering the prices for imported goods.

In this section, we will rely on the same approach as we used on the non-tariff measures and estimate how the effective tariff changes, depending on the product category – crop products, livestock products, and processed food products. Similarly to the previous section, we are testing whether or not there is a statistically significant difference in tariffs for agrifood products with low complexity of processing (crop and livestock products) versus processed food products.

To do so, we are relying on the World Integrated Trade Solution (WITS) data. As the primary indicator for the effective tax rates, we are using the AHS Weighted Average (here and after – AHS) – Effectively Applied Weighted Average (%) tariff, which is the average of tariffs weighted by their corresponding trade value[57]. After cleaning the data, we ended up with a set of 124 countries, for each of which there is information on AHS for all three sectors of interest – crop products, livestock products, and processed food products (Table 26).

[56] Disdier, A. C., & Van Tongeren, F. (2010). Non-tariff measures in agrifood trade: What do the data tell us? Evidence from a cluster analysis on OECD imports. *Applied Economic Perspectives and Policy*, *32*(3), 436-455.

[57] WITS, https://wits.worldbank.org/countryprofile/metadata/en/indicator/tariff

Table 26. Descriptive statistics and confidence intervals for the effective tax rates for each of the three sectors of interest for the selected 124 countries

	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
AHS, Crops, %	5,79	0,61	6,85	4,57	7,00
AHS, Livestock, %	9,45	0,92	10,21	7,63	11,26
AHS, Processed food, %	31,72	6,77	75,36	18,33	45,12

Source: WITS database, own estimations. The p-value for t-tests on the equality of means is statistically significant at a 1% confidence level for all three subsectors.

Unlike the non-tariff measures, we found statistically significant (at a 1% confidence level) differences in the weighted average effective tariff rates for all three categories of products. The lowest weighted average effective tariff rate is for crop products, 5.8%, and the effective tariff rate for livestock products is 9.4%. And the effective tariff rate for processed food is almost six times the crop products' rate and more than three times the rate for livestock products – 31.7%. Thus, we can conclude that countries use tariffs to decrease imports of agrifood products with higher complexity.

At the same time, the effective tariff rates for Ukrainian processed food products are lower compared to the average world values (see Table 27).

Table 27. Descriptive statistics and confidence intervals for the effective tax rates for Ukrainian processed food export versus the world average (only for those 114 countries for which the rate for Ukraine is available)

Indicator	Median	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
AHS, Processed food, for Ukraine	3,41	9,78	1,61	16,92	6,58	12,98
AHS, Processed food, World	9,39	21,01	3,81	39,93	13,46	28,55

Source: WITS database, own estimations. The p-value for t-tests on the equality of means is statistically significant at a 1% confidence level. The top 1% of observations with the highest interest rates were omitted from the analysis.

Half of the countries Ukraine is trading with have an effective tariff rate smaller than 3,41%. And 75% of countries have effect tariff rates lower than 13.05%. In monetary terms, the total amount of imported food products was equal to 581 billion USD in 2019 (only 114 countries for which the rate for Ukraine is available in the database were selected for the analysis). However, countries that have the AHS for Ukrainian processed food products lower than 3.5% account for 245 bln. USD, or roughly 42% of the total potential market. Countries that have the AHS for Ukrainian food products in the range from 3.5% to 10% account for an additional 202.6 bln. USD of the world's market volume (or an additional 35% of the total market share). And countries with effective tariff rates of over 10% account for the remaining 23% of the world market. Therefore, most of the potential markets (without taking into account the geospatial and logistics component) at the moment and at the current volumes of export do not have severe effective tariff rates against Ukrainian imports.

4. Market access – bilateral agreements

One of the common ways to reduce the tariffs is to sign a free trade agreement. Free trade agreements could be made between countries, groups of countries, or between a country and a group of countries.

In this section, we analyze the efficiency of signing trade agreements to boost the export of agrifood products. In doing so, we are comparing the average volume of export from Ukraine to the partner country (countries) for three years before the agreement became effective and three years after the agreement became effective. We are comparing the differences in the volume of exports from Ukraine to partner countries for three categories – food products, livestock products, and crop products.

Due to the data limitations - we cannot analyze the agreements that were signed after 2019, and at the same time – the agreements signed in 1990 does not seem to be a reliable source of information for analyzing the effect of free trade agreements. Thus, in this section we will analyze four free trade agreements signed by Ukraine in 2010ths (Table 28).

Table 28. Free Trade Agreements signed by Ukraine in 2010ths

Agreement Name	Partner countries	Year (became effective)
Deep and Comprehensive FTA (DCFTA)	EU	2016
European Free Trade Association (EFTA)	Switzerland, Norway, Iceland and Liechtenstein*	2012
CIS	Azerbaijan, Belarus, Armenia, Kazakhstan, Kyrgyzstan, Moldova, the RF, Tajikistan, Turkmenistan, Uzbekistan	2012
CIS**	Azerbaijan, Belarus, Armenia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Uzbekistan (w/o the RF)	2012
Bilateral agreement	Montenegro	2013

*Source: Ministry of Foreign Affairs, https://mfa.gov.ua/en/about-ukraine/economic-cooperation/free-trade-agreements-fta *Liechtenstein is not included in our analysis due to data limitations **We analysed the effect of the CIS agreement with and without the RF*

As we can see from Table 29, the effect of the Free Trade Agreements is not universal, and it highly depends on the signing parties. The agreement made with the RF did not lead to any noticeable improvement in export revenues. The increases in bilateral trade revenues were significantly dragging behind the overall increase in Ukraine's agrifood export revenues.

Table 29. Free Trade Agreements and changes in the agrifood export revenues

Agreement Name	Livestock			
	Avg export to the countries, three years prior, m. USD	Avg export to the countries, three years after agreement became affective, m. USD	Increase, %	Overall change in export
DCFTA	318,1	456,1	43%	7,0%
EFTA	1,63	1,86	14,3%	20,1%
CIS	1016,5	1050,0	3,3%	20,1%
CIS**	400,1	477,0	19,2%	20,1%
Montenegro	0,000	0,006	1960%	13,3%
Agreement Name	Crops			
	Avg export to the countries three years prior, m. USD	Avg export to the countries, three years after the agreement became effective, m. USD	Increase, %	An overall change in export
DCFTA	3499,6	4199,2	20%	11,2%
EFTA	8,78	40,97	366,4%	71,3%
CIS	726,6	495,2	14,3%	71,3%
CIS**	354,5	282,5	-20,3%	71,3%
Montenegro	0,011	0,117	976%	29,2%
Agreement Name	Food Products			
	Avg export to the countries three years prior, m. USD	Avg export to the countries, three years after the agreement became effective, m. USD	Increase, %	An overall change in export
DCFTA	814,3	826,4	1%	-10,1%
EFTA	2,85	5,33	87,1%	34,3%
CIS	1751,8	2013,1	14,3%	34,3%
CIS**	824,0	1063,8	29,1%	34,3%
Montenegro	0,010	0,338	3317%	14,4%

Source – UN Comtrade database, own estimations. An overall change in export – change in average export volumes for the corresponding product category between two time periods – three years before the FTA and three years after the FTA.

The agreements with Montenegro and EFTA coincided in time with a noticeable percentage increase in the corresponding export revenues. The only category that did not outperform overall Ukraine's increase in export revenues – it is the livestock export to the EFTA countries after signing out the agreement. At the same time, the size of these economies is relatively small, and the increase in revenues, albeit significant in percentage terms – is not economically significant in monetary terms.

On the other hand, the DCFTA with the EU clearly demonstrates the viability of signing the FTAs to boost export volumes and revenues. After signing the DCFTA – Ukraine's exports to the EU countries grew and outperformed the overall categories' export changes for all categories in our analysis.

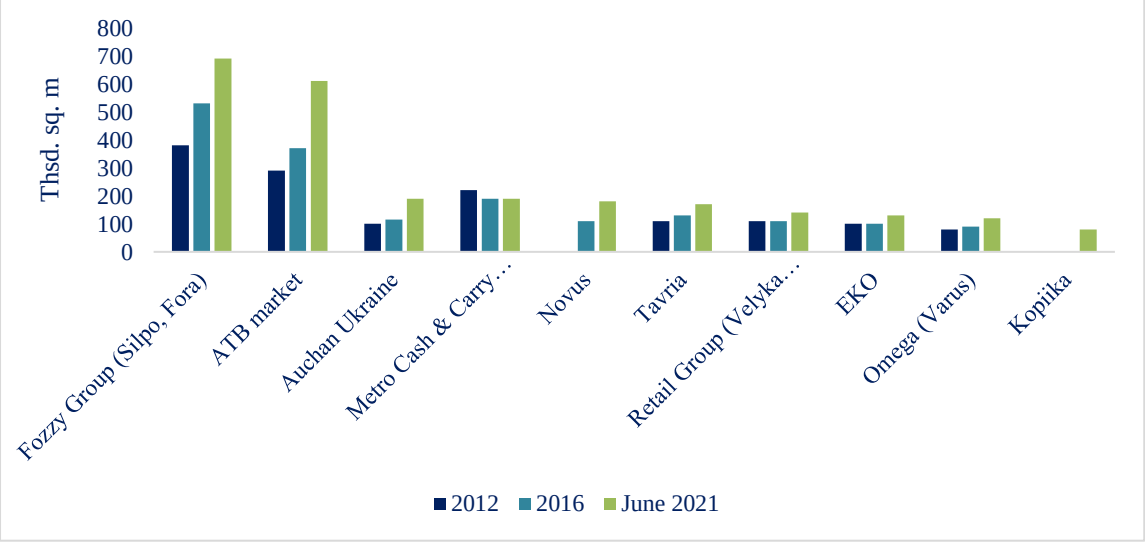
Summary of Chapter D. The market access is not homogeneous across different agrifood subsectors. While we have not found any significant differences between non-tariff measures applied to the products with a lower degree of processing (livestock products and crop products) and processed food products – 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 almost six times the crop products' rate and more than three times the rate for livestock products – 31.7%. At the same time, 77% of the world market for processed food products has effective rates below 10% for Ukrainian food imports. 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 agrifood products – crop products, livestock products, and processed food products. The Deep and Comprehensive FTA between Ukraine and the EU boosted the export of livestock products to the EU by 43% (the overall export growth for these categories was 7%), the 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).

