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Overview of the Feed Grain Market in Moldova

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Abstract— *This article provides comprehensive information on the national grain market and addresses current issues regarding its development. It analyzes statistical data depicting the current state and trends within the Moldovan grain market, including the fluctuation of grain prices over time. This analysis draws pertinent conclusions, and the primary challenges hindering the market's effective development are highlighted. The aim of the research was to analyze the formation and development of the regional feed grain market in the economic context of the Republic of Moldova. To present and analyze the information, the realities and conditions of the grain market's functioning were examined, along with the specific features of forming the regional feed grain market.*

Keywords— ***feed, grain, market***

I. INTRODUCTION

Climate change represents the most serious crisis of our time. Global warming threatens the environment, food security, slows down economic development, and global prosperity. Deep understanding and proper management of agro-climatic and soil conditions, which form the basis of agriculture, are essential for sustainable land use and food security.

In all countries around the world, agriculture is the primary sector responsible for ensuring food security for the population, while also making a unique contribution to the overall development process. Sustainable economic development is impossible without sustainable agricultural development, which, in turn, aims to contribute to improving livelihoods so that it can achieve economic goals, implement measures to protect the environment, and promote social equality. Agriculture plays a crucial role in the global economy. Its functions are wide-ranging and include ensuring food security, stimulating economic and industrial growth, reducing poverty, narrowing income inequality, providing ecological services, and structural transformations [Byerlee et al., 2010].

The outlook projects future patterns of use of key agricultural commodities such as cereals, oilseeds, roots and tubers, pulses, sugar cane and sugar beet, palm oil, and cotton, as well as livestock products including meat, dairy, eggs, and fish, along with their by-products. These projections encompass their various uses as food, animal feed, and raw materials for biofuels and industrial applications.

Throughout the process of civilization formation, humanity has mastered highly advanced agricultural technologies and is currently capable of producing both plant and animal resources quite successfully. Estimates indicate that in modern conditions, approximately 1.5 billion hectares, or 10–11% of all land surfaces on Earth, are used for agricultural crops, while together with pastures and meadows, humans utilize 23–30% of the land.

Grains and their processed products, as mass and every day consumption goods, constitute an integral part of the agri-food and feed market, forming a relatively substantial and specific environment for the development of market relations. Nearly every inhabitant, regardless of nationality, dietary traditions, socio-economic status, or income level, participates in this market environment almost daily.

II. AGRICULTURE AS A DIRECTION OF ECONOMIC GROWTH

The demographic growth of the population urgently requires a sharp (approximately threefold) increase in food production, while actual crop yields and grain output

increase on average by 20–35% over a period of 10 years. According to FAO data, the increase in gross grain output worldwide until the mid-1970s was 75% attributed to the growth in crop yields and only 25% due to the expansion of cultivated areas [Wright, 2009].

According to forecasts, by 2032, global grain production is expected to increase from the current level by approximately 320 million tons to 3.1 billion tons, primarily driven by maize and rice. It is anticipated that, similar to the last decade, this growth will occur primarily in Asian countries, accounting for about 45% of global growth. Africa is expected to contribute more to global grain production growth than in the last decade, with maize and other coarse grains being the main drivers of growth Fig.1).

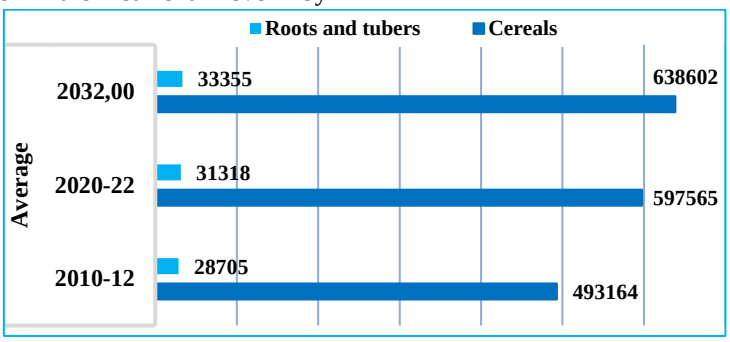

Fig.1. Regional indicators: Europe and Central Asia. Quantity produced (kt) (OECD-FAO Agricultural Outlook 2023-2032 © OECD/FAO 2023)

Latin America and the Caribbean Basin will also contribute significantly to the increase, primarily due to maize. Assuming average growing conditions in Oceania, it is not expected to maintain the record levels of production observed in the base period (OECD/Food and Agriculture Organization of the United Nations, 2023).

