

Directed work on breeding of high-blooded rabbit litters in the rabbit breeding laboratory of Belgorod GAU

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Abstract. The rabbit is one of the most common types of laboratory animals used in a number of experimental studies in general biology, medicine and veterinary medicine. And today, the most actively discussed strategy is the policy of import substitution as a factor in ensuring the growth of domestic agribusiness, and of course rabbit breeding is the most promising and rapidly developing industry. Therefore, we believe that the creation of crossbred rabbits of domestic selection that are not inferior in their characteristics to their European counterparts is an extremely urgent task, which served as the driver for the development of the issue of creating a highly productive herd of rabbits (high-blooded crossbreeds) in a relatively short time: until 2024. It should be noted that the selection process began in 2013 and systematically developed until the present time, when it became obvious and relevant for the development of the food cluster of the Belgorod region, including the work on the creation of a specialized, fully adapted line of rabbits. As a result of systematic selection work aimed at growth energy, milk production in rabbits and white dermis, we have a rabbit with a given phenotype (white color with a thickness of 9-15 microns in the area of the withers of the epidermis, dermis -250-350 microns, in accordance with the requirements for the production of resorbing membranes from dermis of rabbits for the dental industry), the live weight of male sires over 8 months of age on average is 4.8-5.8 kg, female rabbits - 4.7-5.5 kg. Today, the obtained economically useful characteristics are being stabilized and consolidated in the offspring.

1 Introduction

Rabbit breeding is one of the most intensive branches of animal husbandry, the potential of which is only slightly utilized in modern conditions [3, 5, 6, 8]. The rabbit as a model object is interesting because its organism is very sensitive to the influence of various biological and physical factors. To date, the rabbit can be considered as a biofactory, it is biomaterials, dietary supplements, raw materials for the cosmetic industry, a great prospect in the production of dietary meat is obvious [1, 2, 3, 5, 7].

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As for meat productivity, the segment is unsatisfied and the potential capacity of this market is about 326.6 thousand tons, that is, for one inhabitant of our country there is an average of 70 g of rabbit meat per year.

Scientists of Belgorod SAU have been studying rabbit peculiarities traditionally for about 30 years, since 2020 the projects of Belgorod SAU are included in the portfolio of the world-class scientific and educational center (SEC) - this served as a driver in the work on a set of measures to prepare and create a highly productive herd of rabbits, focused on the special qualities of the skin cover [1,4, 9, 10, 12, 13].

Therefore, a directed approach in solving a number of problems was necessary, respectively, the first stage involved the analysis of the state of rabbit breeding at the time of drawing up a plan of selection and breeding work with the herd, developed the methodology and the main directions of improvement of the herd, then a methodical description of the selection of rabbits in the breeding nucleus and the final stage is the organization of the production cycle. And also - identification of highly productive producers in order to expand the sample and specialized lines of rabbits, their evaluation of the quality of offspring; comprehensive evaluation of breeding stock, repair young stock three times a year to establish the class of animals; analysis of reproductive function of male producers, evaluation of semen quality; selection and selection of pairs, in order to obtain a homogeneous rabbit stock; blood studies: biochemical and general clinical analysis; monitoring studies of basic physiological parameters; pro

2 Material and methods of research

The research was carried out in conditions of rabbit farm of Belgorod State Agricultural University. The object of scientific research was the breeding stock of rabbits, rabbit breeds of meat-pelt and meat direction of productivity.

The livestock is represented by the main herd: 62 rabbits and 12 males, 300 young animals on breeding. All animals were kept in the same conditions. They were kept individually in cages of industrial type - two-tier cages. Each cage was equipped with nipple drinkers connected to the common water supply system and hopper feeders for mixed fodder.

The experimental animals were fed a household ration, which consisted of pelleted mixed fodder for rabbits produced by Belkorm Ltd. The rabbit housing fully complied with the existing hygienic requirements. Zoohygienic conditions were identical.

