Preparing accounting information on costs for manufactured crop production

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Abstract

The article investigates the procedure for preparing accounting information on costs for manufactured crop products according to their nature in terms of the irreversibility of biological processes. Comparison of modern theory and practice of cost accounting with their functional orientation showed the lack of developments in the field under consideration. The aim of this study is to build the methodological framework for recording costs for manufactured crop production with a long development cycle as a result of deep and comprehensive study of these costs objectification. It is concluded that it is necessary to recognize the continuous, irreversible biological process of growing a particular agricultural crop as an integral fact of business operation of an economic entity. In this connection, it is proposed to create and use reserves of direct costs for manufacturing crop products, starting from the month of seed sowing until the last month of intensive harvesting. The formation of the accounting and information space as a result of introducing some proposals will ensure fast analysis of production costs and the costs of crop products with a long production period.

Keywords: Cost accounting. Crop production costs. Cost reserve. Functional cost orientation.

1. Introduction

Providing the population with food products is based on the most complicated process of their production. It is carried out by clusters of enterprises of agro-industrial complex and trade, which implies several interrelated cycles of production of various types of products - the agricultural one and products of its processing, as well as a developed trading network for their sale. In each of these areas of activity, it is possible to identify the main business processes involved in providing the population with food products, which require certain costs.

Planning the turnover is guided by the demand of the final consumer of food products. However, unlike trade, where the formation of costs and pricing are based on market research, the fundamental business process in agriculture and industry is the production process that has the greatest need for business funds. Enterprise management deals with costs planning and control, trying to develop and optimize management decisions.

The main task of accounting is to generate information on the actual cost of production for the reporting period. The planned values in the accounting are applied only for the evaluation of the produced labor products during the reporting period.

We suppose that the current practice is acceptable for industrial production. A comparatively short cycle of producing finished products makes it possible to compare the received necessary information on actual costs with the planned values.

The peculiarities of agricultural production are determined by its distinctive features, suggesting that it is unacceptable to use the established practice of preparing accounting information on costs for management:

- the duration of the production cycle;

- production is carried out mainly by biological processes and the man only supports the necessary conditions in order to achieve the expected results;

- biological processes are irreversible and permanent;

- the starting point of the production cycle implies inevitable costs in future reporting periods;

- some costs associated with the production cycle, for a long time after its completion (for example, repair of fixed assets);

- stages of biological processes do not have any clear correspondence to the reporting periods.

To optimize accounting and information support for management of agricultural organizations, it is necessary to develop some methodological guidelines for costs accounting in direct connection with the specifics of the production process.

2. Theory

Many authors pay attention to characteristics of agricultural production associated with biological processes and adaptation to climatic conditions.

These characteristics explain the differences in the organization of accounting of agricultural enterprises, which, in turn, lead to various difficulties throughout the accounting process. For example, the dependence of agricultural enterprises on seasons and climate. Each process of agricultural production requires certain specific conditions for cultivation, maintenance and harvesting. In certain periods of the year, workers of agricultural enterprises work intensively in day and night shifts, and during the rest of the year the enterprise is idle. In addition, certain costs of agricultural enterprises are related to the budget of the next month or even next year (Zeki Doğan et al., 2013).

The process of agricultural production has a long character in time and is characterized by uneven output. Calculation of production costs in agricultural organizations is carried out once after the end of the calendar year. In industries producing continuously (for example, protected horticulture, poultry farming or dairy cattle), it is possible to calculate not only the annual costs, but the ones for shorter periods as well (Spatayeva S. B., 2015).

Nowadays, the issue of assessing biological assets and agricultural products in accordance with International Financial Reporting Standards (IFRS) is currently widespread in the world. These items should be measured at fair value less costs to sell, even at the time of initial recognition, and for biological assets it should also be done at the end of each reporting period (IFRS (IAS) 41). International Standard (IFRS) No. 13, "Fair Value Measurement", defines it as the price that would have been received when selling an asset or paid when transferring an obligation in the ordinary course of business between market participants at the valuation date.