Chapter E. Food retail and its effect on the food processing sector

According to the Ukrstat data, food retailers' turnover accounted for 449,8 bln. UAH in 2021; this is around 78% of all food trade turnover. For meat and milk products, the share of retail trade in total turnover exceeded 90%, while for fruits and vegetables, it was just 47%.

Ukrainian food retail is featured by the dominance of several large players. The main companies operating in this market are Fozzy Group (supermarkets Silpo, Fora), ATB market, Auchan Ukraine, Metro Cash & Carry Ukraine, and Novus. Figure 16 shows that shopping areas for these top-5 food retailers has increased over the last decade (except Metro Cash & Carry), while for other large food retailers (Tavria, Retail Group, EKO, Omega, Kopiika), the shopping area declined or showed moderate growth. It might imply the consolidation process in Ukraine's food retail.

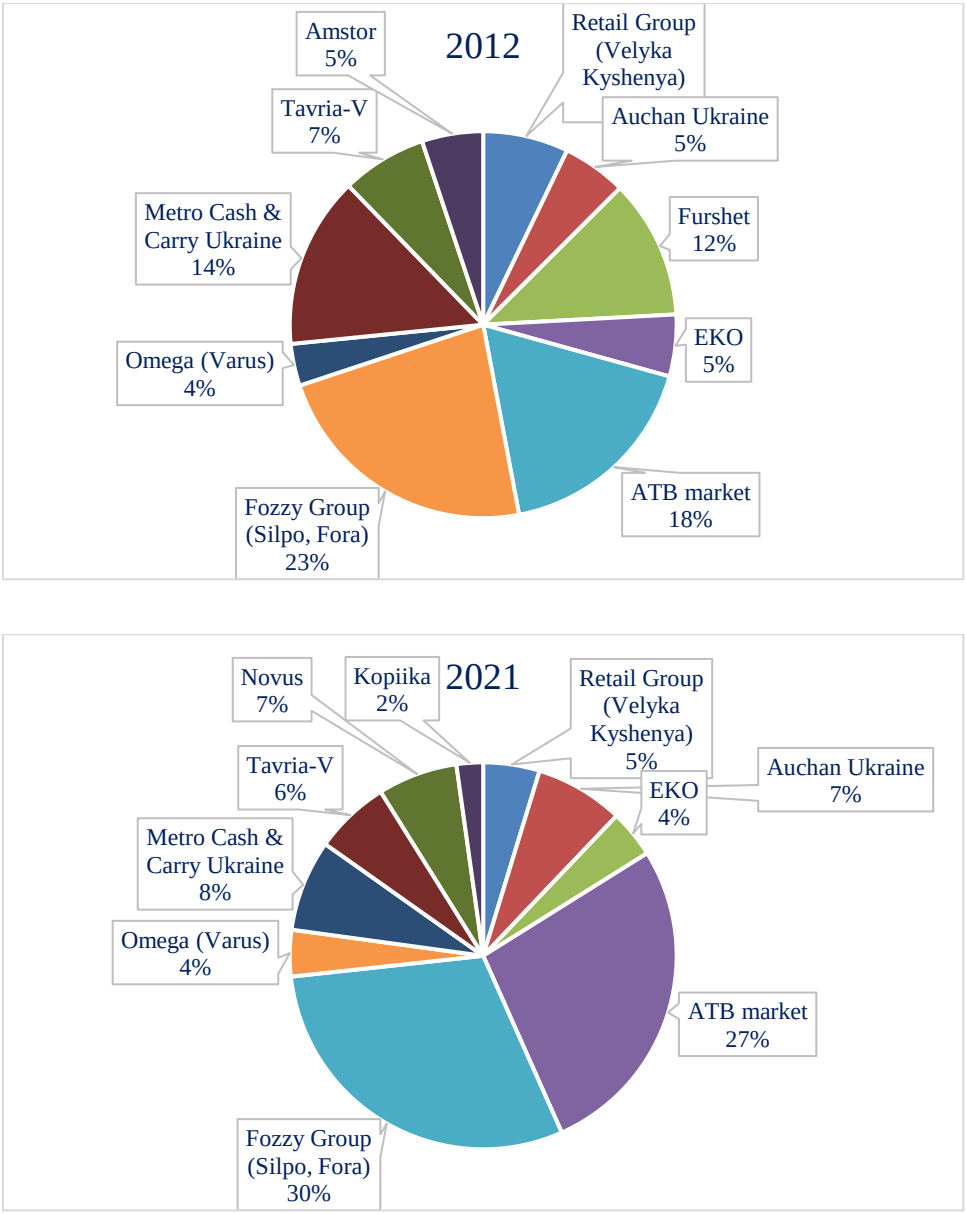
Figure 16. The shopping area of main food retailers



Source: Retail Association of Ukraine, GT Partners Ukraine

The increased concentration is also confirmed by Figure 17. In 2012, the share of Fozzy Group and ATB market was 41%, while in 2021, it already reached 56%. Meanwhile, smaller retailers lost their position and disappeared from the top-10 list (Furshet, Amstor).

Figure 17. Structure of shopping area of main food retailers

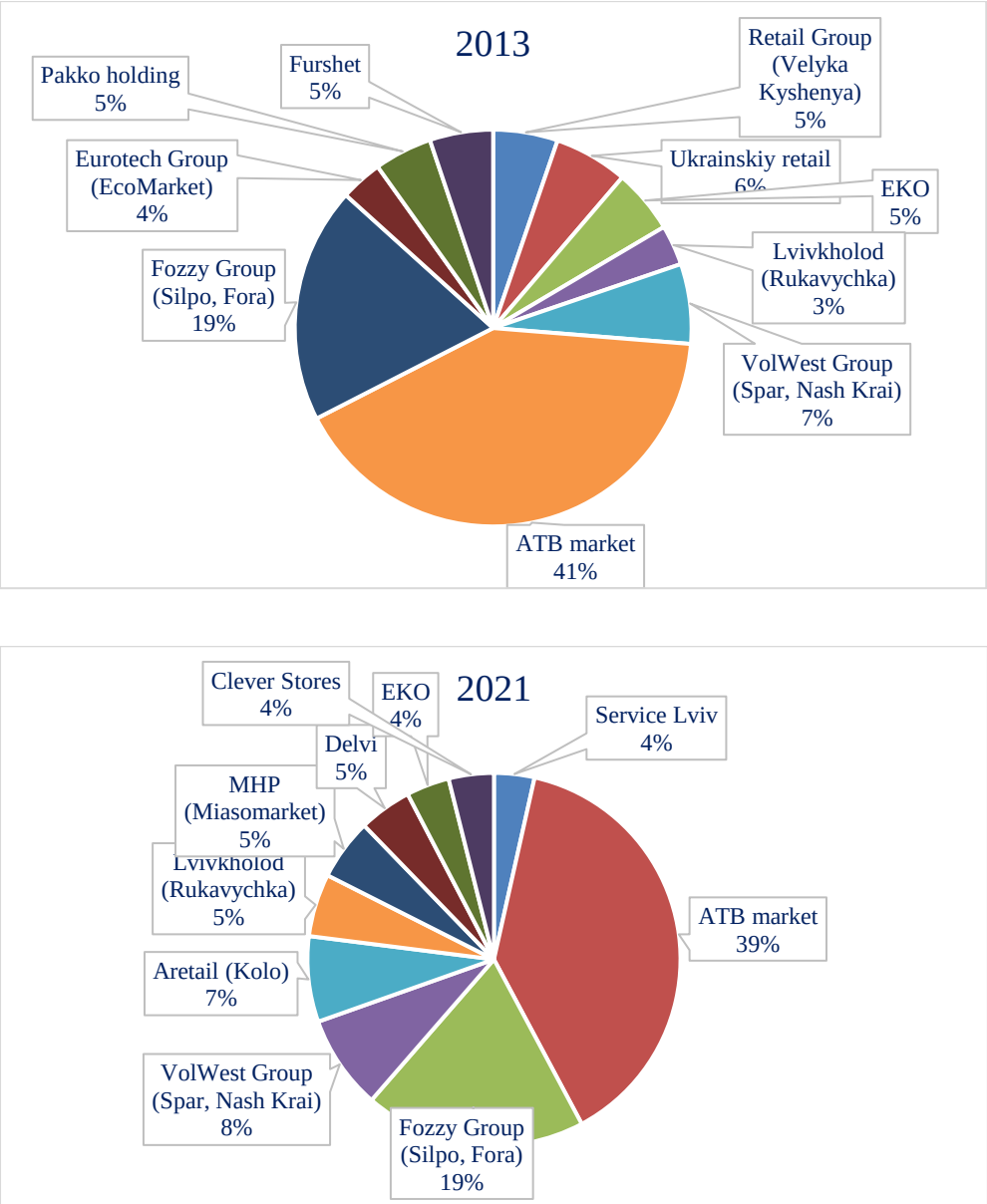


Source: Retail Association of Ukraine

As for the number of shops of the main retailers, the list of top-10 players is different from the top-10 for shopping areas (Figure 18). It is explained by the fact that some large retailers (Novus, Metro, Auchan) are focused on the relatively small number of large-area shops. At the same time, other groups of local and national retailers (Spar, Nash Krai, Rukavychka, Kolo, Miasomarket, EKO) prefer to open a large number of small shops which are better tailored to local demand. ATB market and Fozzy Group remain leading retailers in terms of the number of shops. However, their share was relatively stable over the last decade. Generally, the pace of opening new shops by these two players is the same as the

average pace of the rest of the market. Since both Fozzy and ATB are growing in terms of the trading area, this indicates that the average area of their shops is growing.

