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## INFLUENCE OF TECHNOLOGICAL FACTORS ON THE NUTRITIONAL FEED OF LUCERAL-CEREAL GRASS MIXTURES IN THE CONDITIONS OF THE RIGHT BANK FOREST STEPPE

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**Abstract.** *The results of research on the impact of mineral fertilizers on the nutritional value of alfalfa grass forage are presented. It was found that the introduction of alfalfa into cereal grasslands promotes the growth of protein and crude fat in the feed and reduces the content of nitrogen-free extractives. Nitrogen fertilizers have the greatest effect on the chemical composition of feed on cereal crops - with the introduction of  $N_{60}P_{60}K_{90}$  the content of crude protein in the dry weight of feed increased by 2.8%.*

**Key words:** *alfalfa-cereals grass mixtures, feed nutrients, crude fat and protein, metabolic energy.*

### **Introduction.**

One of the urgent problems of the livestock industry of Ukraine is the insufficient amount of vegetable protein in the diet of animals. One way to solve this problem is to increase the efficiency of natural forage.

In Ukraine, the area of such lands is about 7.8 mln ha, of which in the right-bank forest-steppe – 1 mln ha. However, their productivity today does not exceed 1.0-1.2 t/ha of fodder units. Technological methods of forming highly productive sown grasslands on natural forage lands recommended by many onion scientists under modern conditions are too energy- and resource-serving [1,4].

Along with the need to increase the yield of sown meadows, it is important in animal nutrition to obtain high quality feed. The nutritional value of perennial forage grasses is significantly influenced by soil conditions, species and varietal composition of grasses, the mode of its use, fertilizer application and other agricultural techniques [2,5].

An effective way to improve the quality of feed is the introduction of perennial forage agrophytocenoses of legumes. Their inclusion in the composition of the grass mixture of 50% or more promotes intensive regrowth of plants, improves the protein content of feed and its mineral composition, as well as increases by 15-30% the yield of livestock products per unit of feed [3,4].



Among perennial legumes, the leading place belongs to alfalfa sowing, which due to the ability to actively use the reserves of moisture in the autumn-winter period, even in spring drought is able to form a high yield. However, the technological aspects of the formation of high productivity of oblique grasslands of alfalfa in mixtures with various cereal components remain unclear [2, 5].

The aim of the research was to study the influence of technological measures on the cultivation of alfalfa-cereal grass mixtures on the nutritional value of fodder in the conditions of the right-bank Forest-Steppe.

#### **Materials and methods of research.**

Field research was conducted during the research field of the department of forage production, land reclamation and meteorology, located in the NULES of Ukraine "Agronomic research station". The technology of growing perennial grasses, with the exception of the studied factors, is generally accepted for the Forest-Steppe of the right-bank Ukraine. Phosphorus and potassium fertilizers in the norm of  $P_{60}K_{90}$ , according to the scheme of the experiment were applied annually in autumn. Nitrogen fertilizers in the  $N_{60}$  norm were applied in three doses:  $N_{20}$  in the spring on permafrost soil and  $N_{20}$  in the spring after the first and second mowings. Spraying with grass stimulant Fumar growth was carried out at the beginning of regrowth of grasses of each slope at a dose of 2 l/ha with a water consumption of 200 l/ha in the period.

The soil of the experimental field is typical low-humus blacksoil. The content of humus in the arable layer - 4.2-4.6 %, mobile phosphorus (according to Machigin) - 40-55 mg/kg of soil, exchangeable potassium - 150-165 mg/kg of soil, easily hydrolyzed nitrogen (according to Cornfield) - 140-160 mg/kg, pH of the salt extract - 6.7-7.0.

#### **Research results and their discussion.**

According to the results of research, it was found that the addition of alfalfa to cereals significantly improved the quality of feed (table).

It is noted that without the application of nitrogen fertilizers the content of crude protein in the dry weight of feed increased by 5.4-5.5 %, and with the application of nitrogen (options  $N_{60}P_{60}K_{90}$  and  $N_{60}P_{60}K_{90}$ +Fumar) - by 1.7-2.7 %. Thus, the increase in crude protein content on nitrogen-free backgrounds was more intense than on backgrounds with nitrogen. No natural differences in the accumulation of crude protein between alfalfa-cereal stands with the participation of different cereal components on the same background were found. The least crude protein was observed in cereals - 11.1-11.9 % (without nitrogen application) and 14.7-15.3% for nitrogen application.

Addition of alfalfa to the composition of the grass mixture along with the increase in crude protein content also led to an increase in protein, crude fat, increased digestibility of dry weight and reduced amount of nitrogen-free extractives.

Without nitrogen fertilizer in the grasslands of alfalfa sowing and legume-cereal mixtures, compared to cereals, the protein content in the dry mass of feed increased by 2.3-3.5 %, while with nitrogen ( $N_{60}P_{60}K_{90}$  and  $N_{60}P_{60}K_{90}$ +Fumar) - only 0 , 4-1.1 %. Thus, the increase in protein content, as well as crude protein, was more intensely observed in the cultivation of plants on nitrogen-free backgrounds.

Digestibility of the dry mass of forage of alfalfa and legume-cereal stands relative to pure cereal crops increased by 2-5 %. The composition of cereal



components in legume-cereal mixtures and the fertilizer system did not significantly affect the digestibility of feed.