Global cereal production is projected to increase by 375 million metric tons (Mt), reaching 3,054 Mt by 2029, primarily due to higher yields. Maize production is expected to see the largest increase (+193 Mt), followed by wheat (+86 Mt), rice (+67 Mt), and other coarse grains (+29 Mt). Advances in biotechnology, resulting in improved seed varieties, coupled with increased use of inputs and enhanced agricultural practices, will continue to drive yield improvements (FAO Cereal Supply and Demand Brief, 2024).

However, these advancements may be tempered by the effects of climate change and associated production constraints, such as inadequate investment or land tenure issues in developing nations.

The global average cereal yield is anticipated to grow by 1.1% annually over the next decade, significantly lower than the 1.9% observed in the previous decade, while total crop area is expected to see only modest growth. These shifts are influenced by rising profitability in the Black Sea region, where production costs are comparatively lower than in other major exporting regions (OECD/FAO, 2020).

One of the most important products with a deep history in human civilization and global trade remains wheat. Currently, it is the most cultivated cereal in the world, with its planted area exceeding 220 million hectares. Developing regions account for 53% of the total harvested area and 50% of production.

Globally, the projected increase in consumption of wheat for food is more than three times larger than that for feed, especially in Asia where there is increasing demand for processed products, such as pastries and noodles. These products call for higher quality, protein rich wheat, produced in the United States, Canada, Australia and, to a lesser extent, in the European Union. Countries in the North Africa and Western Asia, such as Egypt, Türkiye, and the Islamic Republic of Iran, will remain major consumers of wheat with high levels of per capita consumption. Global production of wheat-based ethanol is expected to recover as production increases in India offsetting the reduction in other countries (OECD/Food and Agriculture Organization of the United Nations, 2023).

Wheat provides over 35% of the calories consumed from grains in developing countries, 74% in developed countries, and 41% worldwide through direct consumption. Nearly 70% of wheat is used for food, with the share for livestock feed and industrial processing accounting for 20% and 2-3%, respectively (Shiferaw, B. et al., 2013).

Wheat continues to decline in price, reaching a three-month low, as supply from the Black Sea region remains competitive. Large Russian export shipments, as well as ongoing shipments from Ukraine despite repeated Russian attacks on Ukrainian ports and grain storage facilities, have diverted attention from unfavorable weather in other wheat-exporting countries such as Canada, Australia, and Argentina, for which USDA has lowered production

forecasts for the 2023/24 season (National Statistical Office of the Republic of Moldova, 2024).

For wheat, it is anticipated that higher yields will compensate for a slight reduction in planted areas. Global production in 2024/25 is forecasted to increase by 1.2% y/y to 798.8 million tons (+9.4 million tons y/y) (Cereals market situation, 2024).

International wheat prices declined for the third consecutive month in March 2024. Favourable crop conditions in the Russian Federation and the United States of America underpinned declines of 8.9 percent and 1.4 percent, respectively, in the Russian Federation (offer, f.o.b., deep-sea ports) quotations and the benchmark United States of America (US No. 2, Hard Red Winter) values. A 5.3 percent decrease in the European Union (France, grade 1, Rouen) prices mostly reflected continued strong competition from the Russian Federation on export markets

(Food Price Monitoring and Analysis, 2024).

However, among the increased productions is Ukraine, whose harvest grew by 1.5 million metric tons to 22.5 million metric tons (previously 21 million metric tons). Additionally, Ukraine is increasing wheat exports in the new season by 0.5 million metric tons to 11 million metric tons. Wheat exports from Russia are increasing by 1 million metric tons to 49 million metric tons. While Russia's harvest remains unchanged at 85 million metric tons, many analysts believe it exceeds 90 million metric tons in reality. Turkey also sees export growth by 0.5 million metric tons (Glauber J., 2024).

