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THE EFFICIENCY OF THE PRODUCTION OF RABBIT MEAT WITH THE HELP OF MODERN TECHNOLOGY IN THE PERSONAL SUBSIDARY FARM

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Communication

Abstract: It is proposed to grow rabbits in the modern production technology with the use of the developed technology of using recycled materials in the construction of cages for keeping rabbits. It is also proposed to use interbreed crossing of New Zealand White breed and Flanders, and also breeds Californian and Flanders breed.

Key words: rabbit meat, recycle, live weight, average daily gain, slaughter yield.

Introduction

At this time there is a revival of rabbit livestock industry in the world (*Croft et al., 2002; Vere et al., 2004; Senchenko, 2016*). Important for farmers financial support of the regional authorities, which the help of loans, grants, subsidies on the production of meat products, especially in the field of children's and dietary food. The Russian market of rabbit meat is not filled practically. According to statistics, the need of dietary rabbit meat in Russia on average is satisfied less than 0.5%. Unsatisfactory demand for dietary rabbit meat in Russia is great and according to the assessment is more than 300 thousand tons per year, which causes the relevance of our work (*Senchenko, 2016*).

Material and methods

Given the above the aim of our study was to study the dynamics of live weight, average daily growth, slaughter yield, organoleptic and chemical indicators of meat of rabbits of different breeds with the use of modern technology. To achieve this goal we solved the following tasks: -to improve the rabbit meat production technology based on the use of crossbreeding and the use of recycled materials in the construction of cages for keeping rabbits; - to study the dynamics of live weight of purebred and crossbred rabbits; - calculate the average daily growth of rabbits of the experimental groups; - to carry out the slaughter rabbits and to calculate the slaughter yield; - to conduct organoleptic evaluation of bouillon from rabbit meat; - to determine the chemical composition of different parts of rabbit carcass.
The studies are conducted on the private mini-farm of the village of Pruzhinino of the Yaroslavl region of Gavrilov-Yam district (Photo 1).

Photo 1. Cages for keeping rabbits on the mini-farm of the village of Pruzhinino

Object of study: purebred and crossbred rabbits of the first generation, obtained in accordance with the scheme (Table 1).

Table 1. Objects of the study

№ of the group	The breed of DOE-rabbit	The breed of male rabbit	The number of rabbits
1	Flanders	Flanders	8
2	Californian	Flanders	10
3	New Zealand	Flanders	12
4	White Giant	Flanders	9
5	Soviet chinchilla	Flanders	8

To receive rabbits it was taken 25 females of different breeds, average weight of which was – 5617 g of White Giant breed, 4722 g – of California breed, 4834 g of New Zealand White, 7139 g of Flanders and 5154 g of Soviet

chinchilla breed. We used electronic scales of CAS SWII-30 mark to define the live weight of rabbits Weighting was conducted on the day of birth of rabbits, and then we weighed them after every 30 days until the age of 5 months. Average daily growth was determined with the help of formula 1.

$$C = \frac{W_t - W_0}{t}, \text{g} \quad (1)$$

,

where C –is the average daily gain of live weight, g;
W_t – animal live weight at the end of the period, kg;
W_o – is the live weight of animal at beginning of the period, kg;
t – is the time between two weighings, days.

The slaughter of the rabbit was carried out at the age of 5 months. Before slaughter the animals were kept without feed and water systems within 12 to 18 h to release the contents of the gastrointestinal tract and bladder. Slaughter yield was calculated with formula 2.

$$S = \frac{W_2}{W_1} * 100, \% \quad (2)$$

where S – slaughter yield, %;
W_2– weight after slaughter, kg;
W_1 –weight before slaughter, kg.

We cut slices of muscle of 25 g mass of thigh, shoulder, back, chuck with scalpel from each carcass and double-milled them in a meat grinder when we conduct organoleptic evaluation of the bouillon from rabbit meat. To prepare the meat bouillon we weighed 20 g of minced meat on a laboratory scale, placed in a conical flask with 100 cm^3 capacity and filled with 60 cm^3 of distilled water. The contents of the flask were thoroughly mixed. The flask was closed with a watch glass and placed in a boiling water bath for 10 min. The smell of meat bouillon was determined in the heating process up to 80^0C-85^0C at the time of the appearance of vapor coming from an open flask by feeling their perfume. The transparency of the bouillon was determined by visual inspection of 20 cm^3 of bouillon, poured in a measuring cylinder with 25 cm^3 capacity and diameter of 20 mm.
The study of the chemical composition of rabbit meat according to the following indicators was carried out in the research laboratory of monitoring and quality control of FSBI Yaroslavl state agricultural Academy: protein, fat, ash, and moisture content. The crossbred rabbit was the investigated object (New Zealand White*Flanders) at the age of 150 days.