Figure 18. Number of shops of leading food retailers

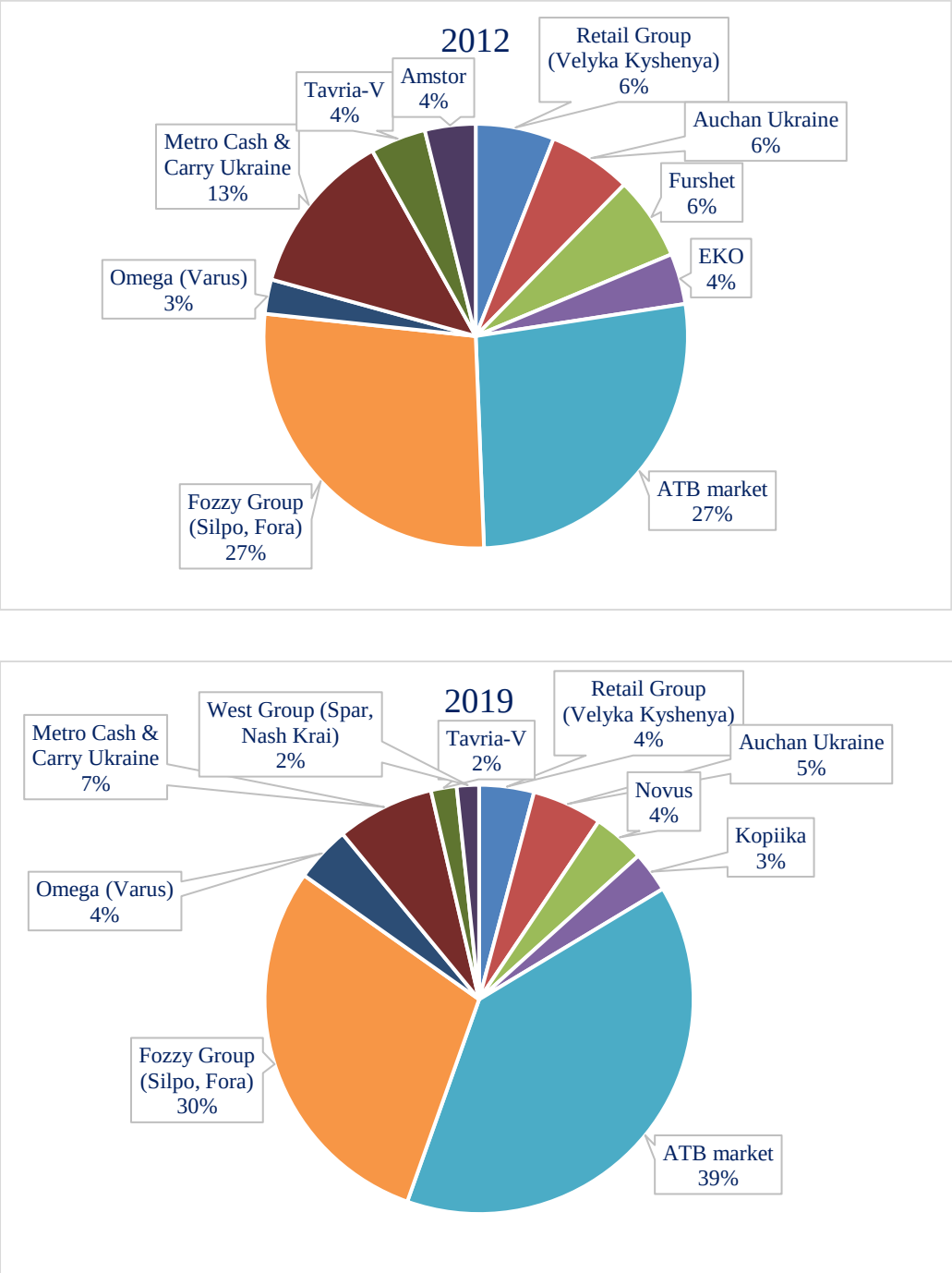


Source: Retail Association of Ukraine, GT Partners Ukraine

As for the market structure, ATB market and Fozzy Group have increased their own shares since 2012 (Figure 19). The shares of other retailers remained relatively stable or decreased. To measure market concentration, we calculate the C4 index (the market share of 4 leading players). In 2019, the total food retail turnover was 335,6 bln. UAH and the share of the top-4 retailers' index was 64%, while the share of the top 10 retailers was 78%. It means that more than 20% of retail turnover belongs to retailers outside the top 10. Generally, business practice shows that a C4 index of 60% indicates a highly

concentrated market with market power and barriers for entry[58]. In the case of Ukraine's retail, the share of the top 2 players (ATB market and Fozzy Group) was 55% in 2019, which implies the possibility of an oligopoly.

Figure 19. Revenue of leading food retailers, bln. UAH



Source: Retail Association of Ukraine, GT Partners Ukraine

Ukraine's Chamber of Commerce provides evidence of market power in the food retail sector. Consolidated large retailers discriminate suppliers of food products in several directions:

[58] https://www.investopedia.com/terms/c/concentrationratio.asp

1. Setting unreasonably long terms of payments (72 on average as of 2022). For comparison, the EU limits settlement terms to 60 days (30 days for perishable products), but the average term in the EU countries is about 5-7 days.

2. Requiring from the supplier payments not related to sales contracts, such as supplier fees for the «entrance» into a new retail network or participation in the modernization of its stores.

3. Imposition by trade networks of additional services to the supplier which are not needed. Setting a disproportionate cost of such services or their fictitious provision (services are not actually provided, but the provider is obliged to transfer funds for these allegedly provided services).

4. Forcing suppliers to lower sales prices to carry out the price discounts for final consumers despite the retailer's margin remaining unchanged.

5. Establishing excessive penalties in contracts for the non-performance supplier of its obligations.

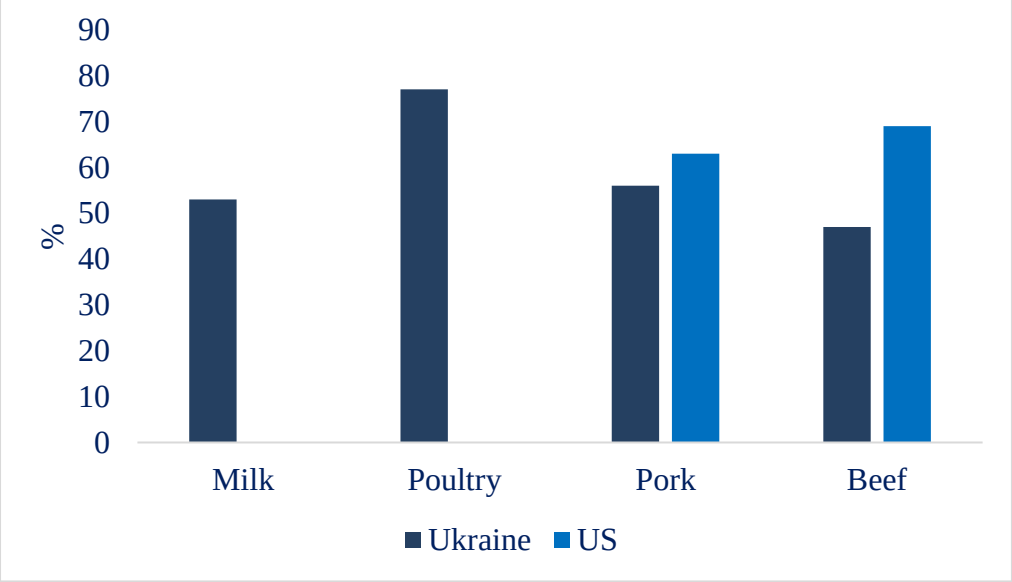
6. Obliging the supplier to provide information about specifications of contracts with other retailers.

7. Forcing suppliers to pick up already delivered goods, when they are spoiled or not sold before the expiry of the storage period without paying for such a product[59].

Possible market power in the food value chain can be found by analysis of price spreads between farm-gate, wholesale, and retail stages. For better interpretation, we calculated a) the share of farm-gate prices in wholesale prices and b) the share of wholesale prices in retail prices.

As Figure 20 shows, the proportion of farm-gate prices in wholesale prices for animal products varies: the highest share is observed for poultry (77%). This can be explained by the strong consolidation and vertical integration in this sector. The lowest share is for beef meat (47%). In the US, the proportions of farm-gate prices for pork and beef are higher than in Ukraine.

