THE 18TH EDITION OF THE INTERNATIONAL CONFERENCE
EUROPEAN INTEGRATION
REALITIES AND PERSPECTIVES

Management of Budgets for Agricultural Crops in the 2023-2024 Agricultural Season

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Abstract: The purpose of the article is the in-depth analysis and information of domestic agricultural producers regarding the specifics and peculiarities of the 2023-2024 agricultural season and practical recommendations regarding the reduction of negative effects in the context of the economic crisis and recession. In this context, the authors analyzed the situation of the income and expenditure budgets for the year 2021 and their estimate for the 2023-2024 agricultural season (2020 and 2022 were excluded from the analysis, because they were years with pronounced droughts, and the price of agricultural production of was quite tall). The final conclusion of the group of authors boils down to: lavender culture is highly profitable, the production processes are fully mechanized and it is a payment with increased resistance to drought (in dry years the quality of the essential oil is higher), which is extremely important in conditions of climate resilience and it is recommended to be practiced for small farmers to diversify incomes in rural areas.

Keywords: budget; profitability; sales income; cost of sales; gross margin; cash flow; agricultural crops; comparative analysis

JEL Classification: M21; Q12; Q19

1. Introduction

During the years 2022-2023, there was a very high uncertainty on the market in the Republic of Moldova, which even in the most successful management or risk management books are not described as many risks as existed and still persist in our country or with that our entrepreneurs faced.

If we are to list all the risks of the years 2022-2023, then we are referring, first of all, to the consequences of the pandemic, the war in the neighboring country (which led to the disruption and increase in the cost of logistics because a large part of the means of production were imported through Odessa (Ukraine)), the energy crisis (the exorbitant price of everything related to energy resources and especially gas and electricity), the economic crisis (which led to increased inflation and higher credit prices - the available credit resources which were not in abundance, and the existing ones were expensive) and last but not least, the terrible drought.

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2. Related Work

Agricultural producers must understand the difficulties of the new agricultural season 2023-2024 by ensuring impeccable management related to cost optimization (especially for mineral fertilizers / fuel by moving as quickly as possible to conservative agriculture), supply at advantageous prices with agricultural inputs, technological discipline and, in particular, the total exclusion of technical credits offered by suppliers (they increase the cost of production means by 15-25%).

Agriculture represents the sector of the national economy which is the most exposed and vulnerable exposed and exposed to natural risks / climate change, energy crisis and pandemic. The main factor that determines the size, quality and stability of agricultural production in the Republic of Moldova is the agro-climatic conditions, in particular, the lack of humidity largely conditioned by droughts, the presence of which is becoming increasingly disastrous and with severe consequences. Temporary droughts have become a rather dangerous natural phenomenon and have an almost chronic character.

3. Concept and Terms

Group of authors developed the economic-financial budgets for the cultivation of agricultural crops, which can be considered an important source of information for benchmarking. The authors used data from the primary records in agricultural enterprises.

4. Solution Approach

Next, it is proposed to analyze the evolution of purchase prices for mineral fertilizers in the Republic of Moldova for the years 2020-2023, because this category of inputs has the largest increases for the 2021-2023 agricultural season, mineral fertilizers having a large share in the cost structure of crops field and practically directly influence the level of harvests per unit area.

Table 1. Analysis of the Evolution of Purchase Prices for Mineral Fertilizers in the Republic of Moldova, Years 2020-2023

The name of the mineral fertilizer	Years, lei / kg				Comparison January 2023 % compared to:		
	January 2020	January 2021	January 2022	January 2023	January 2020	January 2021	January 2022
Ammonium nitrate N 34.4%	5.4	5.8	15.0	17.0	313.4%	293.1%	113.3%
Ammonium sulfate N-21%, S-24%	4.9	5.6	14.0	15.0	306.1%	267.9%	107.1%
Carbamide (Urea) N46.3%	7.0	8.5	22.0	18.0	257.1%	211.8%	81.8%
Nitroamophosca NPK 16:16:16	7.5	8.4	16.0	19.5	259.1%	232.1%	121.9%
Diamophosca NPK-10:26:26	8.9	9.0	18.0	21.0	235.3%	233.3%	116.7%
Sulfoamofos N20 P20 Sulfur13.5	7.2	9.7	16.0	19.5	271.8%	201.0%	121.9%
Amophos N12 P52	10.0	12.7	20.0	24.0	240.6%	189.0%	120.0%
Potassium Chloride, KCl 60%	7.5	8.8	14.0	14.0	186.0%	159.1%	100.0%