**Table - Content of organic matter in the feed and digestibility of alfalfa, alfalfa and cereal grasses, depending on the fertilizer, % in dry weight (average for 3 years)**

Fertilization	Crude protein	Protein	Crude fat	Crude cellulose	NFE	Digestibility
<b>Medicago sativa</b>						
No fertilizers	17,5	11,8	2,5	25,1	46,7	60
P <sub>60</sub> K <sub>90</sub>	18,1	12,7	2,6	26,7	43,6	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub>	19,1	13,3	2,9	27,9	40,7	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub> + Fumar	19,9	13,7	3,0	28,0	39,5	59
<b>Medicago sativa + Festuca orientalis + Festuca pratensis</b>						
Без добрив	16,5	12,1	2,8	27,7	44,0	59
P <sub>60</sub> K <sub>90</sub>	17,0	12,8	3,0	28,3	42,4	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub>	17,4	13,4	3,4	28,9	41,7	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub> + Фумар	18,4	13,6	3,5	29,0	39,6	58
<b>Medicago sativa + Festuca orientalis + Dactylis glomerata</b>						
No fertilizers	16,8	12,6	3,1	28,7	43,0	58
P <sub>60</sub> K <sub>90</sub>	16,9	13,0	3,3	29,0	41,3	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub>	18,4	13,7	3,5	29,5	38,8	57
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub> + Fumar	18,6	13,9	3,6	29,7	38,2	57
<b>Medicago sativa + Bromopsis inermis + Lolium perenne</b>						
No fertilizers	17,0	12,9	3,3	29,0	41,3	59
P <sub>60</sub> K <sub>90</sub>	17,4	13,3	3,5	29,3	40,2	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub>	18,8	13,7	3,7	29,9	41,7	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub> + Fumar	19,1	14,1	3,7	29,4	37,8	59
<b>Medicago sativa + Bromopsis inermis + Festuca orientalisorientalis</b>						
No fertilizers	17,0	11,9	2,6	26,9	44,8	58
P <sub>60</sub> K <sub>90</sub>	17,3	12,4	2,9	27,7	43,1	57
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub>	18,7	13,0	3,0	28,6	40,5	58
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub> + Fumar	19,0	13,4	3,2	28,8	39,7	58
<b>Bromopsis inermis + Festuca orientalis (cereal grassland)</b>						
No fertilizers	11,1	9,5	3,6	29,6	47,2	55
P <sub>60</sub> K <sub>90</sub>	11,9	10,2	3,8	29,4	46,5	56
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub>	14,8	12,6	3,7	29,8	43,3	55
N <sub>60</sub> P <sub>60</sub> K <sub>90</sub> + Fumar	15,3	13,1	3,7	29,2	43,3	55
Zootechnical norm	14	–	3-5	25-30	–	50-70
SSD <sub>05</sub> , %	0,6	0,6	0,2	0,6	0,7	2

Content of nitrogen-free extractives (NFE) under the influence of symbiotic and mineral nitrogen decreased. Thus, in alfalfa and alfalfa-grass stands, which are affected by symbiotic nitrogen, the content of NFE in the dry mass of feed on the background without nitrogen decreased by 1.5-6.3%. With the application of nitrogen fertilizers (variant N<sub>60</sub>P<sub>60</sub>K<sub>90</sub> compared to P<sub>60</sub>K<sub>90</sub>) on cereals, the content of NFE decreased by 3.2 %, while on grasses with alfalfa - by 0.7-2.6 %.

Among the mineral fertilizers used, the chemical composition of grass fodder with grass grass is most affected by nitrogen fertilizers. The introduction of N<sub>60</sub> on the background of P<sub>60</sub>K<sub>90</sub> caused an increase in the dry weight of feed, primarily the content of nitrogen-containing substances, in particular, crude protein - by 2.8 % and



protein - from 10.2 to 12.6 %.

In alfalfa and alfalfa-cereals grasslands, the content of crude protein and protein from nitrogen application changed to a lesser extent - when N<sub>60</sub> was applied against the background of P<sub>60</sub>K<sub>90</sub>, the crude protein content increased from 16.9-18.1 to 17.4-19.1 %. Simultaneously with the increase in crude protein content (by 0.5-2.9 %) there was a decrease in the content of nitrogen-free extractives. The introduction of alfalfa into cereal grasslands provided an increase in crude protein

Application of N<sub>60</sub>P<sub>60</sub>K<sub>90</sub>+Fumar ensured the highest feed quality on all studied grasslands. On alfalfa and alfalfa-grass stands such a combination of technological measures ensured the accumulation in the dry mass of 18.4-19.9 % of crude protein, which is 1.8-2.4 % more than the control. Under such conditions, cereal grass accumulated 15.3 % of crude protein, which is 4.2% more than without fertilizers.

The content of crude fat in the dry mass was 2.5-3.8%, crude fiber - 25.1-29.9%. These parameters of feed quality did not significantly depend on the studied factors.

Comparison of the chemical composition of the obtained feed with the zootechnical norms of cattle feeding showed that their values mostly corresponded to the established standards, however, some discrepancies were noted. Thus, the content of crude protein on sown cereals on the background without fertilizers and when applying P<sub>60</sub>K<sub>90</sub> was less than normal (11.1-11.9% at a rate of 14% in the dry mass).

**Conclusions.** It was found that the introduction of alfalfa into cereal grasslands promotes the growth of protein and crude fat in the feed and reduces the content of nitrogen-free extractives. Nitrogen fertilizers have the greatest effect on the chemical composition of feed on cereal crops - with the introduction of N<sub>60</sub>P<sub>60</sub>K<sub>90</sub> content of crude protein in the dry weight of feed increased by 2.8%. The obtained data should be taken into account when planning the sowing of fodder crops and the preparation of balanced rations of intensive type.

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