

METHODOLOGICAL ASPECTS OF ELABORATION OF COST RATES APPLIED IN THE AGRICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA

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Abstract

Entrepreneurial activity in the agricultural sector requires activities that, initially, involve a certain volume of financial resources. The correct planning and management of these expenses can only be executed following the analysis of a set of economic indicators that reflect consumption and production costs in the given sphere. Currently, through the use of some groups of technical procedures, both consumption and production costs in it represents cost rates, used in the process of planning technological production activities. The purpose of the given work is to reflect the methodology for developing the respective indicators, highlighting the main technical aspects of forming cost rates and the principles of using the given methodology. At the same time, the standard cost of agricultural and animal husbandry products is determined by means of the cost tariffs - an indicator that reflects the expenses for obtaining a plant/animal husbandry production unit on a certain area of land/head. In addition to the theoretical part of the given methodology, where the methods of determining the tariffs applied in the given sector are presented, the work also contains a practical demonstration of the use of tariffs in determining production costs for autumn wheat and autumn barley. In conclusion, the methodology of developing cost tariffs applied in the agricultural sector reflects the entire agricultural production process, is explicit and easily usable by agricultural entrepreneurs and serves as a reference for planning production processes in the sector.

Key words: agriculture, cost tariffs, production costs

INTRODUCTION

Through the land reform, implemented in the period 1998-2000 in the Republic of Moldova, the goal was to redistribute agricultural land plots and the assets of former collective farms among active members of the respective entities.

Later, the given action was followed by the formation of different types of households with agricultural activities, such as: peasant households, individual enterprises, joint-stock companies, limited liability companies, etc. [1].

The main purpose of these households was and still is to obtain income from the cultivation of agricultural crops and/or the breeding of animals and birds, from the provision of various agricultural services.

The economic efficiency of this activity is ensured only by the production and efficient marketing of agricultural products, the optimal management of land resources, the

creation of means of production and services, capital and labor [17].

The result of these actions represents the difference between the value of global production and the amount of production and marketing consumption of agricultural products or services.

Currently, the stage of correct estimation of production consumption, as well as the development of standard costs for obtaining a production unit, represent an impediment for most domestic agricultural entrepreneurs [16]. In the given context, in order to overcome this obstacle, the methodology for the objective identification of these costs was elaborated, the measure being reflected in the form of tariffs.

Cost levels represent the clarification of the production consumption of agricultural products and services for various types of companies in the field and are reflected in the form of indicators of the current expenses required for the production process.

MATERIALS AND METHODS

The informational framework necessary for the development of cost tariffs in agriculture is represented by: legislative acts, sectoral cost norms, developed by specialized institutions, cost standards obtained as a result of specialized studies.

The basic method for calculating cost rates is the predictive method, which consists in determining the normalized costs in accordance with technological and economic standards. Also, the expertise method and the method of specialized studies will be used - methods that will be applied to the determination of the prices of raw materials purchased by agricultural households, the assessment of the amount of expenses for marketing agricultural products, etc.

Various methods are used to determine consumption related to basic products (residual value method, related cost distribution method).

The cost rate calculation method operates with a number of indicators, such as: production costs; fixed costs; global costs; variable costs; selling costs; standard (planned) costs.

When determining the cost elements, methods taken from the accounting standards of the Republic of Moldova are applied. Additionally, the taxes and fees involved in the formation of production costs are determined by the current legislation

RESULTS AND DISCUSSIONS

The development of cost tariffs in agriculture represents an extensive process of actions involving a wide spectrum of economic indicators. Once determined, the rates represent a reliable source of accessible data for use by agricultural entrepreneurs in the process of planning the respective activity. Cost rates represent consumption of production and agricultural services, and represent a group of economic indicators of current expenses directed towards ensuring the production process. Applying the respective methodology allows obtaining a relevant database that reflects different types of costs for a wide range of agricultural

products and services. Material costs are based on current prices in the local market, and the evolution of the rates in question does not involve including various types of financial losses.

The determination of production and marketing costs is carried out in accordance with the rules of cost grouping, the listed items aim to ensure the inclusion of the costs borne by the respective economic agents (Table 1).

