

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Prospects for The Organization of Pasture Technological Modules for Livestock Development with The Use Of UAV.

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ABSTRACT

The article presents the results of the study effectiveness of unmanned aerial vehicles (UAV) for the intensification of cattle breeding. The level of confidence in the use of data obtained with the help of (UAV) in growing livestock of different directions of productivity is estimated.

Keywords: pasture cattle breeding, beef cattle breeding, Hereford breed, Dmitrievsky type of Hereford, unmanned aerial vehicles

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INTRODUCTION

Pasture production of beef is one of the most important components of the livestock sector, which is designed to provide the population with high-grade proteins and fats, and to strengthen the health of the nation. Feeding contingent is formed due to animals of different breeds and the direction of production use, and the most promising is the use of animal meat genotypes. Among the breed diversity of the Stavropol region is a new type of Hereford breed, "Dmitrievsky", the genetic material for the creation of which were the purebred herds of the Hereford breed of domestic and foreign reproductions collected in the Druzhba breeding farm of the Apanasenkovsky district. Live weight of bulls-producers of a new genotype at the age of 2 years and cows at the age of 1 calving - 645.5 kg and 504.3 kg, for milk, the advantage of the new population was 20.7 kg. Bulls Dmitrievsky type in 15 months outperformed the base version for live weight by 30 kg, the mass of carcass at 32 kg. In the average sample of minced meat, the animals of the new generation of protein contained 0.87% more than those of the original population. Profit from the sale of animals Dmitrievsky type was higher by 6123.7 rubles. (14.5%) than the base variant, and the level of profitability - by 10.7%. The new type of Hereford created in the conditions of grazing livestock will help to increase the production of high quality beef and can serve as the genetic basis for the creation of an industrial fattening contingent for the production of beef in the Stavropol region.

A positive example of effective production of beef in the Stavropol Territory is the development of pasture livestock in the farm Kolesnikov, where a highly productive herd of beef cattle was created with the nature of growth of young animals for fattening at the level of 1300-1500 g of daily average weight gain.

The current development of pasture livestock is the use of unmanned aerial vehicles, which makes it possible to obtain reliable information on the dynamics of vegetation of forage grasses in different pasture areas and to identify the optimal stage for the use of each site. Among the unmanned aerial vehicles (UAV) used in the national economy, UAVs of small, medium-range, with take-off weight from 5 to 50 kg, range of action from 5 to 75 km are recognized as the most effective.

MATERIALS AND METHODS

In order to develop an optimal methodology for organizing a pasture module for livestock raising for meat, we conducted studies on the effectiveness of pasture maintenance of bull-calves of different genotypes: meat (Dmitrievsky type of Hereford breed), milk (red-motley breed).

The experimental group of gobies of red-motley breed (I) was kept on the equipped pasture module, where feeds (hay, silage) were harvested to provide energy for the growth of animals at a level of not less than 800 g, the control group of animals of pedigree and age analogues (II) was kept in conditions traditional stall-walking technology, providing a feeding level of at least 800 g of daily average weight gain [1-5].

To study the efficiency of using unmanned aerial vehicles for the organization of pasture modules, we used UAV Merlin equipped with special devices that allow real-time aerial photography to obtain a continuous and complete picture of the terrain, as well as the spectral characteristics of the studied objects.

RESULTS AND DISCUSSION

Determination of the nutrition of pasture forage grasses showed that during the summer period, a regular change in nutritional value was observed - a 15.5% decrease in the moisture content of the green mass, respectively, an increase in the dry matter content, an increase in the crude protein content by 0.17%, crude fiber - by 6.54% and raw fat by 0.54% (Table 1).

In the accounting period, the average daily feed intake for the experimental group per head was: 28-35 kg of pasture grass, 0.3-1.5 kg of hay. Nutrients consumed, on average, crude protein - 1223 g, fiber - 1956 g, raw fat - 307 g, BEV - 4610 g, feed - 6,71-8,86.

The diet of feeding of animals of the control group included silage - 15-22 kg, hay - 1.8-2.5 kg, straw - 1.5-2.0 kg, fodder - 2.0-2.5 kg, nutritional value was 7.5 feed units. In 1 kg of dry matter, the diet contained 10.13 MJ. The average daily intake of nutrients was: crude protein - 997 g, crude fiber - 2974 g, raw fat - 224 g,

nitrogen-free extractive substances - 5528 grams, feed units - 7.1 or 94.6% of the nutritional value of the prescribed diet.