The situation in the grain market (wheat and feed grains) in the 2022/23 season is somewhat ambiguous compared to the previous season. Global wheat production reached an Taking into consideration the direct feeding of cereals and the utilization of processed items like protein meal, fishmeal, cereal bran, and other related by-products in the livestock industry enables the Outlook to ascertain the sector's overall contribution to human nutrition. This approach also aids in assessing the potential ramifications of developments on global food and nutrition security.

In 2023, Moldova exported the highest volume of wheat compared to the previous three years, reaching 1,136,643 tons, with Romania becoming the primary destination, accounting for 62% of the exports. The total wheat export indicator for Moldova last year was 3.9 times higher than in 2022 (291,242 tons) and 5.3% higher than in 2021 (1,079,326 tons). However, the average export price of wheat in 2023 was the lowest in the past three years, at 3.77 lei/kg, which was 29.7% lower than in 2022 (5.39 lei/kg) and 10.5% lower than in 2021 (4.21 lei/kg). This situation

unprecedented level, and global stocks are increasing. Conversely, production of maize and other feed grains was insufficient to meet demand, leading to an expected reduction in global feed grain stocks by the end of the 2023 season. million tonnes of grains by April 2023, which helped increase supplies and alleviate some uncertainty in grain markets; however, shipments from Ukraine remain limited.

The WASDE report made new adjustments to the agricultural commodities market. Global wheat production was estimated at 787.34 million metric tons, a decrease of 6.03 million metric tons from August 2023 (793.37 million metric tons). Production declined in regions such as the European Union, down by 1 million metric tons to 134 million metric tons, Canada by 1 million metric tons to 31 million metric tons, and Australia by 3 million metric tons from 29 million to 26 million metric tons.

The IGC has released its first comprehensive forecasts for the 2024-2025 period, predicting that the total global grain production volume will increase to 2,332.2 million tons (+27.9 million or +1.2% y/y), potentially setting a new record. Taking into account new highs in key

consumption markets, total demand is forecasted at a record-high level of 2,330.7 million tons (+24.2 million or +1.1% y/y), including 767.2 million tons (+0.7%) for food, 1055.9 million tons (+1.0%) for feed, and 375.9 million tons (+0.9%) for industrial use. After several years of consecutive declines, ending stocks are expected to slightly increase to 600.8 million tons (+0.2% y/y) (IGC sees record global grains crop in 2024/25, 2024).

III. FEED GRAIN MARKET IN MOLDOVA

is not unique to Moldova but is observed in the global market as well, where grain prices were 15.4% lower than the 2022 average.

Romania became the main destination for wheat exports from Moldova, with a volume of 707,000 tons, accounting for 62% of the total exports of approximately 1.14 million tons last year. The volume of wheat exported to Romania in 2023 was 4.4 times higher than the exports to this country in 2022 (160,200 tons) and 18 times higher than in 2021 (39,700 tons). While in 2021, only 17 companies in Moldova exported wheat to Romania, this number increased 4.5 times to 77 companies in 2023.

Previously, Turkey accounted for the majority of Moldova's wheat exports, but starting from April 2023, Turkey imposed a 130% tax on grain imports, leading traders from Moldova to redirect their exports to RomaniaTop of Form (InfoMarket, 2024).

Overall, the gross agricultural output of the Republic of Moldova in all categories of farms increased by 23.6% in 2023 compared to 2022, according to preliminary estimates, at comparable prices. Meanwhile, crop production increased by 35.1%, whereas livestock production decreased by 1.9% (Gross agricultural production in 2023, (2024) (Fig. 2).

The dynamics of production for the main types of agricultural products over the past two years have shown an increase in agricultural crop production, including grains, in 2023 compared to the previous year (Table 1).

