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## CURRENT STATE AND DEVELOPMENT PROSPECTS OF THE SOY MARKET IN UKRAINE

### Abstract

The growth of the population in the world provides increased demand for soy and its processing products. Because in low-income countries, soy and its processing products are used as a cheap vegetable protein for human nutrition, and in developed countries - as a valuable protein raw material in animal feed. The article calculates the cost of 1 kg of raw protein in protein feeds of plant and animal origin. The cost of vegetable feed per 1 kg of protein is 1.5-3.5 times lower than the cost of animal feed. The dynamics of global soybean production are shown, which indicates that in 2023/24 it was about 395 million tons. The main soybean-producing countries are Brazil, the USA, and Argentina, whose share in the total world production is more than 80%. The dynamics of soybean production and processing in Ukraine is presented. The largest soybean processors in Ukraine are such companies as Bunge, AdamPolSoya, Cargill, Kreativ OEP, Kyiv-Atlantic, Royal Taste, Vinnytsia OEP and others. The soybean market in Ukraine demonstrates significant success both in cultivation and in export and processing. Despite the difficult conditions caused by military actions and economic challenges, Ukrainian farmers were able to reach historical highs in the production and export of soybeans, ensuring high product quality and competitive prices on the world market. Soy is an export-oriented crop, about ¾ of which is delivered abroad in the form of raw materials or processed products. The largest importers of Ukrainian soybeans are the European Union, Egypt and Turkey. In connection with the innovations in the supply of soybeans to the EU, soybean producers must not only grow (use of high-quality, certified seed material, mineral fertilizers, general production and administrative costs), but also have a certificate of traceability and confirmation of the absence of deforestation throughout the production chain. Since the violation of EUDR provisions can lead to serious consequences and sanctions, namely fines of up to 4% of the total annual turnover of the enterprise for the previous financial year, confiscation of products, temporary exclusion from procurement procedures and access to public funding, including tender procedures and subsidies.

**Key words:** soy, production, export, processing, certificate of traceability, EUDR.

### Introduction

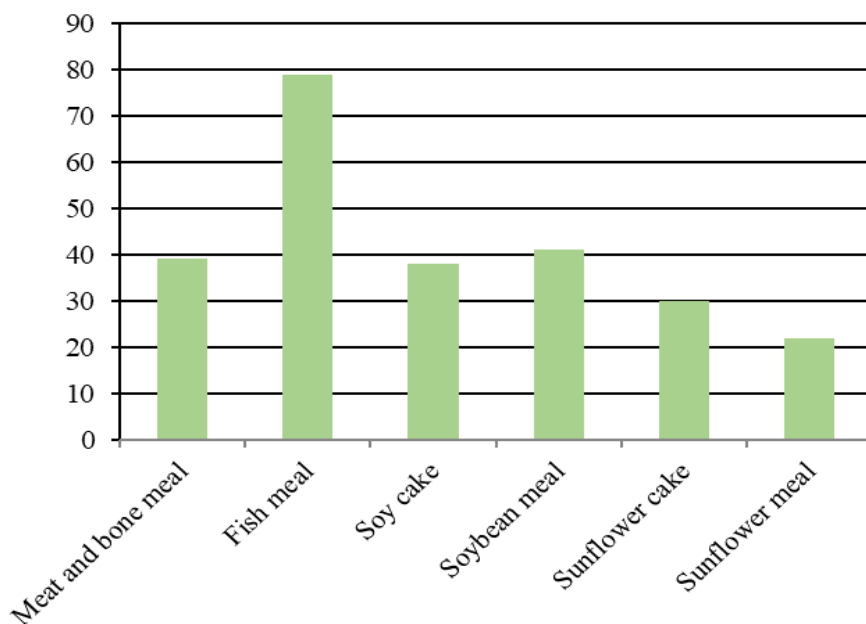
The intensification of animal husbandry depends on the full feeding of farm animals, which provides for the content of the most important nutrients and biologically active substances in the feed. In order to obtain the necessary amount of high-quality livestock products, to ensure high reproductive capacity of animals, specialists

develop animal feeding rations taking into account minimum feed costs.