When we conduct sampling we took the rabbit carcass and divided it along the spine into two equal parts, then each part of the sample was taken from the neck, back, abdomen, front and hind legs and the liver, weighing about 10 g. The Evaluation was conducted in two replications.
The determination of the chemical composition of the parts of rabbit carcasses was carried out according to the following indexes:
- moisture content according to GOST 33319-2015;
- ash content GOST 31727-2012 (ISO 936:1998);
- the protein content according to GOST 25011-81;
- fat content, GOST 23042-2015;
- the content of extractive nitrogen-free substances.

To calculate the maintenance BEV in meat from 100% subtracted water content, protein, fat and ash.
Biometric processing of the results of the studies were conducted according to the method *Merkur'eva (1970)*

Results and discussion

To reduce the cost of the production of rabbit meat we have developed a technology that involves the processing of recycled material (plastic bottles, metal profiles) and their further use for the equipment of cells, as drinkers and feeders, *Merkurjeva (1970).* After the introduction of this technology animals were kept in outdoor cages of self modifications with the size 80×50×60 cm from used old pallets. The feature of the feeding was in the diet of rabbits including feeding of mother's milk during the longer period. It was a 2-3 months instead of one, depending on the milk yield of females. In addition, we fed of rabbits after their birth often. Constant access to water and food in the cells was always maintained. Feeding was carried out by juicy feed and pellets for rabbits or pigs. The dynamic of live weight of animals in the period from birth to 5 months was learned in the experiment to study the growth of purebred and crossbred rabbits of different genotypes in accordance with the methodology of the research. The results of the determination of the dynamics of live weight are presented in Table 2.

Table 2. The dynamics of rabbits live weight

№ group	Age, days					
	1	30	60	90	120	150
	Live weight, kg					
1. Flanders*Flanders	0.06±0.004	0.6±0.005	1.5±0.006	2.5±0.011	3.9±0.011	4.9±0.013
2.Flanders*Californian	0.06±0.003	0.6±0.004	1.5±0.008	2.9±0.010	4.5±0.011	5.6±0.013
3. New Zealand*Flanders	0.06±0.003	0.7±0.004	1.7±0.008	3.0±0.010	4.7±0.008	5.7±0.015
4. White Giant *Flanders	0.07±0.004	0.6±0.005	1.6±0.007	3.0±0.009	4.4±0.009	5.8±0.012
5. Soviet chinchilla* Flanders	0.06±0.002	0.6±0.003	1.4±0.005	2.3±0.007	3.5±0.008	4.8±0.010

From Table 2 it can be seen that the highest live weight had the rabbits of the 3rd group (New Zealand White*Flanders) which were kept under proposed technology in the period from 30 day to 120-day age, but the highest live weight of 150 days of age rabbits was observed in the 4th group, obtained by interbreed crossing of the breeds of White Giant and Flanders – 5.8 kg. Also, high live weight at this age had the rabbits of the 3rd group (New Zealand White*Flanders) – 5.7 kg and 2nd group (California*Flanders) – 5.6 kg.

The value of the average daily growth of the experimental groups of rabbits is presented in Table 3. Analyzing the indexes of the table 4 it can be seen that the best average daily growth from 30-day to 120-day age was in group №3 (New Zealand White*Flanders) and in group №2, that is, rabbits, obtained by interbreed crossing of the Californian and Flanders. But in the period of 120-day to 150-day age best average daily growth was among crossbred rabbits of White Giant*Flanders.

Table 3. Rabbits daily growth

№ group	Period, days				
	1-30	30-60	60-90	90-120	120-150
	Average daily growth, g				
1. Flanders*. Flanders	20±3	25±2	27±4	32±4	32±5
2. Flanders * Californian	20±2	25±4	32±4	37±5	37±6
3. New Zealand*. Flanders	23±3	28±4	33±5	39±5	38±6
4. White Giant *. Flanders	20±3	26±3	33±4	36±4	39±5
5. Soviet chinchilla*. Flanders	20±2	23±2	25±3	29±3	30±4

To study the meat quality of rabbits we conducted slaughter of 5 rabbits of each group. The results of the slaughter are presented in the table 4.

Table 4. Results of slaughter of rabbits

Index	№ group				
	1	2	3	4	5
Rabbits live weight before slaughter, kg	4.9±0.03	5.5±0.03	5.6±0.02	5.7±0.02	4.7±0.02
Rabbits live weight after slaughter, kg	2.6±0.03	3.0±0.02	3.1±0.03	2.8±0.02	2.5±0.03
Slaughter yield, %	53	55	56	49	53

According to the table 5 it can be concluded that carcass yield of young rabbits was almost identical and ranged from 53-56% except rabbits obtained by crossing breeds of White Giant*Flanders. The breed of White Giant can give meat and pelt and its carcass yield is 5-10 % less than New Zealand white and Californian breeds.

