https://doi.org/10.15414/isd2018.s3.10

ECONOMIC BASIS FOR THE CREATION OF FODDER BASE OF THE ENTERPRISE

Vitalii Kovalenko1, Nataliya Perederiy2
National University of Life and Environmental Sciences of Ukraine[1,2]
Department of fodder production, reclamation and meteorology
Department of administrative management and foreign economic activity
Heroiv Oborony, 15, 03041
Kyiv, Ukraine
e-mail[1, 2]: vpkovalenko04@gmail.com, nperederiy@ukr.net

Abstract

Improving the efficiency of production, increase in gross and commodity production is inextricably linked with the comprehensive intensification, that is, with the growth of additional investments in agricultural production. The increase in capital investments is the basis of strengthening and improving the material-technical base, introduction of achievements of scientific-technical progress. Increasing of intensity of agronomy and animal husbandry promotes more efficient use of land and livestock, growth of crop yields and livestock productivity.

Economic and energy analysis in scientific research in agricultural direction is important because it allows you to justify the options of growing crops from the point of view of profitability and conservation, which is of particular importance in a market economy. Achievements in almost all branches of modern science were noted in the last century. However, the important issues of increasing economic and energy efficiency of agricultural production still remain relevant and a priority for many scientists.

However, a number of problems in this area have not found their solution, since an unreasonable increase in production costs, including due to overuse of agricultural resources leads to a decrease in the efficiency of management. Therefore, scientific research and cameral processing of experimental data should be directed to identification of resources, taking into account the economic and energy feasibility of measures of optimizing the production processes of cultivation of perennial legume grasses in conditions of forest-steppe of Ukraine.

The aim of this study is to evaluate the effectiveness of the cultivation of the studied crops – alfalfa, clover and sainfoin. For this purpose there was selected the method on the basis of calculations of marginal income (for fodder production it is

negative), the total costs, thresholds of production and profitability, on the basis of which the indicators of production costs were obtained.

From the conducted calculations it becomes clear that technologies without the use of fertilizers can be recommended to the farm as the most economical and efficient. The found economic conclusions do not contradict the basic tenets of cultivation of legumes, which indicate that perennial leguminous grasses play a major role in solving the problems of biological fertility of the soil.

Keywords: *cost-effectiveness, production of perennial legumes, production efficiency*

JEL Classification: *Q10, Q13, Q17*

1 Motivation and Research Questions

The main feed required for ruminants is supplied by forage production processes. Its assessment is in many cases possible, for example, by the relative purchase price.

In practice, most often, the main forage is produced for own use. Even where sale and purchase are possible, they exist in very small quantities. If within the economic planning it is necessary to decide how the total demand for main feed can be covered in the cheapest way (in terms of working time, of capital availability), a crucial role is played by the cost of feed production. Therefore, the evaluation of products supplied is in excess.

The animal feed balance sheets is based on nutrient content. This means that these are not the needs in hay and soilage that are balanced but and energy, protein and other nutrients. It is often enough to stay on limited nutrients.

Negative indicators as for the profitability, which are obtained in forage production show, which total costs in using the feeds are additionally transferred on every hectare of cultivation of the latter (in addition to the General costs in animal husbandry) [1].

The analysis of researches dedicated to this problem in the works Durst L., Vitman M., Zinchenko A. I., Petrychenko V. F., and others allows to conclude that approaches to definition of economic efficiency of creation of highly productive agrophytocenosis of perennial legumes need to be systemic.

The aim of the study is to evaluate the effectiveness of the cultivation of the studied crops – alfalfa, clover and sainfoin. For this purpose there was selected the method on the basis of calculations of marginal income (for fodder production it is negative), the total costs, thresholds of production and profitability, on the basis of which the indicators of production costs were obtained.

2 Data and Methods

Marginal revenue is calculated as the difference between the value of commodity output and variable costs in a certain production process. This is a contribution made by a separate product to covering of fixed costs and to the profit of the enterprise. Thus, it is internally economic indicator of competitiveness. Marginal income is always calculated on a certain unit, for example 1 ha and, as a rule, for one year. From the value of marginal income there will be deducted the same fixed values and overhead costs, which are distributed at the end of the year on the entire area proportionally [2,3].

Here it should be noted that feeds are not a commodity, that is, for them there are no permanent markets. In this regard, the evaluation parameters of the feed may be:

- nutrient content (e.g., MWA, fodder units, starch units per 1 ha);
- feed quality (concentration of nutrients, digestibility);
- seasonality of feed arrivals.

3 Results and Discussion

Harvest of forage crops is estimated at market prices only in certain cases, if food produced for sale (e.g., hay). Therefore, such products can be considered as a commodity.