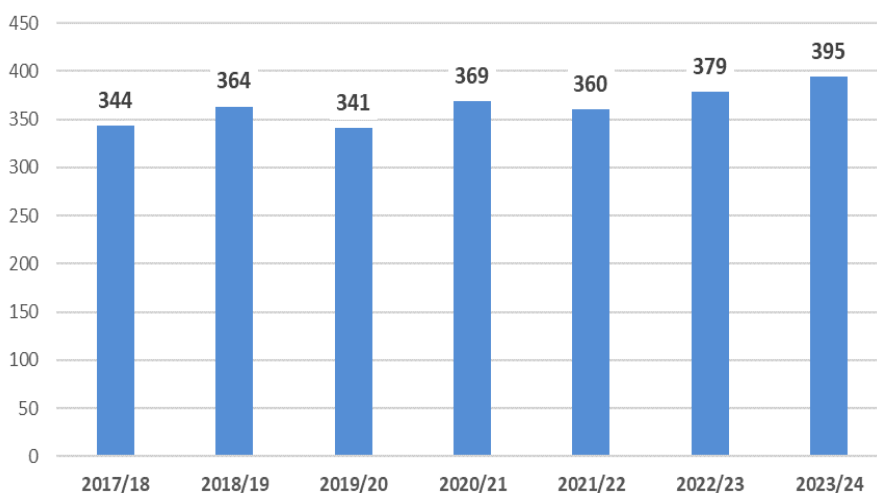
Providing farm animals with fodder protein is one of the important tasks of agriculture and enterprises that produce protein fodder or receive it in the form of waste from their enterprises. The use of by-products of food processing is of great importance in animal feeding

**Table 1 – Amino acid composition of animal and vegetable protein feeds**

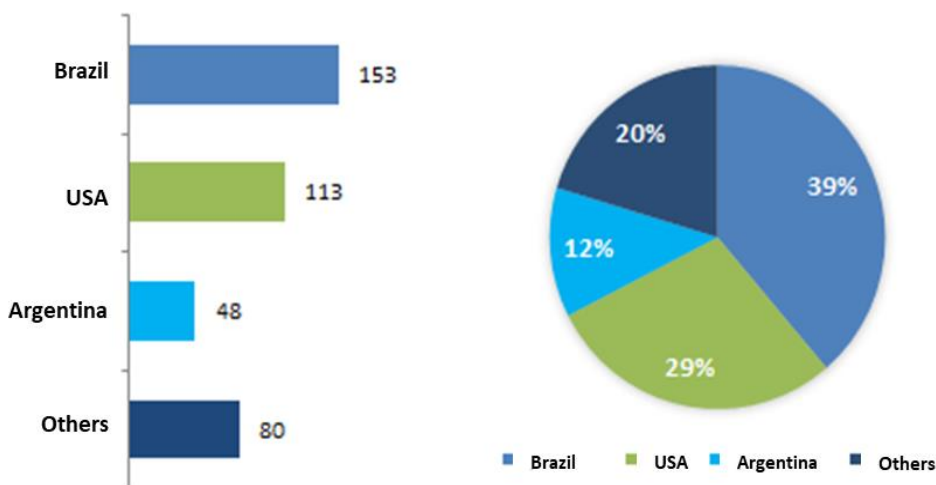
Indicators	Animal fodder			Plant fodder			
	Meat and bone meal	Meat flour	Fish meal	Sunflower cake	Soy cake	Sunflower meal	Soybean meal
<i>Content, %</i>							
dry matter	86,5	90,0	88,0	89,2	90,0	90,0	89,1
protein	41,8	56,1	59,1	33,4	41,8	34,0	37,2
<i>Content in 1 kg:</i>							
digestible protein, g	344	516,0	532,0	307,0	393,0	386	388
amino acids, g:							
lysine	35,3	40,4	47,1	13,1	26,3	14,2	28,2
methionine+cystine	11,4	12,9	25,5	15,4	11,3	16,7	10,8
tryptophan	5,1	5,8	5,3	6,0	5,7	9,9	4,8
macronutrients, g:							
calcium	94,9	61,0	59,3	3,3	4,3	3,6	2,6
phosphorus	47,8	31,0	32,6	11,6	6,9	6,7	6,6
magnesium	1,9	0,9	4,53	5,4	2,9	5,1	3,3
potassium	2,8	5,8	16,6	10,4	17,4	8,0	19,5
sodium	8,7	10,1	16,9	0,6	0,5	0,4	1,9
chlorine	4,3	8,1	10,6	1,0	0,9	0,4	0,4



**Fig. 1. Cost of 1 kg of raw protein in protein feed of plant and animal origin (\*prices for October 2022)**



**Fig. 2. World soybean production, million tons (according to USDA data)**



**Fig. 3. Major soybean producers in the world 2023/24, million tons (according to USDA data)**

programs, and also solves the problem of disposal of these by-products. The application of such solutions will allow to reduce the need of farms for fodder grain, fodder of animal origin and other expensive components used in feeding.