Source: developed by the group of authors

Analyzing the data in the table, we conclude that the purchase prices of mineral fertilizers have increased considerably in the year 2022 - 2023 compared to the year 2020 - 2021. In particular, the greatest increase is noted for nitrogen-based mineral fertilizers where the increase varies from approx. 3 times

for the same period. This fact will directly influence the increase in the production costs of cereals (especially winter wheat, maize, sugar beet and less barley).

All these disturbances in import prices are conditioned by the energy crisis in the world and most strongly by the imposition of quotas on the export of mineral fertilizers from the Russian Federation, which negatively influenced this growth.

Importantly, in this context, the diversification of mineral fertilizer imports from other countries (Uzbekistan, Kazakhstan, etc.) becomes an urgent imperative and all specialized suppliers in partnership with the Government must facilitate as urgently as possible the fulfillment of the need for mineral fertilizers for the local market and the reduction speculative prices motivated by fertilizer shortages.

A special emphasis in this article was given to the analysis income and expenditure budgets for the year 2021 and their estimate for the 2023-2024 agricultural season (the year 2020 and the year 2022 were excluded from the analysis due to the drought), and their comparison made it possible to elucidate the alarming situations and what needs to be done to not incur losses or simply to cover costs for the new agricultural season.

One thing is certain, that all agricultural enterprises must have elaborated income and expenditure budgets (especially in the created conditions), and the use of budgets allows the enterprise to organize the production process much more efficiently, to select more correctly the convenient aggregates from the point of view from an economic point of view and necessary for the execution of each work, and finally, to reduce labor and material-financial costs for a unit of product. At the same time, the enterprise obtains the opportunity to perform a preventive economic evaluation of the finished production, determine its competitiveness and reduce the risks related to the production process.

In the context of the situation created on the regional markets, the Republic of Moldova will be affected by the energy crisis extremely strongly, because most of the energy resources and means of production are imported. All these created high prices require farmers to have exemplary and efficient financial management to survive these unprecedented challenges.

In this sense, the budgets for 10 agricultural crops (the most representative) were analyzed, where the budgets for a normal agricultural year (without economic recession - the 2021 season) were systematized and the budgets for the new agricultural season (years 2023-2024) were estimated) based on trends outlined in the purchase prices of agricultural inputs and the marketing of agricultural production.

Table 2. Analysis and Comparison of the Budgets for the Cultivation of Agricultural Crops in the Republic of Moldova

No.	Specification of plum variety and cultivation technology	Harvest per hectare, t/ha	Revenue from sales, lei/ha	Cost of sales, lei/ha						Profit, lei/ha	Economic return, %	Economic calculations for 1 kg of production, lei/kg			Annual cash flow available, lei/ha
				total	inclusive							The average selling price,	Unit cost, lei/kg	Gross margin (commercial	
					means of production	mechanized services	manual operations	other costs (including payment	unexpected expenses						
Analysis of revenue and expenditure budgets at the level of 2023															

