Current trends in directed work on production of rabbit breeding products

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Abstract. Today, the meat industry is making great strides developing both in terms of quality raw materials and quantity. The task is to provide the population of the country with full-fledged protein of animal origin and rabbit meat has no equal in this: rabbit meat is a dietary product favorably differing from other species. To date, we have not satisfied market for 300 thousand tons of rabbit meat and it is understandable - the product market is in the stage of formation. In this regard, the task of creating a highly productive rabbit, not inferior in its performance to analogues, is very relevant. Scientists of Belgorod State Agricultural University since 2013 are engaged in the breeding process, which continues to this day, which is highly relevant for the development of food cluster Belgorod region. The result of work is a highly productive rabbit of own selection of meat direction of productivity. The main zootechnical parameters of the rabbit: slaughter yield 60-65%, average daily gain in the stage of active growth - 45g. Slaughter indicators rabbit own selection shows at the age of 3 months in the range from 2900-3800g. That is significant in breeding for live weight. \ In the conditions of the laboratory of rabbit breeding, we get 6 births per year. As a result of systematic selection work aimed at growth energy, milkiness in rabbits and dermis white color we have a rabbit with a given phenotype, live weight of male producers over 8 months of age on average - 4,8-5,8 kg, rabbits - 4,7-5,5 kg. 2023-2024 years according to the technological map of the breeding process - stabilization and consolidation in the offspring of the obtained economically useful characteristics.

1 Introduction

In terms of production of dietary meat rabbit breeding can be attributed to one of the intensive branches of animal husbandry, the potential of which is enormous and is currently used absolutely insignificant.

Modern approaches in nutrition are increasingly focused on proper nutrition, taking into account the caloric content of the product and healthy eating. Rabbit meat is a diet meat, occupying a place of honor next to diet turkey. Rabbit is valuable for its high content of high-

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grade protein with low fat and cholesterol content, and it should be noted that the digestibility of rabbit meat protein is up to 90%, while the animal protein of other animal species, including cattle is 60%. Rabbit meat is valued for its vitamin and mineral complexes, iron, phosphorus, manganese, fluorine, etc. This and many other things indicate its unambiguous indication for people of older age, with GI issues, children of different ages, nursing moms.

For about 10 years scientists of Belgorod State Agricultural University have been working on the study of zootechnical characteristics of the rabbit, as well as research in the field of organization of environmental conditions, which naturally involves the cultivation of a healthy active animal.

In 2019, a world-class research and education center (REC) was organized on the basis of Belgorod State National Research University, which was the prerequisite for Belgorod SAU to participate in the center's program together with the firm AgroVi LLC, representing the industrial partner.

Since 2020, the projects of Belgorod State Agricultural University are included in the portfolio of the scientific and educational center (SEC) of the world level - this has served as a driver in the work on the creation of a highly productive herd of rabbits of its own selection with a high growth rate, high slaughter yield, white dermis.

As a rule, the initial platform for obtaining a high-blooded breed is known breeds of up to 15 varieties, including lines, crosses, which are grown taking into account the pedigree bases, which is directly related to the selection process.

As a result, the overall plan for 2022-2023 included:

1. Organization and systematic work on the formation of the breeding nucleus;
2. Bonitizing activities of different sex and age groups;
3. Monitoring studies of reproduction;
4. Selection and selection activities in a breeding program;
5. Monitoring studies of basic physiological indicators.

2 Research objects and methods

The base for scientific research was the laboratory of rabbit breeding of Belgorod State Agricultural University, where the object of scientific research and observation are all sex and age groups.

The rabbit population is 500 animals, of which the main herd is 100 animals. The environmental conditions were identical in the whole herd.

Keeping of livestock is provided in industrial-style cages, individually, watering is automated through a system of nipples. Feeding is carried out manually by a set amount of feed into the hopper feeders of the cages. The laboratory provides dry type of feeding with granulated mixed fodder of different brands: universal for young animals and for lactating females. The housing provides for a closed type rabbit house with set microclimate parameters for the whole stock.