Ejaculate was obtained using an artificial vagina. The quality was assessed microscopically.

At one month of age, young animals were individually branded, body weight was measured and examined for exterior malformations.

B 1-15 "Sasha" scales B 1-15 were used as a weight measuring device.

The development of the animals' physique was evaluated by linear indices, the type of rabbits' constitution by the knockdown index.

3 Research Results

3.1 Organization of the process of rabbit rearing

Period of researches is laid down for five years till 2025, but for today we have positive intermediate results. In conditions of laboratory the dry type of feeding by full-fed compound feed for rabbits PZK-91-1-217 is laid down, the recipe of compound feed included a mixture of cereals, cake, meal, adsorbent of mycotoxins, coccidiostatic, that allows to receive high productivity of animals and output of ecologically safe product. Uninterrupted nipple

watering. According to zoohygienic parameters rabbit farm fully meets regulatory requirements, and since October 2022 is equipped with a climate control system, which provides us with uninterrupted production of rabbit farming products.

The main technological methods in work with the herd included: evaluation of the main herd by categories of fatness and knockdown index, respectively, in reproduction went individuals having factory condition, with fatness above and below average individuals were culled from the main herd. The results of evaluation and boning of rabbits showed: live weight averaged 4.403 kg, color - white, silver, ermine, the index of knockdown 65-67%, strong physique, well-developed bone, rounded croup, strong limbs, ears erect, hair cover thick with elastic elastic tip and underfur, when blown at the "bottom of the rosette" skin is not visible.

Before the start of the production cycle, a production calendar is drawn up, where the planned mating and culling of rabbits is prescribed. According to the production calendar and the onset of hunting in rabbits, they were put in the cage of the male. External condition of genital organs is an important component of evaluation of rabbit's readiness for mating (Table 1). The state of sexual hunting in rabbits was determined according to the method of R.M. Nigmatullin [14].

Table 1. External condition of genitalia of rabbits ready for covering.

Main herd	The shape of the vulva	The color of the vulva
Rabbits	Rounded, swollen, sharply defined folding	Dark pink, red with burgundy, cherry red shades.

Twelve to 15 days after covering, the rabbit was checked for sucroparity by probing. As the main phase of reproduction, the gestation period lasts about 30 days, with variations from 28 to 32 days. With large litters, the duration of sucrolity is shorter, with small litters it is longer. Fertility of rabbits of the main herd was 100%.

One of the main signs of maternal qualities is the yield of weaned rabbits. In our research we studied maternal qualities of rabbits and safety of rabbits up to 45 days of age. To date, economically attractive for the realization is the live weight of rabbits on fattening at the age of 2.5 months - up to 2.5 kg. Nowadays in our country, as well as in most countries, from the point of view of meat production it is important that the carcass contained the maximum amount of muscle tissue and the minimum amount of bones and fat, so the rabbit carcass by three months of fattening is optimal, which is demonstrated by rabbits of the studied rabbits (tab.2).

Table 2. Productive qualities of rabbits (n=50)

№	Indicators	Characteristics of rabbits
1.	Duration of pregnancy, days.	31.4±0.58
2.	Fecundity, goals.	8.8±0.33*
3.	Nest live weight, g: at birth	550±0.33*
4.	Number of weaned rabbits per 1 rabbit at 45 days, goals.	8.1±0.16*
5.	Live weight of 1 head, g: in 45 days	1300±24
6.	within 60 days	1647±30
7.	At 90 days.	2720±0.05

The main indicator of reproductive ability of rabbits is the percentage of litter preservation (Table 3).

Table 3. Main indicators of reproductive abilities of rabbits (n=50)

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

As for the growth of rabbits, it was characterized by the highest growth potential relative to subsequent periods of ontogenesis, so it was at this time that the highest feed conversion was observed. Each animal consumed from 120 to 200 grams of feed per day, and the average daily gain confidently tends to 50 grams.