Balancing the diet in terms of protein content is carried out by using protein feeds of plant and animal origin, as well as feed additives. The protein content in animal feed is almost 2 times higher than plant feed, and the digestible protein content in animal feed is 1.2-1.5 times higher than plant feed (Table 1) [1].

Animal feed proteins have a much higher content of essential amino acids - lysine and methionine.

When calculating economic indicators in the feeding of farm animals, it is not necessary to calculate the cost of 1 kg of physical weight of feed or 1 kg of dry matter, but it is advisable to calculate the cost of feed in terms of 1 kg of protein (Fig. 1).

The cost of vegetable feed per 1 kg of protein is 1.5-3.5 times lower than the cost of animal feed. The cost of fodder directly affects the cost of finished livestock products and is of crucial importance for making a decision on its use.

**The purpose of the work** is to analyze the market of oil crops in Ukraine, namely production, consumption, export of soybeans and its processing products.

**Results and its discussion**

Soy is an extremely important crop, which is characterized by fodder, food, technical and medicinal values.

According to USDA estimates, world soybean production in 2023/24 (Fig. 2) was about 395 million tons, compared to 379 mil-

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lion tons in the previous season [2]. The reason for the increase in production is record areas and, accordingly, a larger harvest in Argentina, the world's leading exporter of soybean meal.

Soy is grown in many countries of the world, as it is one of the main strategic crops in the agriculture of many countries. The main soybean producing countries - Brazil, USA and Argentina are the leaders in this field (Fig. 3). In recent years, the share of the three countries that are the largest soybean producers in the total world production was more than 80%. It should be noted that the share of Brazil alone was 35-40%.

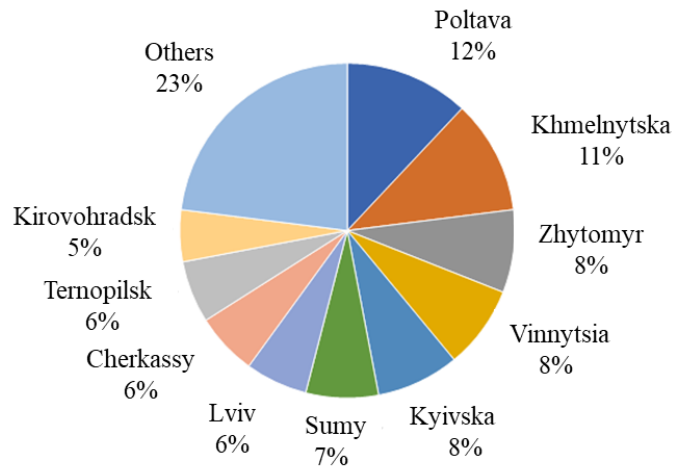
Ukraine ranks 9th in the world ranking, the cultivated area was 1.84 million hectares in 2023, which was 1% of the world data [according to USDA]. During 1990 - 2020, significant development of soybean cultivation took place in Ukraine, in particular, the sown area, gross harvest and productivity increased. This indicates the improvement of agrotechnical conditions and the efficiency of the production of this strategic crop. However, regional differences in growth rates emphasize the importance of adapting agrotechnical practices to local conditions (Table 2) [2].