Feeding level is provided by dry type of feeding with pelleted mixed fodder.

The main parameters of growth of rabbits were determined according to the standard method: weighing with periodicity before weaning of young animals - 7 days, then after 21 days in 20 days. Absolute average daily gain was calculated by the formula:

The physique of the studied animals was evaluated by linear indices. The index of compactness and as an indirect indicator of potential meat yield was calculated by the knockdown index:

The index of safety of young rabbits on suckling was determined by the ratio of the number of young animals to weaning to the total number of heads expressed in percent.

Semen was evaluated microscopically no later than 2 minutes after semen collection using an artificial vagina.

The following were used for microclimate assessment: thermoanemometer type TTM-2, aspiration psychrometer type MV-4M, luxmeter type TKA-Lux, gas analyzer OKA-92.

3 Research results and their discussion

3.1 Organization of environmental conditions of rabbit breeding

The years 2022 - 2023 are an intermediate time period in obtaining a high-blooded litter, with the final result expected between 2024 and 2025.

Complete feed for rabbits was produced in the conditions of the feed mill in accordance with GOST, has certification.

Recipe of mixed fodder includes grass meal, bran, cereals, cake, mycotoxin adsorbent, coccidiostatic. The main component and extremely useful is grass meal, as it is close to fresh or green mass in its content of nutrient components, while retaining its properties for a long period of up to 95%. In formulations of mixed fodders it is obligatory presence of sorbents and coccidiostatic, necessary components for increase of productivity and output of ecologically safe product.

The introduction of premix into the composition of complete feed completely solves the problem of complex satisfaction of physiological needs of animals in vitamin and mineral complexes.

Laboratory of rabbit breeding since October 2022 is equipped with climate control system, which allows to provide stable indicators of temperature and humidity regime in production premises at the level of 17^0 C and the level of gas composition of the air environment, where the concentration of hydrogen sulfide is absent, concentration of CO_2 - 0,03%.

As a result of organized work of the climate control system fluctuations of temperature and humidity regime are excluded, which allows to avoid such negative phenomena as: sweating, dryness of skin and mucous membranes, which can lead to a decrease in resistance of the rabbits' organism.

Air velocity was measured according to generally accepted methods at the animal level and does not exceed 0.3 m/s. Relative humidity in the range of 45-65%, which is normal for rabbit houses of closed type. The content of harmful substances in the air of the premises does not exceed the permissible standards. Illumination is 50-100 lux.

The production cycle before the breeding company includes the evaluation of all rabbits on the complex of traits (tab.1).

Table 1. Results of boning of rabbits of the main herd

№	Age, days.	Live weight, g	Coloring	Index bunching, %
1.	169	4700	Characteristic of the breed Silver	69.3
2.	165	4159	Characteristic of wild forms of Agouti	64.8
3.	161	4258	Characteristic of the Black-Brown breed	65.3
4.	161	4330	Characteristic of wild forms of Agouti	57.6
5.	158	4311	Characteristic of the breed Silver	61.8
6.	156	4001	Characteristic of wild forms of Agouti	67.2
7.	156	4478	Characteristic of the Black-Brown breed	65.3
8.	156	5702	Characteristic of the breed Silver	71.8
9.	156	3180	Characteristic of the California breed	63.1
10.	156	4592	Characteristic of wild forms of Agouti	66.2
11.	130	4770	Characteristic of the California breed	65.1

12.	128	4252	Characteristic of the California breed	64.2
13.	128	5365	Characteristic of the California breed	62.1
14.	128	3644	Characteristic of the California breed	68.5

According to the production calendar and vulva evaluation, rabbits were placed in the cage of the male breeder and two sheds were performed with a period of up to 10 minutes. Fifteen days after mating, rabbits were palpated to detect sucroparity, and no missed females were observed. As the main period in reproduction, the gestation period averages 30 days (Table 2).