Figure 20. The share of farm-gate prices in wholesale food prices in 2021

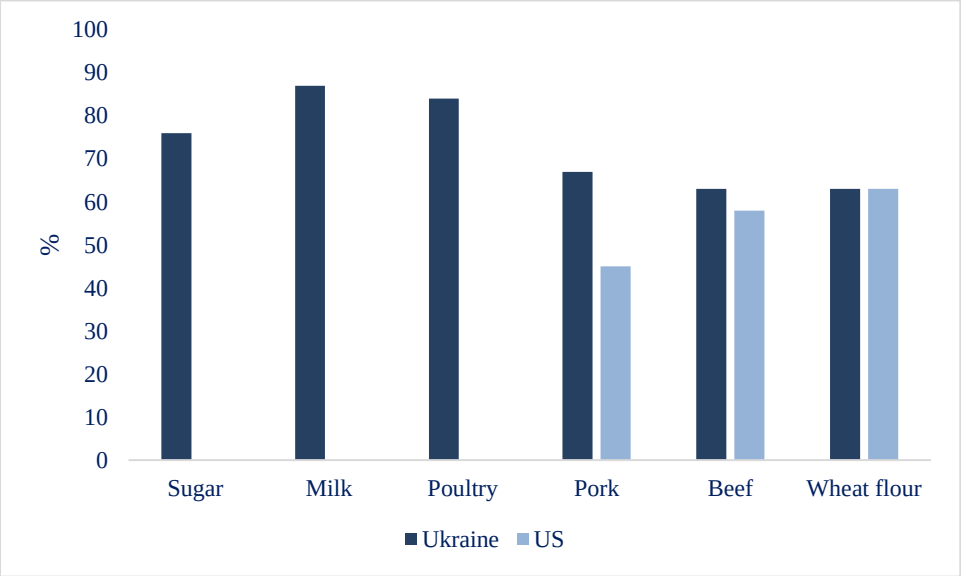


Source: Ukrstat, USDA. Note: Prices exclude VAT.

[59] Ukraine's Chamber of Commerce. (2022). The analytical note from 19.10.2022.

The shares of wholesale prices in retail food prices are generally higher than the proportions of farm-gate prices in wholesale prices (Figure 21). The highest proportions are observed for milk and poultry (87% and 84%, respectively) and the lowest – for beef and wheat flour (63% in both categories). Proportions in the US are much lower; this may indicate that local food retailers have higher market power compared to Ukraine.

Figure 21. The share of wholesale prices in retail food prices in 2021



Source: Ukrstat, USDA. Note: Prices exclude VAT.

Summary of Chapter E. Retailers took a large part of Ukraine's food market; the sector consolidated over the last years. Since the two largest retailers (ATB market and Fozzy Group) take 55% of the local food market, this may indicate their market power. Evidence from Ukraine's Chamber of Commerce confirms the discrimination of wholesale food suppliers by retailers. Nevertheless, the analysis of proportions between farm-gate, wholesale, and retail prices shows that a) the share of farm-gate prices in wholesale prices in Ukraine is lower than in the US, and b) the share of wholesale prices in retail prices is higher than in the US. It means that the marketing margin of food retailers in Ukraine is not unusually large; no discriminatory price effects to the upstream sectors are observed.

Chapter F. The active policies applied in Ukraine in the past to promote the food processing industry and their primary outcomes

1. Milling and bakery sectors

1.1. Tax benefits

From 1999 to 2016, agricultural support was primarily based on tax exemptions. First, **the preferential VAT regime for agricultural producers** (AgVAT regime) was introduced in 1999. The AgVAT regime assumed that tax credit for VAT (output VAT minus input VAT) is not subject to payment to the budget and remains at the disposal of agricultural producers for their use in further production[60].

[60] https://zakon.rada.gov.ua/laws/show/168/97-%D0%B2%D1%80#Text

Such policy had the same effect as direct subsidy. In terms of primary agriculture, such strong support demotivated farmers to increase productivity[61]; also, a large part of tax benefits and subsidies are transmitted to the supplies of production resources. The AgVAT tax regime was abolished in 2016.

Besides, the Fixed Agricultural Tax (FAT) was introduced in 1999[62]. It was a flat rate tax that replaced a number of taxes (including profit tax), leaving agricultural profits essentially untaxed. In 2015, FAT was transformed into the fourth group of the single tax.

Impact on the processing industry: Both AgVAT and FAT regimes have an indirect positive effect on the milling and bakery sectors via stimulation of milling wheat production.

1.2. Export VAT refund

In 2016, export VAT refund for the agricultural sector was introduced[63]. It allowed for avoiding double taxation since exported commodities are subject to VAT taxation in importing countries. Such policy led to the growth of domestic prices by the sum of compensated VAT[64]. This is explained by strong competition between grain exporters; they were obliged to increase bid prices to remain competitive.

Impact on the processing industry: The growth of domestic milling wheat prices triggered by export VAT refunds negatively affected the local milling industry.

2. Vegetable oils sector

2.1. Export duty for sunflower seed

In 1999, the government adopted the Law «On export (export) duty rates for seeds of certain types of oil crops»[65] and imposed a 23% duty on sunflower exports. The duty was intended to support the domestic processing industry and create value-added inside the country. The duty rate was reduced to 17% in 2001. In the process of negotiations on accession to the WTO, Ukraine undertook to reduce the export duty annually by one percentage point from 16% until the rate reaches 10%[66]. In addition, as part of the signing of the DCFTA agreement with the EU in 2016, Ukraine undertakes to reduce the customs duty by 0.9% every year for exports to the countries of the European Union[67].

The policy resulted in the massive construction of processing plants and the growth of sunflower oil production. Active demand from processors also stimulated an increase in sunflower cultivation[68]. Nevertheless, the export tax has overstimulated the growth of domestic crushing capacities. As mentioned above, these capacities exceed the total production of oilseeds in Ukraine. While soybeans and rapeseed have the potential for domestic processing, further growth of sunflower production faces some problems. During the last years, the planting areas for sunflowers either stabilized or shrunk since the further increase of the areas implies a more frequent appearance of sunflowers in the crop

[61] https://agravery.com/uk/posts/show/bitva-ekspertiv-argumenti-za-ta-proti-podatkovih-pilg-dla-agrariiv
[62] https://zakon.rada.gov.ua/laws/show/320-14#Text
[63] https://ips.ligazakon.net/document/GH3I100A
[64] http://eip.org.ua/docs/EP_17_3_111_uk.pdf
[65] https://zakon.rada.gov.ua/laws/show/1033-14#Text
[66] https://www.wto.org/english/tratop_e/tpr_e/s334_e.pdf
[67] https://eu-ua.kmu.gov.ua/tekst-uhody-pro-asotsiatsiiu/dodatky-iv-rozdil/dodatok-1-d
[68] https://apps.fas.usda.gov/psdonline/app/index.html#/app/home

rotation system associated with the spread of diseases[69] and the excessive water extraction from the soil[70]. Therefore, the domestic output of sunflowers in Ukraine can be expanded mostly via an increase in yields.

The deficit of sunflower negatively affects crush margin over the last years[71]. It is exacerbated by strong competition to Ukrainian sunflower oil from rival origins and other types of vegetable oil (palm, soybean). Besides, crushing costs in Ukraine are usually higher than in the EU countries[72]. The existence of many crushers is based mostly on the shadow sunflower market[73] which allows farmers to offer lower seed prices.

Impact on the processing industry: Stimulation of domestic processing was excessive and led to inefficient allocation of resources (underloaded capacities, inefficient crush plants). In 2020, the welfare effect of sunflower seed export duty cancellation was estimated using the partial equilibrium analysis[74]. The results show a positive general welfare effect from the liberalization of sunflower market. Meanwhile, the model faces a number of methodological issues and unrealistic empirical outcomes, and therefore can be improved during further research.

2.2. Non-refunding of VAT to soybean exporters

At the end of 2017, the amendments to the Tax Code of Ukraine were adopted, according to which soybean and rapeseed exporters were exempted from paying VAT. Soybean exporters were exempted from paying VAT for the period from 1.09.2018 to 31.12.2021, while rapeseed exporters were exempted for the period from 01.01.2020 to 31.12.2021[75]. However, these exemptions were canceled in May 2018[76]. The main motivation for such amendments was the stimulation of domestic oilseeds crush.

These so-called «soybean amendments» had a negative impact on Ukrainian agriculture via decreased domestic prices for farmers and non-refunded VAT for exporters. According to the KSE estimates, the total loss of producers and exporters of soybeans was around **88,5 mln. USD** in the 2018/19 season, while the total gain of domestic processors was **26 mln. USD**[77]. Soybean amendments provided only short-term benefits for soybean crush since they motivated farmers to decrease planting areas of the crop in the following seasons[78]. At the end of 2020, the soybean amendments were found to be ineffective and canceled by the government[79].

Impact on processing industry: Short-term benefits for oilseeds crushing industry. In the long run, these benefits would be mitigated by the drop in domestic production.

[69] https://propozitsiya.com/ua/shcho-yak-posiyaty-sonyashnyk-po-sonyashnyku
[70] https://www.agroone.info/publication/sonjashnik-vologu-vipiv-dobriva-z-iv-nichogo-ne-zalishiv/
[71] https://www.growhow.in.ua/rynok-soniashnyku-rentabelnist-dlia-fermeriv-zalyshaietsia-vysokoiu-navidminu-vid-pererobnykiv/
[72] https://agroportal.ua/blogs/zapret-eksporta-lesakruglyaka-i-poshlina-na-eksport-semyan-podsolnechnika
[73] https://agroday.com.ua/2018/10/19/chvert-ukrayinskogo-rynku-sonyashnyku-znahodytsya-v-tini/
[74] https://kse.ua/wp-content/uploads/2020/08/Vereshchahin_Thesis.pdf
[75] https://zakon.rada.gov.ua/laws/show/2245-19#Text
[76] https://zakon.rada.gov.ua/laws/show/2440-19#Text
[77] https://kse.ua/wp-content/uploads/2019/11/Policy-brief-Soy-VAT-non-refund-to-exporters.pdf
[78] https://www.ukrinform.ua/rubric-economy/3001148-posivni-plosi-olijnih-mozut-skorotitis-cerez-diu-soevih-pravok.html
[79] https://ips.ligazakon.net/document/JI00230I?an=3

3. Meat and milk sectors

3.1. Tax benefits for the livestock sector

As mentioned above, tax benefits in the form of AgVAT and FAT regimes were the primary agricultural support during the last two decades. Also, from the late 1990-s to 2010, milk and meat processors were obliged to pay their VAT payables to agricultural producers instead of paying it to the state budget[80]. As a consequence, the suppliers received essential **price top-ups.** During the fall of meat and milk processing in 2008-2010, the amount of «redirected» VAT dropped. Therefore, this mechanism was replaced by the new one that assumes the split of the processors' VAT into two parts: 1) intended for producer prices top-ups; 2) accumulated into the Special Fund with the following transferring to the producers in the form of per cow payment[81]. The new scheme started in 2011; however, it continued to use per-ton payments. Over the next few years, the proportion of the VAT used for price top-ups decreased. In 2015, this mechanism was abolished in the context of the overall tax reform.