In determining the output of nutrients the following should be considered:

- the annual gross harvest of green fodder (that means, not yet harvested yield without losses), centner of wet weight;
- dry substance content in green mass at harvest (for example, the collected corn; fresh-cut grass, etc.);
- dry substance content in the finished feed (green forage, silage, haylage, hay);
- the calculation of losses needs to distinguish between loss of dry substance and losses of nutrient energy.

The nutrient losses of energy are generally higher than losses of dry substance; however, both greatly depend on the processes of collection and conservation; nutrient content in finished feed (MJ NEL, MJ OE, crude protein) [4,5].

Margin revenues to grow alfalfa, sainfoin and clover for green fodder was calculated for the separate subdivision of National University of life and environmental Sciences of Ukraine "Agronomic experiment station". This method of calculation allows to define the most competitive technology of cultivation for each

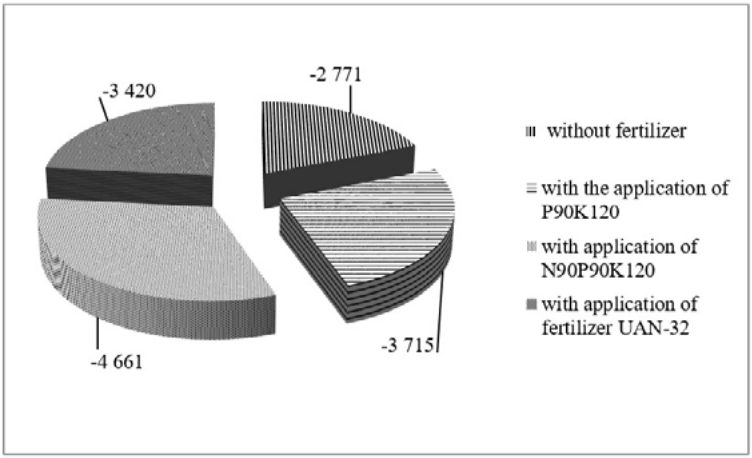
crop and to compare these among themselves for the efficiency of their cultivation and yield of energy per hectare.

The study shows the calculation of marginal revenue for alfalfa for green forage by four technologies: without fertilizer, with the application of $P_{90}K_{120}$, application of $N_{90}P_{90}K_{120}$, application of fertilizer UAN-32.

The results obtained in terms of a comparison of variable costs for 1 hectare allow us to determine the most cost effective method in relation to costs.

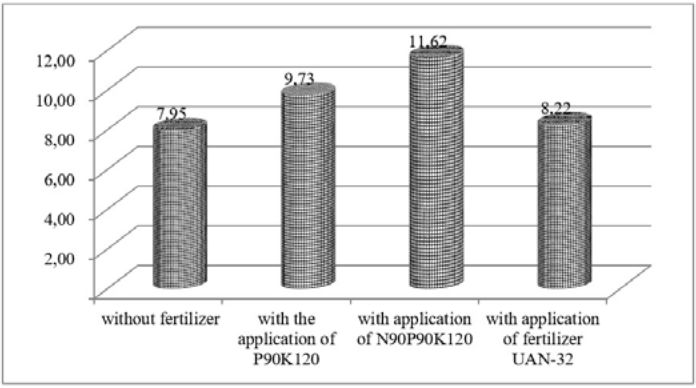
According to Figure 1, we can conclude that as for the attractiveness of use of one hectare and cost savings of optimal alfalfa for green forage, the most appropriate from the proposed is the technology of cultivation without application of fertilizers – 2771 UAH per 1 ha, while the most expensive in terms of cost of funds was the technology with applying $N_{90}P_{90}K_{120}$ – 4661 UAH per 1 ha.

Figure 1 **Variable costs per 1 ha per year for growing alfalfa for green forage by different technologies, UAH.**



As another indicator of the determination of costs we should note the number of variable expenses calculated for 100 MJ NEL (Figure 2).

Figure 2 **Indicators of variables cost per 100 MJ NEL in the cultivation of alfalfa for green fodder by different technologies, UAH.**

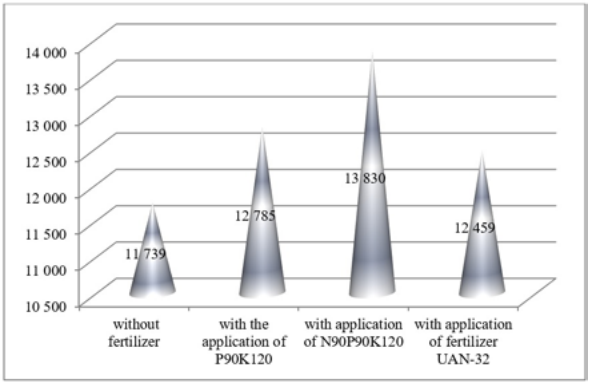


As in the previous calculation, the most economical in its expenditure side was the production of alfalfa for green fodder without the use of fertilizers – 7,95 UAH. To receive 100 MJ NEL most funds are required by the technology that uses N90P90K120 – 11,62 UAH 100 MJ NEL.