The authors suppose that IAS 41 is devoted to the concept of "living assets", which is the only characteristic of natural biological growth (Gonçalves et al., 2015). There is an opinion that the rules of international accounting are aimed at making a more accurate picture of economic processes in agricultural activities. According to Sedláček (2010), they reflect the entire process of controlled biological transformation of animals or plants intended for sale, agricultural production or production of other biological assets. Many biological assets have corresponding market prices or value, since biological products as a whole are the main commodities that are actively sold. When market prices or the value of a biological asset in its current state are not available, one should use the present value of the expected net cash flows from the asset.

Shirobokov V.G. et al. (2010) proposed a technique for assessing the unfinished production of cash crops based on the stages of plant development, which makes it possible to

determine the fair value of the immature biological asset at the reporting date until its full ripeness and harvest time.

However, the process of applying IFRS faces a number of problems (Mizikovsky, 2018). In practice, the procedure for assessing the objects in question in different countries, according to national normative documents as well, has its own peculiarities. Common rules often differ from the ones established by IFRS.

According to Generally Accepted Accounting Principles (GAAP), US biological assets are usually valued at initial cost. These assets are tested for impairment in the same way as other long-term assets (Kaiser, 2014) (Marsh et al., 2013).

According to Czech accounting legislation, which adheres to the principle of prudence, it is possible to use the following bases for the evaluation of biological assets:

- the purchase price, i.e. the price of the acquired property plus the costs associated with it,

- the purchase price of reproduction, i.e. the price of the property that would have been acquired at the time of payment,

- factory costs, which are direct costs of production or other activities relating to your own inventory, and a part of indirect costs associated with production or other activities,

- factory costs, which are direct costs for production or other activities with respect to own long-term assets, and indirect costs associated with production or other activities determined in accordance with accounting methods (Sedlacek, 2010).

Often, modern accounting practices are conducted to determine the tax base, rather than providing useful financial information for enterprises to make decisions (for example, in Turkey) (Zeki Doğan et al., 2013).

In the Czech Republic and Slovakia, product prices are determined by the market. The methodology for calculating expenditures and incomes in agriculture was recommended by the Ministry of Agriculture for use in subjects of the AIC (Foltinova et al.,2014).

Since the Libyan government subsidizes agricultural firms, it determines the prices of products. Cost systems in this case are used to determine the exact costs of products in order to find the difference between prices set by the state and the actual cost (Fatah et al., 2013).

Numerous authors criticize financial accounting based on IFRS rules in that it does not provide useful data for management over the previous period and for making various financial decisions. It does not provide the management with daily information on spending to make effective plans for the future (Vinesh et al., 2011). He does not give any idea of the process of

resources transformation (Manoubia ben Amara, 2016). The need for better information for decision-making is the main reason for maintaining full costing (Barg et al.,2004).

The results of a survey of officials in Libyan agricultural organizations showed that information on costs is mainly used to establish product prices, manage costs and determine the cost of the product, compare the costs of the year and identify additional activities (Fatah et al., 2013).

Due to the fact that economies of the Czech Republic and Slovakia operate at the market with monopolistic competition and minimal possibility of increasing prices, the authors consider it is necessary to seek hidden reserves in costs and consumption. Enterprises should constantly plan costs and assess deviations of actual costs from the plan. The business information system must be at such a level that the management can use reliable information about any costs of the farm, the reasons for costs and the cost structure for individual indicators. The availability of such information is of great importance for effective financial and operational management (Foltinova et al.,2014).

According to Laurence Le Gallo (2015), knowledge of value is necessary for making decisions, such as:

- setting the selling price (prices, catalog, budgeting, response to challenge);
- the product portfolio management (decide which products to develop or stop);
- selection of production internalization or outsourcing;
- identification of directions to reduce costs;
- decision-making on the beginning of a new activity;
- and so on.

In addition, cost information is used only within the company and, therefore, can be adapted to the specific needs of each organization (Laurence Le Gallo, 2015). This information is a strategic element for the organization (Brizolla et al., 2017).

From the point of view of most areas of agricultural production, climate models are of limited importance for specific long-term planning at the local level. A well-documented set of agricultural strategies for managing climate-related risks is important (Chambwera, 2011).

