

# ОРГАНІЗАЦІЯ ТА ЕКОНОМІКА ФАРМАЦІЇ

*Recommended by Doctor of Pharmacy, professor A. S. Nemchenko*

UDC 615.2: 338.5: 636.09

<https://doi.org/10.24959/nphj.17.2174>

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## Analysis of modern approaches to formation of cost price for veterinary preparations

**Aim.** To analyze the modern approaches to cost accounting and calculation of the cost price of veterinary preparations (VP) in order to increase their economic availability.

**Materials and methods.** The regulatory and legal framework and methodological approaches to formation of the cost of production were analyzed. The production and full costs of VP were calculated in order to substantiate the economic feasibility of their manufacturing. The structure of the cost price of VP was analyzed.

**Results and discussion.** The analysis of the modern approaches to pricing on medicines and VP has been carried out. It has been determined that chemical and pharmaceutical enterprises producing medicines and VP use different approaches when accounting the costs and calculating the cost price; as a result, it has a significant impact on the level of prices and the structure of the cost price. The project cost of three new antimastitis VP in the form of cream, solution and spray has been calculated using two different methods. The calculations performed confirm the economic feasibility of introduction of VP into production.

**Conclusions.** Antimastitis products proposed for introduction into production are price competitive. The efficient cost management of VP will allow gaining competitive advantages at the market and providing their economic availability.

**Key words:** *medicines; veterinary preparations; pricing; calculation; production cost price; full cost price*

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### Аналіз сучасних підходів до формування собівартості ветеринарних препаратів

**Мета** роботи – аналіз сучасних підходів до обліку витрат та калькулювання собівартості ветеринарних препаратів (ВП) з метою підвищення їх економічної доступності.

**Матеріали та методи.** Аналіз нормативно-правової бази і методичних підходів до формування собівартості продукції. Калькуляція виробничої та повної собівартості ВП з метою обґрунтування економічної доцільності їх впровадження у виробництво. Аналіз структури собівартості ВП.

**Результати та їх обговорення.** Здійснено аналіз сучасних підходів до ціноутворення на ЛЗ та ВП. Встановлено, що хіміко-фармацевтичні підприємства, що виробляють ЛЗ та ВП, при обліку витрат та калькулюванні собівартості застосовують різні підходи, що врешті-решт суттєво впливає на рівень цін і структуру собівартості. Здійснено калькулювання проектної собівартості трьох нових протимаститних ВП у формі крему, розчину та спрею за двома різними методиками. Проведені розрахунки підтверджують економічну доцільність впровадження ВП у виробництво.

**Висновки.** Запропоновані до впровадження у виробництво протимаститні засоби є конкурентоспроможними за ціною. Ефективне управління собівартістю ВП дозволить отримати конкурентні переваги на ринку та забезпечити їх економічну доступність.

**Ключові слова:** *лікарські засоби; ветеринарні препарати; ціноутворення; калькуляція; виробнича собівартість; повна собівартість*

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### Анализ современных подходов к формированию себестоимости ветеринарных препаратов

**Цель** работы – анализ современных подходов к учету затрат и калькулированию себестоимости ветеринарных препаратов (ВП) с целью повышения их экономической доступности.

**Материалы и методы.** Анализ нормативно-правовой базы и методических подходов к формированию себестоимости продукции. Калькуляция производственной и полной себестоимости ВП с целью обоснования экономической целесообразности их внедрения в производство. Анализ структуры себестоимости ВП.

**Результаты и их обсуждение.** Осуществлен анализ современных подходов к ценообразованию на ЛС и ВП. Установлено, что химико-фармацевтические предприятия, производящие ЛС и ВП, при учете затрат и калькуляции себестоимости применяют различные подходы, что в результате существенно влияет на уровень цен и структуру себестоимости. Проведена калькуляция проектной себестоимости трех новых противомаститных ВП в форме крема, раствора и спрея по двум разным методикам. Проведенные расчеты подтверждают экономическую целесообразность внедрения ОП в производство.

