THE NECESSARY DIRECTIONS OF DEVELOPMENT OF PRODUCTION OF PERENNIAL GRASSES IN THE SOUTH OF UKRAINE

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Abstract. The article analyzes the development of production of perennial grasses on the farms of the South Ukraine. The reduction of areas under these crops in all regions of southern Steppe was established. Loss of ecologically pure nitrogen in value when the area under perennial grasses was calculated. The future trends were identified and the forecast of the acre age size of the researched cultures and a number of the cattle until 2020 was calculated with help of using statistical analysis.

Keywords: perennial grasses, sowing acreage, structure, predictable level, soil fertility, cost ecologically pure nitrogen, competitiveness, profitability.

Introduction

Efficient energy use in agriculture nowadays is one of the main criteria for the implementation of sustainable, environmentally friendly and energy efficient production [UHLIN, 1998; JONGE, 2004].

Stating the problem

The problem of providing the population with food, especially of animal origin does not lose its urgency for modern management in agriculture.

First of all, it must be solved by means of improving the efficiency of animal husbandry industry, by enriching forage, providing high–quality cheap forages, in particular by producing perennial grasses, especially legumes, as the main provider of fodder protein.

In addition, the condition of soil in Ukraine depends on development of production of these crops, as it is a major natural and economic factor of agricultural productivity. Therefore, the question of optimization of the size and structure of sown areas, including perennial grasses, needs special attention nowadays [BABICH–POBEREZHNA et al., 2008, VASILEVA, 2012, KOLBE, et al., 2006, PLATAČE et al., 2013, NNC "IAE", 2012].

Principal objectives

To prove expansion of sown areas in the South of Ukraine (the investigated area included such regions as Zaporizhya, Mykolaiv, Odessa, Kherson regions and the Autonomous Republic of Crimea (ARC) grouped according to aridity coefficient of economy) on the basis of a retrospective analysis of the production of perennial grasses.

Principal results of the study

Analysis of the structure of sown areas has indicated significant violations of rules of cropping on the fields of southern Ukrainian steppe.

So, in 2009, 62.3% of the sown area in the total sown area was allotted for grain and legumes, for commercial crops–28.4% and for fodder crops–4.4%. In 2012 the proportion of sown areas of commercial crops increased to 32.8% of the total cultivated area by reducing area under grains and legumes (57.8%).

In some areas of agro formations, the share of sunflower in relative density in the structure of total sown area was even higher, indicating that market of oil and fat products, as part of providing the population with food, today is a top priority [GHICA, et al., 2013; GAITIN et al., 2013].
This encourages producers to grow a crop that is marked by its high competitiveness at the expense of expansion of the sown area under it.

However, a group of scientists, led by Professor I.I. Cherven [CHERVEN et al., 2008], has determined that humus balance for sunflower with yield of 8.1 q/ha and 20.0% in structure of the rotation, taking into account a by-product into soil, is negative and makes up minus 0.23 t/ha.

Unreasonably low proportion of area remains under fodder crops. This indicates that under conditions of uncontrolled (unplanned) management agricultural enterprises are oriented to produce extremely liquid crop production, which is in great demand both in the domestic and foreign agricultural markets.

With a total reduction of area under forage crops a significant reduction of the area of perennial grasses, the main of which are legumes was observed.

During the period from 1990 to 2012 the sown area of perennial grasses for hay and green fodder in the South of Ukraine decreased from 731.2 to 108.6 thousand hectares, or 85.1%.

Several years’ research has proved that for optimal production of high-grade vegetable forage crops on sown areas it is advisable to keep in limits 50–55%.

Area density of perennial grasses for hay and green fodder in the structure of the total sown area of the South of Ukraine was only 1.6% at rate of 8–10%.

The violation of current legislation is observed, in particular the Land Code of Ukraine and the Law of Ukraine “On Environmental Protection” regarding improper crop rotation, which provides for civil, administrative or criminal responsibility.

In our opinion, reducing area under perennial grasses, and consequently gross harvest of green fodder, production of which is characterized by low costs (11–12 UAH/q for sale price of green mass of perennial grasses in South 16–22 UAH/q) has caused deterioration of indexes of livestock growth, particularly cattle, as their main consumer.

Thus, level of profitability of milk production in Ukrainian agricultural enterprises has decreased over period from 1990 to 2012 from 32.2% to 2.3% (29.9 percentage points), cattle for meat–20.6% to minus 29.5% (50.1 percentage points). On need to increase area of perennial grasses in structure of total sown area and according to data on needs of animals, particularly cattle, in hay and green mass of these crops, which are an important part of their feeding.