From the third to the seventh day the live weight of rabbits increased by 46%, absolute gain amounted to 49±3 g, average daily gain increased by 62%. This period is characterized by transition from colostrum to milk. And although colostrum is characterized by a higher content of dry matter, protein and fat, the transition to milk production of which is steadily increasing and reaches its maximum on the 17th day of lactation, allows to maintain the trend to increase the average daily gain in the period from 14 to 21 days.

Also in this time interval there is an increase in caprophagy (from the first days after birth the rabbit leaves in the nest a small amount of solid feces, which is consumed by the rabbits, during this period this process is maximized), left by the female in the nest, and what is not unimportant in this period the rabbits have the opportunity to leave the nest and begin to get acquainted with the food consumed by their mother [9].

By 30 days the average live weight of young animals increases 2 times, absolute gain amounted to 361±4 g, and the average daily gain increased by 88 %, relative to the previous studied time interval. In the period from 21 to 30 days there is a decrease in the lactation curve in females, and in rabbits there is a change in the basis of diet from milk to mixed fodder.

Further changes in the growth of rabbits from 60 to 90 days of age are summarized in Table 4.

Table 4. Optimal parameters of live weight rabbits at 60 and 90 days of age

Age, days.	Live weight, kg	Absolute growth, g	Average daily gain, g	Relative growth, %
60	2,1±0,1	1344±43	45±3	64±5**
90	3,2±0,2	1114±35	37±4***	35±4***
120	3,5±0,1	295±27	10±1	8±2

As noted by scientists Ulyanov A.G., Zvyagin A.N.: "...the percentage ratio of total growth for a certain period of time to the initial live weight is an indicator of relative growth rate or intensity (intensity) of growth. The study of absolute and relative growth rate is necessary to determine the readiness of rabbits for reproduction, optimal timing of realization, control of animal adaptations to technological conditions".

The intensity of growth of rabbits in different age periods is not the same: the most active growth goes up to 60 days of age, then decreases and by 120 days of age stabilizes, remaining constant, which is consistent with the physiology of growth of rabbits.

Average daily gain in the stage of active growth (30-60 days) averages 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) according to OST 1988.

In the production process we use a semi-intensive rhythm of reproduction, which is

consistent with the experience of advanced meat farms. To date, the semi-intensive rhythm of reproduction for industrial breeding of rabbits has become the main in the conditions of the laboratory of rabbit breeding of Belgorod State Agricultural University.

Consequently, for the purpose of directed work on cultivation of highly productive herd, the co-authors have developed and implemented a number of mandatory measures: creation of optimal environmental conditions for the cultivation of different sex and age groups, maintenance of breeding records, evaluation of young stock on a set of traits, carrying out of boning of rabbits of the main herd, selection of rabbits on a set of economically useful traits, etc.

4 Conclusions

Summarizing, we see, as a number of scientists A.G. Ageikin, N.A. Balakirev, R.M. Nigmatullin and others claim, the rabbit is quiet, not aggressive and from the outside is a very calm animal, but still represents a non-stress-resistant animal, i.e. sucrol females can abort and even fall at sharp, loud sounds (which we observed at the beginning of the operation SWO). Rabbits are very sensitive to high-pitched sounds, loud voices, and large numbers of people. Therefore, our team had concerns about the fulfillment of breeding objectives, but to date we can state positive dynamics. The growth of the herd is significantly more than 2 times compared to 2020. To date, the herd, a significant part - 85% meet the requirements: phenotype: hair cover and dermis white color, 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 features"). Productive indicators: average daily live weight gain, milk yield of females, nest weight.

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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 (white color with thickness in the withers area of the epidermis 9-15 microns, dermis -250-350 microns, according to the requirements for the production of resorbing membranes from the dermis of rabbits for the dental industry), live weight of male producers over 8 months of age on average - 4,8-5,8 kg, rabbits - 4,7-5,5 kg.

To date, stabilization and consolidation of the obtained economic and useful characteristics in the offspring is underway, and from 2024 we will plan to add blood in order to avoid close inbreeding.

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