**Выводы.** Предложенные к внедрению в производство противомаститные средства являются конкурентоспособными по цене. Эффективное управление себестоимостью ВП позволит получить конкурентные преимущества на рынке и обеспечить их экономическую доступность.

**Ключевые слова:** *лекарственные средства; ветеринарные препараты; ценообразование; калькуляция; производственная себестоимость; полная себестоимость*

Pharmaceutical products intended for needs of veterinary medicine, in particular for the treatment and prevention of diseases of agricultural animals, are a prerequisite for the effective functioning of the livestock industry. During the last years there has been dynamic development of the world market of veterinary preparations (VP) due to the processes of globalization, development of science and introduction of innovative medical technologies. Be fair to say that the VP market is closely interrelated with the drug market for human, and often VP are produced by pharmaceutical companies (Bayer, КРКА, etc.); therefore, there is a need for the state regulation of production and turnover of VP. Moreover, the market of veterinary preparations has its own characteristics: the market is clearly segmented by consumers; the demand is formed by specialists of veterinary medicine, the elasticity of the demand for VP is low; buyers of VP are not consumers. It should be noted that regulation of the turnover of VP compared to the state regulation of the turnover for human drugs is significantly different [1].

According to the Law of Ukraine "On veterinary medicine" only VP registered in due order are permitted for use. As of 20.05.2017 there were 5162 names of hemio-pharmaceutical drugs (1284 domestic drugs constituting 24.87 % of the total number of the registered VP) and 667 immunobiological VP (the share of domestic products was 28 % – 186 names) included to the State Register of veterinary preparations. Among them approximately 20 % of the registered drugs (995 names) are for the treatment of cattle. It should be noted that in the past two years the registry was not updated. Despite the large number of VP registered in Ukraine the demand remains greatly insufficient. The market is saturated with generic drugs manufactured in Germany (686 trade names), Poland (600), France (597), Russia (506), Spain (318), Netherlands (265), Italy (250), Belgium (160), USA (159), Canada (57), Estonia (42), etc. [2, 3]. Unfortunately, the VP competitiveness of domestic production is low, the technological level of the Ukrainian producers is rather low compared to foreign companies, and it explains the small volume of exports of domestic VP. In addition, development and introduction of new original VP are not practically carried out, and production of substances in Ukraine is virtually absent. Therefore, the issue of increasing the competitiveness of domestic VP through the effective cost price control becomes topical.

**The aim** of the work was to study the approaches to formation of prices for VP and determine the project cost price of new VP for the treatment and prevention of cow mastitis in order to substantiate the economic expediency of their introduction into production.

### **Results and discussion**

Taking into account the need for development of new antimastitis products three VP for the treatment and prevention of mastitis in cattle were proposed to introduction. These VP were created on the basis of silver citrate and copper. They are available in three different dosage forms in an easy to use pack, namely "Argocid-C" (cream, 100 g tube), "Argocid" (solution for intracasternal introduction) and "Argocid-copper" (spray). One of the important components of the development process of new drugs is determination of the forecast cost price to substantiate the economic expediency of their introduction into production with regard to health technology assessment in the aspect of their economic availability.

For determining the cost price the Regulation (standard) for accounting – R(S)A 16 "Expenses" [4], as well as the Methodical recommendations on forming the cost price of products in industry approved by the Ministry of Industrial Policy of Ukraine No. 373 dated 09.07.2007 are used [5].

According to the R(S)A 16 direct costs that can be directly referred to a specific object of expenditure are included to the manufacturing cost. They are direct material costs (the cost of the raw material, basic and auxiliary materials); direct costs for remuneration of labor; other direct costs (benefits-related deductions, rent, depreciation, waste losses, etc.); as well as production overhead costs (POC), which include the costs for management of production, depreciation of fixed assets, the costs of improving the technology and organization of production, maintenance of premises and service of the production process, labor protection, occupational safety and environmental protection, other expenses (internal displacement; shortage; standstill payment, etc.) [4, 5].