Thus, the huge role of optimizing the accounting of costs for the production of products, as the basis of information support for rational managerial decisions, is indisputable. In our opinion, the principle of the closest connection of costs with their causes requires more attention in agriculture than in other industries.

The organization and methodology of cost accounting is currently represented in a variety of ways and methods of work. Differences in their practical application are due to a variety of factors.

For example, in most Libyan households, the overhead costs are allocated per one sector, namely the crop sector, ignoring the livestock sector and justifying this fact that the crop sector is the main activity in Libyan agricultural firms (Fatah et al., 2013).

Much research is devoted to the organization and methods of cost accounting in agriculture. The authors consider the transaction costs associated with all six stages of the agricultural value chain, from the growth decision to the sale of products at the wholesale market (Silva et al., 2008). At the level of planning production processes, the cost groups are divided into individual and total costs, as well as into variable and fixed costs. Methods of accounting for total and variable costs are considered (Manoubia ben Amara, 2016). The procedure for recording costs in agriculture using the "target-costing" method is determined (Foltinova et al.,2014) (Kostyukova et al., 2018). For objects of cost accounting, the process, transverse and ordering methods are considered. Depending on rapid cost accounting and control, the methods of accounting for actual costs and accounting for standard costs are distinguished. The "standard-cost" accounting system is used (Spatayeva, 2015). The order of distributing overhead costs according to the "ABC" system is investigated (Kostyukova, 2014). According to Shirobokov (2007), accounting on the basis of the "input-output" method, widespread in most countries of the world, is considered.

In all forms of available methods of cost accounting, the features of long-term agricultural production, based on the irreversibility of biological processes, are not taken into account.

The aim of this study is to prepare the methodological background for cost accounting in agricultural production having a long development cycle as a result of an in-depth and comprehensive study of these costs objectification.

3. Methods

Achieving this aim is based on determining the essence of the relevant biological processes from the point of view of the reasons and the temporary certainty of the costs of production. It is necessary to compare the current practice of cost accounting with their

functional focus and develop a cost model that helps to eliminate the identified inconsistencies.

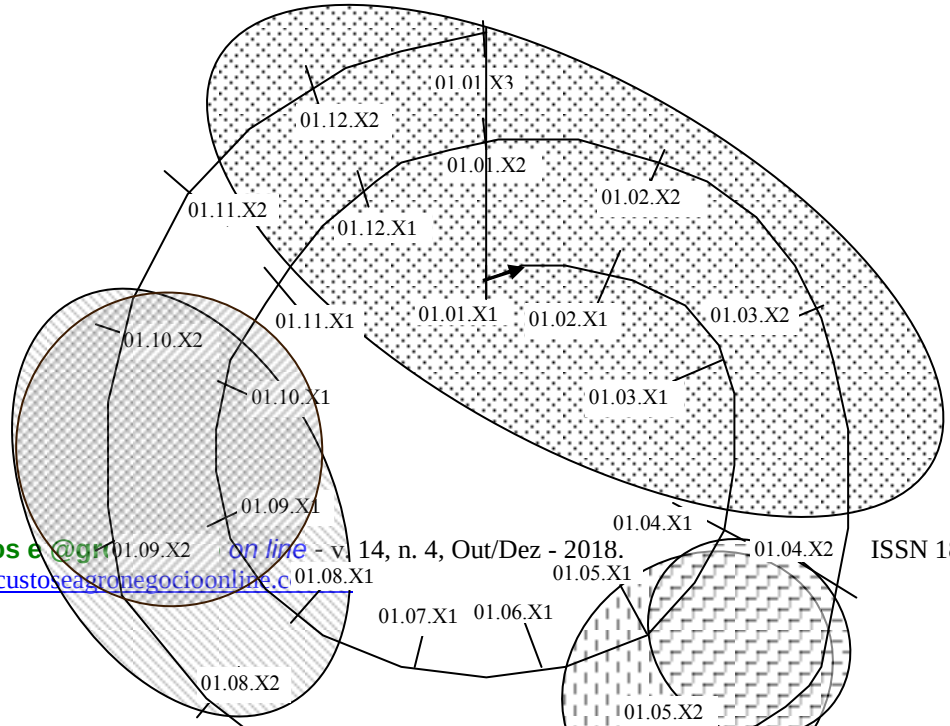
Most methods used in practice for cost accounting suggest the calculation of the actual cost of most types of agricultural products only at the end of the calendar year. Only then actual and planned indicators are compared.

