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The Use Of Innovative Remote Monitoring Methods For Growing Sheep Breeds Manych Merino.

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ABSTRACT

The article discusses the development of innovative remote monitoring methods for growing sheep breed Manych merino. The results of the assessment of nutritional value and amino acid grazing in combination with the remote assessment of the NDVI vegetation index are given. It is shown that the introduction of innovative remote monitoring methods allows to optimize production processes when growing the intensive genotype of sheep and to increase the average daily gains of young stock by 7-8% when kept on various pasture plots.

Keywords: pasture forage, the amino acid composition of forage, nutritional value, vegetation index, sheep, Manich merino.

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INTRODUCTION

The traditional branch of sheep farming in Russia is currently in the process of reorganization and the transition to the introduction of new intensive technologies for the production of products most in demand today in the markets of domestic and international trade - lamb. In fact, one of the reasons for the significant reduction in the number of sheep in the period 1960 - 2012. and, accordingly, a 5-fold reduction in the share of mutton and goat meat in total meat production in Russia from 12.3% (1960) to 2.3% (2012), it was just the reorientation of market demand from one type of product sheep - wool, on the other species - lamb, especially obtained from the young.

In the period of the second half of the 20th century, fine highly productive sheep breeds were created in Russia, divided into 8 groups according to the type of products received from them: fine-wool, semi-fine-fur, semi-coarse-haired; milk For decades, the demand for wool products has been supported by the demand for wool products in many sectors of the national economy. However, due to the crisis in agriculture during the 90s of the twentieth century, in fact, the sheep industry was not ready to work in the new conditions, which led to a significant reduction in livestock and the disappearance of a number of breeds [9].

Among the reasons hindering the positive development of the industry, it is considered to be, firstly, selection and genetic - this is the absence of modern intensive breeds, with high payment for food for meat products; secondly, technological - insufficient level of feeding of livestock of sheep and insufficiently developed zootechnical service for the introduction of artificial insemination of sheep [11]. As a result, in practice, the work on the reproduction of the herd is often reduced to the use of free mating of breeding stock with rams-producers, which greatly complicates the management of breeding and breeding work in the herd and reduces the effect of breeding in breeding herds. Taking into account the fact that selection and genetic processes for improving the economically useful traits of sheep are quite long-term, breeding (creating new breeds of sheep) usually takes place over 8-10 generations of animals, which for sheep breeding is 15 to 20 years, in our studies, as a result, the focus is on the introduction of modern technological methods to improve the feeding of sheep and the management of a herd of controlled animals, through the use of remote digital aerospace technology and telemetry.

At the same time, an important reserve for the accelerated creation of specialized production of high-quality lamb and lamb of sheep breeding remains the use of the industrial crossing method - use in selecting parental pairs, and fatherly - the best breeds of the world and domestic gene pool, for example: il de France, suffolk, charolais, half-dorset, Vandea, Blue de Maine, Dorper, Merinolend, Taschlinskaya, Southern Meat, West Siberian Meat, etc. [11].

The best domestic maternal form for the creation of commercial flocks of beef sheep are the uterus of the North Caucasus, Soviet and Volgograd meat and wool breeds. Improving the meat qualities of these animals will allow in a short time to get livestock with improved meat forms that are well adapted to the conditions of grazing. Despite the fact that sheep of merino breeds is not classified as specialized meat breeds, however, their carcasses meet the requirements of the modern market, which is very important in the production of mutton.

One of the problems in the field of feeding sheep for the purpose of obtaining mutton is that the existing rations of feeding were mostly aimed at raising sheep of wool and wool-meat breeds. Therefore, the development of pasture sheep breeding, an increase in the number of highly productive meat sheep will contribute to the development of the feed mill industry and an increase in the number of plants for the preparation of animal feed for sheep. This will require the development of high-performance domestic feed and various additives for young specialized meat breeds, starting from 2 weeks of age. In the leading sheep countries of the world, the production of lamb is mainly focused on intensive rearing, feeding, fattening of lambs and slaughtering of animals at 8-9 months of age, which makes it possible to produce high-quality young lamb [10].