Indirect (overhead) costs that cannot be directly attributed to a specific product are not included to the manufacturing cost; they are part of the full cost price of VP. For example, general (administrative), distribution costs and other operating expenses refer to indirect costs.

The list and the composition of items for calculation of the cost price of products are approved by the order on accounting policy of the enterprise.

As practice shows, cost accounting at chemicopharmaceutical enterprises is carried out using different approaches. Thus, according to the method of cost estimation there is accounting by standard cost, actual cost or planned cost. By completeness of inclusion of costs in the cost price of products there is "absorption costing" – the method of full distribution of costs and direct-cost (accounting for direct costs, also called "variable costing"). According to the method of allocation of costs to the production process of manufacturing VP their accounting can be done using process-oriented or job-order cost methods [6].

Cost accounting is one of the most important aspects of cost control, which, in turn, is the basis for making management decisions about feasibility of the production of specific VP; pricing for products; changes in technology and organization of production, etc.

The main methods for accounting and control of expenses include such accounting systems as direct-cost, standard cost (the standard method). With the aim of cost control the following systems are used: target cost reduction systems such as Target-Costing, Kaisen-Costing, enterprise resource planning systems such as Kanban and Just-in-Time, and continuous improvement of costs (cost-benefit analysis – CBA), functional accounting – ABC method (Activity Based Costing), the method of analysis and optimization of costs (cost management), the concept of management of the life cycle cost (LCC method). It is worth noting that all these methods mentioned usually do not exist in pure form, they can be implemented in parallel or complement each other [7, 8].

Chemical and pharmaceutical enterprises engaged in production of drugs for human and veterinary preparations use similar approaches to cost accounting and pricing, however, there are certain peculiarities (in particular VAT) due to the fact that prices for VP are not regulated by the state. Furthermore, the preferential VAT rate of 7 % does not applied to the VP, which are analogs of humane drugs (since they are not duly registered in the State Register of Medicines).

When preparing the project calculation the need for the raw material and materials for manufacture of VP is determined on the basis of the norms of expenses calculated by compiling the material balance of production.

The analysis of methodical approaches for determining the cost price of drugs and VP indicates that grouping and cost accounting can vary significantly for different enterprises. The changes to the composition of the cost items depending on technology, equipment and organization of production, as well as the proportion of certain cost elements in the cost price of products can be approved by the order of the accounting policy. Indeed, this greatly affects the price.

Thus, for example, according to various sources the transportation and procurement costs can be from 0.2 % to 5.0 % of the total cost of the raw material, basic and auxiliary materials. As a rule, POC are from 240 % to 360 % of the wage of the main production workers.

According to the accounting policy enterprises used various approaches to determination and accounting of

indirect costs. Most companies take administrative expenses at the level of 240-260 % of the wage of the main production workers, distribution costs – 40-50 %, other operating expenses – 60-70 %. When determining the cost items some enterprises take the manufacturing cost as the basis. For example, administrative expenses are at the level of 11-16 % of the manufacturing cost, distribution costs – 6-9 % and other operating expenses – 3-7 %, respectively.

The calculations of basic and additional wages are based on determining the share of the drug in the production program of the enterprise and the production volume of a specific drug manufacturer. The benefits-related deductions are 22 % of the wage of the main production workers.

For comparison the cost price of three new antimastitis VP proposed for introduction in various dosage forms (cream, solution for intracisternal introduction and spray) in cattle has been calculated using two different methods.

According to the first method the indirect costs are allocated to the wages of production workers, namely administrative expenses – 260 % of the basic wage, distribution costs – 40 %, other operating expenses – 70 %, respectively.

According to another method the above cost items are determined on the basis of the manufacturing cost, in particular administrative expenses are 16 % of the manufacturing cost, distribution costs – 9 %, other expenses – 7 %.

