Factory accounting and assessment of uncooked smoked sausages production efficiency

A N Sivaks¹, Zh N Dibrova², N V Zhukova², V N Zhenzhebir³ and S A Okhramenko⁴

¹ Samara State University of Economics, Samara, 443090, Russian Federation
² K G Razumovsky Moscow State University of technologies and management (the First Cossack University), Moscow, 109004, Russian Federation
³ Plekhanov Russian University of Economics, Moscow, 117997, Russian Federation
⁴ E-mail: s.a.okhramenko@mgutum.ru

Abstract This article presents a research of factory accounting and its impact on efficiency of production of uncooked smoked sausages (dry salami). Those uncooked smoked sausages were just introduced into a factory production, and their method of production involved starter cultures. In course of the research, the efficiency of the project, the profitability of the project and the payback period were found. The cost of the food products newly introduced into production and the payback period of the project were found. The research showed the efficiency of the project, the profitability of the project was equal to 43%, the payback period was 7 months. The cost of Savory sausage per 1 kg is 449.80 rubles, per 1 ton is 449,800 rubles. The cost of Gourmet sausage per 1 kg is 456.59 rubles, for 1 ton is 456,590 rubles. The total cost of production of uncooked smoked sausages was 5,452,615 rubles. The use of our starter cultures in production of uncooked smoked sausages led to costs savings. The initial cost of Savory sausage was 621.78 rubles, and after reduction of its prime cost it became 449.80 rubles. The initial cost of Gourmet sausage was 610.72 rubles, and after reduction of its prime cost it became 456.59 rubles.

1. Introduction
In Russia the meat processing industry is a vast branch of the food market. It represents the market of meat and meat products. This market features rapidly growing production rates, high demand and high consumption of meat products, and also the meat has high importance as a part of the basic human diet [1-5].

The peculiar feature of the Russian meat market is high competition within. The high level of competition encourages manufacturers to improve the quality of their products [6-10].

One of the ways to produce meat products with defined technological properties is to use starter cultures of microorganisms. The cultures preparations introduced during the salting stage change the microbiological media and thereby prevent development of undesired microbiological processes both during the production process and during at the storage [11-15]. Also, the ongoing biochemical processes, activated by starter cultures, allow reducing a range of technological processes. These cultures provide the greatest influence on the drying process of uncooked smoked sausages and dry-cured meat products.
The second equally important factor in improving the enterprise competitiveness is the management of production costs. In meat products production the factory accounting is based on separation of an enterprise’s costs and the determination of prices for the products, taking into account the preferred level of profitability for the enterprise [16-20].

Factory accounting ensures the profitability of production, and the method of factory accounting determines the competitiveness of the enterprise in whole.

Considering the above, herewith the task was set to analyze costs accounting and assessment of production efficiency when uncooked smoked sausages were introduced into production.

2. Materials and methods

This research considers the assessment of costs accounting and assessment of production efficiency of uncooked smoked sausages, produced according to the following technology. The raw material costs are shown below in tables 1 and 2. Both samples of sausages were produced using the starter culture Optistart.

Table 1. Recipe and costs of raw material for Savory uncooked smoked sausage, per 1000 kg of a finished product.

| #  | Item                   | Quantity per 1,000 kg, kg | Price per kg. | Amount    |
|----|------------------------|---------------------------|---------------|-----------|
| 1  | Pork, ham              | 254.7                     | 185.99        | 47,371.653|
| 2  | Pork, shoulder         | 523.6                     | 179.04        | 93,745.344|
| 3  | Back pork fat          | 495.3                     | 202.88        | 100,486.46|
| 4  | Drinking water         | 100.7                     | 0.01          | 1,007     |
| 5  | Salt (food salt)       | 24,056                    | 6.88          | 165,505.28|
| 6  | Sodium nitrite         | 16,981                    | 12.15         | 206,319.15|
| 7  | Dextrose               | 3,538                     | 60.48         | 213,978.24|
| 8  | Carmine extract        | 0.042                     | 6441.71       | 270,551.82|
| 9  | Soy protein            | 40,283                    | 142.35        | 5,734,2851|
| 10 | Rice red dye           | 0.515                     | 159.45        | 82,116.75 |
| 11 | Spices mixture “S/K”   | 10,613                    | 794.83        | 8,435,5308|
| 12 | Start culture Optistart| 0.283                     | 14246.93      | 4,031.88  |
|    | Total                  | 1,470.61                  |               | 260,744.64|