The evaluation of organoleptic characteristics of meat of rabbits of two groups, number 3 (New Zealand White*Flanders) and number 1 (Flanders*Flanders) was carried out in accordance with the requirements of GOST 20235.0-74 «Rabbit meat. Sampling methods. Organoleptic methods of freshness determination» (*GOST, 1974*).

The results of the evaluation of organoleptic characteristics of rabbit meat are shown in the Table 5.

Table 5. Organoleptic characteristics of rabbit meat

Index	New Zealand*Flanders	Flanders* Flanders
The surface of the carcass	Crust of drying pale pink Wet, shiny	Crust of drying pale pink Wet, shiny
Serous membrane of the abdominal cavity	Slightly moist, pale pink color	Slightly moist, pale pink color
Muscle on the cut Consistency	Muscle is elastic, the hole aligns quickly	Muscle is elastic, the hole aligns quickly
Smell	Specific, peculiar to fresh meat	Specific, peculiar to fresh meat
Transparency and flavor of the broth	Transparent, fragrant	Transparent, fragrant

From Table 5 we can see that the organoleptic characteristics of rabbit meat of group №3 and group №1 do not differ from each other. Visual inspection of rabbit meat in both groups reported good carcasses vascularization. All samples of meat were well-expressed drying crust. After 24 hours of storage of rabbit meat the speed of alignment of the pits on the surface after finger pressure was the same. Thus, the rabbit meat was good, bruises were not found, without foreign smell, without blood clots. Smell – typical of this type of meat, the color pink and white. The bouillon is transparent, without characteristic smell

so the meat was fresh. We assessed the broth in terms of taste, aroma and transparency and identified the following features: the broth from rabbit meat of the group 3 was more fatty, rich, as meat rabbits (New Zealand White breed) have a greater number of minuscule fat, unlike meat of rabbit from group №1
The chemical composition of carcass parts of the rabbit (New Zealand White* Flanders) is presented in table 6.

Table 6. Chemical composition of parts of the carcass of a rabbit (New Zealand White*Flanders)

Part of the carcass	Total moisture, %	Dry matter, %	Fat, %	Protein, %	Ash, %	NFE,%
Neck	75.59±0.70	24.41±0.70	1.73±1.63	21.00±0.62	0.71±0.29	0.98±0.01
Abdomen	75.37±0.44	24.63±0.44	1.76±0.23	21.19±0.53	0.80±0.61	0.88±0.59
Blade	75.33±0.69	24.67±0.69	2.00±1.33	20.81±1.77	0.62±0.21	1.24±1.34
Thigh	78.61±0.40	21.39±0.40	0.74±0.28	14.13±0.30	0.93±0.34	5.60±0.52
Back	77.14±0.17	22.86±0.17	1.75±0.71	19.41±0.57	0.85±0.14	0.86±0.82
Liver	74.65±0.02	25.36±0.02	1.64±0.72	18.06±0.88	1.19±0.19	4.47±1.39

Based on the results of the studies we concluded that the lowest moisture content is in the liver (74.65 %), and the highest is in the thigh (78.61%). More dry matter is in the liver (25.36%), and less is in the thigh (21.39%). Fat is less in the hip (0.74%), but more is in the blade (2.00%). The highest protein content is in the abdomen (21.19%) and less is in the thigh (14.13%). The highest content of ash is in liver (1.19%) and the smallest is in the blade (0.62%). The highest content of nitrogen-free extractives is located in the thigh (5.60%) and the smallest is in the back (0.86%).
Metzger et al. (2003); Szkucik and Libelt (2006); Maj et al. (2008); informed that the level of protein, fat and ash in rabbit meat were in the ranges: 21.36-23.91%, 0.65-1.74% and 1.16-1.30%, ab we can conclude that our results are similar.

Conclusion

Based on our researches we came to the conclusion: the using of our developed technology of application of recyclable materials and interbreed cross breeds of New Zealand White*Californian and Flanders*Flanders increases the efficiency of rabbit meat production in the conditions of private farming.

Efikasnost proizvodnje mesa zeca uz pomoć savremene tehnologije na privatnoj farmi

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Rezime

Predlaže se uzgoj zečeva u savremenoj proizvodnoj tehnologiji uz korišćenje razvijene tehnologije upotrebe recikliranih materijala u izgradnji kaveza za držanje zečeva. Takođe se predlaže korišćenje meleza novozelandske bele rase i flandrijske rase zečeva, kao i meleza kalifornijske i flandrijske rasa.

Ključne reči: meso zeca, recikliranje, živa masa, prosečni dnevni prirast, klanični randman

Acknowledgments

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