In the literature, there are recommendations for cost accounting within the period of direct production (for example, growing products). Brizolla et al. (2017) proposed a system of information, which is based on determining variable direct costs according to planning the production cycle, beginning with soil preparation and ending with harvesting.

The application of the ABC method is based on determining the total cost of each activity (type of work). For example, for agriculture, the cost of production, as a cost object, is determined according to the costs of the agricultural activities carried out for its production, for example: seed preparation, plowing, fertilization, sowing, pest protection and harvesting. Indeed, the application of the ABC method will allow determining the real results of the work, analyzing the use of resources at each of the activities, and identifying products with greater profitability, which optimizes management (Balzan et al.,2017).

However, these methods do not provide for the study of the economic essence of costs on the basis of their functional orientation specificity - the irreversible, permanent and independent nature of biological processes.

Consider the duration of the process of cereals production based on the calendar of agricultural works in the regions located in the center of the European part of Russia with a temperate continental climate. The sequence of the related operations in the biennium (from 01.01.X1 to 01.01.X3) is shown in Figure 2.



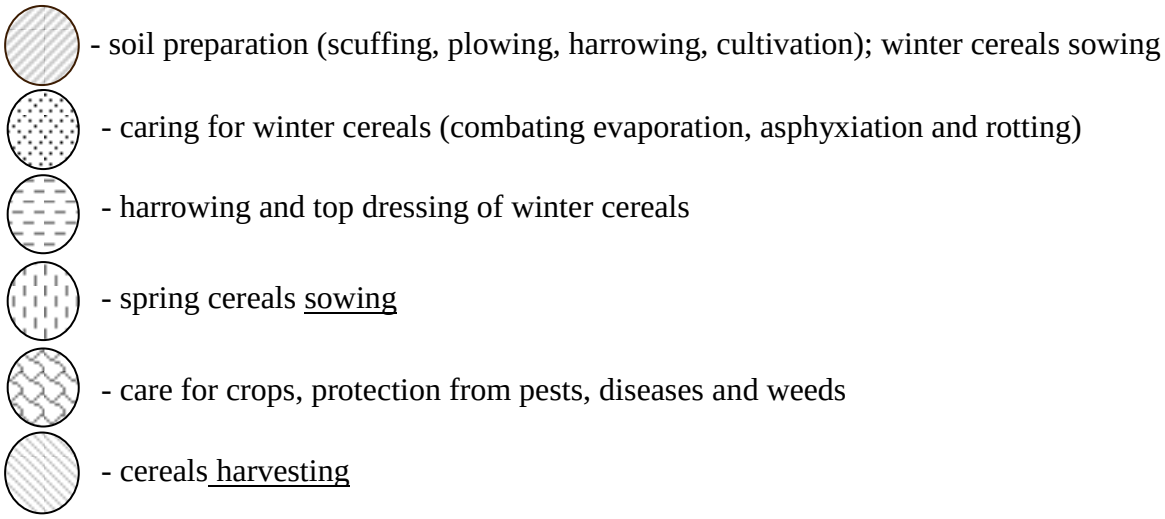


Figure 2: Main activities in the process of growing cereals
Data resource: author's compiled by www.agrien.ru/reg/reg.html

The integrity and irreversibility of the development of agricultural crops implies the inseparability of the process of crop production in terms of the functional affiliation of costs. This means that sowing a certain type of crop causes an unavoidable need for some costs to care and harvest in the future with the ones estimated but having uncertain date and magnitude. Consequently, it becomes necessary to keep a record of these costs throughout the production period after sowing.

As illustrated by industrial branches, the process of growing products can be compared with the process of milk ripening to produce kefir or with the process of metal casting, starting with mixing the ingredients or filling the mold with molten material until getting the finished product (or components, semi-finished products, return waste, other products labor). It is an irreversible and indivisible process. Production costs are distributed between its types on a monthly basis, which allows analyzing the cost of production during the year.