Table 1. Direct consumption items included in the standard cost of agricultural products

The name of the articles	Crop	Zootechnics
1.Total variable costs, including		
1.1Seed material	+	-
1.2Fertilizers	+	-
1.3 Chemical preparations	+	-
1.4 Veterinary services and preparations	-	+
1.5 Feed	-	+
1.6 Mechanized operations	+	+
1.7 Manual operations	+	+
1.8 Other consumptions	+	+
2. Total constant (fixed) costs, including		
2.1 Depreciation of fixed assets	+	+
2.2 Taxes and duties	+	+
2.3 Lease payments	+	-
2.4 Other direct fixed consumption	+	+
3. Indirect costs	+	+
4. Standardized cost	+	+

Note: „+” – the existence of the article, „-” – its absence.

Source: Author's synthesis based on regulations in force.

The total of variable costs results in the total variable cost and changes depending on the production volume. This indicator is calculated based on the ratio between total variable cost and physical production obtained, expressed in the variable cost per unit of product obtained or service provided. [3].

In turn, variable consumption is divided into material consumption and consumption in the form of services. Material consumption has a significant weight in the structure of production consumption. Since the absolute size of these consumptions is directly proportional to the cultivation area (livestock), they are part of the group of variable consumptions.

In the phytotechnical sector, the main components of material consumption are:

seeds, planting material, mineral fertilizers, chemical fertilizers, pesticides.

In the zootechnical sector, these consumptions are simple and compound feeds, veterinary medicinal preparations [8].

The consumption of seeds and planting material is a mandatory component in the given structure, it represents the normed consumption for sowing or planting a unit of agricultural surface. The volume of consumption of mineral and organic fertilizers is directly proportional to the volume of the expected harvest, their cost may also vary depending on the chemical and technical characteristics of the fertilizing product.

The initial data for calculating the consumption of mineral fertilizers are as follows:

1. The volume of mineral fertilizers on main nutrient elements, incorporated in the soil or administered on the foliar part of the plants are expressed in kg of active substance per ha;
2. The mass of organic fertilizers, which will be introduced into the soil on one agricultural hectare, is 3.5 tons annually;
3. The market price of fertilizers at wholesale warehouses, including transport costs to the relevant household;
4. The rules for introducing mineral fertilizers into the soil are determined according to the pedological conditions and the expected yield per hectare.

The quantity of fertilizers needed to obtain a production unit depends on the agricultural crop being cultivated. For optimal standardization of the fertilizer quantity, it is necessary to determine the export of active substance by agricultural crops in the physiological process, as well as the agrochemical characteristics of the soil. [14].

The protection of agricultural crops involves the use of phytosanitary products. The use of these chemical means is an important technological element for both conventional and sustainable agriculture.

The use of phytosanitary products and chemical fertilizers in the agricultural production process is regulated by a set of laws adopted at the national level. The consumption of chemical products is determined by the physiological specificities

of each crop, taking into account the initial economic objectives. The applicative aspect of the initial pesticide use information is established based on expert judgment. Thus, the volume of consumption of phytosanitary preparations depends on the applied protection methods. When developing these methods, the following aspects will be taken into account:

1. Reducing or optimizing the number of treatments;
2. Alternation of products with active substance for a more effective diversification;
3. Application of the treatment in the periods most sensitive to pathogens and pests [9];
4. The use of the most effective phytosanitary preparations to reduce the given type of consumption.

The consumption of phytosanitary and veterinary preparations is a basic component in the structure of production costs, with an essential contribution to the formation of the quantity and quality of the expected product [7].

In the animal husbandry sector, the basic weight of the consumption is the cost of feed. The principles of rational feeding involve understanding issues such as the nutritional value of feed and rations, feed resources and their nutritional characteristics, the feed requirements, which vary according to age category, physiological condition, and production status [18]. Being the result of the activity in the phytotechnical sector, different types of feed for animals and birds pass, in one way or another, through technological processes of cultivation, harvesting, primary processing, transport, storage, etc. Subsequently, those expenses are reflected in the cost of this type of product. At the same time, a significant part of fodder is manufactured and realized as commodity production. Therefore, the share of this type of fodder in the structure of material fodder consumption differs considerably, depending on the correlation of different factors, such as: species of animals and birds; the final destination of the livestock production to be obtained. Nutrition and feeding directly and obviously influence not only the level of animal production, but also reproduction,

growth and development processes, the health status of animals, and, last but not least, economic efficiency - a decisive objective in carrying out activities in animal husbandry [13].