Having using the data on number of cattle in the southern regions of country from 2005 to 2012 and having applied method of analytic alignment of this dynamic series for above function (parabola of 2nd order Y=9.669x^2–133.65x+1165.7), we calculated predictable index of livestock. So, considering trends that occur during period understudy (97.6% probability), it is possible to state that number of cattle in the southern Steppe as of 01.01.2021 will compound 1502.6 thousand heads.

Thus, there is a necessity to fully meeting the needs of livestock in high–protein forage, including perennial grasses. In connection with wide assortment of proposals from different scientists [PROVATOROV et al., 2009, CAUNII et al., 2014] most appropriate is to define the needs of animals in metabolizable energy (ME) of forages. Taking into consideration that predictable number of cattle must be completely provided with forages of perennial grasses, it is calculated that 2450.8 TJ ME of hay must be received in 2015, 4253.5 TJ ME in 2020; respectively 5109.4 and 8867.7 TJ ME of green mass (including haylage).

Thus, to obtain necessary amount of energy for animal forgery gross yield production of perennial grasses in South of Ukraine we must produce: hay–3486.2 in 2015 and 6050.5 thousand quintals–in 2020, green mass–22023.3 and 38222.8 thousand quintal, respectively. Stating fact that in 2020 comparing to 2012 gross harvest of hay must be increased in 2.8 times while the green mass (including haylage)–in 16 times.

To achieve these production volumes of perennial grasses with an average yield of hay in the period from
2005 to 2012 (25.0 q/ha), it is necessary to bring the area of these crops up to 139.4 in 2015, up to 242.0 thousand hectares in 2020, green manure for the verdurous grasses (with yields of 110.6 q/ha)–up to 199.1 and 345.6 thousand hectares, respectively.

Taking into account needs of these areas for seeds, which as usual is 10% of the total area of grass fodder (58.8 thousand hectares in 2020), area under perennial grasses as a whole should reach 646.4 thousand hectares, or 9.3% of total sown area of South of Ukraine.

It should be mentioned that according the forecast for 2020 the predictable part of the areas of high-quality forage crops, taking into account the need for cattle forages, will respond to scientifically grounded standard.

Having taken into account the minimum marginal value recommended by scientifically proved regulations the areas under perennial grasses for hay and green fodder and seeds (8.0%), it was determined that this rate must have been not less than 556.9 thousand hectares in the southern Steppe agro formations in 2012. In that year, difference between the optimal, that is the recommended amount of space these grasses and actual was 448.3 thousand hectares in South of Ukraine.

It is necessary to mention that reduction of areas under perennial grasses has a negative impact on soil fertility rates and has a direct influence on economic efficiency.

The experience of American scientists has shown that alfalfa is able to capture up to 463 kg/ha of nitrogen from atmosphere per year [VANCE et al., 1988; IONEL et al., 2013].

According to Ukrainian scientists, in Southern Ukraine meter layer of soil after cultivation of alfalfa three years is enriched in nitrogen–up to 244 kg/ha, phosphorus–39, potassium–134, calcium–102 kg/ha by after cutting residues and roots [ANTIPOVA, 2009].

Considering our calculations, we get 753 UAH of losses of nitrogen per hectare of reduced sown area under grass [TSURKAN, 2012; IONEL et al., 2013]. It is defined that 2001 in all categories of agro formations of southern Steppe rough losses of pollution–free nitrogen with reduction of the areas under perennial grasses made up 179.2 million UAH showing annual increase in the area under perennial grasses negative impact on soil fertility and performance directly affects the economic benefits. In 2012, this rate reached 337.6 million UAH.

Conclusions
In general, the economic management in the South of Ukraine is carried out with violation of the legislation on fertility preservation of soil.

The structure of crop production does not meet scientifically grounded proposals that lead to the application of chemicals, resulting in a lack of high-quality forage for animal feed, and consequently reduction of the amount and worsening the quality of food.

To optimize the structure and size of cultivated areas in the South of Ukraine it is necessary to reduce part of the areas of industrial crops, especially sunflower, while upholding the rules of rotation relative to the rotation of the culture.

To meet the predicted demand projected for 2020 in the hay and green mass of perennial grasses for cattle, taking into account the sown areas under seeds, it is necessary to increase the area under these crops up to 646.4 thousand hectares, which will respond to scientific principle, and namely it will be 9.3% of total sown area. At the same time, it is necessary to apply innovative achievements to increase efficiency and, consequently, to increase a gross yield of green mass and hay rich in protein.

In addition, the implementation of economic management must not only faithfully take responsibility for its actions, but also realise the responsibility before our descendants for the devastation (deterioration of fertility) of our lands.

All this requires returning to the careful planning of the process of agricultural production by managers at all levels of management.
References


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