The specific issues associated with VAT taxation are related to pig production. In contrast to other countries with African swine fever (ASF), tax service in Ukraine forces pork producers to pay VAT for liquidated animals, increasing their losses. In addition, the compensation for ASF-related losses caused is absent[82]. As for the poultry sector, the introduction of export VAT refund fostered the export of poultry meat and stimulated local meat processors to increase prices.

Impact on the processing industry: Redirection of VAT to milk and meat suppliers provided benefits to the processing sector via stimulation of domestic production. The absence of VAT compensation for liquidated pigs due to ASF exacerbated the stagnation of the pig sector and, therefore, negatively affected the meat processing industry. The export VAT refund for the poultry sector was negative for local processors since their input prices increased.

3.2. Tax benefits for the feed grain sector

As mentioned above, AgVAT and FAT regimes positively affected grain-consuming industries due to the stimulation of domestic grain production. The introduction of export VAT refund in 2016 raised local prices of feed grains and led to the narrowing of the feeding margin. A drop in profitability was especially pronounced in the not-export-oriented livestock sectors, which cannot benefit from export VAT refunds for their own production (pig and cattle breeding).

Impact on the processing industry: AgVAT and FAT maintained feed supply and, therefore, livestock supply inside the country, but to a limited extent (since feed grains are mostly exported). Export VAT refunds exacerbated the pressure on livestock production; therefore, meat and milk processors faced higher input prices.

3.3. Direct subsidies

From the 1990-s, the livestock sector received mostly **output subsidies** in the form of direct payments received: a) per ton of animals delivered for processing; b) per head of a breeding cow and pedigree

[80] https://zakon.rada.gov.ua/laws/show/805-99-%D0%BF#Text

[81] https://zakon.rada.gov.ua/laws/show/4268-17#Text

[82] https://www.unian.ua/economics/agro/10736682-tvarinniki-prosyat-skasuvati-podatok-na-znishchenih-cherez-achs-sviney.html

cow added to the existing herd above the defined minimum herd size[83]. The amount of output payments dropped essentially in 2011 amidst budget constraints.

Besides, Ukraine's livestock sector receives **input subsidies** since 2002 (and increasingly since 2016). The objects of partial budget compensation are a) breeding stocks, semen, and embryos; b) the cost of machinery and equipment produced in Ukraine.

Currently, the livestock sector support is based mostly on **concessional credits** and **partial compensation for the construction and reconstruction** of animal farms and complexes.

Impact on the processing industry: All types of subsidies positively affect the meat processing industry via support of livestock production.

3.4. Regulations related to the quality of animal products

Ukraine's WTO accession and economic integration with the EU stimulated a number of regulations related to the adoption of quality and safety standards for animal products to international benchmarks. The main regulations included:

- Adaptation to the WTO Agreement on Sanitary and Phytosanitary Measures (SPS Agreement)[84];
- Cooperation with the World Organization for Animal Health (OIE);
- The adoption of the Law «On amendments to some legislative acts of Ukraine concerning food products» № 1602-VII from 24.07.2014, intended to align Ukrainian legislation with the EU's in the field of food safety and quality[85];
- Establishment of a single food safety authority – the State Service on Safety of Foodstuffs and Consumer Protection;
- Adaptation to the private EU standards: Global GAP standards for sustainable agricultural production; QS standards for meat and meat products; FAMI-QS standards for feed quality, IFS standards for the food industry[86];
- Other regulations.

Implementing the above regulations took a lot of work for the whole food industry, particularly for meat and milk processing. A bright example is the abolishment of the second grade of milk quality according to DSTU 3662-97 «Whole cow's milk. Purchasing requirements»[87] in 2020. This policy implies that milk produced in households does not meet the quality requirements for further processing. This leads to a higher deficit of raw milk inside the country and a reduced milk processing margin[88].

[83] https://zakon.rada.gov.ua/laws/show/1877-15#Text

[84] https://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm

[85] https://zakononline.com.ua/documents/show/356878___356943

[86] http://agritrade-ukraine.com/images/ATU/%D0%91%D1%96%D0%B1%D0%BB%D1%96%D0%BE/%D0%9F%D1%80%D0%B0%D0%BA%D1%82%D0%B8%D1%87%D0%BD%D0%B8%D0%B9_%D0%B4%D0%BE%D0%B2%D1%96%D0%B4%D0%BD%D0%B8%D0%BA.pdf

[87] https://dnaop.com/html/34011/doc-%D0%94%D0%A1%D0%A2%D0%A3_3662-97

[88] https://agravery.com/uk/posts/show/drugosortnij-produkt-do-cogo-prizvede-vidmova-vid-moloka-vid-naselenna

Impact on the processing industry: WTO and EU, quality and safety regulations, were difficult to implement in Ukraine's food processing industry. In some cases (such as the abolition of the second grade for cow milk), they led to the reduced profitability of the processing sector.

4. Sugar sector

4.1. Sugar production quota (A)

The quota was implemented in 2000 to limit the amount of sugar produced by refineries at the level needed for the domestic consumption[89]. Every year, the required amount of sugar was distributed among refineries. The excessive sugar had to be exported or sold within quota A in the next marketing year. The purpose of this regulation was to balance the domestic sugar market to avoid shortage and oversupply. The quota was not binding; the government adjusted the final volume of the quota annually to the actual production level.

Impact on processing industry: Strong stimulation of local refinery, reduced economic efficiency of sugar production.

4.2. Minimal sugar prices

Simultaneously with quota A implementation, the Ukrainian government applied the minimal prices for sugar and sugar beets within quota A[90]. But since the implementation of the regulation, no refinery was penalized for the violation of the minimal prices. The Ukrainian government tried to keep domestic prices above the minimum level via interventions by the Agrarian Fund of Ukraine established in 2005. The process of interventional buying was not transparent and associated with corruption. Since the minimal prices were above the global prices, this policy was criticized during the accession to the WTO in 2008. But the Ukrainian government proceeded with this policy even after WTO accession. In 2018, both production quotas and minimal prices were canceled by the Verkhovna Rada of Ukraine.

Impact on processing industry: Strong stimulation of local refinery, reduced economic efficiency of sugar production.

4.3. Tariff rate quota

Before 2006, Ukraine's sugar market was protected by a 50% import duty. The negotiations regarding Ukraine's accession to WTO eased this restriction by the introduction of a tariff rate quota for raw cane sugar in 2006[91]. Ukraine was obliged to import 267,8 thsd. tons of cane sugar from other WTO countries using a 2% tariff rate. Despite the low tariff, the annual imports of raw sugar reached the limit of the quota only in the years of high local prices. After the hryvnia weakening in 2015, the import of raw sugar reduced close to zero due to the drop in domestic prices.

Impact on processing industry: Weak impact of local refinery due to low competitiveness of raw cane sugar on Ukraine’s market.

[89] https://zakon.rada.gov.ua/laws/show/z0673-00#Text
[90] https://zakon.rada.gov.ua/laws/show/758-14#Text
[91] https://zakon.rada.gov.ua/laws/show/404-16.#Text

4.4. Tolling restriction

Under tolling contracts, the raw cane sugar is imported duty-free, refined, and then re-exported as white sugar or in sugar-containing products within 90 days[92]. Tolling does not negatively affect the domestic beet sugar sector and provides additional benefits such as the reduction of fixed costs per unit of produced sugar, additional investments in sugar beet and refining industries, opening new export markets[93]. Nevertheless, the Ukrainian government prohibited the raw sugar toll processing in 2009 without detailed justifications[94].

Impact on the processing industry: Negative effect on the refinery sector: underloading the capacities after the short season of sugar beet processing, higher fixed costs, and lack of investments.

5. Processing of vegetables, fruits, and berries

5.1. Grants for the development of gardens and greenhouses

Before 2020, Ukraine's vegetable and fruits production did not receive product-specific state support[95]. All transfers were provided to the sector via general programs to the whole agricultural sector (particularly - small farmers' support). In 2020, the government approved the Concept of the State Target Program for the Development of Vegetable Growing for the period until 2025[96] and programs for the support of fruits and berries production. These programs were extended in 2022 in the form of grants[97]. The preliminary results show that these grants work successfully[98] and will have a positive impact on the development of new greenhouses and fruit gardens.

Impact on the processing industry: Grants have a positive effect on the domestic output of fruits and vegetables and, therefore, on the downstream sectors.

By using OECD data, we can estimate **the effect of state policy on agricultural prices** in Ukraine. Commodity-specific transfers are measured in the form of Market Price Support (MPS). MPS can be defined as the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures creating a gap between domestic producer prices and reference prices of a specific agricultural commodity measured at the farm-gate level[99]. Positive MPS provides gains for farmers and losses for consumers (particularly the food industry).