An important reserve for increasing the efficiency of pasture sheep breeding and providing animals with pasture forage plays an important role in the rational use of natural hayfields and pasture plots. In the Russian Federation, they occupy about 80 million hectares, or 36% of the total agricultural land, while hayfields occupy about 18 million hectares, and pastures - 58.3 million hectares. With the traditional system of use, natural hayfields and pastures are, as a rule, unproductive and give on average a small yield of feed (6-10 centners of fodder units and 30-50 centners of green mass). The main reason for the low efficiency of natural pastures is the unsystematic use of animals and the virtual absence of measures for radical improvement — tinning and surface loosening, seeding on perennial and annual grasses, application of local and mineral fertilizers, and clearing shrubs. The introduction of these activities in combination with the use of remote digital aerospace technologies and telemetry will be able to increase their biological productivity by a factor of 3-4, which will significantly improve the economic performance of grazing livestock.

The introduction of the developed technology of pasture livestock will be accompanied by the development of projects to improve and rational use of pastures and hayfields based on the data of remote digital aerospace technologies and telemetry, allowing to assess the degree of depletion of pasture plots, soil composition, topography. Another important element of the new innovation system for raising sheep is the development of production plans for a flow-shop system for turning the flocks of sheep, taking into account the use of grazing of various age and sex groups of sheep, the qualitative composition of pasture grasses, the livestock load on pasture plots, including the use of long-standing cultivated hayfields and pastures, if available. And also, the development of technological maps of the combined use of remote digital aerospace technology and telemetry in different seasons of the year and taking into account climatic conditions.

Rational organization of the innovation system of pasture sheep breeding will contribute to the improvement of production indicators in the field of herd reproduction. Since, for the production of lamb, the need to increase the proportion of uterus in the herd significantly increases, since meat production per head increases: with an increase in the number of dams in the herd from 60 to 80%, the production of lamb, respectively, increases by 25-30 %.

The introduction of the innovation system of pasture sheep breeding will combine the use of biotechnical and technological factors that will increase the output of lambs to the uterus, reduce the intervals between lambs, reduce the negative impact of seasonality of reproduction, and as a result, ensure the production of young lamb from the year, early weaning of lambs from the queens and earlier breeding of sheep [10].

In connection with the above, the development of an innovative system of pasture livestock farming based on the use of digital aerospace technology and telemetry will be carried out in the following areas:

- application of methods for remote control of a sheep production flock: moving industrial flocks (flocks) based on the results of remote digital aerospace technology and telemetry, which will allow keeping track of the livestock of sheep in farms of different ownership forms in real time, will significantly facilitate the work of veterinarians to prevent uncontrolled movements of livestock and, as a consequence, the spread of various diseases among sheep;
- remote assessment of the state of pastures, the formation of optimized modes of efficient use of pastures;
- the formation of a modern innovative livestock industry, in accordance with the fundamental direction of development and implementation of domestic digital technologies in various branches of agriculture, including grazing livestock.
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MATERIALS AND METHODS

Pasture feed for research was selected during the main vegetation period of plants (June-July) and studied by standard generally accepted methods.

The chemical composition of the feed was determined in the laboratory of the Scientific and Technical Center "Feed and Metabolism" of the Stavropol State Agrarian University on the equipment of the firms INGOS (Czech Republic), FIBRETHERM (Germany), VELP SCIENTIFICA (Italy).

Moisture of the feed was determined by the difference between the mass of the sample before and after drying at 130 °C for 40 min and calculating the mass fraction of moisture [8].

Raw protein feed was determined by ashing the organic matter of the sample to be analyzed with sulfuric acid in the presence of a catalyst, alkalizing the reaction product, distilling and titrating the released ammonia, calculating the mass fraction of nitrogen and calculating the mass fraction of crude protein by multiplying the result by converting the mass fraction of nitrogen to the mass fraction of raw protein, equal to 6.25 (according to Kjeldahl) [4].