However, if in the industry the processes considered (according to the example) take several minutes or hours, then in the plant growing from sowing to obtaining the initial result of production, the harvested crop, several months pass. In addition, the time of growing

winter crops falls on adjacent calendar years. The period of several months of production in this case is an irreversible and indivisible plant growth process, which determines the inevitability of costs throughout its length, including a significant part at the end, when harvesting.

Therefore, the cost accrual in general should be carried out throughout the entire production cycle, taking into account the expected amounts. At the same time, it is ensured that the actual cost of production is determined at the most reliable level after its completion, that is, two or three months before the end of the calendar year.

4. Model and Results

It seems that the feature of agricultural production in question calls for recognizing the constant biological process of growing a particular crop as an integral fact of business life and creating in this connection reserves of direct production costs during this process. The reserve is calculated optimally starting from the month of seed sowing until the last month of intensive harvesting.

In this case it is expedient to distribute indirect costs to the costs of the main production monthly (optimally - in proportion to the area of arable land or crops). However, after harvesting, from about November to March, they can't be attributed to its cost, because they are already associated with its storage and sale, and not production, as well as with the preparation and planning of production in the next year. An exception is winter crops. It is expedient to attribute indirect costs monthly to their cost from the moment of sowing in proportion to the share of the sown arable land.

The solution of the problem of these costs recovery is the accounting for the corresponding places of their occurrence (Figure 3). As a result, the costs are distributed as follows:

- directly related to the sale and storage of products already produced (by storage location) are recovered to the cost of sales;

- related to the planning and preparation of production in the future are recovered to the production cost of products of the next year, that is, they are taken into account as costs in the incomplete production in the reporting year;

- associated with production of winter crops are recovered to their prime cost according to the planting acreage.

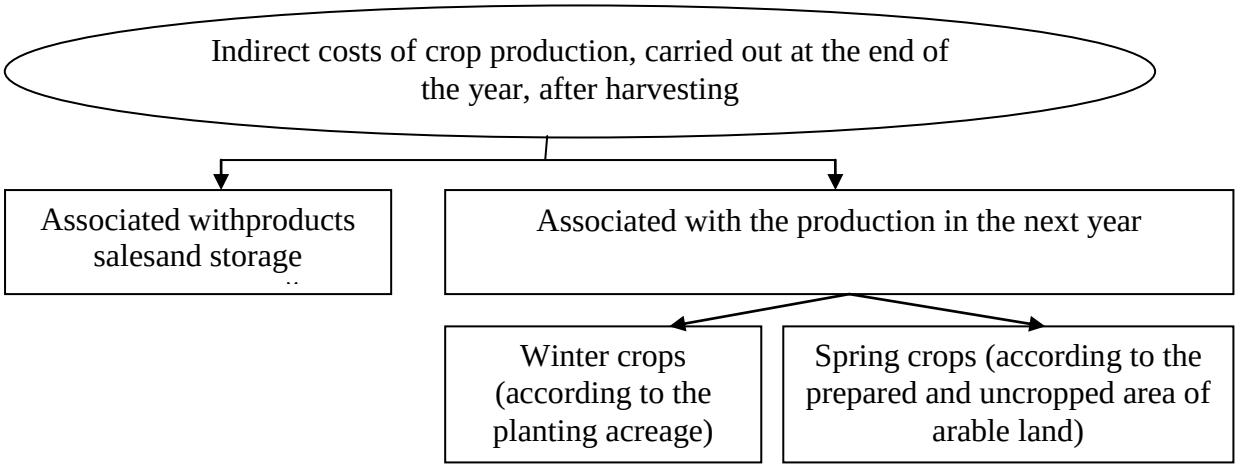


Figure 3: Direction of indirect costs of crop production after harvesting

It turns out that the bulk of indirect costs of crop production in the last months of the year, is the cost of work in process at the end of the period. In the month of sowing spring crops next year, the cumulative sum of these costs is distributed to the costs of the main production of a particular product in proportion to the planting acreage.