**Table 2 - Sown area, yield and production of soybeans in Ukraine**

Years	Sown area, thousand ha	Average yield, tons/ha	Production, thousand tons
1990	87,8	11,3	99,3
2000	60,6	10,6	64,4
2010	1036,6	16,2	1680,2
2020	1364,3	20,5	2797,7

According to the Ministry of Agriculture and Food and the State Statute (Fig. 4), the main soybean crops in 2023 are concentrated in the central-western part of Ukraine, since 250,000 km<sup>2</sup> of the country's territory has been mined, 44.8% of this area is fields. In 2021,

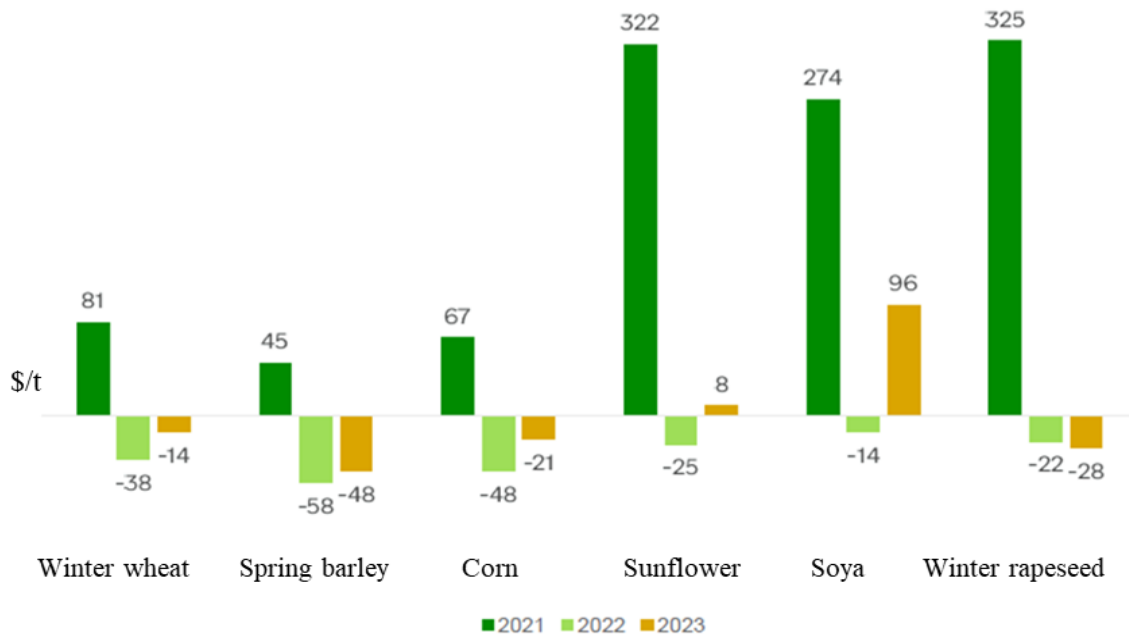
soybean acreage in the currently occupied territories of the Kherson region accounted for about 6% of the total [3-4].



**Fig. 4. Soybean cultivation by region in 2023 (thousand hectares)**

The total area of soybean cultivation in Ukraine in 2023 amounted to 1.84 million hectares and increased by 19.5% compared to 2022 (Table 3) mainly due to the reduction of the area under corn, due to the lack of nitrogen fertilizers and a significant increase in costs for growing. In addition, a key factor in the growth of soybeans is the higher profitability of production per ton, especially compared to grain crops (wheat, barley or corn). According to the calculations of the Ministry of Agrarian Policy, Policy and Food of Ukraine and UKAB specialists, in 2023 soybean was the most profitable among all crops (Fig. 5) [3-4].

The gross harvest of soybeans in Ukraine in 2023-2024 reached a historical maximum, amounting to about 5.2 million tons, which is 21% more compared to the indicator of 2022-2023 and 9% more compared to the previous maximum, which was 4.8 million tons in 2018-2019 (Fig. 6) [2, 4].