Crude fiber was determined (according to Genneberg and Shtoman) by a method based on the sequential processing of the sample of the test sample with acid and alkali solutions, ashing and quantitative determination of the organic residue by the gravimetric method. The content of crude fiber is expressed as a mass fraction in% or in grams per 1 kg of dry matter [3].

The crude fat in the feed was determined by the method of extraction of crude fat from a sample of diethyl or petroleum ether in the Soxhlet apparatus. removing the solvent and weighing the non-fat residue [1].

Crude ash in the feed was determined by determining the mass of the residue after combustion and subsequent calcination of the sample [2].

Calcium in the feed was determined by the method of ashing organic matter of the analyzed sample, processing the resulting ash with a solution of hydrochloric acid, precipitating calcium in the form of calcium oxalate, followed by dissolving the precipitate with a solution of sulfuric acid to form oxalic acid, which is titrated with potassium permanganate [6].

Phosphorus in feed was determined by dry ashing of the sample with calcium carbonate and heating the residue with hydrochloric and nitric acids (for organic feed) or in wet ashing of the sample with a mixture of sulfuric and nitric acids (for mineral compounds and liquid feed). An aliquot of the hydrolyzate is mixed with a molybdovanadate reagent and the optical density of the resulting yellow solution is measured at a wavelength of 430 nm [7].

Free forms of amino acids in feeds (cystine and cysteine in total; methionine; lysine; threonine; alanine; aspartic acid; glutamic acid; glycine; histidine; isoleucine; leucine; phenylalanine; proline; serine; tyrosine; valine.) Were determined by extraction with diluted salt acid. Extracted together with amino acids, the nitrogenous macromolecules were precipitated with sulfosalicylic acid and filtered. The acidity of the filter medium was adjusted to a value of 2.20 units. pH Amino acids were separated by ion exchange chromatography, the reaction was performed with ninhydrin and their concentration was determined by photometric detection at a wavelength of 570 nm. Definition of total content (free and related forms inamount) of individual amino acids was performed by the method depending on the individual amino acids to be determined. Before hydrolysis, cystine (cysteine) and methionine were oxidized tocysteic acid and methionine sulfone, respectively. Tyrosine was determined in hydrolyzed unoxidized samples. All other amino acids listed above were determined in both oxidized and non-oxidized samples. Oxidation was carried out at temperature 0 °C with a mixture of formic acid with phenol. Excess oxidizer decomposed with sodium disulfite. Oxidized or unoxidized samples were subjected to hydrolysis with hydrochloric acid at a molar concentration of 6 mol / dm for 23 hours. The acidity of the hydrolyzate was adjusted to 2.20 units. pH Amino acids were separated by ion exchange chromatography, they were derivatized with ninhydrin and detected at a wavelength of 570 nm (440 nm for proline) [5].

Groups of animals for research were formed on the principle of pair-analogs from sheep of the Manich merino breed of the Stavropol Territory of Russia. The number of rams in each group was 100 heads, the age of the animals was 4 months. The study was carried out for 60 days.

In our studies, groups of sheep were grazed on pastures, the botanical composition of which consisted of legume-cereal plants (25: 75%): Onobrychis, Medicago, Festucapratensis, Loliumperenne. The pasture ecosystems were studied using an AC-32-10 unmanned aerial vehicle and a DJI 900 hexacopter, a Canon M10 camera and a vegetation index calculation software (NDVI).

Studies were conducted in the centers of collective use: The Center for Collective Use "Educational and Scientific Testing Laboratory (UNIL)", the Center for Collective Use "NTC Feed and Metabolism" and using a unique scientific installation "Laboratory of Milk Quality Selection Control" based on FSBEI HE «Stavropol State Agrarian University».

RESULTS AND DISCUSSION

Table 1 shows the results of the assessment of nutritional value and amino acid grazing in combination with the remote assessment of the vegetative index NDVI (Table 1). The group of pasture feeds with an average vegetative index of 0.35 (group II) was characterized by a higher content of amino acids, compared with group I, where the NDVI index was 0.25.