Table 2. Recipe and costs of raw material for uncooked smoked sausage “Gourmet”, per 1000 kg of finished product.

| #  | Item                   | Quantity per 1 ton | Price per kg. | Amount    |
|----|------------------------|-------------------|---------------|-----------|
| 1  | Back pork fat          | 462.5             | 202.88        | 93,832    |
| 2  | Chicken fillet         | 462.5             | 139.13        | 64,347.625|
| 3  | Chicken fillet         | 616.7             | 142.76        | 88,040.092|
| 4  | Sodium nitrite         | 18.5              | 12.15         | 224,775   |
| 5  | Salt (food salt)       | 26,209            | 6.88          | 180,317.92|
| 6  | Hungarian salami       | 16,958            | 629.03        | 10,667,090.74|
| 7  | Food colorant “Beef”   | 6,167             | 519.22        | 3,202,029.74|
| 8  | Dextrose               | 3,083             | 60.48         | 186,459.84|
| 9  | Starter culture Optistart| 0.308          | 14,246.93     | 4,388.05  |
|    | Total                  | 1,612.93          |               | 265,068.44|

The calculations will also take into account the cost of equipment and its depreciation. The list of equipment is as follows:
• cold storage chamber – 51,000 rubles;
• cutter – 1,550,000 rubles;
• filler – 1,220,000 rubles;
• drying chamber – 121,000 rubles;
• smoking chamber – 1,549,480 rubles;
• clipping machine – 13,840 rubles;
• crusher – 315,160 rubles.

It is also necessary to take into account the labor costs. The following personnel are required to run the production process:

• Meat mincer (meat cutting) - 1 employee, salary is 60,000 rubles per month;
• Operator (minced meat filling) - 2 employees, salary is 42,500 rubles per month;
• Technologist - 1 employee, salary is 120,000 rubles per month;
• Transporter - 1 employee, salary is 40,000 rubles per month;
• Quality supervisor - 1 employee, salary 55,000 rubles per month;
• Packer - 1 employee, salary is 40,000 rubles per month;
• Thermist - 1 employee, salary is 45,000 rubles per month;
• Shift foreman - 2 employees, salary is 80,000 rubles per month.

In the present research the various parameters were also calculated. The calculations were made according to the following formulas:

Depreciation of equipment:

\[
Depr = I_c \times N_{depr} \div 100\% 
\]  

(1)

Depr – depreciation of equipment;
I_c – initial cost;
N_{depr} – norm of depreciation.

Norm of depreciation:

\[
N_{depr} = (1 + n) \times 100\% 
\]  

(2)

n – term of service life.

Return:

\[
R_3 = Inc_{bt} \div T_c \times 100\% 
\]  

(3)

Inc_{bt} – Income before tax;
T_c – Total cost.

Payback period of the project:

\[
C_0 = Inv \div Inc 
\]  

(4)

Inv – investments to the project;
Inc – income.

Deductions to extrabudgetary funds:

\[
O = 0.302 \times P_{fund} 
\]  

(5)

Where 0.302 – is the minimal deduction to extrabudgetary funds;
P_{fund} – payroll fund.
3. Results and discussion

The prime cost of uncooked smoked sausage is determined on the basis of the norms of raw materials, recipes of the sausage and the rate of actual consumption of the raw materials.

The calculation is made for one ton of products. Here the output of finished products is shown as well as quantity of raw materials according to the technological norms.