The accrual of the proposed reserve and the procedure for allocating indirect costs according to their actual participation in the production of a particular crop, determine the appropriate methodology for recording production costs. Tables 1 and 2 give examples of the monthly accounting information on the cost of spring and winter wheat produced, using available and proposed accounting methods.

The accrual of the reserve will ensure a relative uniformity of costs, which corresponds to the peculiarities of the process of crop production. The information on the amount of its monthly balance or over-expenditure makes it possible to monitor the planned cost figures (expected by the magnitude of the created reserve) quickly (Mizikovsky et al., 2017).

When allocating indirect costs according to their actual participation in the production of a particular crop, a real total amount of production costs is formed.

The proposed cost accounting methodology as a whole makes it possible to calculate the actual cost of production at the end of the last month of harvest quickly enough, in contrast to conventional calculation after the end of the calendar year. In this case, the cost of storage and sale of manufactured products can be accounted separately. Their value in the last

months of the year (after harvest) is negligible, in our example it is 0.33-0.38 % in the total amount of production costs.

The formation of an accounting and information space as a result of the introduction of proposals will ensure the speedy analysis of production costs and crop production cost even before the end of the calendar year, and not after, that is, after the completion of a separate business process. In addition, it will take into account the indivisibility of the process of its production, that is, growing as a fact of business life or a single object of accounting. And the accrual of the proposed reserve over the whole period will form the source of the expected direct costs.

The revealed differences testify to the need for a substantial transformation of the methodology of cost accounting in agriculture on the basis of their functional affiliation. The maximum adaptation of accounting to the specifics of agricultural production will ensure a high level of efficiency and reliability of information for making managerial decisions.

Table 1: Monthly formation of the total cost of spring wheat according to the accepted method and actual participation in its production

Costs forming the cost of spring wheat by different methods		Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total
Calculation of direct costs of production in accordance with generally accepted methodology	thous. rub.			406.515	844.407	894.195	1549.799	1442.863	1266.026	652.115	632.417			7688.341
	% to total			5.29	10.98	11.63	20.16	18.77	16.47	8.48	8.23			100.00
Calculation of direct	thous. rub.	-	-	1451.065	1044.550	1044.550	1044.550	1044.550	1044.550	1044.550	-30.024			7688.341

production costs when reserving	% to total			18.87	13.59	13.59	13.59	13.59	13.59	13.59	-0.39			100.00
Balance of the reserve at the end of the month, thous. rub.		-	-	1044.550	1244.692	1395.047	889.797	491.483	270.007	662.441	30.024	-	-	6028.044
Indirect costs for monthly distribution, thous. rub.		400,102	438.779	478.789	413.439	493.459	542.805	518.799	520.133	492.126	462.792	440.379	446.808	5648.416
Calculation of production costs in accordance with generally accepted methodology and monthly allocation of indirect costs	thous. rub.	400.102	438.779	885.304	1257.846	1387.655	2092.605	1961.663	1786.159	1144.242	1095.209	440.379	446.808	13336.757
	% to total	3.00	3.29	6.64	9.43	10.40	15.69	14.71	13.39	8.58	8.21	3.30	3.35	100.00
Calculation of production costs when reserving and the monthly allocation of indirect costs	thous. rub.	400.102	438.779	1929.854	1457.989	1538.009	1587.355	1563.349	1564.683	1536.676	432.767	440.379	446.808	13336.757
	% to total	3.00	3.29	14.47	10.93	11.53	11.90	11.72	11.73	11.52	3.24	3.30	3.35	100,00
Calculation of costs according to their actual participation in production	thous. rub.			3552.451	1457.989	1538.009	1587.355	1563.349	1564.683	1536.676	432.767	50.545	51.220	13335.050
	% to total			26.64	10.93	11.53	11.90	11.72	11.73	11.52	3.25	0.38	0.38	100.00
Including costs for sales of manufactured products, thous. rub.									53.968	54.886	56.302	50.545	51.220	266.923

Table 2: Monthly formation of the total cost of winter wheat according to the accepted method and actual participation in its production