Table 1: Nutrient and amino acid composition of pasture forage, M ± m

Indicators	Group	
	I NDVI=0.25	III NDVI=0.35
Aspartic acid (Asp),%	0,16±0,01	0,24±0,03
Threonine (Thr),%	0,08±0,01	0,12±0,01
Serine (Ser),%	0,08±0,01	0,13±0,01
Glutamic acid (Glu),%	0,24±0,01	0,36±0,04
Proline (Pro),%	0,09±0,01	0,14±0,02
Glycine (Gly),%	0,09±0,01	0,15±0,02
Alanin (Ala),%	0,14±0,01	0,17±0,02
Valine (Val),%	0,10±0,01	0,14±0,02
Methionine (Met),%	0,04±0,01	0,05±0,01
Isoleucine (Lie),%	0,07±0,01	0,10±0,02
Leucine (Leu),%	0,15±0,01	0,20±0,03
Tyrosine (Tyr),%	0,07±0,01	0,09±0,02
Phenylalanine (Phe),%	0,10±0,01	0,12±0,03
Histidine (His),%	0,04±0,01	0,05±0,01
Lysine (Lys),%	0,09±0,01	0,11±0,02
Arginine (Arg),%	0,08±0,01	0,12±0,03
Crude protein,%	2,12±0,04	2,95±0,03
Total humidity,%	38,10±4,62	48,98±4,87
Crude fiber,%	19,25±1,75	29,16±0,87
Crude fat,%	0,99±0,26	1,44±0,26
Crude ash,%	2,75±0,01	3,44±0,24
Calcium,%	0,37±0,02	0,40±0,01
Phosphorus,%	0,18±0,01	0,25±0,03

Thus, the amino acid content of Asparaginic (Asp) in the second group was higher by 50.0%, Threonine (Thr) - by 50.0%, Serine (Ser) - by 62.5%, Glutamic acid (Glu) - by 50, 0%, Proline (Pro) - by 55.5%, Glycine (Gly) - by 66.7%, Alanine (Ala) - by 21.4%, Valine (Val) - by 40.0%, Methionine (Met) - by 25.0%, Isoleucine (Lie) - by 42.8%, Leucine (Leu) - by 33.3%, Tyrosine (Tyr) - by 28.6%, Phenylalanine (Phe) - by 12.0 %, Histidine (His) - by 25.0%, Lysine (Lys) - by 22.2%, Arginine (Arg) - by 50.0%.

Amino acid composition in group II compared with group I with a lower vegetative index, was better for non-replaceable and non-replaceable amino acids, which directly indicates a better nutritional value of feed. So in group II the content of crude protein was 0.73 abs. % crude fiber at 9.91 abs. % raw fat 0.45 absl. % crude ash at 0.69 abs. %, therefore, calcium and phosphorus at 0.69 and 0.03 absl. %, respectively.

The productive qualities of young stock breed Manych merino for 60 days are presented in table 2.

Table 2: Productive qualities of repair youngsters, M ± m

Indicators	Group	
	I	II
The average live weight at the start of the experiment, kg	21,24±0,32	21,56±0,29
The average live weight at the end of the experiment, kg	30,97±1,57	32,02±1,48
Average daily weight gain, g	162,20±4,45*	174,40±3,87*

* Statistically significant differences with $p < 0.05$

To optimize the production processes of pasture keeping of young sheep, remote monitoring of the vegetation index using unmanned aerial vehicles was used. The results of rearing experimental sheep in pasture plots with different values of the vegetation index showed that in the arid steppes of Stavropol, when growing the experimental group of young with a higher value of vegetation index, animals grow more intensively than their counterparts on a pasture plot with a lower value of vegetation index.

Thus, the introduction of innovative methods of remote monitoring allows you to optimize production processes when growing the intensive genotype of sheep and increase the average daily growth rate of young stock by 7.52% when kept on various pasture plots.

CONCLUSION

With the pasture keeping of young sheep of the Manych merino breed, the use of remote monitoring of the vegetation index allows optimizing the process of raising animals and statistically significantly increasing the average daily increase in their live weight by 7.52%.

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