1	Autumn wheat	6.00	22,800	21,779	12,430	3,587	172	3,610	1,980	1,021	4.7%	3.80	3.63	0.17	1,021
2	Autumn barley	5.50	19,800	18,319	9,405	3,504	135	3,610	1,665	1,481	8.1%	3.60	3.33	0.27	1,481
3	Maize	7.50	24,750	18,920	8,946	4,451	192	3,610	1,720	5,830	30.8%	3.30	2.52	0.78	5,830
4	Soybean	2.50	22,000	21,097	11,087	4,412	70	3,610	1,918	903	4.3%	8.80	8.44	0.36	909
5	Rape	3.20	28,800	24,068	14,317	3,803	150	3,610	2,188	4,732	19.7%	9.00	7.52	1.48	4,732
6	Sunflower	2.70	21,060	15,728	6,560	4,038	90	3,610	1,430	5,332	33.9%	7.80	5.83	1.97	5,629
7	Technical grapes	16.67	76,667	62,389	20,175	4,594	23,263	8,686	5,672	14,277	22.9%	4.60	3.74	0.86	23,711
8	Vertical table grapes	16.19	101,190	79,054	25,596	4,963	32,602	8,706	7,187	22,136	28.0%	6.25	4.88	1.37	31,592
9	Common plum	16.67	96,667	64,568	23,625	4,918	22,337	7,818	5,870	32,098	49.7%	5.80	3.87	1.93	40,577
10	Apples M-9 (without mesh)	55.56	258,333	201,679	65,274	10,682	59,439	47,950	18,334	56,654	28.1%	4.65	3.63	1.02	109,577
Analysis of estimated revenue and expenditure budgets for 2021															
1	Autumn wheat	6.00	24,000	18,054	11,262	3,098	143	1,910	1,641	5,946	32.9%	4.00	3.01	0.99	5,946
2	Autumn barley	5.50	19,250	14,981	8,566	3,028	114	1,910	1,362	4,269	28.5%	3.50	2.72	0.78	4,269
3	Maize	7.50	24,000	14,926	7,663	3,836	160	1,910	1,357	9,074	60.8%	3.20	1.99	1.21	9,074
4	Soybean	2.50	25,000	16,615	9,332	3,804	58	1,910	1,510	8,385	50.5%	10.00	6.65	3.35	8,390
5	Rape	3.20	32,000	19,557	12,462	3,282	125	1,910	1,778	12,443	63.6%	10.00	6.11	3.89	12,443
6	Sunflower	2.70	25,650	15,102	8,261	3,483	75	1,910	1,373	10,548	69.9%	9.50	5.59	3.91	10,779
7	Technical grapes	16.67	78,667	54,178	17,981	3,999	19,386	7,886	4,925	24,489	45.2%	4.72	3.25	1.47	33,043
8	Vertical table grapes	16.19	109,286	68,726	22,870	4,324	27,435	7,849	6,248	40,559	59.0%	6.75	4.24	2.51	49,073

9	Common plum	16.67	76,667	53,947	19,028	4,281	18,881	6,852	4,904	22,720	42.1%	4.60	3.24	1.36	30,136
10	Apples M-9 (without mesh)	55.56	268,611	167,047	47,455	9,241	49,799	45,366	15,186	101,565	60.8%	4.84	3.01	1.83	151,603
Comparison of revenue and expenditure budgets for the year 2023 compared to the year 2021															
1	Autumn wheat	0.00	-1,200	3,724	1,168	489	29	1,700	339	-4.924	-132.2%	-0.20	0.62	-0.82	-4.924
2	Autumn barley	0.00	550	3,338	839	476	20	1,700	303	-2.788	-83.5%	0.10	0.61	-0.51	-2.788
3	Maize	0.00	750	3,993	1,283	615	32	1,700	363	-3.243	-81.2%	0.10	0.53	-0.43	-3.243
4	Soybean	0.00	-3,000	4,482	1,755	608	12	1,700	407	-7,482	-166.9%	-1.20	1.79	-2.99	-7,481
5	Rape	0.00	-3,200	4,511	1,855	520	25	1,700	410	-7,711	-170.9%	-1.00	1.41	-2.41	-7,711
6	Sunflower	0.00	-4,590	627	-1,701	555	15	1,700	57	-5.217	-832.3%	-1.70	0.23	-1.93	-5.151
7	Technical grapes	0.00	-2,000	8,212	2,193	595	3,877	800	747	-10,212	-124.4%	-0.12	0.49	-0.61	-9,332
8	Vertical table grapes	0.00	-8.095	10,328	2,726	639	5,167	857	939	-18,423	-178.4%	-0.50	0.64	-1.14	-17,481
9	Common plum	0.00	20,000	10,621	4,597	636	3,456	966	966	9,379	88.3%	1.20	0.64	0.56	10,442
10	Apples M-9 (without mesh)	0.00	-10,278	34,632	17,819	1,441	9,640	2,584	3,148	-44,910	-129.7%	-0.19	0.62	-0.81	-42,026

Source: developed by the group of authors

The general conclusion is that agricultural producers can register profits for the year 2023 when cultivating agricultural crops, but it requires an impeccable technological discipline, the correct analysis of the field situations (in case there are deviations from the norms - it is better to reduce ambitions and go on a simplistic variant of the technology) and adopting decisions based on economic arguments (concrete calculations with the correct estimation of revenues and costs).