Thus, the transportation and procurement costs are 5 % of the total cost of the raw material, basic and auxiliary materials in the first case, and in the second case they are 1 %.

The forecast cost price of the veterinary preparation "Argocid-C" in the form of the cream (100.0 g tube) for the treatment of mastitis in cows is determined on the basis of the material balance of production. The composition of the preparation contains: silver citrate – 0.05; D-panthenol – 5.0; vaseline oil – 20.0; propylene glycol – 5.0; polysorbate-80 – 6.0; glycerol monostearate – 4.0; deionized water – up to 100.0. The results of calculations are given in Tab. 1.

Therefore, according to our calculations the full cost price of the cream "Argocid-C" will be from 10,00 to 12,35 UAH, the wholesale price (including VAT) – from 16,00 to 20,00 UAH. As a reference drug the cream-emulsion "De long" in 100 g tube manufactured by O.L.KAR (Ukraine) was chosen. Prices of wholesale suppliers for "De long" vary from 19,50 to 23,00 UAH. Thus, conclusion can be made about the economic feasibility of production of new VP "Argocid-C" for the treatment of mastitis in cattle.

When determining the forecast cost price for the veterinary preparation "Argocid" in the form of the solution for intracisternal introduction (100 ml vial) it is assumed that the preparation has the following composition: silver citrate – 0.05; D-panthenol – 2.5; PVP – 7.5; arginine – 2.6; water for injection – up to 100 ml. The forecast cost price of the veterinary preparation "Argocid" is given in Tab. 2.

Table 1

The forecast calculation of the antimastitis veterinary preparation "Argocid-C". The pricing unit – 1 thousand packs (100 g tube)

The item name	Method 1		Method 2	
	Cost, UAH	Share, %	Cost, UAH	Share, %
The main raw material	6800,28	–	6800,28	–
Auxiliary materials	2107,35	–	2107,35	–
Total material costs	8907,63	88.94	8907,63	72.23
Transportation and procurement costs	445,37	4.40	89,07	0.72
Basic wage	79,04	–	79,04	–
Additional wage	29,54	–	29,54	–
Overall total wage	108,58	1.08	108,58	0.88
Payroll charges	23,89	0.20	23,89	0.19
Production overhead costs	237,12	2.36	213,41	1.73
Manufacturing cost	9722,59	97.08	9342,58	75.75
Administrative expenses	205,51	2.05	1494,81	12.12
Distribution costs	31,62	0.3	840,83	6.82
Other operating expenses	55,33	0.5	653,98	5.30
Full cost price	10015,05	100	12332,20	100

Therefore, the forecast full cost price of the solution for intracisternal introduction "Argocid" is from 12,60 to 15,50 UAH per a pack, the wholesale price (including VAT) will be from 21,15 to 26,21 UAH. Prices of wholesale suppliers for "Mastilin", the reference drug of the domestic production, the solution for intracisternal and endometrial introduction, 200 ml (LLC Research and Production Enterprise "Environmental Capital") vary from 84,26 to 95,06 UAH. It should be noted that today the preparation has no analogs.

The forecast cost price of the veterinary preparation "Argocid-copper" (spray to disinfect teat dips) is also determined. The preparation has the following composition: "Sumerian silver" (copper and silver citrate in the ratio of 1 : 1) – 90 %; excipients – 10 %. The results of calculations are given in Tab. 3.

As can be seen from Tab. 3, the full cost price of VP "Argocid-copper" will be from 31,10 to 39,10 UAH per a pack depending on the method of calculation chosen. Therefore, the wholesale price (including VAT) can be from 52,25 to 65,70 UAH. The reference drug is the concentrated solution Dipal, DeLaval (Sweden) in 5 L canisters. Prices of wholesale suppliers calculated with reference to the required amount (250 ml) are from 73 to 112 UAH (without the cost of the pack). The analysis shows that production of the new VP is economically feasible. In addition, the advantage of "Argocid-copper" in the form of spray is that it is completely ready for use and easy to use.