Table 2. Live weight of rabbits, g.

Gender and age groups	Indicators	Effectiveness
Rabbits before the breeding campaign	Live weight, g	3753±80
The rabbits after the calf's calving	Live weight, g	4023±72

From the data in the table it is obvious that the weight indices of rabbits of the main herd in different physiological periods, was standard for an adult, healthy animal.

Evaluation of maternal qualities is extremely important in the selection of rabbits in the breeding nucleus, so we monitored the milkiness of rabbits, where the evaluation was carried out on the condition of the litter. The rabbits were quietly in the nests, without squeaking, all this indicates good milkiness of females.

The yield of weaned rabbits is a trait that can be used to judge the maternal performance of rabbits. In our research we analyzed the percentage of preservation in critical periods of rearing, and the preservation index is one of the monitoring indicators of reproduction of rabbits (Table 3).

Table 3. Reproductive performance of rabbits

Gender and age groups	Indicators	Effectiveness
Young rabbits	Multiple births, goals.	8±0.43
	Preservation, % (21-day-old growing)	97.8±71
	Mortality up to the age of sex (4 months), %	1.2±0.29
	Preservation, % (60-day growing)	97.1±0.58

In the period up to sixty days of growing rabbit is characterized by a special intensity and rapidly goes up, to 90-day age stabilizes and by slaughter remains at the same high level. To provide young animals active growth it is important to provide the livestock with high-grade feed: in the range of 120 -200 g, which is the norm for the growing organism. Growth in rabbits in our studies reached up to 49g per day, and this indicates the rapidity and intensity of growth and development (tab.4).

Table 4. Growth rates of rabbits in the active stage

Growing day	Live weight, g	Sprouts		
		absolute	average daily	relative
30	762±102	695	23.2	92.5
60	2104±104	1345	44.4	64.3
90	3218±218	1117	37.5	34.8
120	3514±111	197	9.7	8.5

The analysis of the table clearly demonstrates the peculiarities of growth of rabbits, as described above: up to 60 days of age the most active growth is seen, up to 90 days of age -

it is stabilized and by slaughter (120 days) comes to a constant index, which is consistent with the physiology of growth of rabbits.

Average daily gain in the stage of active growth (30-60 days) reaches 50g, by 120 days of age there is a stabilization in live weight gain. Rabbit of own selection has by 3 months of age live weight in the range of 2900-3800g. that is much higher than similar breed (California) on OST 1988. The main distinguishing features of rabbits own selection and similar breed of meat direction of productivity California: the minimum requirements for live weight on OST - 2.6 (Elite) -2.3 (I), rabbit own selection has a live weight of 3.1 (E) -2.9 (I). According to the evaluation of physique the main distinguishing features are broad chest and loins, strong, correctly set limbs, rounded croup, flat back. White color of dermis, in contrast to the California breed the color of tips of paws, tail, ears - not expressed, sometimes gray. As for the hair cover, it is as in the compared breed of white color, shining, dense derma. It should be said that the characteristics of the rabbit of our breeding eirisomic type or meat productivity, in the production process we use a semi-intensive rhythm of reproduction, which is consistent with the experience of advanced farms meat direction.

As for the criteria for selection of rabbits in the breeding nucleus at the age of 5.5 months, we were guided by the industry standard, as a result a number of indicators were determined: live weight 4.1-4.3 kg, 60% - knockdown index, multiple fertility - 8 heads, fertilization - 95%, maternal instinct characterized by good milk production, nest preparation, caring attitude to the litter, aggression excluded. The production process of breeding was organized taking into account the application of different degrees of inbreeding.

To date, the rabbits of the main herd of our own selection have a live weight of over 4 kg, the knockdown index, which characterizes meat productivity, is high - 60% and above, the percentage of fertilization - 95%. The rabbits have high maternal qualities: they are not aggressive to their offspring, they feed on time, they dig a lot of fluff from the abdomen area into the nest.