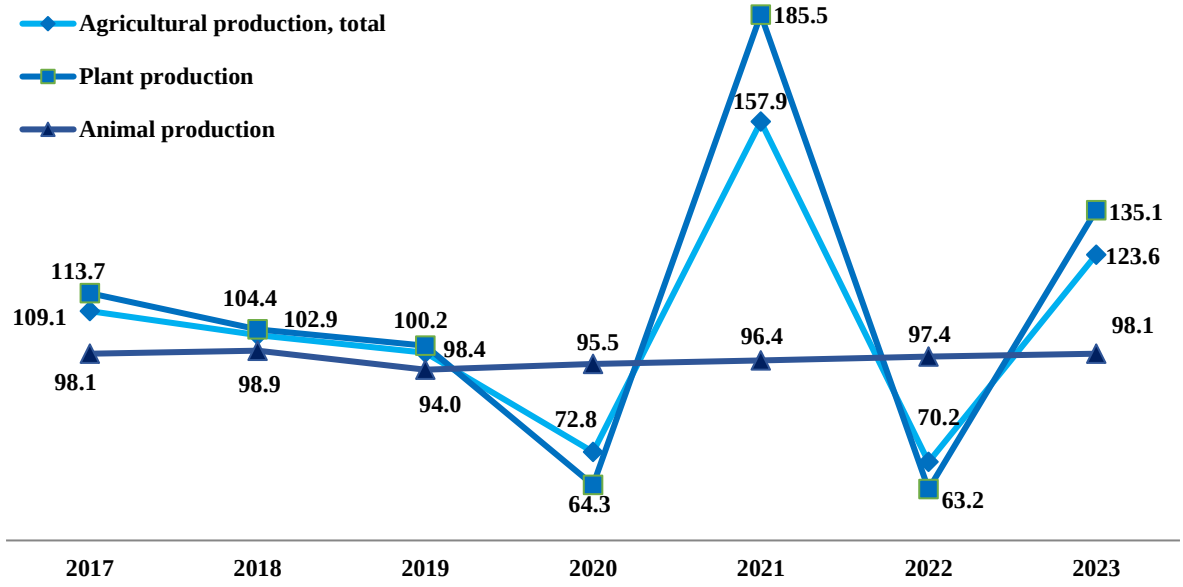

Fig.2. Dynamics of annual indicators of total agricultural production in all categories of farms in Moldova from 2017 to 2023 (the previous year is taken as 100%) (National Statistical databank, 2024).

Table 1. Production of main agricultural products in farms of all categories in Moldova

Indicators	Agricultural production, thousands of tons		Agricultural production in 2023, % of 2022	The degree of influence of agricultural products on growth (+), decrease (-) in global agricultural production in 2023 compared to 20224, %
	2022	2023		
Agricultural production - total	x	x	x	+23,6
Plant production	x	x	x	+24,2
of which the main types:				
Cereals and legumes - total	1784,4	3196,4	179,1	+14,6
from which:				
wheat	855,0	1551,7	181,5	+7,7
barley	132,7	242,6	182,8	+1,1
corn for grains	752,3	1336,9	177,7	+1,1
legumes for grains	26,3	37,7	143,2	+0,2
Soya	32,4	38,0	117,4	+0,1
Rapeseed	77,4	210,9	272,6	+3,3

The global growth in crop production is mainly driven by increased productivity rather than expansion of land use. Therefore, investments in improving yield and farm management are crucial. Assuming further progress in plant breeding and transition to more intensive production systems, it is projected that yield improvement will account for 79% of global crop production growth, expansion of arable land for 15%, and higher farming intensity for 6% over the forecast period. However, the yield of crops such as oil palm and rapeseed in major producing countries has not increased over the past decade; additional investments are needed to increase the yield of these crops.

In the Republic of Moldova, the 2023 harvest compared to 2022 is characterized by a significant increase in the production volumes of major agricultural crops: cereals and legumes increased by 79.1% (including barley by 82.8%, wheat by 81.5%, maize for grain by 77.7%, legumes for grain by 43.2%), and soybeans by 17.4% (Table 2, Figure 2, 3).