As Figure 22 shows, exported commodities (wheat, corn, sunflower) generally have negative MPS, while importable ones (meat, milk, sugar, eggs) have positive MPS due to import tariffs. This partially explains the success of the sunflower oil industry and problems in meat and milk processing.

[92] https://zakon.rada.gov.ua/laws/show/327/95-%D0%B2%D1%80#Text

[93] http://www.ier.com.ua/files/publications/Policy_papers/Agriculture_dialogue/2011/PP_33_Position_paper_on_Tolling_in_sugar_eng.pdf

[94] https://zakon.rada.gov.ua/laws/show/1782-17#Text

[95] https://fruit-ukraine.org/eng/2020/11/17/uha-ukrainian-vegetable-growers-will-receive-state-support-first-time-29-years/

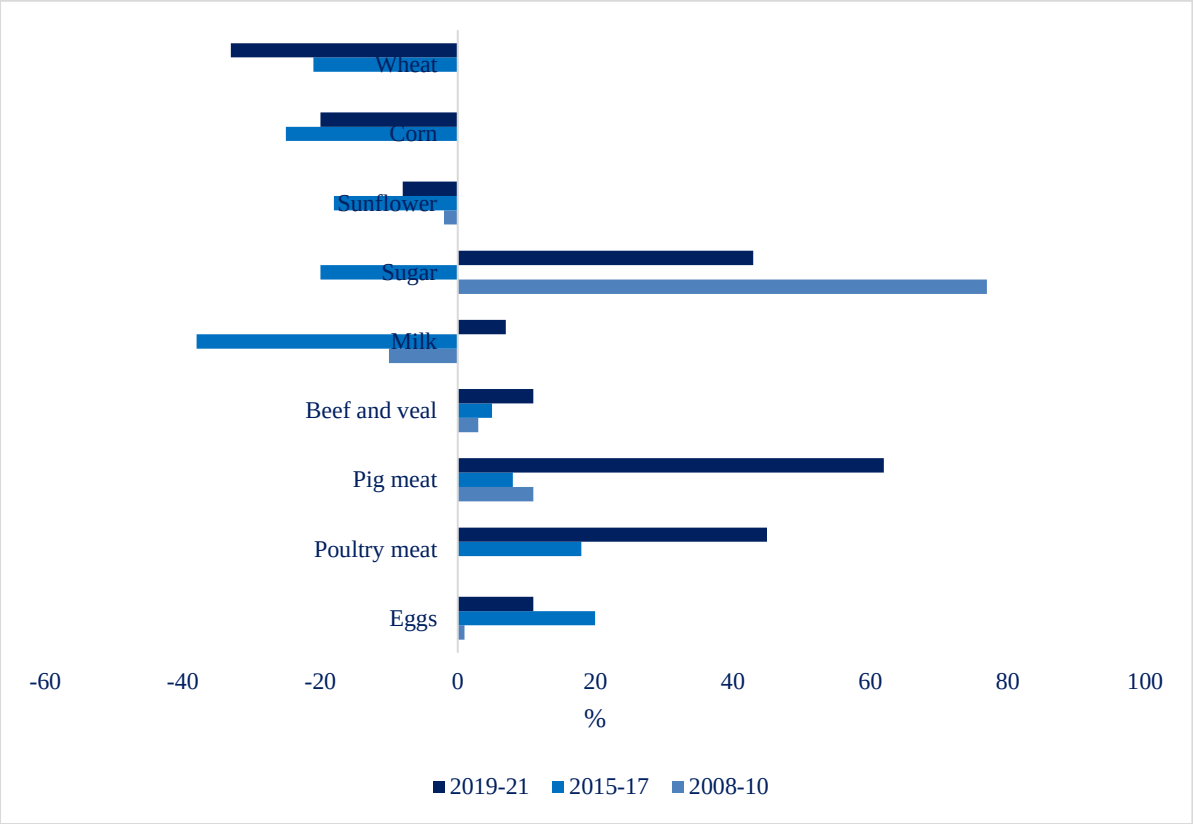
[96] https://zakon.rada.gov.ua/laws/show/1333-2020-%D1%80#Text

[97] https://ips.ligazakon.net/document/view/kp220738?an=202&ed=2022_08_05

[98] https://kurkul.com/news/32074-granti-na-sadi-ta-teplitsi-otrimali-vje-16-virobnikiv

[99] https://stats.oecd.org/glossary/detail.asp?ID=1600

Figure 22. Market price support for the main agricultural commodities in Ukraine



Source: OECD Agricultural Monitoring and Evaluation

Summary to Chapter F. The evolution of agricultural policy in Ukraine over the last decades reshaped the structure of the food processing industry. Export taxation for sunflower seeds boosted their crushing, but this development was also supported by strong international demand. By contrast, the milling industry stagnated amid unrestricted wheat exports and protected export markets for wheat flour. The soybeans crushing sector faced a similar situation; a large part of beans was exported unprocessed despite the underloaded local crushing plants. This implies the low economic efficiency of the processing industry. The stability of the sugar sector is ensured mostly by protectionist measures. This is also partially true for meat and milk processing; in the last years, these sectors have been vulnerable to competition from imported EU products.

Chapter G. Literature review of active public policies to support food processing. Relevance for Ukraine

Food processing is a crucial aspect of the food and agricultural industries. With the beginning of the war, the question of food processing started to receive even broader attention from policymakers. There are three primary reasons for it - the food processing is perceived as a way to generate the value-added, potentially improve domestic food security, and ease the critical bottleneck in the agricultural industry – logistics. With these thoughts, we hear more and more about the importance of food processing and discussions on the optimal policies to stimulate the food processing industry in Ukraine. This chapter will provide a brief overview of the existing empirical evidence regarding the state support of food processing.

Throughout this chapter, we will analyze the existing studies for their effect on productivity, efficiency, and development of the food processing companies as well as their long-term effects that eventually define the viability of the support programs.

The EU has adopted a system for stimulating, among other things, food processing – these programs are called rural development programs (RDPs)[100]. These programs are often tailored for small and medium enterprises, and there is already extensive empirical evidence to analyze the effects of these programs on food processing companies.

In the Czech Republic, the RDPs are also augmented by the national subsidies called "Support for processing of agricultural products and increasing competitiveness" that primarily target larger food processors. The list of companies that can apply to these programs is defined by the set of products they are producing. These programs offer a great scope with state support for a variety of different uses. The list includes investments in innovation, marketing, eco-energy, property, consulting, and development. A recent analysis of these support programs demonstrated that there is no positive correlation between receiving state support and the efficiency of agricultural production[101]. A similar analysis was performed for the selection of the products and studied the effect of subsidies on meat processing enterprises in the Czech Republic. In this study, models show no contemporaneous increase in labor productivity, value-added, and the overall competitiveness[102]. At the same time, the author found a positive effect on the number of employees and the value of fixed assets.

Another widely known Czech program that supported food producers was called Operational Programme Enterprise and Innovation (OPEI). The goal of the OPEI was to increase the competitiveness of Czech enterprises through financial instruments and subsidies and to bring the industry close to the level of leading industrial EU member states. The program existed from 2007 to 2013. Approximately 86 m. USD was distributed among 337 supported projects. An analysis of the result of the program found that companies that participated in the program after two years after participation had a higher price-cost margins, experienced growth of tangible assets, sales, value-added per labor cost[103]. At the same time, the authors also explain that these results could be caused by selection bias. Another group of scientists, while studying the entrepreneurs who participated in the program, highlighted that most projects would probably be materialized even without receiving a subsidy, and applicants do not condition the realization of their projects by the support regime[104].

The systemic review of 30 studies focusing on the state support to small and medium enterprises covering 13 EU countries concludes that these subsidies and grants positively affect the firm survival,

[100] Rural development programs, European Commission, https://agriculture.ec.europa.eu/common-agricultural-policy/rural-development/country_en

[101] Náglová, Z., & Pechrová, M. Š. (2019). Subsidies and technical efficiency of Czech food processing industry. *Agricultural Economics*, *65*(4), 151-159.

[102] Náglová, Z. (2018). Investment subsidies in the meat industry and their impact on business economics. *Central European Business Review*, *7*(1), 37-45.

[103] Dvouletý, O., & Blažková, I. (2019). Assessing the microeconomic effects of public subsidies on the performance of firms in the Czech food processing industry: A counterfactual impact evaluation. *Agribusiness*, *35*(3), 394-422.

[104] Wokoun, R., Kolarik, P., & Kolarikova, J. (2016). Evaluation of entrepreneurs with a focus on operational program enterprise and innovation (OPEI). Results of a Questionnaire Survey. *Economics & Sociology*, *9*(4), 272.

employment, fixed assets, and sales. At the same time, the effect on labor productivity and total factor productivity is mixed[105].

One of the frequently discussed potential support policies is the provision of a credit guarantee. The results of the study indicate that after the program, there were no statistically conclusive results for the financial outcome variables[106]. We can conclude that there is no unanimously shared opinion on the effects of subsidies on the producers' performance, especially – long-term performance. Thus, implementing the subsidy or grant support programs could be risky, especially once the shallowness of the resources is considered.

Apart from the effects of different support programs, it is also beneficial to discuss the heterogeneity in firms' performance. The analysis of EU food processors found that the firm performance (profit) depends on the firm itself rather than on the industry or country[107]. Similar analysis – comparison of the food processing industries in the EU and the US revealed more details on the profitability of the food processing industry. The persistence of profitability in food processing is lower compared to the other sectors, and it is less affected by the economic shocks[108]. What drives the profitability, according to his study – is the producer size and financial risks. The larger producers are, on average, more profitable.