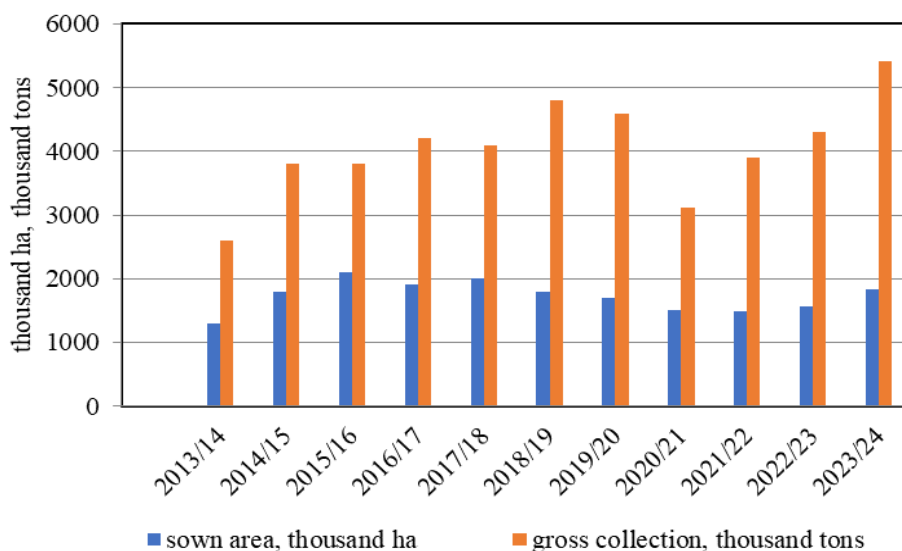
**Fig. 5. Average profitability of grain and oilseed production in Ukraine**



**Table 3 – Dynamics of the area of soybean cultivation by main cultivation regions**

Region	Area in 2015, thousand ha	Area in 2017, thousand ha	Area in 2022, thousand ha	Area in 2023, thousand ha
Poltava	540	221	134	216
Kherson	447	117	-	-
Cherkasy	368	129	110	111
Sumy	292	152	98	138
Khmelnyskyi	279	190	180	211
Vinnysia	219	145	106	141
Kyiv	214	172	106	139
Zhytomyr	173	151	160	148
Kropyvnytskyi	175	160	77	98
Ternopil	105	83	97	103
Lviv	39	58	109	120
<b>Total</b>	<b>2135</b>	<b>1982</b>	<b>1538</b>	<b>1842</b>

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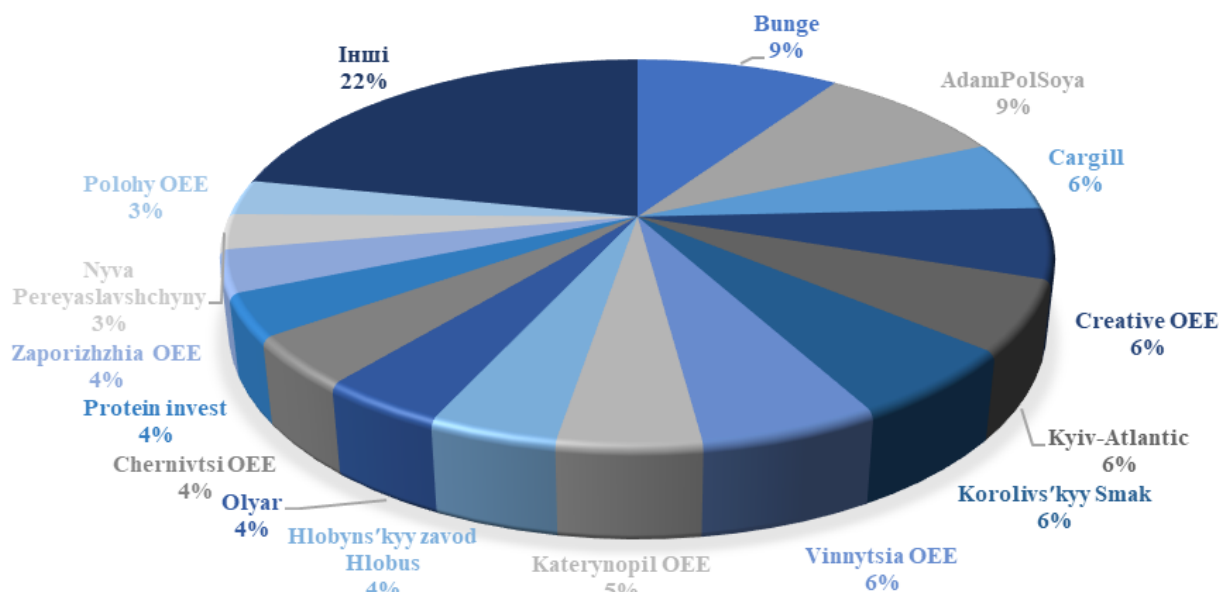


**Fig. 6. Dynamics of soybean production in Ukraine**

Along with the increase in soybean production in Ukraine, there is an increase in soybean consumption, namely, the processing of soybeans into oil in 2023-2024 amounted to 1.9 million tons, which is 12.9% more compared to 2022-2023.