This conclusion is motivated by the following:

(i) the increase in the price of mineral fertilizers and the problem of delivering the necessary volumes for farmers will lead to a decrease in the introduction of fertilizers (especially nitrogen) into the soil, which will directly influence the yields of field crops. At the same time, farmers who will use fertilizers will incur high costs, which present risks of recovering them because it is impossible to estimate what will be the marketing prices of agricultural production (important – in the event of a reduction in prices at international oil quotations will be reduced and grain prices);

(ii) the increase in the price of energy resources (diesel and fuel) will not essentially influence production costs, but most strongly the distribution logistics and the transport of agricultural production to warehouses and export;

(iii) phytosanitary preparations and seed material do not have essential growth within the limits of 2-25% compared to the previous season, and their use and combination must be carried out in optimal periods and with maximum effect.

All these previously mentioned aspects require agricultural producers to have unprecedented technological management and financial management (quite complicated), in order to reduce the negative effects of climatic conditions, the energy crisis, the economic recession (increased inflation) and the excessive price of agricultural inputs on economic results operational for agricultural crops.

In an agricultural household there are several types of costs – specific to the entire household and specific to some subdivisions; there are costs incurred over a short period of time and costs incurred over a longer period of time. It is important to delimit production costs from other expenses incurred within the enterprise.

Table 3. Analysis and Comparison of the Structure of Production Costs in the Cultivation of Agricultural Crops

No.	Plum variety specification and cultivation technology	Cost of sales structure, %					
		total	inclusive				
			means of production	mechanized services	manual operations	other costs (including rent payment, depreciation)	unexpected expenses
Cost of sales structure in 2023							
1	Autumn wheat	100.0%	57.1%	16.5%	0.8%	16.6%	9.1%
2	Autumn barley	100.0%	51.3%	19.1%	0.7%	19.7%	9.1%
3	Maize	100.0%	47.3%	23.5%	1.0%	19.1%	9.1%
4	Soybean	100.0%	52.6%	20.9%	0.3%	17.1%	9.1%
5	Rape	100.0%	59.5%	15.8%	0.6%	15.0%	9.1%
6	Sunflower	100.0%	41.7%	25.7%	0.6%	23.0%	9.1%
7	Technical grapes	100.0%	32.3%	7.4%	37.3%	13.9%	9.1%
8	Vertical table grapes	100.0%	32.4%	6.3%	41.2%	11.0%	9.1%
9	Common plum	100.0%	36.6%	7.6%	34.6%	12.1%	9.1%
10	Apples M-9 (without mesh)	100.0%	32.4%	5.3%	29.5%	23.8%	9.1%
The structure of sales costs at the level of 2021							
1	Autumn wheat	100.0%	62.4%	17.2%	0.8%	10.6%	9.1%
2	Autumn barley	100.0%	57.2%	20.2%	0.8%	12.7%	9.1%
3	Maize	100.0%	51.3%	25.7%	1.1%	12.8%	9.1%
4	Soybean	100.0%	56.2%	22.9%	0.4%	11.5%	9.1%
5	Rape	100.0%	63.7%	16.8%	0.6%	9.8%	9.1%
6	Sunflower	100.0%	54.7%	23.1%	0.5%	12.6%	9.1%
7	Technical grapes	100.0%	33.2%	7.4%	35.8%	14.6%	9.1%
8	Vertical table grapes	100.0%	33.3%	6.3%	39.9%	11.4%	9.1%
9	Common plum	100.0%	35.3%	7.9%	35.0%	12.7%	9.1%
10	Apples M-9 (without mesh)	100.0%	28.4%	5.5%	29.8%	27.2%	9.1%
Comparison of deviations for the year 2023 compared to the year 2021 in percentage points							
1	Autumn wheat	0.0%	5.3%	0.7%	0.0%	-6.0%	0.0%
2	Autumn barley	0.0%	5.8%	1.1%	0.0%	-7.0%	0.0%