4 Conclusions

The global task at the first stages of work was to obtain strong, meeting the parameters of the offspring of eurisomic type of constitution, rabbits with high maternal qualities, a high degree of litter equalization, which in the future will give the opportunity to form a parental herd with the specified parameters on exterior, color and dermis thickness in order to obtain resorbing membranes (Fig. 1).

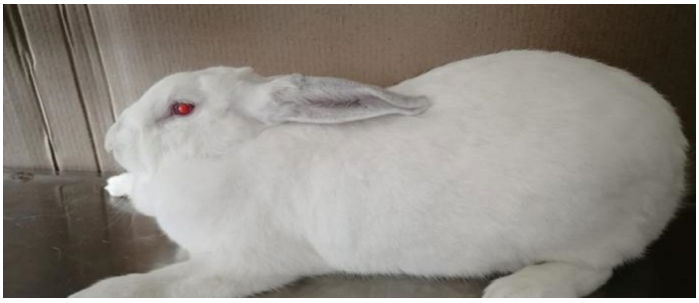

Fig. 1. Rabbit of the main flock

The rabbit is characterized as a quiet and from the outside a very calm animal, but meanwhile is not stress-resistant, i.e. sucrolling females can abort and even graze at sharp, loud sounds (which we observed at the beginning of the SWO operation) and odors. Rabbits are very sensitive to high-pitched sounds, loud voices, and large numbers of people. Therefore, our team had concerns about the fulfillment of tasks, but to date we can state

positive dynamics. Herd growth is significantly more than double compared to the same period in 2020. To date, the herd, a significant part - 85% meet the requirements: phenotype: hair cover and dermis white, class Elite and 1 class for females (know-how №2021084 on registration as know-how result of intellectual activity "Method of evaluation of rabbits on the complex of traits"). On productive indicators.

Average daily gain in the stage of active growth (30-60 days) averages 45g, by 120 days of age there is a stabilization in live weight gain. Rabbit of own selection has by 3 months of age live weight in the range of 2900-3800g. that is much higher than similar breed (California) according to OST 1988.

Milkiness of rabbits was estimated by the condition of the nest in the first day 550-650g in the nest on average 10 rabbits, to weaning - 950g.

For breeding work with the purpose of creation of highly productive livestock within the framework of the project of the full cycle of NLC, were used as initial breeds of the breed Silver and California with the subsequent infusion of blood of rabbits of the breeds Butterfly and White Pannon.

As a result of systematic selection work aimed at growth energy, milkiness in rabbits and white dermis, we have a rabbit with a given phenotype, live weight of male producers over 8 months of age on average - 4.8-5.8 kg, rabbits - 4.7-5.5 kg.

Slaughter yield from 60%, average daily gains in the stage of active growth 50g.

To date, stabilization and consolidation of the obtained economic and useful characteristics in the offspring is in progress.

Rabbit of our selection of meat direction of productivity, like the analog (hybrid Hikol), slaughter yield over 60%, average daily gain on average for the period of fattening 45g. Analog (hybrid Hikol), as sources write 45-60g, but slaughter live weight rabbit own selection reaches the age of 3 months (3.5 kg), the analog 3-4 months and it is according to scientists record performance. In the conditions of our laboratory by the age of 3 months we have a range of live weights from 2900-3800g. That is a significant achievement in breeding for live weight.

Paws rabbits own selection strong, pubescent that makes it possible to equip cages with mesh floors, as well as the analog.

Percentage of births in our females is the same 85-90%, on average per birth females own selection bring 10 rabbits, the hybrid Hikol 10-12, but to weaning remains at them 8 heads, we have 8-9 heads. In the laboratory conditions of rabbit breeding we apply semi-intensive mode of use rabbits, ie, we get 6 crops per year, to increase the number of crops, and this is a tough exploitation of the body of the rabbit, puts the need to update the herd more often, ie, invest economically, well, and of course marketing policy. To increase the output of products need to expand the customer base, to conduct advertising campaigns, etc.

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