Methods of creation and characterization of specialized quail meat breed

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Abstract. The work was performed in the Gene Pool LLC of the Moscow Region. The goal was to create meat quail adapted to the feeding and keeping conditions traditional for Russia. The initial genetic material was the pharaoh and Texas white breeds, which are stored in the bioresource farm collection. As a result of reproductive crosses of birds of these breeds, individuals with almost white plumage color and satisfactory productive indicators were isolated. To increase the efficiency of poultry breeding during the selection of quail of this group, complex polygenic constructions of quantitative characters were used, linking them with the adaptive ability of the bird at the stages of growth, development and productivity. This allowed to improve the meat form of physique for 11 generations of selection, increase the live weight of quail at the slaughter age by 26.1%, increase the yield of quail from the laying hen by 8.3%. Comparative tests showed that the cost of production from the created poultry was lower than that of the original breeds: Pharaoh by 32.9%; Texas White - 12.0%. The breed was called Radonezh (patent No. 6999), the bird is recommended for breeding in industrial, farming and individual subsidiary farms of the population.

1. Introduction

It is well-known that interest in breeding quail is due to the quality and taste characteristics of the products received from them [1,2]. Products obtained from quail (egg and meat) are characterized by peculiar taste characteristics, an optimal set of amino acids, trace elements and vitamins for human nutrition. The taste of quail meat is equivalent to game, which makes it a delicate food [3,4,5].

Until recently, in Russia commodity products from quail (meat and egg) were obtained from poultry of local populations. This bird was characterized by low meat productivity, low commercial quality of carcasses, which hindered the commercial production of quail meat. Quails were mainly bred to obtain eggs [6,7,8].

The experience of foreign countries (USA, France, etc.) showed that commodity production of quail meat in the world is based on the use of poultry of specialized meat genus. The most widespread meat breeds in the world are Pharaoh and Texas white [9, 10].

In the Russian Federation, the specialized pharaoh and Texas white breeds were imported because of the border in the 90s of the last century. These quails were imported without origin, through an exchange between amateurs - poultry farmers of border countries or in another way [11,12].

The meat quails brought into the country were initially bred in private subsidiary or small farms, amateur poultry farmers. Prolonged unsystematic breeding of birds negatively affected indices of its productivity and vitality. Nevertheless, the results of the evaluation of these quail breeds at the Gene
Pool fund, Moscow Region, showed that some individuals stored in the gene pool are of some practical interest [13,14].

Although, on the whole, the preserved bird was characterized by unstable productivity, increased mortality, and the presence of defects in the exterior (curvature of the keel of the sternum, toes, and beak), which are explained by the manifestation of inbred depression caused by unsystematic breeding.

Based on the foregoing, we set the task to create, on the basis of the existing gene pool, a meat breed of quail, characterized by high meat productivity and adapted to the traditional conditions of feeding and keeping in our country.

2. Material and research method

The work was performed at the Gene Pool LLC of the Moscow Region. The source material for the construction of specialized meat-type quails was taken from the pharaoh and Texas white quails, which are kept on the farm. At the first stage of work, direct and reverse crosses of these breeds were carried out to obtain birds of a new generation.

In the experimental groups were 20 males and 80 females. Individuals of the desired genotype, with predominantly white plumage, were selected from the offspring of this bird. This bird was the basis for family breeding aimed at creating a new generation of birds.

Evaluation and selection of birds was carried out with quail content in individual cages, their reproduction was carried out by replanting a laying hen to a male producer of known origin. One quail secured 3–4 non-drying.

To rationally use the livestock and increase the productivity of quail, we selected birds taking into account the specifics of working with paternal and maternal forms, and also adjusted the program of work with poultry in grandparent and parent flocks. The selection of poultry according to breeding characteristics was carried out taking into account the direction of productivity and degree of relationship of producers (quail and quail). Close mating was not used. Quail breeding, according to leading signs, was carried out comprehensively, using polygenic designs for meat productivity, including: rate of increase in live weight, meat form of physique; according to fertility indicators (quail from quail hens) - egg production for a productive period, yield and quality of hatching eggs.