In the composition of production costs, the share of received services occupies up to 40%, in some cases, such as the production of apples - it can reach the level of 70% [6].

The services provided in the production process in both phytotechnics and animal husbandry are differentiated into mechanized services, with the involvement of machinery and mechanized techniques, and manual services – directly involving manual labor. The main component of expenses for mechanization works is the cost of diesel, gasoline and other petroleum products. The method of determining the market prices of these products is developed in accordance with the Methodology of the formation and application of prices for petroleum products. The volume of consumption (in natural units) of diesel, gasoline, etc. at the execution of each separate technological operation, it is determined by applying the technological data sheets, the type of consumption norms, the technical passports of the tractors, combines, vehicles, etc.

The market price of a conventional unit (P_p) of petroleum products is calculated according to the formula:

$$P_p = P_m \frac{1}{G} + K_1 P_{um} + K_2 P_{ut} + K_3 P_s \quad (\text{MDL/kg}) \dots \dots \dots (1)$$

where:

P_m – market price of 1 liter of diesel (MDL);
 G – specific gravity of diesel ($G=0.86$);
 $K_1; K_2; K_3$ – engine oil, transmission oil and solid oil usage ratio;

$P_{um}; P_{ut}; P_s$ – the market price of a liter of motor oil, transmission oil and solid oil.

For each technological process, the production capacity in one exchange (W_{sch}) of used aggregates is calculated, the calculation being carried out according to the formula:

$$W_{sch} = 0.1 \times B_1 \times V_1 \times T_e \quad (\text{ha/hour}) \dots \dots \dots (2)$$

where:

B_1 - working width of the aggregate (m);

V_1 - working speed of the aggregate (km/hour);

T_e - actual working time.

The amount of expenses for the execution of mechanized works calculated for a surface unit (C_m) or for a conventional surface unit is calculated according to the formula:

$$C_m = Q_{pet} + P_m + A_t + R_t + N \quad (\text{MDL/ha}) \dots \dots (3)$$

where:

Q_{pet} – cost of fuel consumption, MDL/ha;

P_m – labor payment (including taxes and breakdowns in the social fund), MDL/ha;

A_t – depreciation of fixed assess, MDL/ha;

R_t – current repairs, technical services and storage costs, MDL/ha;

N – other types of planned expenses (taxes, administrative expenses, lease expenses, etc.), and unplanned expenses (advertising, landscaping, ecological measures, etc.)

The cost of the mechanical services is established with the formula:

$$P_p = C_m \times K_{prof} \dots \dots \dots (4)$$

where:

C_m – unitary cost of the mechanized services;

$K_{prof.}$ – coefficient of profitability of mechanization works [11].

The agricultural sector is characterized by a massive involvement of manual labor. The degree of use in one type of process or another depends on the complexity of the work performed, the level of automation and mechanization of production technologies, and the specifics of the agricultural sector.

As an example, in the normalized cost structure for the production of winter wheat, the cost of mechanized services represents 35% and manual services - about 5%, while in the production of currants, mechanized expenses represent 4.7% and manual operations represent 64% of the total production consumption [2].

If the cost of mechanized services consists of several components (reflected previously), then only salary expenses are used as the basis for the formation of operational consumption and are developed based on the pricing of

manual production works. Therefore, the salary represents the remuneration of the providers, an action that is carried out through the tariff system [4].

The labor remuneration tariff system represents by itself the totality of norms with the help of which the differentiation and regulation of the level of remuneration of various jobs and categories of workers in the branches of agricultural production is carried out depending on the quality of work, the level of qualification of the worker, the working conditions [15]. The composition of the salary includes the so-called basic salary (tariff salary for workers and position salary for other collaborators) and various financial supplements.

As the main wage component for calculating the rates of expenses for services and agricultural products, this methodology provides for the use of the basic tariff wage, established for the fulfillment of a work norm and differentiated depending on the tariff categories of the agricultural work. The salary includes the so-called base salary (tariff salary for workers and position salary for other employees) and various financial supplements [12].