3	Maize	0.0%	4.1%	2.2%	0.1%	-6.3%	0.0%
4	Soybean	0.0%	3.6%	2.0%	0.0%	-5.6%	0.0%
5	Rape	0.0%	4.2%	1.0%	0.0%	-5.2%	0.0%
6	Sunflower	0.0%	13.0%	-2.6%	-0.1%	-10.3%	0.0%
7	Technical grapes	0.0%	0.9%	0.0%	-1.5%	0.6%	0.0%
8	Vertical table grapes	0.0%	0.9%	0.0%	-1.3%	0.4%	0.0%
9	Common plum	0.0%	-1.3%	0.3%	0.4%	0.6%	0.0%
10	Apples M-9 (without mesh)	0.0%	-4.0%	0.2%	0.3%	3.4%	0.0%

Source: developed by the group of authors

The analysis of the structure of production costs in the cultivation of agricultural crops shows a considerable increase in the means of production (the dramatic increase in the price of mineral fertilizers). The 2023-2024 agricultural season will be a great challenge for farmers, and those who will ensure an effective technological discipline and a correct management of financial resources will be able to cushion these negative effects of the increase in the price of inputs and not least of the increasingly difficult climatic conditions due to climate change.

Table 4. Analysis of the Structure of Production Costs for the Cultivation of Agricultural Crops, Year 2023

No.	Specifying the crops and the cultivation technology applied	Cost of sales for the 2023 agricultural season, lei/ha					
		total	inclusive				
			means of production	mechanized services	manual operations	other costs and fees (including depreciation)	unexpected expenses
1	Autumn wheat	**21,778.7**	12,430.4	3,586.8	171.6	3,610.0	1,979.9
	Cost structure, %	**100.0%**	**57.1%**	**16.5%**	**0.8%**	**16.6%**	**9.1%**
2	Autumn barley	**18,319.0**	9,405.0	3,504.0	134.7	3,610.0	1,665.4
	Cost structure, %	**100.0%**	**51.3%**	**19.1%**	**0.7%**	**19.7%**	**9.1%**
3	Maize	**18,919.7**	8,946.3	4,451.4	192.0	3,610.0	1,720.0
	Cost structure, %	**100.0%**	**47.3%**	**23.5%**	**1.0%**	**19.1%**	**9.1%**
4	Soybean	**21,097.3**	11,087.2	4,412.3	69.8	3,610.0	1,917.9
	Cost structure, %	**100.0%**	**52.6%**	**20.9%**	**0.3%**	**17.1%**	**9.1%**
5	Rape	**24,068.0**	14,317.5	3,802.5	150.1	3,610.0	2,188.0
	Cost structure, %	**100.0%**	**59.5%**	**15.8%**	**0.6%**	**15.0%**	**9.1%**
6	Sunflower	**15,728.3**	6,560.4	4,038.0	90.1	3,610.0	1,429.8
	Cost structure, %	**100.0%**	**41.7%**	**25.7%**	**0.6%**	**23.0%**	**9.1%**
7	Technical grapes	**62,389.4**	20,174.5	4,594.1	23,262.8	8,686.1	5,671.8
	Cost structure, %	**100.0%**	**32.3%**	**7.4%**	**37.3%**	**13.9%**	**9.1%**
8	Vertical table grapes	**79,054.2**	25,596.5	4,963.2	32,601.7	8,706.1	7,186.7
	Cost structure, %	**100.0%**	**32.4%**	**6.3%**	**41.2%**	**11.0%**	**9.1%**
9	Common plum	**64,568.4**	23,625.4	4,917.7	22,337.3	7,818.2	5,869.9
	Cost structure, %	**100.0%**	**36.6%**	**7.6%**	**34.6%**	**12.1%**	**9.1%**
10	Apples M-9 (without mesh)	**201,678.9**	65,274.2	10,682.0	59,438.6	47,949.6	18,334.4
	Cost structure, %	**100.0%**	**32.4%**	**5.3%**	**29.5%**	**23.8%**	**9.1%**

Source: developed by the group of authors

Studying and understanding the gross profit is only the first step to determine the business model / management of the production of agricultural crops and the business in general, for this reason it is necessary to carefully plan the budgets and monitor them carefully so as not to record over-costs.