Also during the research overall costs (total cost value) per 1 hectare of this crop were calculated (Figure 3).

As defined, alfalfa for green forage here is the product for internal needs of feed production, therefore it is not directed for sale and at the expense of its cultivation the profits is not formed.

Figure 3 **Total costs per 1 ha in the cultivation of alfalfa for green fodder by different technologies, UAH.**

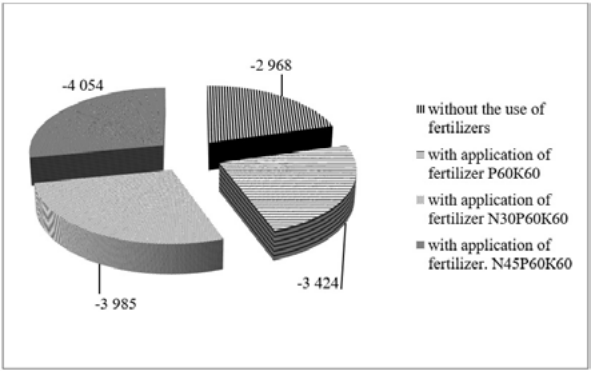


The analysis of Figure 3 shows that the farm, which is studied, requires 11739 UAH of costs for a year for cultivation of alfalfa for green fodder with the technology without application of fertilizers and 13380 UAH per technology, where $N_{90}P_{90}K_{120}$ is applied.

The next crop, which is grown on the farm and which was calculated, is the sainfoin for forage.

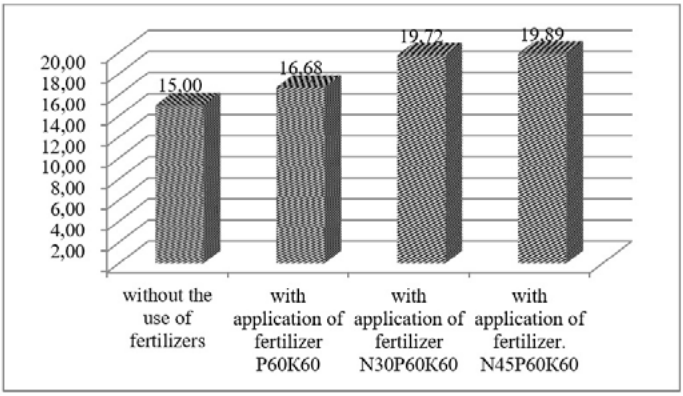
According to the analysis of the carried out calculations it can be concluded that the most cost-effective option, as well as among the technologies used for fodder production of alfalfa, was the cultivation of sainfoin for green forage without the use of fertilizers (Figure 4).

Figure 4 **Variable costs per 1 ha per year for growing sainfoin for forage by different technologies, UAH.**



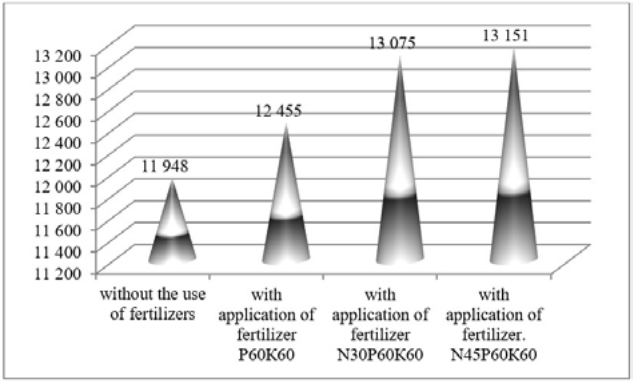
Also this trend has continued in subsequent calculations regarding the variable costs per 100 MJ NEL. The technology without the use of fertilizers for the cultivation of sainfoin requires 15,00 UAH of variable costs, whereas in the case of the use of fertilizers $N_{45}P_{60}K_{60}$ the figure of variable cost per year reaches the highest values – 19,89 UAH (Figure 5).