The tariff grid, approved by the Decision of the Government of the Republic of Moldova (no. 743 of 06.11.2002) provides for six qualification categories for agriculture, with the general growth coefficient at the level of 2.00(category VI in relation to the first category) and is updated annually. Manually executed works are assigned to category I, II, III, IV, difficult works belong to category V-IV. For the livestock sector, categories III-IV are mostly assign. The monthly tariff salary is determined by multiplying the tariff salary for one hour by the total number of hours worked during a month (169 hours).

In the agricultural production process, some variable consumptions are carried out that are not part of the previously examined compartment and are represented by the following items: Irrigation expenses; Insurance premiums, related to certain agricultural crops (animal species); Expenses for guarding cultivated agricultural land, expenses for design services, extension, etc.

Fixed costs represent all consumption independent of production volume (depreciation of fixed assets, taxes, lease payments, etc.).But changing the volume of production after some limits can generate the reduction or increase of fixed expenses. Thus, fixed costs can become conditionally constant costs, with the discrete change of its values depending on the change in production volume after some limit [5].

The wear and tear of fixed assets represents the decrease in value of fixed assets in the production process or the loss of some capacities, properties and qualities of fixed assets as a result of their operation, their value being gradually transferred to the cost of manufactured production. Depreciation is calculated on each group and object of fixed assets depending on their initial value and duration of use. Lease payments are a specific component and represent a way of redistributing the agricultural surplus. Although in most cases the lease payments are made in kind, in the present methodology they are calculated in their monetary equivalent, resulting from the size of the market prices of the respective products on the date of making the calculations.

Taxes and duties consist of land tax (single tax) and value added tax (VAT).The amount of the land tax is established annually by the representative authorities of the local public administration, within the limits of the maximum quotas specified in the Fiscal Code and other normative acts.

Other direct consumption will include: Insurance premiums; consumption related to combating and liquidating the consequences of natural disasters, etc.; the cost of small value items that can be attributed to a specific agricultural product.

Indirect costs represent all expenses related to the management and servicing of the entity's production subdivisions.

Summing up the total variable costs, the fixed fixed costs and the indirect ones gives you the total global cost of production, expressed as a monetary unit at a unit of measure.

A study case- calculation of production costs per 1 ha for winter wheat and barley in a vegetal farm of Moldova

For a clearer explanation of the process of developing cost tariffs in agriculture, we will provide a demonstration with real data. For this example, we will consider two cereal crops - autumn wheat and autumn barley. Following the application of the methodology for determining the standardized cost, the following result was obtained (Table 2).

Table 2. Standard cost of autumn wheat grains and autumn barley grains. MDL/ha

Specification	Autumn wheat yield 30 quintals/ha	Autumn barley yield 25 quintals/ha
1. Total variable costs, including	7,700	8,271
1.1 Seeding material	1,666	1,520
1.2 Fertilizers	2,335	2,000
1.3 Chemical preparations	1,050	1,731
1.4 Mechanized operations	2,180	2,485
1.5 Manual operations	245	295
1.6 Other expenses	224	240
2. Total fixed costs, including	1,194	1,211
2.1 Depreciation of fixed assets	100	100
2.2 Taxes and fees	170	170
2.3 Rent payments	693	693
2.4 Other direct fixed expenses	231	248
3. Direct consumption, total	8,894	9,482
4. Indirect costs	267	286
5. Standard cost	9,161	9,768

Source: Author's calculations based on the methodology used.

In order to determine the standardized cost of wheat and barley production, the following consumption indicators were initially calculated:

Calculation of variable costs

(1)*Seed material*. For sowing one hectare of winter wheat, 300 kg of seed material are needed, for barley - 220 kg. By multiplying by the selling price of one kilogram of seed material, the total value of the respective indicator was obtained.

(2)*Fertilizers*. Usually, due to the lack of organic fertilizers, the determination of the respective consumption will be based only on the value of chemical fertilizers. Depending on the need for N;P;K in the soil and

according to the technological sheet, the indicator given for wheat is 2,335 MDL/ha, for barley - 2,000 MDL/ha.