Table 2. Average yield of main agricultural crops in farms of all categories, centners per hectare

Indicators	2022	2023	2023 as a percentage of 2022
Cereals and legumes - total	20,9	33,4	159,8
din care: from which:			
Wheat	25,8	41,3	160,1
Barley	24,4	40,4	165,6
Corn for grains	17,4	28,0	160,9
Legumes for grains	9,1	10,6	116,5
Soya	13,9	15,4	110,8
Rapeseed	22,6	25,5	112,8

In 2023, agricultural enterprises produced the majority of grain and legume crops for grain, accounting for 61.5% overall (including barley - 79.6%, wheat - 76.5%, legumes for grain - 52.3%), and soybeans - 56.3%.

Additionally, 59.4% of maize for grain was produced in households and peasant (farm) households.

The shift towards consuming high-quality animal-derived food products by the population has led to a redirection of the country's grain supply from its food component to its feed component.

The reliable provision of grain and the development of its export are directly linked to the increase in production and improved utilization of grain for feed purposes, as it is primarily the feed grain consumption that drives this shift. Feed grain serves as the foundation for livestock production and constitutes the predominant raw material for the compound feed industry, thereby shaping the intersectoral proportions in the agro-industrial complex, determining the development of the entire grain market, and holding significant socio-economic importance both nationally and regionally.

The feed grain market holds a special place in the agricultural food markets system. Its level of development significantly influences the nature of the reproductive process across the entire national economy in any country. Moreover, the characteristics of feed grain as a commodity make this market unique not only in economic but also in political and social aspects.

The forecast for global consumption of feed grains in the 2023–2024 season has also been revised upward by 2.5 million tons, driven by the possible increase in maize and barley consumption for feed purposes. With the upward revision, it is projected that the total consumption of feed grains in the 2023–2024 season worldwide will reach 1,509 million tons, which is 1.5 percent higher than the level of the 2022–2023 season (The food forecast provides a brief overview of the markets, 2024).

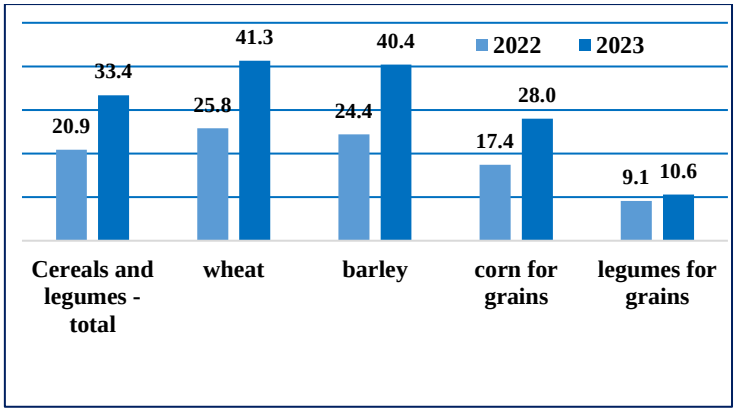

Fig.2. Yield of grains in farms of all categories in Moldova, centners per hectare

Global trade volumes of feed grains in the 2023/24 period will reach 221 million tons, which is 1.4 percent higher than in 2022/23, primarily due to increased trade in sorghum and, to a lesser extent, maize. This growth will be driven by the expected increase in purchases of all types of feed grains by mainland China, as well as the resumption of maize imports by several countries, primarily in Asia, following reduced purchases in the previous season. The recovery of sorghum and maize sales by the United States and, to a lesser extent, increased maize shipments by Brazil will contribute to the increase in global feed grain exports [Cereals market situation, 2024].

According to estimates, global sales of feed grains are expected to reach approximately $50.0 billion USD in 2024. The compound annual growth rate (CAGR) of the market is projected to be 3.4% over the forecast period, with the total valuation reaching $70.0 billion USD by 2034.