The largest soybean processors in Ukraine are such companies as Bunge, AdamPolSoya, Cargill, Creativ OEE, Kyiv-Atlantic, Korolivs'kyi Smak, Vinnysia OEE and others. (Fig. 7) [4].

In 2023-2024, the export of soybeans from Ukraine reached almost 3.3 million tons, which is 5% more than last year (Fig. 7).



**Fig. 7. The largest soybean processing enterprises in Ukraine**



The largest importers of Ukrainian soybeans are the European Union, Egypt and Turkey (Table 4). Ukrainian soybean exports to Egypt in 2023-24 amounted to 32% and more than doubled compared to 2022-23, which was due to the attractive price and high quality of Ukrainian products. The share of the European Union among buyers of Ukrainian soybeans in 2023-24 was 35% and decreased compared to 2022-23 due to the increase in soybean production in Europe, as well as stricter requirements for importing products [3].

A feature of the Ukrainian soybean market is a significant number of genetically modified varieties (~50%), which are prohibited in Europe. In accordance with the Law of Ukraine "On the State System of Biosafety in the Creation, Testing, Transport and Use of Genetically Modified Organisms", the industrial production and introduction into circulation of GMOs, as well as products produced with the use of GMOs, is prohibited until their state registration.

GMO soy is popular among Ukrainian farmers due to the possibility of its cultivation with minimal costs of organic protection means and pesticides. It is cheaper to produce and gives a more stable harvest. Transgenic soy is mainly used for processing in the domestic market. To develop soybean exports to EU countries, Ukrainian farmers should grow organic soybeans without GMOs, although switching to organic farming is not easy, but profitable for agricultural producers. Farms with the status of organic production sell products 1.5-2 times more expensive.

According to the initiative of the European Commission, it was planned that by the end of 2024 the export of soybeans to the EU would be subject to new rules, the availability of a certificate of traceability and confirmation of the absence of facts of deforestation. Currently, the EU is potentially ready to postpone the implementation of this decision for another year (until the end of 2025) and give time to companies and farms to prepare a traceability base and increase technical capabilities for separate storage and transportation of these products [5-6].

The implementation of the EUDR can significantly affect the volume and geography of imports of soybeans and processed products (meal), as a violation of the provisions of the EUDR can lead to serious consequences and sanctions, namely fines in the amount of up to 4% of the total annual turnover of the enterprise for

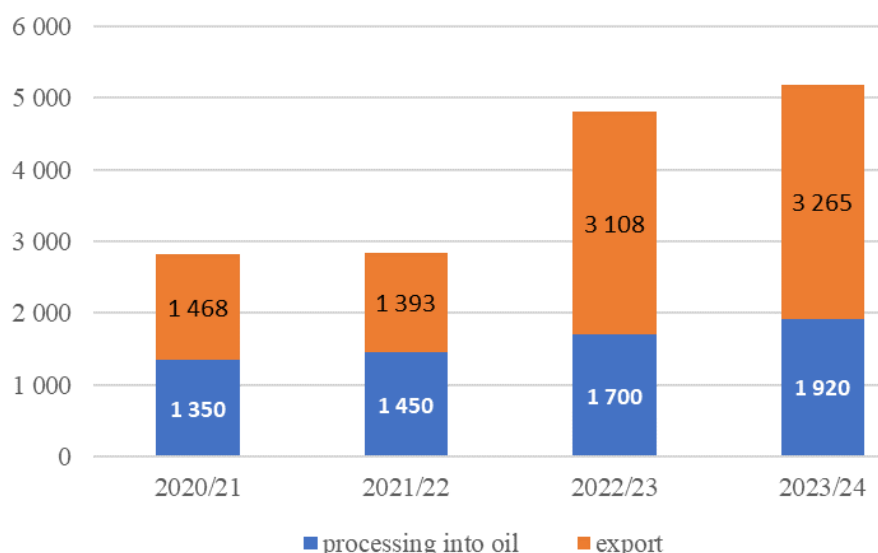


Fig. 7. Distribution of soybeans in Ukraine, thousand tonnes

Table 4 – Importing countries of Ukrainian soybeans

	2019/20	2020/21	2021/22	2022/23	2023/24
EU	731	408	426	1 490	1 041
Egypt	464	104	27	440	956
Turkey	936	546	405	1 101	674
Lebanon	146	40	17	22	80
China	73	44	37	32	34
UAE	4	6	-	18	25
Israel	47	-	-	11	20
Moldova	0,02	0,2	3	61	33
Georgia	2	3	7	19	6
Others	516	290	203	66	112