Table 1: Chemical composition of green pasture forage ($\bar{X} \pm Sx$)

Samples	Chemical composition of fodder of natural moisture, g%							Feed units, kg
	Humidity	Crude protein	Raw fiber	Crude fat	Crude Ash	Ca, mg %	P, mg %	
Average pasture test in May-June	71,2±1,81* *	3,48±0,85	5,45 ± 0,14	0,81±0,02	2,05±0,06	0,12±0,03	0,07±0,01	0,25±0,01
Average pasture test in July-August	55,7±5,80	3,65±0,59	11,99±0,32**	1,35±0,17* *	2,61±0,45	0,14±0,24	0,08±0,01	0,26±0,02

Note ** - reliability of differences $p < 0,05$

Carrying out time-keeping studies on the behavior of elements of behavior showed that during the first 9-15 days, the gobies of the experimental group underwent an adaptation period to new conditions of content, which coincided with the studies of other authors [7, 8], after which a regularity began in time with animals on motor, braking and feeding actions (Table 2).

Table 2: Characteristics of the behavior of 8-month-old bull-calves ($\bar{X} \pm Sx$)

Group of animals	Time spent on elements of behavior, min.		
	Motorized	Braking	Fodder
I	196,40±7,15	670,40±7,81	573,20±6,62
II	280,80±14,50**	691,40±15,52	467,80±10,66**
I / II, %	- 30,06**	- 3,04	+ 22,53**

Note ** - reliability of differences $p < 0,05$

Thus, we found that when pasture content changes, the main elements of behavior of animals of the experimental group (I) in comparison with their analogues of the control group (II): the time for movement increases by 2.2% ($p < 0.05$), by rest in the supine position - by 3.33% ($p < 0.05$), water consumption by 0.76-0.84% ($p < 0.05$), feed intake by 5.62% ($p < 0.05$), and, to the greatest extent, this only applies to the consumption of juicy (pasturable) forages - by 5.77% ($p < 0.05$), while the consumption of roughage was only 1.32% ($p < 0,1$). The bulls of the control group spent more time on resting by 4.79% and on game actions by 8.06% ($p < 0.05$). At the age of 8 months of concentrated feedstocks, the experimental group was not given, and in the control group, 1.54% of the total time was consumed for their consumption. Differences in the time spent on the chewing process are statistically unreliable ($p > 0.05$).

It is known that the processes of digestion and chewing gum in pasture conditions are much better

with complete provision of the animals' needs in water and the possibility of rest in the supine position [7, 8]. The general trends of differences in the behavior of the animals of Group I in the case of pasture were manifested in an increase in the expenditure of time by 28.64% for fodder activities (consumption of feed and gum) and a decrease in time by 30.06% for motor actions (movements and playing actions), which led to higher productive qualities of the bull-calves of the 1st group.

Table 3: Dynamics of live weight and growth energy of bull-calves ($\bar{X} \pm Sx$)

Index	Group of animals		I / II, %
	Experienced (I)	Control (II)	
Live weight, kg in 6 months	185,5 ± 2,03	184,3±2,12	+ 0,7
in 14 months	350,7 ± 3,70	329,7±2,42	+ 6,37 **
The average daily gain of live weight, g	786,8 ± 14,1	692,2 ± 9,2	+ 13,7**

Note ** - reliability of differences $p < 0,05$

An analysis of the results of animal rearing showed that the live weight of the youngsters of the I and II groups in a 6-month-old age corresponded to the breed standard of the 1st class for animals of the breed of the breed and was within 175-195 kg (Table 3). The gross increase in the live weight of the first head of the experimental group for 210 days of the pasture period (April-November) amounted to 165.2 kg, which is 19.8 kg more than in their pedigree analogues of the control group ($p < 0.05$).

The average daily gain in the live weight of the calves of group I was 13.67% higher than in the control group ($p < 0.05$). That is, the cultivation of gobies without limiting their behavior with free access to coarse juicy fodder allows the animal to display growth energy at the level of 770-800 g.

The results of our research have been put into the development of a natural pasture technological module that can give an additional impetus to the development of beef cattle breeding can be given by the organization of pasture technological modules, which it is advisable to equip with regard to the terrain.

The load of the fattening contingent on the pasture territory depends on the planned intensity of livestock production for meat. When planning the average daily energy of growth of animals at the level of 600-650 g and without additional feeding, the load of young animals on pasture territory can be about 1 head / ha.

When planning the average daily weight gain at the level of 800-1100 g, additional feeding is necessary, while the load per 1 ha of pastures can reach up to 2-3 youngsters. Animals should be grown free of staple and have free access to all types of feed that are harvested according to the technological need for the entire growing period.