However, the support options are not limited to budgetary outlays. In this chapter of the report, we also want to discuss two instruments that could be useful in policymakers' toolbox.

The first one is the non-tariff measures (NTMs) and trade liberalization. The NTMs have a negative effect on productivity; once applied to intermediary inputs, so do the input tariffs and output NTMs. This effect is not only supported by theory but also studied empirically in Ukraine[109]. And vice versa, greater competition in imported intermediate inputs in the food processing industry positively affects the producers.[110].

And the second one is related to innovation practices. The determinant for successfully implementing product innovation is the capacity to build relationships in the market[111].

Summary of Chapter G. As for the international experience, the effects of direct support measures on the performance of the food processing companies are inconclusive. These effects are likely heterogeneous in time and across different company sizes. Adopting such a support regime to enhance food processing in Ukraine is an unjustifiably risky decision. Among optimal policies that lead to

[105] Dvouletý, O., Srhoj, S., & Pantea, S. (2021). Public SME grants and firm performance in European Union: A systematic review of empirical evidence. *Small Business Economics*, *57*, 243-263.
[106] Dvouletý, O., Čadil, J., & Mirošník, K. (2018). Do firms supported by credit guarantee schemes report better financial results two years after the end of intervention? *The BE Journal of Economic Analysis & Policy*, *19*(1), 20180057.
[107] Hirsch, S., & Schiefer, J. (2016). What causes firm profitability variation in the EU food industry? A redux of classical approaches of variance decomposition. *Agribusiness*, *32*(1), 79-92.
[108] Gschwandtner, A., & Hirsch, S. (2018). What drives firm profitability? A comparison of the US and EU food processing industries. *The Manchester School*, *86*(3), 390-416.
[109] Shepotylo, O., Vakhitov, V., Movchan, V., & Panga, M. (2022). Non-tariff measures and productivity of Ukrainian food-processing firms. *Journal of Agricultural Economics*, *73*(1), 234-256.
[110] Olper, A., Curzi, D., & Raimondi, V. (2017). Imported intermediate inputs and firms' productivity growth: Evidence from the food industry. *Journal of Agricultural Economics*, *68*(1), 280-300.
[111] Capitanio, F., Coppola, A., & Pascucci, S. (2010). Product and process innovation in the Italian food industry. *Agribusiness*, *26*(4), 503-518.

productivity increase in the sector are policies aimed to expand the potential set of choices for intermediate inputs and policies that encourage communications between market participants.

Chapter H. Policy recommendations on regulations and public expenditures to support more and better food processing in Ukraine

Based on the literature review presented in the chapter G of this report and in the previous sections of the report – the direct support measures are not the best option since there is no unambiguous evidence supporting the hypothesis of the positive effect of direct subsidies on the development of the food processing industry.

In the scenario where the policymakers decide to launch such a program anyway – it is important to follow these two principles:

1. The design of the policy should incorporate the policy evaluation component. The policymaker should collect all related information to have an opportunity to analyze the results of the policy.
2. The direct support programs should be proactive and encourage investments and other activities that would not occur without the policy.

The key role of the policymakers is to set the rules and, if applicable – facilitate the public services provision. Based on our analysis – to efficiently facilitate the development of the food processing industry – policymakers should primarily focus on expanding access to markets - lobbying for new free trade agreements, and other forms of collaboration for mutually beneficial collaboration between countries.

Apart from pure diplomacy, policymakers and diplomats should serve as a bridge between domestic producers and potential importers, enhancing the transfer of knowledge and the potential for cooperation.

State agencies should serve as a supporting institution and knowledge hub that supports business activities by collecting and providing up-to data market analytics.

Policymakers should spread awareness of the ongoing regulations in the EU in simple and understandable terms. Issue some supporting materials so that producers operating in the industries affected by the regulations are at least aware of the basic principles of what is going on in our partner economies regarding the regulatory environment. Again, as we mentioned in chapter C of this report - regulations affect different countries disproportionately, while food safety regulations add up 0.6-1% to the total costs of the EU producers – the magnitude of the effect is fivefold for countries without a wide application of such requirements. More than 90% of crop imports and more than 60% of food products imports to the EU are already subject to traceability requirements. Spreading the information on these trends as well as the pre-developed roadmap for conforming with new regulations, could help producers to prepare for the upcoming changes in advance.

Such actions are relevant not only to boost food processing but to ensure the competitiveness of the whole export-oriented subsectors of Ukrainian agriculture. Ukrainian food and agricultural producers'

awareness of the ongoing trends in the EU regulations will make Ukrainian food systems more resilient in the face of the potential upcoming legislative changes.

Annex

Table A1. Main import categories of industrial inputs for Ukraine's food industry

4-digit HS code	6-digit HS code	2012	2021
3920. Plates, sheets, film, foil and strip, of non-cellular plastics, not reinforced, laminated, supported or similarly combined with other materials	All 6-digit codes in this group.	412650	405274
3923. Articles for the conveyance or packaging of goods, of plastics; stoppers, lids, caps and other closures, of plastics	All 6-digit codes in this group.	184814	206925
4823. Other paper, paperboard, cellulose wadding and webs of cellulose fibres, cut to size or shape	482390. Paper, paperboard, cellulose wadding and webs of cellulose fibres, in strips or rolls of a width <= 36 cm, in rectangular or square sheets, of which no side > 36 cm in the unfolded state, or cut to shape other than rectangular or square, and articles of paper pulp, paper, cellulose wadding or webs of cellulose fibres, n.e.s.	17040	18213
7010. Carboys, bottles, flasks, jars, pots, phials, ampoules and other containers, of glass, of a kind used for the conveyance or packing of goods, preserving jars, stoppers, lids and other closures, of glass	All 6-digit codes in this group.	70133	24860
8438. Machinery for the industrial preparation or manufacture of food or drink (other than machinery for the extraction or preparation of animal or fixed vegetable fats or oils); parts thereof	843810. Bakery machinery and machinery for the industrial preparation or manufacture of macaroni, spaghetti or similar products	23791	26317
	843850. Machinery for the industrial preparation of meat or poultry	31758	25598
	843880. Machinery for the industrial preparation or manufacture of food or drink, n.e.s.	22069	23784
	843820. Machinery for the industrial preparation or manufacture of confectionery, cocoa or chocolate	59794	10119
	843860. Machinery for the industrial preparation of fruits, nuts or vegetables	3710	9662
	843890. Parts of machinery for the industrial preparation or manufacture of food or drink, n.e.s.	5074	5313
	843830. Machinery for sugar manufacture	4523	4186
	843840. Brewery machinery	3399	2072
8208. Knives and cutting blades, of base metal, for machines or for mechanical appliances	820830. Knives and cutting blades, of base metal, for kitchen appliances or for machines used by the food industry	197	295

8417. Industrial or laboratory furnaces and ovens, non-electric, incl. incinerators	841720. Bakery ovens, incl. biscuit ovens, non-electric	8238	6371
8418. Refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat pumps; parts thereof	841810. Combined refrigerator-freezers, with separate external doors or drawers, or combinations thereof	255667	170570
	841861. Heat pumps	1031	5052
8422. Dishwashing machines; machinery for cleaning or drying bottles or other containers; machinery for filling, closing, sealing or labelling bottles, cans, boxes, bags or other containers; machinery for capsuling bottles, jars, tubes and similar containers; other packing or wrapping machinery, incl. heat-shrink wrapping machinery; machinery for aerating beverages; parts thereof	842240. Packing or wrapping machinery, incl. heat-shrink wrapping machinery	48127	64671
	842230. Machinery for filling, closing, sealing or labelling bottles, cans, boxes, bags or other containers; machinery for capsuling bottles, jars, tubes and similar containers; machinery for aerating beverages	65987	62851
	842290. Parts of dishwashing machines, packing or wrapping machinery and other machinery and apparatus of heading 8422, n.e.s.	9209	8418
	842219. Dishwashing machines (excluding those of the household type)	1850	4859
	842220. Machinery for cleaning or drying bottles or other containers (excluding dishwashing machines)	7725	3627
8479. Machines and mechanical appliances having individual functions, not specified or included elsewhere in this chapter; parts thereof	847920. Machinery for the extraction or preparation of animal or fixed vegetable or microbial fats or oils	34212	13024

Source: ITC trade map

Table D1. % of livestock products covered by categories of NTMs by countries

Reporter	Livestock, number of types of NTMs applied, % of products			
	No NTMs	1 type	2 types	3+ types
European Union (28)	4,5	2,1	74,7	18,8
USA	0,6	4,2	0,0	95,2
Japan	16,4	14,0	21,1	48,5
Canada	3,6	3,0	4,8	88,7
Russian Federation	7,1	11,9	3,3	77,7
Mexico	17,3	10,7	0,0	72,0
Viet Nam	19,4	11,6	28,0	41,1
Saudi Arabia	41,7	3,3	1,2	53,9
India	58,3	22,8	16,7	2,2
Indonesia	18,5	18,5	3,0	60,1

United Arab Emirates	1,8	0,6	0,0	97,6
Malaysia	7,1	2,4	17,0	73,5
Australia	12,2	15,5	14,3	58,0
Thailand	12,5	2,4	0,3	84,8
Turkey	39,3	7,7	18,8	34,2
Switzerland	3,3	1,2	10,7	84,8
Philippines	9,5	8,6	4,2	77,7
Singapore	26,8	2,1	0,9	70,2
Brazil	25,3	20,8	22,9	31,0
Nigeria	39,0	27,6	22,8	10,5
Pakistan	39,9	16,4	11,9	31,9
Average (for the whole sample)	41,0	11,3	13,9	33,8