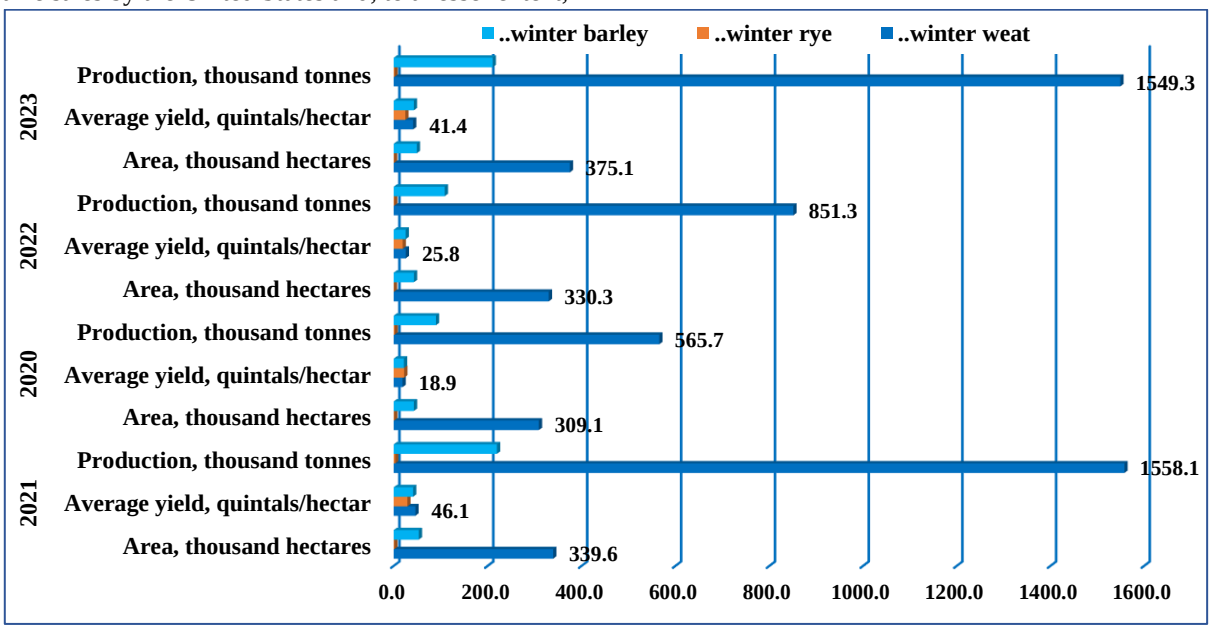

Fig.4. Production and average yield by Agricultural crops and Years in Moldova

Feed grains, including maize, wheat, barley, and sorghum, play a crucial role in animal feed production. They are rich sources of carbohydrates, proteins, and other nutrients used for feeding livestock and poultry.

With the growth of the world population, the demand for animal protein sources such as meat, eggs, and dairy products is also increasing rapidly. This, in turn, will create favorable growth opportunities for feed grain producers and suppliers.

In recent years, sustainable agriculture has also gained traction. Feed grain producers are increasingly adopting sustainable agricultural practices to maintain ecological balance and resource-efficient farming methods to minimize the environmental footprint of feed grain

cultivation. (Feed Grain Market Outlook from 2024 to 2034).

Global feed grain reserves at the end of the 2024 season are projected to reach 366 million tons, which is 3.9 percent higher than the previous year's value. An increase in corn reserves is expected, primarily in the United States, and to a much lesser extent, an increase in barley reserves among its producers. Evidence of an improvement in the supply situation in 2023/24 will be the increase in the ratio of reserves to their utilization (domestic consumption plus exports) among major exporters, from 13.0 percent in 2022/23 to 14.5 percent in 2023/24. Expanded deliveries and reduced prices will lead to a 1.7 percent increase in total feed grain consumption in 2023/24, primarily for livestock feed, followed by industrial needs and, to a lesser extent, food purposes. The increase in livestock feed consumption by 2.6 percent is driven by high demand for feed (The global food situation,2024; Statistical databank, 2024).

In 2023, the share of livestock production from the total volume of agricultural production in Moldova was 25% (compared to 69% for crops and 31% for livestock in 2022) (Table 3).