When calculating the cost of uncooked smoked sausage, it is necessary to keep in mind that the yield of finished products is less than the volume of raw materials used for its production.

According to the technology under consideration, the yield of the finished product – i.e. Savory sausage, is 68%. As a result, we get the raw material cost per 1000 kg, take into account losses of 32%, so it makes 260,744.64 rubles.

The yield of the finished product – Gourmet sausage, is 62%. As a result, we get the raw material cost per 1000 kg, take into account losses of 38%, so it makes 265,068.44 rubles.

Let’s calculate the depreciation of the equipment.

The service life of the equipment is 7 years.

\[
N_{depr} = (1 - \frac{1}{7}) \times 100\% = 14.29\%
\]

\[
A = 4.820.480 \times 14.29\% \div 100\% = 688.846.59
\]

Let’s calculate the norm of depreciation per 1 month and per 1.000 kg of produced sausages

\[
A_{mon} = 688.846.59 \div 12 = 57.403.88
\]

Monthly output of the finished products is 12,000 kg

\[
A_p = 57.403.88 \div 12 = 4.784
\]

Let us calculate the cost of auxiliary raw materials, auxiliary raw materials, raw materials which are not an integral part of the produced sausages, but which are used in the manufacture process, for example, packaging.

The sausage casing is used as auxiliary materials in production of sausages. For production of Savory sausage, the enterprise used “Fibrous” casing. The casing costs 14.33 rubles per running meter; the consumption per 1000 kg of finished product is 1.114 meters, so the total cost for casing makes 15,963.6 rubles. For production of Gourmet sausage, the “Gourmet” casing is used, which cost is 13.74 rubles per running meter, consumption per 1000 kg of finished products is 1.337 meters, the total cost is 18,370.38 rubles.

It is necessary to calculate costs for utilities, and other payments, which include the cost of fuel, hot and cold water, steam, compressed air and cold, directly involved in the production process. At the same time, these expenses include the costs of fuel and electric power, both received from the outsource company and generated by the enterprise itself. Costs per 1.000 kg of manufactured product are presented below in table 3.

Table 3. Calculation of utility payments.

| # | Item                  | Norm per 1,000 kg | Price per UOM | Amount   |
|---|-----------------------|-------------------|---------------|----------|
| 1 | Electric power, kW/h  | 116               | 5.47          | 634.52   |
| 2 | Water, m³             | 18                | 40.48         | 728.64   |
| 3 | Gas, m³               | 19                | 6.83          | 129.77   |
|   | Total                 | -                 | -             | 1,492.93 |

Let’s define the wage fund, consider the forming components:
• salaries costs charged for works of certain categories of employees, directly involved in the production process or services;
• incentive accruals, bonuses, premiums to labor tariff rates and salaries, provided for by the remuneration system in this specific enterprise.

For sausages production 10 employees are required. Labor costs (i.e. amount of salaries) will amount to 605.000 rubles per month.

Taking into account the deduction to extrabudgetary funds, the payroll fund will be as follows:

\[ 605.000 \text{ rub} \times 1.302 = 787.710 \text{ rub} \]

The total volume of Savory and Gourmet sausage is 12.000 kilograms.

Thus, the payment for 1 kg of manufactured products will be as follows:

\[ 787.710 \div 12.000 = 65.64 \text{ rub/kg} \]

We calculate the general production (shop) costs.

General production costs are 40% of salaries, calculated at rate of 1.000 kilograms of finished product.

\[ 65.64 \times 1.000 \times 0.4 = 26.256 \]

7. General operating costs

General operating costs are 50% of salaries, calculated at rate of 1.000 kilograms of finished product.

\[ 65.64 \times 1.000 \times 0.5 = 32.820 \]

Include:

• cleaning of the workshop;
• post services;
• communication services;
• the Internet;
• repair of equipment;
• cost of office consumables;
• compliance with safety regulations;
• information and consulting services.

9. Selling expenses

Include:

• the cost of the goods delivery to the destination – 5.000 rubles.
• advertising costs – 43.470 rubles.
• representation costs – 3.500 rubles.