Table D2. % of crop products covered by categories of NTMs by countries

Reporter	Crops, number of types of NTMs applied			
	No NTMs	1 type	2 types	3+ types
European Union (28)	1,1	3,7	87,8	7,4
USA	0,0	0,6	7,4	92,1
Japan	7,1	1,4	42,1	49,4
Canada	2,8	20,2	29,6	47,4
Russian Federation	3,7	2,0	1,1	93,2
Mexico	15,3	19,9	52,3	12,5
Viet Nam	6,3	4,8	21,6	67,3
Saudi Arabia	11,4	1,7	20,2	66,8
India	17,9	13,3	60,5	8,3
Indonesia	13,1	26,1	11,1	49,7
United Arab Emirates	2,6	0,3	0,0	97,2
Malaysia	2,0	2,3	12,8	83,0
Australia	2,6	9,7	7,7	80,1
Thailand	19,6	0,3	2,8	77,3
Turkey	7,4	30,7	17,1	44,9
Switzerland	2,0	0,9	5,4	91,8
Philippines	3,4	3,1	3,7	89,8
Singapore	11,1	13,1	13,9	61,9
Brazil	6,0	6,8	1,4	85,8
Nigeria	11,3	81,7	3,7	3,3
Pakistan	55,4	20,5	3,7	20,5
Average (for the whole sample)	24,7	15,0	20,3	40,0

Table D3. % of processed food products covered by categories of NTMs by countries

Reporter	Food products, number of types of NTMs applied			
	No NTMs	1 type	2 types	3+ types
European Union (28)	0,5	7,1	80,1	12,3
USA	0,0	1,4	6,6	91,9
Japan	3,8	1,0	57,4	37,9
Canada	1,9	4,7	12,3	81,0
Russian Federation	1,4	3,3	4,3	91,0
Mexico	15,2	18,0	25,6	41,2
Viet Nam	1,4	1,9	36,0	60,7
Saudi Arabia	16,1	0,5	14,2	69,2
India	4,7	47,2	45,6	2,6
Indonesia	5,2	10,9	21,8	62,1
United Arab Emirates	0,0	65,9	12,3	21,8
Malaysia	1,9	2,4	61,6	34,1
Australia	1,4	13,7	32,2	52,6
Thailand	10,0	1,0	0,5	88,6
Turkey	12,8	25,1	37,9	24,2
Switzerland	0,0	4,7	1,4	93,8
Philippines	1,0	2,4	0,0	96,7
Singapore	10,4	0,5	9,5	79,6
Brazil	7,1	4,3	11,4	77,3
Nigeria	5,7	18,1	56,5	19,7
Pakistan	74,9	7,1	8,1	10,0
Average (for the whole sample)	23,1	15,2	25,0	36,7

Table D4. % of imported products covered by categories of NTMs by countries

Reporter	All imports, number of types of NTMs applied			
	No NTMs	1 type	2 types	3+ types
European Union (28)	6,6	54,2	26,5	12,8
USA	37,6	33,5	7,6	21,3
Japan	40,2	16,2	12,0	31,7
Canada	4,9	42,3	28,8	24,0
Russian Federation	3,1	21,9	36,1	38,9
Mexico	51,6	19,5	13,1	15,8
Viet Nam	50,9	26,6	11,5	11,1
Saudi Arabia	32,8	18,9	11,6	36,8
India	58,6	15,5	23,2	2,8
Indonesia	39,2	19,4	17,9	23,6
United Arab Emirates	40,2	4,6	5,3	49,8
Malaysia	63,6	10,9	8,7	16,8

Australia	38,3	29,9	5,3	26,5
Thailand	70,8	10,5	2,5	16,2
Turkey	34,0	22,2	29,3	14,6
Switzerland	16,6	25,7	34,4	23,3
Philippines	30,2	14,9	13,7	41,2
Singapore	72,6	5,9	5,7	15,7
Brazil	27,7	20,8	17,1	34,4
Nigeria	22,2	54,8	17,1	6,0
Pakistan	84,2	6,0	5,3	4,6
Average (for the whole sample)	61,0	16,7	10,1	12,2

Table D5. Effective tariff rates for each of the sectors of interests

Reporter	AHS, Food products, %	AHS, Crop products, %	AHS, Livestock products, %
Albania	2,16	1,98	4,46
Angola	20,33	2,77	10,82
Antigua and Barbuda	14,98	20,02	10,65
Argentina	6,39	2,04	0,98
Armenia	7,89	1,81	13,67
Aruba	33,01	0,77	0,91
Australia	1,20	0,36	0,84
Austria	11,72	2,83	21,06
Azerbaijan	88,28	3,80	6,18
Bahrain	46,58	0,88	2,17
Belarus	26,72	2,91	4,60
Belgium	8,36	2,49	10,41
Belize	16,23	4,18	6,04
Benin	14,69	11,26	21,47
Bermuda	579,91	4,70	5,24
Bolivia	4,94	1,02	1,72
Bosnia and Herzegovina	174,40	3,57	5,44
Botswana	3,52	0,00	0,81
Brazil	9,70	3,55	2,64
Brunei	0,00	0,01	0,00
Bulgaria	8,22	2,91	3,29
Burkina Faso	7,52	3,87	3,57
Burundi	6,09	27,05	9,08
Canada	12,09	0,48	23,51
Cape Verde	25,04	6,45	16,63
Chile	0,67	0,28	0,25
China	8,51	4,79	6,25
Colombia	2,02	3,45	7,20

Comoros	7,74	0,26	0,07
Congo, Dem. Rep.	15,16	10,16	10,74
Costa Rica	3,55	2,76	14,90
Cote d'Ivoire	11,60	9,91	10,65
Croatia	9,96	2,06	3,94
Cyprus	11,41	5,64	15,66
Czech Republic	8,65	4,05	11,87
Denmark	4,70	3,30	3,93
Ecuador	16,03	4,63	1,30
Egypt, Arab Rep.	174,98	0,44	1,93
El Salvador	1,85	2,42	3,20
Estonia	5,16	6,47	9,14
Eswatini	1,42	1,41	1,30
European Union	7,97	2,69	10,26
Fiji	192,09	5,49	21,51
Finland	12,09	3,07	5,75
France	4,73	2,90	7,09
French Polynesia	4,06	4,60	1,56
Germany	8,39	2,06	16,16
Ghana	15,95	15,03	13,83
Greece	5,11	4,21	6,49
Grenada	19,63	11,91	15,59
Guyana	17,82	19,41	12,89
Hong Kong, China	0,00	0,00	0,00
Hungary	3,67	1,20	1,96
Iceland	9,20	1,03	33,13
India	53,88	37,36	23,59
Indonesia	7,05	2,16	3,81
Ireland	10,86	2,53	13,45
Italy	4,86	3,11	17,11
Japan	43,49	13,42	19,79
Kazakhstan	4,05	1,20	7,82
Kenya	24,11	26,03	34,91
Kuwait	31,96	0,85	2,20
Kyrgyz Republic	6,53	0,85	8,45
Lao PDR	0,56	2,07	2,19
Latvia	4,29	2,74	6,62
Lebanon	7,20	4,64	3,35
Lesotho	0,04	0,13	0,01
Lithuania	4,89	3,78	7,11
Macao	0,00	0,00	0,00
Madagascar	9,59	4,32	9,79
Malawi	8,88	3,63	4,90
Maldives	131,12	1,43	1,27

Mali	9,82	4,21	8,45
Malta	11,59	6,50	6,47
Mauritania	15,30	6,71	6,22
Mauritius	4,37	0,48	0,00
Mongolia	9,89	5,46	7,99
Montenegro	1,72	2,73	2,40
Montserrat	15,66	10,93	3,21
Morocco	11,93	13,72	18,19
Myanmar	5,15	2,14	2,43
Namibia	1,21	1,27	5,47
Nepal	76,60	9,10	14,29
Netherlands	7,61	2,29	25,37
New Zealand	1,00	0,20	1,69
Nicaragua	1,07	5,07	8,50
Niger	13,22	6,34	24,02
North Macedonia	12,92	5,89	6,08
Norway	20,77	18,88	52,63
Oman	1,98	0,79	1,10
Pakistan	14,52	7,89	16,64
Paraguay	4,52	0,68	0,30
Peru	0,20	0,10	0,31
Philippines	2,47	9,36	8,42
Poland	6,29	2,55	4,50
Portugal	14,51	2,01	7,78
Qatar	15,09	1,18	2,85
Romania	8,35	2,83	2,04
Russian Federation	35,23	3,00	5,58
Rwanda	14,90	12,19	22,98
Sao Tome and Principe	10,89	5,59	11,33
Senegal	13,47	10,10	12,31
Seychelles	312,78	2,24	1,53
Singapore	17,03	0,00	0,00
Slovak Republic	11,41	7,04	21,64
Slovenia	5,17	2,69	15,00
South Africa	32,08	4,17	8,52
Spain	5,06	2,81	6,36
Sri Lanka	163,73	25,89	29,57
St. Lucia	73,25	11,97	2,69
St. Vincent and the Grenadines	13,32	7,30	5,25
Suriname	15,12	23,18	25,69
Sweden	8,44	3,84	2,56
Switzerland	219,88	17,20	63,74
Tanzania	29,20	20,35	11,87

Togo	15,60	14,26	14,35
Turkey	14,03	28,30	36,31
Uganda	24,27	11,85	8,69
Ukraine	96,37	2,66	2,78
United Arab Emirates	44,84	1,79	3,08
United Kingdom	13,09	3,25	12,32
United States	379,84	0,48	1,62
Uruguay	4,37	2,13	1,75
Vietnam	5,15	6,29	5,40

Source: WITS