Table 2

The forecast calculation of the solution for intracisternal introduction "Argocid". The pricing unit – 1 thousand packs (100.0 ml vial)

The item name	Method 1		Method 2	
	Cost, UAH	Share, %	Cost, UAH	Share, %
The main raw material	6252,12	–	6252,12	–
Auxiliary materials	5108,58	–	5108,58	–
Total material costs	11360,70	90.23	11360,70	72.81
Transportation and procurement costs	568,04	4.51	113,61	0.73
Basic wage	79,04	–	79,04	–
Additional wage	29,54	–	29,54	–
Overall total wage	108,41	0.86	108,41	0.69
Payroll charges	23,89	0.19	23,89	0.15
Production overhead costs	237,12	1.88	213,41	1.37
Manufacturing cost	12298,16	97.68	11820,02	75.76
Administrative expenses	205,50	1.63	1891,20	12.12
Distribution costs	31,62	0.25	1063,80	6.81
Other operating expenses	55,33	0.44	827,40	5.30
Full cost price	12590,61	100	15602,42	100

Table 3

The forecast calculation of the veterinary preparation "Argocid-copper" (spray). The pricing unit – 1 thousand packs (250 ml vial with a dispenser)

The item name	Method 1		Method 2	
	Cost, UAH	Share, %	Cost, UAH	Share, %
The main raw material	21670,00	–	21670,00	–
Auxiliary materials	7322,50	–	7322,50	–
Total material costs	28992,50	93.21	28992,50	74.13
Transportation and procurement costs	1449,63	4.66	289,93	0.74
Basic wage	79,04	–	79,04	–
Additional wage	29,54	–	29,54	–
Overall total wage	108,41	0.35	108,41	0.28
Payroll charges	23,89	0.08	23,89	0.06
Production overhead costs	237,12	0.76	213,41	0.55
Manufacturing cost	30811,55	99.06	29628,14	75.76
Administrative expenses	205,50	0.66	4740,50	12.12
Distribution costs	31,62	0.10	2666,53	6.82
Other operating expenses	55,33	0.18	2073,97	5.30
Full cost price	31104,00	100	39109,14	100

The analysis of the structure of the cost price for VP indicates that chemical and pharmaceutical production is material-intensive (in general, material cost is 92-98 % of the manufacturing cost and 70-90 % of the full cost price).

Moreover, in calculations by the first method (when indirect costs are allocated for salaries of regular employees), the proportion of the manufacturing cost in the full cost price is 97-99 %. According to the second method (when administrative expenses, distribution costs and other operating expenses are determined based on the manufacturing cost), the manufacturing cost is 75-76 % of the full cost price.

Therefore, the basic reserve of increase of the domestic VP competitiveness by the price is the effective cost management, and it provides the choice of the optimal method of cost accounting and methods of calculation of the cost price.

#### CONCLUSIONS

1. The analysis of the modern approaches to pricing on medicines and VP has been carried out. It has been determined that enterprises manufacturing VP use different approaches and systems of cost accounting and the cost price calculation; as a result, it has a significant

impact on the level of prices and the structure of the cost price.

2. The project cost of three new VP based on silver and copper citrate in the form of cream, solution and spray proposed for introduction into production has been calculated. The calculations performed, as well as the comparison with the reference drugs confirm the economic feasibility of introduction of VP into production.

3. The calculation of the cost price for VP has been done using two different methods; their main difference is in the methods of determination and distribution of indirect costs. The comparative analysis of the cost price structure of VP has been conducted by the items. It has been determined that in case of distribution of indirect costs for wage the share of the manufacturing cost is 97-99 % of the full cost price. In case of determining overhead costs based on the manufacturing cost it is 75-76 % of the full cost price.

4. The efficient cost management of VP will allow gaining competitive advantages at the market and providing their economic availability.

**Conflict of Interests:** authors have no conflict of interests to declare.

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*Надійшла до редакції 03.05.2017 р.*