Total: 51.960 rubles.

The obtained data is consolidated below in the table 4.

| Table 4. Calculation of the cost of uncooked smoked sausage per 1 ton, by costs items. |
|----------------------------------|----------------|----------------|
| Item                             | Picante        | Gourmet       |
| Raw materials                    | 260.744.64     | 265.068.44    |
| Auxiliary materials              | 15.963.62      | 18.370.38     |
| Fuel and electric power for      | 1.492.93       | 1.492.93      |
| technological processes          |                |                |
Payroll fund 402.927.19 409.657.75
General production costs 26.256 26.256
General operating expenses 32.820 32.820
**Factory prime cost** 397.826.06 404.623.93
Business expenses 51.970 51.970
**Total** 449.796.06 456.593.93

*Total full prime cost per 1 kg. of Savory sausage, taking into account the losses (32%) is:*

\[
449.796.06 \text{ rub} \div 1.000 \text{ kg} = 449.8 \text{ rub/kg}
\]

Weight of one linksausage is 396 g.
Price per one linksausage:

\[
449.8 \times 0.396 = 178.12
\]

*Total full prime cost per 1 kg. of Gourmet sausage, taking into account the losses (38%) is:*

\[
456.593.93 \text{ rub} \div 1.000 \text{ kg} = 456.9
\]

Weight of one linksausage is 380 g.
Price per one linksausage:

\[
456.59 \times 0.38 = 173.5
\]

Based on the calculations above, the total cost per month will be 5.452.599 rubles.
Below the calculation of investments is presented in the table 5.

**Table 5. Investments to the project.**

| Item                        | Picante sausage | Gourmet sausage |
|-----------------------------|-----------------|-----------------|
| Purchase of equipment, rub. | 4.820.480       | 4.820.480       |
| Salary, rub.                | 605.000         | 605.000         |
| Costs per month, rub.       | 1.754.220       | 3.969.837       |
| **Total investment, RUB**   | 16.303.559      |                 |

The prime cost of uncooked smoked sausages for the year amounted to 65.431.385.6 rubles. Income before tax 28.338.279.47 rubles.
Return on costs:

\[
R_3 = 28.338.279.47 \div 65.431.385.6 = 43\%
\]

**Payback period**

\[
C_0 = 16.303.559 \div 2.361.523.29 = 7 \text{ months}
\]

**4. Conclusion**

Cost calculation and accounting is a necessary step for production of uncooked smoked sausages.
It helps to understand whether it is profitable to produce sausage and offer it to the customers.

The rate of return (profitability) of products shows how much profit the company receives from each ruble of the sold products. The rate of return value characterizes the pricing policy of an enterprise and serves as basis for assessing the competitiveness of the products. Decrease of sold products profitability may indicate a decrease in market demand. Product profitability can be increased by increasing prices or decreasing costs, but this is temporary measure. It is more reasonable and efficient to increase production and sales of products in line together with the improving market environment.
Constant monitoring of absolute values of income and relative parameters of profitability in dynamics helps to find problem points in production and economic activities; to introduce changes in due time and to correct shortcomings. Those measures eventually lead to increase in efficiency of production and strengthening of the enterprise’s competitive position in a market of the products.

In the course of the study, the efficiency of the project was established, the profitability of the project was 43%; the payback period was 7 months.

The cost of Savory sausage for 1 kg is 449.80 rubles, for 1 ton it is 449,800 rubles. The cost of Gourmet sausage for 1 kg is 456.59 rubles, for 1 ton it is 456,590 rubles. The total cost of production of uncooked sausage was 5,452,615 rubles.

Application of our starter cultures for production of uncooked smoked sausages lead to costs savings. The initial cost of Savory sausage was 621.78 rubles, and after cost cutting it became 449.80 rubles. The initial cost of Gourmet sausage was 610.72 rubles, and after cost cutting it became 456.59 rubles.

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