Figure 5 **Indicators of variables cost per 100 MJ per NEL when growing sainfoin for forage by different technologies, UAH.**



According to the calculations of the total costs per 1 ha, the farm spends 11948 UAH a year when growing sainfoin for forage by the technology without the use of fertilizers, while applying the most expensive technology with the application of $N_{45}P_{60}K_{60}$ – 13151 UAH (Figure 6).

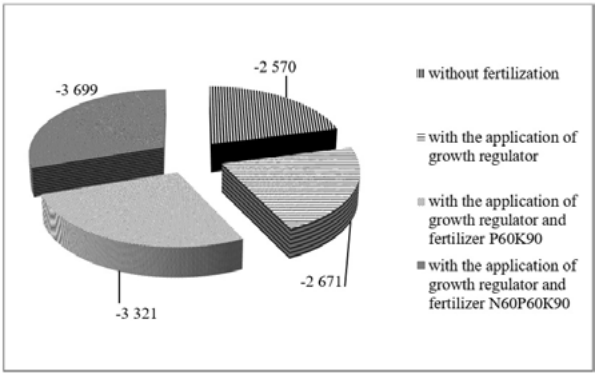
Figure 6 **Total costs per 1 ha when growing sainfoin for forage by different technologies, UAH.**



In addition, the studied farm carries out production of clover for green forage using four technologies: without fertilizers; with application of growth regulator; with application of growth regulator and fertilizer $P_{60}K_{60}$; with application of growth regulator and fertilizer $N_{60}P_{60}K_{90}$.

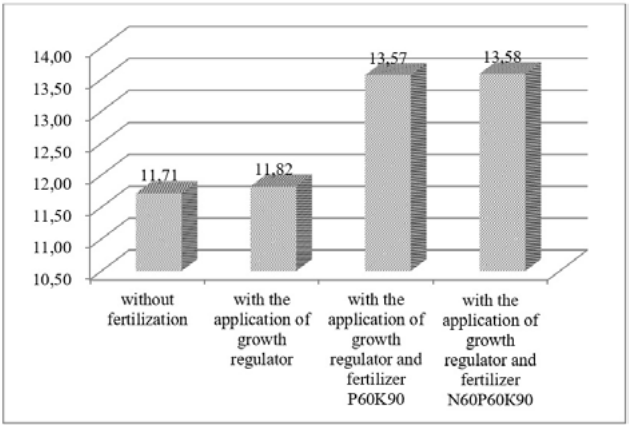
As in the previous cases, the economically justified as for the costs was the technology without fertilization, where variable costs per 1 ha per year is 2570 UAH. The most expensive was the technology with the application of growth regulator and fertilizer $N_{60}P_{60}K_{90}$, with variable costs at the level of 3699 UAH (Figure 7).

Figure 7 **Variable costs per 1 ha per year when growing clover for green fodder by different technologies, UAH.**



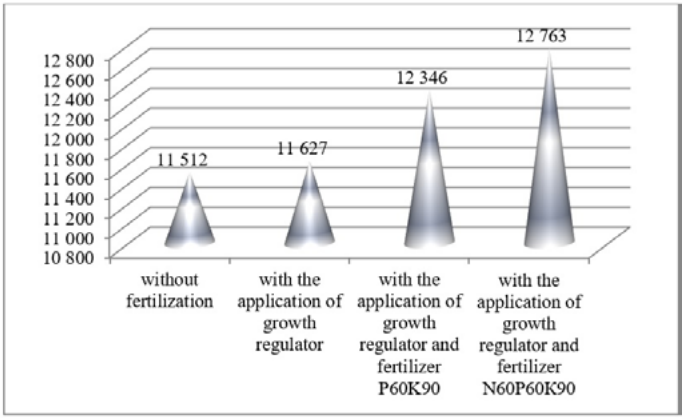
According to the Figure 8, 11,71 UAH of variable costs per 1 ha per year is required based on an output of 100 MJ NEL at the technology without fertilization, while with application of growth regulator and fertilizer $N_{60}P_{60}K_{90}$ – 13,58 UAH.

Figure 8 **Indicators of variables cost per 100 MJ per NEL when growing clover for green fodder by different technologies, UAH.**



To have a clear understanding about costs, we will calculate the total costs for the production of clover for green fodder.

Figure 9 **Total costs per 1 ha when growing clover for green fodder by different technologies, UAH.**



The analysis of Figure 9 shows that the total costs per 1 ha a year for growing clover for green fodder amount to UAH 11512 applying the technology without fertilization, with the application of growth regulator and fertilizer $N_{60}P_{60}K_{90}$ – 12763 UAH.