Feeding of animals is carried out using self-feeders for hay, concentrated feed and mineral fertilizing, which are filled as needed, usually once or twice a week. The normative feeding front from self-feeders for hay per head is 0.4 m. It is advisable to place feeding troughs on hard-surface areas.

Pasture territory is fenced off permanently, it is possible to use natural beams, yars, slopes. On the southern side, pasture territory is equipped with a three-walled canopy with a deep litter at a rate of 2.5-3.0 square meters. m per head of young animals. Given the terrain and distance to the roads, at a distance of 50-70 m between themselves-feeders for concentrated feeds and mineral fertilizing. Silo and haylage are harvested by the aboveground method and are also located directly in the pasture area at the rate of 3.5-4.0 tons per head for the whole period of cultivation, it is possible to harvest mixed silos (silage + haylage in proportion 1: 1).

The feeding of fattening cattle is made from natural reservoirs or troughs and drinking bowls. The content of young animals on a natural pasture module can be carried out from April to November, while you need to focus on specific climatic conditions - when the period of precipitation and icing occurs, animals can

reduce the rate of growth of live weight. For veterinary treatments, a split system is placed on the territory of the pasture module.

The structure of the ration of feeding taking into account the nutritional value of the feed should be (%): coarse - 20-35; juicy - 40-65; concentrated - 15-30. With intensive fattening of the bull, on average, 1 head per day can eat (kg): silage - 15-30, hay - 3-6, straw - 1.5-3, concentrates - 2-5, salt - 30-70 g, Monocalcium phosphate - 30-50 g.

To achieve a profitability level of beef production within the range of 15-35%, the following technological parameters should be adhered to: the average live weight for the sale of 15-18-month-old youngsters for meat is 450-500 kg; feed costs per 1 kg of live weight gain (taking into account pasture forages) - no more than 9-11 kg of feed units, labor costs - up to 3-5 people per hour.

Genetic basis for the creation of an industrial fattening contingent can serve animals of the new meat genotype "Dmitrievsky", created on the basis of breeding purebred herefordskogo domestic and foreign reproduction, collected in the breeding farm "Druzhba" Apanasenkovsky district. Live weight in bulls-producers of a new genotype at the age of 2 years and cows at the age of 1 calving is 645.5 kg and 504.3 kg, against 504.3 kg and 460.5 kg - for the Hereford breed. Milk (live calf weight at the age of 205 days) the advantage of the new population was 20.7 kg. Bulls Dmitrievsky type in 15 months outperformed the base version for live weight by 30 kg, the mass of carcass at 32 kg. In the sample of minced meat, the animals of the new generation of protein contained 0.87% more than the analogues of the initial population, while the fat - 2.48% less. The coefficient of bioconversion of protein in new-type bull-calves was 9.88% compared to 9.18% for Hereford breed analogs, but their energy conversion coefficient was less by 0.38%. Profit from the sale of animals Dmitrievsky type was higher by 6123.7 rubles. (14.5%) than the base variant, and the level of profitability - by 10.7%. The created new type of Herefords with pasture content will contribute to increasing the production of high quality beef and can serve as the genetic basis for creating an industrial fattening contingent for the production of beef in the Stavropol region.

In one of the advanced peasant (farming) farms Kolesnikov created a highly productive herd of beef cattle with the energy of growth of young animals for fattening at the level of 1300-1500 grams of average daily weight gain, which is a positive example of the effective pasture production of beef in the Stavropol Territory [2].

The use of unmanned aerial vehicles makes it possible to obtain information on the dynamics of vegetation of forage grasses on different pastures, to identify the optimal stage for the use of each site. The most effective is the use of small, medium-range UAVs with take-off mass from 5 to 50 kg, range of action from 5 to 75 km.

Verification of the possibility to search for and identify large animals in different parts of the territory with different terrain with the installed thermal imaging and video equipment at UAV Merlin showed that the equipment complex provides optical information from all kinds of optical loads (video camera, thermal imager). Optical information is transmitted in real-time to the ground control station, while images are snapped to GPS coordinates on board the UAV. The quality of the images obtained from the thermal imager is sufficient to identify the objects (including individual animals and their species).

CONCLUSION

- Genetic basis for the creation of the industry of pastoral meat cattle breeding in the Stavropol Territory are highly productive animals of the new meat type Dmitrievsky, the cultivation of which contributed to an increase in the profitability of beef production by 10.7% compared to the base variant.
- For the effective development of pasture livestock in the steppe regions, it is most expedient to use the UAV Merlin, whose equipment provides extensive information for identifying and obtaining the spectral characteristics of various objects (pasture areas and animals), which is necessary for the organization of pasture modules.

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