Effect of fertilizer on nutritional value of feed alfalfa-cereal grass mixtures in the conditions of the Right-bank Forest Steppe

I. V. SVYSTUNOVA, L. M. BURKO, S. P. POLTORETSKYI, T. I. PROROCHENKO, V. PRAVEDNYI

National University of Life and Environmental Sciences of Ukraine

One of the ways to solve the problem of insufficient amount of vegetable protein in the animals diet is to increase the efficiency of natural forage lands, the area of which in the Forest-Steppe of Ukraine is about 1 million hectares. However, their productivity today does not exceed 1.0-1.2 t/ha of fodder units, which is several times less than their potential, and recommended by many scientists technological methods of forming highly productive sown grasslands on natural fodder lands under modern conditions are too energy and resource consuming.

In addition to the need to increase the yield of sown meadows, in animal nutrition it is important to obtain high-nutrient feed, which largely depends on soil conditions, species and varietal composition of grasses, its use, fertilizers and other agricultural techniques.

The aim of the research was to study the influence of technological measures of alfalfa-grass mixtures cultivation on fodder nutrition in the conditions of the Right-Bank Forest-Steppe.

Experimental research was conducted during 2014-2016 on the research field of the Department of Forage Production, Land Reclamation and Meteorology, located in the NULES of Ukraine "Agronomic Research Station". The scheme of the experiment included the following factors: factor A - grass cover (types of grasses and sowing rate of their seeds, kg/ha): 1) alfalfa, 16; 2) alfalfa, 12 + tall fescue, 10 + meadow fescue, 8; 3) alfalfa sowing, 10 + tall fescue, 10 + cock's-foot, 8; 4) alfalfa sowing, 10+ smooth brome, 14 + perennial ryegrass, 10; 5) alfalfa sowing, 10 + smooth brome, 14 + tall fescue, 8; 6) smooth brome, 14 + tall fescue, 8 (cereal grassland), control; factor B - fertilizers (nutrients and their doses): 1) without fertilizers, control; 2) $P_{60}K_{90}$; 3)

$N_{60}P_{60}K_{90}$; 4) $N_{60}P_{60}K_{90}$ + Fumar growth stimulant. Phosphorus and potassium fertilizers in the dose of $P_{60}K_{90}$, according to the scheme of the experiment were applied annually in autumn. Nitrogen fertilizers in the dose of N_{60} were applied in three steps: N_{20} at spring on frost soil and N_{20} - after the first and second mowing. Spraying by grass growth stimulant Fumar was carried out at the beginning of grasses regrowth after each mowing at a dose of 2 l/ha. The soil of the experimental field is typical chernozem with humus content in the arable layer of 4.2-4.6%, mobile phosphorus (according to Machygin) - 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.

According to the results of research, it was found that the inclusion of alfalfa in cereals increased the content of crude protein to a greater extent than the introduction of nitrogen in the dose N60 on the same cereal herbage at the same background P60K90. There are no natural differences in the accumulation of crude protein between alfalfa-cereal herbages with the participation of different cereal components on the same background. The least crude protein was observed in cereals. The introduction of alfalfa sowing into the composition of the grass mixture simultaneously with the increase in the content of crude protein also led to an increase in the content of protein, crude fat and reduced the amount of nitrogen-free extractives. Digestibility of dry matter of fodder of alfalfa and legume-cereal herbages, 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.

The application of $N_{60}P_{60}K_{90}$ + Fumar ensured the highest feed quality on all studied grasslands. On alfalfa and alfalfa-cereal stands such combination of technological measures ensured the accumulation in the dry mass of crude protein 18.4-19.9%, on cereals - 15.3%.

The content of crude fat in the dry mass and crude fiber did not significantly depend on the studied factors.

The inclusion of alfalfa in the composition of alfalfa-cereal mixtures contributed to the growth of metabolic energy content - from 8.6-8.8 to 8.9-9.2 MJ/kg, relatively pure cereals.

The supply of feed unit by digestible protein in the studies was quite high and, depending on the action of the studied factors was 107-174 g. This indicator was mostly influenced by symbiotic and mineral nitrogen. With the inclusion of alfalfa in cereals, as well as in pure alfalfa crops in the absence of nitrogen fertilizer, the supply of feed unit by digestible protein increased by 44-62 g, with the introduction of mineral nitrogen - by 22-31 g. In legume-cereal mixtures the provision of the feed unit by digestible protein, no significant difference was observed.

The application of nitrogen fertilizers improved the provision of the feed unit by digestible protein more significantly on cereal herbages than on alfalfa and alfalfa-cereal herbages.

Keywords: alfalfa-cereal grass mixtures, feed nutrient content, crude protein, crude fat, metabolic energy.