Table 3. Livestock production by main types in 2023

Indicators	Total	In % by 2022	Share (% of total)
Production (raising) of animals (in live weight) – total, thousand tons	168,2	98,6	100,0
of which:			
Agricultural enterprises	94,1	99,5	55,9
Households of the population	74,1	97,5	44,1
Milk – total, thousand tons	261,3	96,6	100,0
of which:			
Agricultural enterprises	43,3	115,1	16,6
Households of the population	218,0	93,6	83,4
Eggs - total, million pieces	585,3	95,5	100,0
of which:			
Agricultural enterprises	252,8	91,5	43,2
Households of the population	332,5	98,8	56,8

The National Bureau of Statistics of the Republic of Moldova reports that in 2023, compared to 2022, agricultural production in all categories of farms increased by 23.6% (at comparable prices). Specifically, plant production increased by 35.1%, while livestock production decreased by 1.9% (InfoMarket-22.02.2024).

To enhance the efficiency of livestock production and ensure better provision of animal-derived food products to the population, a sustainable supply of feed grains to the livestock sectors is essential. The regional feed grain market is an integral part of the national grain market and constitutes a complex multifunctional economic system.

The dynamics of producer price indices for agricultural products in Moldova over the past two years (in %, compared to the previous year) showed that Livestock production (growth) in all categories of farms decreased by approximately 1.4% in 2023 compared to 2022. The decline in production was driven by reductions in production in households (-2.5%) and agricultural enterprises (-0.5%) (Table 4) (National Statistical Office of the Republic of Moldova. Agriculture. 2024).

It is a fact that growth in total factor productivity (TFP)—the efficiency with which producers combine factors of production to produce output—has driven much of the growth in agricultural production over the past two decades, although progress has been uneven across countries and sectors. The productivity gap among farms remains large, and improving the productivity of lagging farms remains a structural adjustment challenge even for countries with high productivity scores.

*Table 4. Dynamics of agricultural producer price indices products (% of the previous year)**

Indicators	2023 as a percentage of 2022	2022 as a percentage of 2021
Agricultural products - total	82,2	113,6
Crop products	77,8	113,2
including by main types:		
Cereals and legumes - total	75,8	121,0
of which:		
Wheat	65,4	128,4
Barley	63,1	125,2
Rye	66,2	109,9
Corn for grain	83,0	109,8
Leguminous crops	109,8	123,9
Livestock products	102,7	116,0
including by main types:		
Animals (live weight) – total	102,1	114,9
of which:		
Cattle	96,0	118,8
Pigs	104,4	118,6
Poultry	100,8	110,1
Milk of all types	107,7	113,5
Food eggs	104,2	126

**Dynamics of prices of agricultural producers in 2023.03/06/2024.* (National Statistical Office of the Republic of Moldova. Agriculture. 2024)

IV. CONCLUSIONS

- The significance of the feed grain market within the agricultural food markets system cannot be overstated. Its development profoundly impacts the reproductive processes of entire national economies. Additionally, the unique characteristics of feed grain as a commodity render this market not only economically significant but also politically and socially influential. The projected increase of 2.5 million tons suggests a growing demand for feed grains worldwide. With this adjustment, it is anticipated that total consumption of feed grains in the 2023–2024 season will reach 1,509 million tons, reflecting a 1.5 percent rise compared to the previous season. This indicates sustained growth in demand for feed grains, highlighting their continued importance in sustaining livestock production and ensuring food security on a global scale.

- The agricultural sector in the Republic of Moldova experienced a substantial increase in production volumes of major crops in the 2023 harvest compared to 2022. This was especially pronounced in barley (79.6%), wheat (76.5%), and legumes for grain (52.3%), with soybeans also featuring prominently at 56.3%. Furthermore, households and peasant (farm) households were significant contributors to maize for grain production, accounting for 59.4% of the total output.

Overall, these statistics indicate a robust performance of the agricultural sector in Moldova during the 2023 harvest, driven by increased production across key crop categories, primarily facilitated by agricultural enterprises.

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