(3)*Chemical preparations*. These represent chemical plant protection products. In our case, the value of this consumption is determined by the content of the preliminary protection program for each individual crop, but it can vary in case of unforeseen conditions. In our case, the expenses are: for wheat - 1,050 MDL, barley - 1,731 MDL.

(4)*Mechanized operations*. It includes the entire set of mechanized works according to the technological sheet. Mechanized operations are calculated based on the initially developed rates for mechanized works. The total mechanized expenses incurred during the production process are reflected as an indicator and included in the respective table. For wheat - 2,180 MDL, barley - 2,485.

(4)*Manual operations*. In our case, manual force is used for loading and unloading the seed material and chemical fertilizers, servicing the seeding equipment. Expenses are calculated based on the hours worked, with remuneration being executed depending on the wage rate category. The value of manual operations used in cultivating one hectare of wheat is 245 MDL, for barley - 295 MDL.

(5)*Other expenses*. These are unforeseen expenses in the process of agricultural crop production, which can vary depending on the applied technologies and the morphological specificity of the crop. In the case of cereal crops grown in the conditions of the Republic of Moldova, these expenses represent 3-4% of the total variable costs.

Calculation of fixed costs

(1)*Wear and tear of fixed assets*. It is calculated using the method of production units, which involves calculating depreciation as the product of the depreciation rate per unit of product (service) and the volume of products manufactured (services provided) in the management period. When determining the depreciation of tangible fixed assets, the economic useful lives and conditions of use are taken into account [10]. Both for autumn wheat and barley, the wear and tear of physical means is estimated at 100 MDL per hectare.

(2)*Taxes and fees.* For activity in the agricultural sector, central authorities have established a flat tax. Similarly, for both crops, the respective tax amounts to 170 MDL/ha.

(3)*Lease payments.* Most large agricultural enterprises have significant portions of leased agricultural land. Following field research, it has been determined at an expert level that currently, the average payment for one hectare of leased agricultural land is on average 693 MDL.

(4)*Other direct fixed expenses.* Includes unplanned expenses related to various local taxes, variations in the calculation of fixed asset depreciation, rent payments. In our case, a margin of 20-24% of total fixed expenses was chosen.

Calculation of Direct consumption costs is the sum between variable costs and fixed costs, which in case of winter wheat accounts for 8,894 Lei/ha and in case of barley for 9,482 Lei/ha.

Calculation of Indirect costs

Indirect costs include administrative expenses, security expenses, logistics and constitute 3% of the total production costs. Thus, for wheat this type of expenses is 267 MDL/ha, for barley - 286 MDL/ha.

Calculation of standard costs

The determination of the total standard cost for both crops is done by summing up all consumption and production costs. As a result, cultivating one hectare of wheat, with an estimated yield of 30 quintals per hectare (average productivity in autumn wheat production in the Republic of Moldova), the standard cost will be 9,161 MDL or 305.3 MDL per quintal of production. For autumn barley, the standard cost for one hectare of crop is 9,768 MDL or 390.7 MDL per quintal of production.

CONCLUSIONS

The cost of production in agriculture represents the value expression of labor consumption directed towards the realization of an economic process completed with obtaining a unit of agricultural product. At the same time, the respective indicator forms the

basis of the prices for the production obtained or the service provided.

In determining production costs in agriculture, consumption or production expenses represent the resources used for the production of agricultural products or the provision of services, and the value of these expenses is reflected in the form of tariffs. The development of cost tariffs in agriculture involves the systematization of a large set of economic, social and technological data. Once established, they separately reflect the amount of expenses to be included in the production cost.

Cost tariffs in agriculture constitute a basic element regarding the planning and self-control of production expenses in the agricultural sector. They serve as an information base for making managerial decisions regarding the formation of the optimal production structure for agricultural production, making investments in the production process, etc. In order for the effect of the development and practical use of the tariff system in the agro-food sector to be reflected in all areas of economic activity, it is necessary to expand the tariff base throughout the value chain: from the producer's farm to the consumer's table.

ACKNOWLEDGEMENTS

The report is part of the set of works carried out under Subprogramme 030101 "Strengthening the resilience, competitiveness and sustainability of the economy of the Republic of Moldova in the context of the process of accession to the European Union", institutional funding.

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