Costs forming the cost of spring wheat by different methods		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr	May
Calculation of direct costs of production in accordance with generally accepted methodology	thous. rub.	2437.415	-	112.678	56.013	40.362	-	142.387	338.979	2412.847
	% to total	25.06	0.00	1.16	0.58	0.42	0.00	1.46	3.49	24.81
Calculation of direct production costs when reserving	thous. rub.	3091.931	654.516	654.516	654.516	654.516	654.516	654.516	654.516	654.516
	% to total	31.79	6.73	6.73	6.73	6.73	6.73	6.73	6.73	6.73
Balance of the reserve at the end of the month, thous. rub.		654.516	1309.032	1850.869	2449.372	3063.526	3718.042	4230.171	4545.708	2787.376
Indirect costs for monthly distribution, thous. rub.		-	-	-	-	506.103	555.027	605.637	522.973	624.194
Calculation of production costs in accordance with generally accepted methodology and monthly allocation of indirect costs	thous. rub.	-	-	-	-	546.466	555.027	748.024	861.952	3037.042
	% to total	-	-	-	-	3.83	3.89	5.24	6.04	21.29
Calculation of production costs when reserving and the monthly allocation of indirect costs	thous. rub.	3091.931	654.516	654.516	654.516	1160.619	1209.543	1260.153	1177.489	1278.710
	% to total	18.33	3.88	3.88	3.88	6.88	7.17	7.47	6.98	7.58
Calculation of costs according to their actual participation in production	thous. rub.	585.598	564.009	599.126	535.593	529.991	520.859	4649.077	1177.489	1278.710
	% to total	3.87	3.72	3.96	3.54	3.50	3.44	30.69	7.77	8.44
Including costs for sales of manufactured products, thous. rub.										

Costs forming the cost of spring wheat by different methods		June	July	August	Sept.	Oct.	Nov.	Dec.	Total
Calculation of direct costs of production in accordance with generally accepted methodology	thous. rub.	616.832	2707.702	860.031					9725.248
	% to total	6.34	27.84	8.84	0.00	0.00			100.00
Calculation of direct production costs when reserving	thous. rub.	654.516	654.516	88.156					9725.248
	% to total	6.73	6.73	0.91	0.00				100.00
Balance of the reserve at the end of the month, thous. rub.		2825,060	771.874	-88.156.9			-	-	28117.392
Indirect costs for monthly distribution, thous. rub.		686,614	656.247	657.934	622.507	585.401	557.051	565.182	7144.877
Calculation of production costs in accordance with generally accepted methodology and monthly allocation of indirect costs	thous. rub.	1303.446	3363.950	1517.966	622.507	585.401	557.051	565.182	14264.019
	% to total	9.14	23.58	10.64	4.36	4.10	3.91	3.96	100.00
Calculation of production costs when reserving and the monthly allocation of indirect costs	thous. rub.	1341.130	1310.763	746.091	622.507	585.401	557.051	565.182	16870.125
	% to total	7.95	7.77	4.42	3.69	3.47	3.30	3.35	100.00
Calculation of costs according to	thous.	1341.	1310.	746.091	622.	585.	50.5	51.2	1514

their actual participation in production	rub.	130	763		507	401	45	20	8.117
	% to total	8.85	8.65	4.93	4.11	3.86	0.33	0.34	100.00
Including costs for sales of manufactured products, thous. rub.				54.551	60.515	57.965	52.885	54.296	280.213

5. Conclusion

Thus, the essential problem of modern practice of calculating the cost of agricultural products is that the costs for a specific product are taken into account during the calendar year ("commingled" method), but functionally refer to a fundamentally different period of its actual production:

- direct costs of crop production at the time of resources consumption (for sowing, tillage and harvesting) functionally pertain to the whole indivisible period of the crop development, since they justify the expediency and ensure the production process throughout its length;

- indirect costs in the subsequent months of the calendar year after harvesting in most cases refer functionally to preparation and production of the expected harvest of the next year, rather than the current one.

Inclusion of costs in the calculation of the cost of production in accordance with their functional participation in production and the formation of a reserve of direct costs of crop production will:

- generate the most reliable information about the cost of production;

- promptly monitor the implementation of planned values in the process of its production;

- timely provide management with information about the actual cost of production after it is received, and not at the end of the year.

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