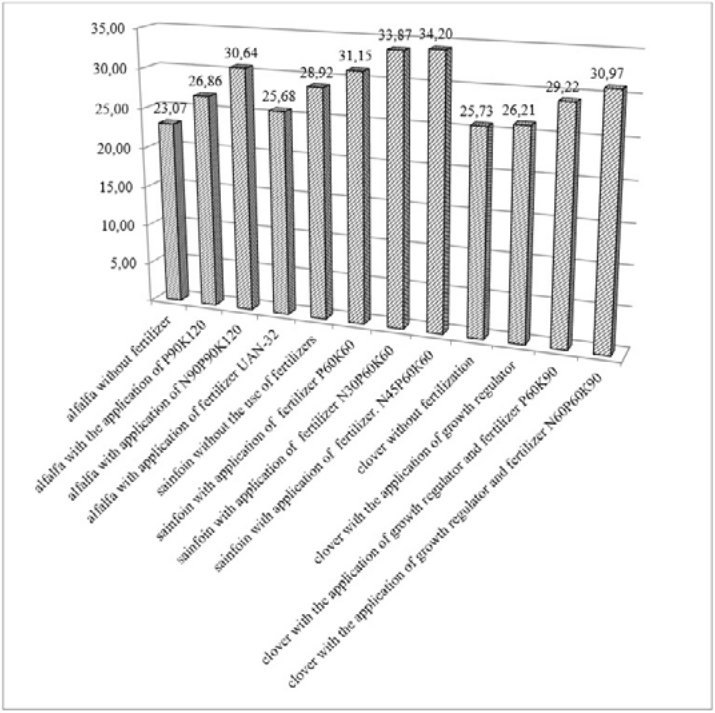
Also there were calculated the thresholds of production, profitability and production cost for the above three crops: alfalfa, sainfoin and clover for green fodder.

As noted above, in fodder production the commercial products does not exist, so the indicators of economic efficiency possess different economic sense than in commercial crop production.

Determination of price limits in fodder does not matter (except for the sale cases). Thresholds of production and profitability are calculated only for the purpose of selecting the least expensive food. They allow you to evaluate different processes of mechanization on the basis of cost per unit of energy produced. The profitability threshold represents the total cost per unit produced (UAH/MJ) (= average production costs per unit of output).

In Figure 10 presents the cost of production of each of the types of feed at the farm with four different technologies for each of them.

Figure 10 **The production cost of 1 centner of forage for green fodder by different technologies, UAH.**



According to the obtained results it can be concluded that for the studied farm most economically advantageous is the production of alfalfa and green fodder, the cost of which is 23,07 UAH/centner. In addition it should be noted that technology without the use of fertilizers is also the most cost-effective in the production of sainfoin and clover for green forage with a cost of 25,68 and of 25,73 UAH/centner, respectively.

4 Conclusion

Hence, from the made calculations it becomes clear that technology without the use of fertilizers can be recommended to the farm as the most economical and efficient. The found economic conclusions do not contradict the basic tenets of cultivation of legumes, which indicate that leguminous grasses plays a major role in solving the problems of promoting biological fertility of the soil. Thanks to the nodule bacteria fixing molecular nitrogen from the air, legumes practically do not require nitrogen fertilizers. The accumulated biological nitrogen enters the soil with the roots and the stubble residues [6,7].

References

1. DEMYDAS, H. I. Indicators of organogenesis and productivity of alfalfa depending on sowing time and cover crop / H. I. Demydas, R. T. Ivanovska, V.P. Kovalenko, L.V. Malynka // Feed and fodder production. – Vinnitsa: 2010. – Vol. 66. – P. 183-188.
2. DURST L., VITMAN M. Feeding of farm animals. – Translated from the German. – Ed. I. Ibatullin. – Vinnitsa, Nova knyga, 2003. – 384 p.
3. Farmer: a professional level. Vol. 2./ Beckman K., Brecker. and others – Sumy: University book, 2014. – 601 p.
4. Farmer: at a basic level. Vol. 1./ Beckman K., Brecker. etc. – K.: INTAS, 2014. – 625 p.
5. MASHCHAK Ya., NAHIRNIAK T., MIZERNYK D.. Theory and practice of grassland farming: monograph / Ya. Mashchak, T. Nahirniak, D. Mizernyk, M. Liushniak, O. Liushniak, S. Smetana. – Drohobych : Kolo, 2011. – 374 p.
6. PEREDERII N.O. Experience of financial planning in Europe. / N.O. Peredery // Scientific Bulletin of National University of life and environmental Sciences of Ukraine. Ser.: Economics, agricultural management, business, 2013. – issue 181 (5). – p. 78-82.
7. The manufacturing economy/ under the editorship of V. P. Halushko, H. Shtriobel. Textbook. – Vinnitsa: New book, 2005. – 400 p.