the previous financial year, confiscation of products, temporary exclusion from procurement procedures and access to state funding, including tender procedures and subsidies [7].

In 2023, the "Danube Soya" association started pilot projects to ensure compliance of soybeans and processed products with the EUDR criteria, which included the introduction of traceability of the soybean lot, the collection of geocoordinates of fields and confirmation of the absence of deforestation using remote sensing.

### Conclusions

The soybean market in Ukraine demonstrates significant success both in cultivation and in export and processing. Despite the difficult conditions caused by military operations and economic challenges, Ukrainian farmers were able to achieve historical highs in the production and export of soybeans, ensuring high product quality and competitive prices on the world market.

In connection with the innovations in the supply of soybeans to the EU, soybean producers need not only to grow (use of high-quality, certified seed material, mineral fertilizers, general production and administrative costs), and also provide documents confirming the pro-



duction of a lot of soybeans in a certain field, geocoordinates of the field, confirmation of the absence of defor-

estation after 2020 (satellite images) and the legality of production, in accordance with the legislation of Ukraine.

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## СУЧАСНИЙ СТАН ТА ПЕРСПЕКТИВИ РОЗВИТКУ РИНКУ СОЇ В УКРАЇНІ

### Анотація

Зростання чисельності населення у світі забезпечує підвищений попит на сою та продукти її переробки. Оскільки у країнах із низьким рівнем доходів населення сою та продукти її переробки використовуються як дешевий рослинний білок для харчування людей, а у розвинених країнах – як цінна білкова сировина в годівлі тварин. В статті розраховано вартість 1 кг сирого протеїну в білкових кормах рослинного та тваринного походження. Вартість кормів рослинного походження у перерахунку на 1 кг протеїну нижча у 1,5-3,5 рази в порівнянні з вартістю кормів тваринного походження. Наведено динаміку світового виробництва сої, яка свідчить, що в 2023/24 році становила близько 395 млн т. Основні країни-виробники сої – Бразилія, США та Аргентина, частка яких у загальному світовому виробництві складає більше 80%. Представлено динаміку виробництва та переробки сої в Україні. Найбільшими переробниками сої в Україні є такі компанії як Bunge, АдамПольСоя, Cargill, Креатив ОЕП, Київ-Атлантик, Королівський смак, Вінницький ОЕП та ін. Ринок сої в Україні демонструє значні успіхи як у вирощуванні, так і в експорті та переробці. Незважаючи на складні умови, зумовлені військовими діями та економічними викликами, українські аграрії змогли досягти історичних максимумів у виробництві та експорті сої, забезпечуючи високу якість продукції та конкурентоспроможні ціни на світовому ринку. Сою – це експорторієнтована культура, близько ¾ якої у вигляді сировини або продуктів переробки постається за кордон. Найбільшими імпортерами української сої є Європейський Союз, Єгипет та Туреччина. У зв'язку з нововведеннями постачання сої до ЄС виробникам сої потрібно не тільки виростити (використання якісного, сертифікованого насінневого матеріалу, мінеральних добрив, загальнопромислові та адміністративні витрати), а й мати сертифікат простежуваності та підтвердження відсутності вирубки лісів по всьому ланцюгу виробництва. Оскільки порушення положень EUDR може призвести до серйозних наслідків і санкцій, а саме штрафів в розмірі до 4% від загального річного обороту підприємства за попередній фінансовий рік, конфіскації продукції, тимчасове виключення з процедур закупівель і доступу до державного фінансування, включаючи тендерні процедури та субсидії.

**Ключові слова:** соя, виробництво, експорт, переробка, сертифікат простежуваності, EUDR.

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