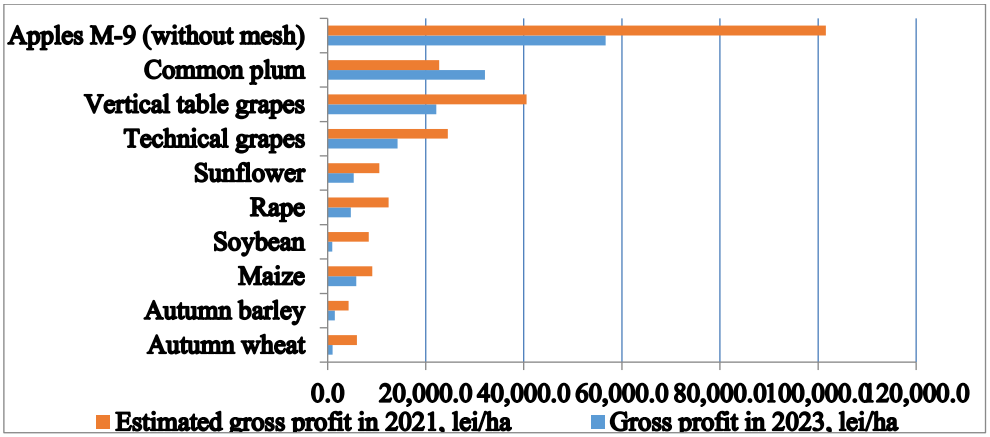

Figure 1. Comparative Analysis of the Gross Profit for the Cultivation of Agricultural Crops for the 2023-2024 Agricultural Season Compared to the Year 2021

Source: developed by the group of authors

Regarding the analysis of the gross profit in the cultivation of agricultural crops, it is an uncertain situation, because we know roughly what the production costs are, and it is a big dilemma what the procurement prices of the agricultural raw material will be, based on the developments and international price quotations from the exchanges that trade agricultural products and how the crisis / war in the neighboring country Ukraine will evolve.

5. Analysis of Results

The overall conclusion -for farmers the conditions of the 2023-2024 agricultural season are difficult, uncertain and unpredictable to anticipate what the final effects will be. In the case of agricultural enterprises, we have a rather difficult situation for the last three years, namely:

1. The excessive drought and its effects in 2020 and 2022 were not overcome or diminished in the overall economic-financial situation of agricultural enterprises;

2. The pandemic situation still has negative effects (perhaps not so pronounced for farmers) but indirectly they led to the price of some services / inputs, which increase business costs in agriculture;

3. The energy crisis has led to an increase in the price of agricultural inputs (the most noticeable and dramatic is in the case of mineral fertilizers), which will directly increase sales costs and the unit cost of agricultural production;

4. And the most drastic is the fact that cash flows in agricultural enterprises are deficient and they need more than ever loans from financing institutions, and the NBM with its policy of sterilizing the money supply to reduce inflation simply made the rates more expensive (base rate 14% and overnight loans 16%), thus worsening the situation in domestic agriculture even more.

6. Conclusions

In this context, some measures aimed at reducing these negative effects and facilitating the predictable development of the agricultural sector are recommended:

1. Government-level negotiation with the involvement of suppliers of the diversification of mineral fertilizer imports to replace the market deficit in these resources and the reduction of the currently speculative purchase price;

2. Facilitating access to loans at lower interest rates for agricultural businesses, because it is important to reduce business and ultimately sales costs, which will ensure lower prices for agri-food products and their accessibility for the final consumer. We understand the NBM's precautions to reduce inflation and they are good tools and can be applied for the population to limit consumption. In the case of lending to agricultural enterprises, it is not logical to increase interest rates, because in the end it contributes to the increase of costs and ultimately of marketing prices, which will contribute to reducing the competitiveness of agricultural production and the purchasing power of the population;

3. The 2023-2024 agricultural season is a problematic one, where all the burden of the negative effects is on the farmers' shoulders, and in this context an unprecedented mobilization of reasoning is required to carry out the costs with correct reasoning and finally to record an acceptable profitability.

If at the end of the 2023-2024 agricultural season the prices of agricultural products will decrease, then the situation can be dramatic. Based on these considerations, agricultural producers must be focused on implementing an unprecedented discipline and, most importantly, an effective process of evaluating and monitoring costs at any stage in agriculture to avoid recording deviations from the planned budgets, and in the event that are essential deviations, immediate measures to remove or reduce them are necessary.

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