Selection methods and techniques were developed taking into account the genetic analysis of data on lines, characteristics of growth, development and productivity of quail. In the process of selection, generally accepted techniques were also used. The bird was rejected according to the main characteristics, producers were evaluated by origin, sisters - brothers, half-sisters - half-brothers, and by the quality of the offspring with identification of producers - reliable improvers by leading breeding characteristics. When creating paternal and maternal forms of quail, the method of combined selection (family in combination with individual) was used with the evaluation of males and females by the quality of linear and hybrid offspring.

The nest mating plan was compiled on the basis of an assessment of birds by live weight, young muscularity, mothers egg production, yield and quality of hatching eggs, and feed production costs.

At the final stage of the formation of breeding nests, the indicators of preliminary laying were taken into account, according to the assessment of the quality of the hatching eggs. The work was carried out on quails of the first year of productivity.

To assess the producers by the quality of the offspring, at least 15–20 were assigned to each breeding quail, and 45–60 diurnal quail were assigned to quail for 45–60 days.

Breeding birds were grown and kept in their own cell batteries. They fed compound feeds consisting of ingredients of domestic origin (crushed wheat, barley, oats (without films), meal and sunflower cake, rape, etc.).

3. Research results

Estimates of the offspring obtained from direct and reverse crosses of Texan white and Pharaoh breeds showed that in interbreed young animals the live weight indicators at 6 weeks of age occupied intermediate values between the original breeds.
The live weight of the interbreed hybrids was as follows: males - 227.2 - 231.4 g; females - 258.4 - 261.3 g. At the same time, the grown hybrid young animals had practically no defects in the exterior observed in the bird of the initial forms. The safety of young animals was - 94.8 - 95.3%.

It should be noted that the color of the plumage of the interbreed hybrids was predominantly brown, similar to the color of the plumage of the Pharaoh breed. Such birds in the groups were - 61.7 - 66.2% of the total number of estimated quails. Quailing with the color characteristic of the Texas white breed in the groups was about 28%. In birds with predominantly white feather color, the presence of dark feathers on the back and head was distinguished. Quail with pure white plumage in 2 groups there were only 3 heads.

Evaluation of the productivity and meat qualities of different-colored poultry showed that interbreeds with different colors of plumage practically did not differ in live weight and other productive characteristics. However, bird carcasses with predominantly white plumage were characterized by a more attractive presentation. On the carcass of such a bird, there are no dark spots characteristic of quail with brown plumage.

Based on the assessment, to create a new generation of quail meat, a bird with predominantly white plumage was used; individual dark feathers were allowed on the head and back, occupying no more than 5% of the total feather cover of the bird.

Indicators of changes in live weight of breeding young animals for 11 generations of estimates are shown in table 1.

Table 1. Characterization of live weight of quail at the age of 6 weeks.

| Generation | Live weight (♂) | Variability | Inheritance h²sd | Live weight (♀) | Variability | Inheritance h²sd |
|------------|-----------------|-------------|-------------------|-----------------|-------------|-------------------|
|            | M±m,g           | Cv          |                   | M±m,g           | Cv          |                   |
| F1         | 242.4±2.18      | 18.9        | -                 | 273.5±2.14      | 18.6        |                   |
| F3         | 264.5±1.12      | 17.5        | 0.40              | 287.9±1.63      | 17.2        | 0.37              |
| F8         | 268.5±0.79      | 14.2        | 0.33              | 314.1±1.18      | 14.9        | 0.32              |
| F10        | 297.4±0.71      | 11.7        | 0.29              | 349.5±0.97      | 12.9        | 0.30              |
| F11        | 313.2±0.78      | 10.1        | 0.27              | 362.6±0.89      | 10.4        | 0.29              |

As follows from the above data (table 1), over 11 generations of selection, the live weight of quail at 6 weeks of age increased: in males by 29.2%; females - 32.6%. At the same time, the indicators of variability and heritability of live weight under the influence of selection significantly decreased.

As a result of the selection work in birds, along with an increase in the live weight of young animals, the reproductive qualities (fecundity) of mature quails were also improved. Such a complex polygenic trait as fecundity (the output is quail from a laying hen) including egg production, yield and incubation quality of eggs, was increased by 9.2 heads. In the 1st generation, this indicator was 110.9 goals in F11 - 120.1 heads. During the work, the safety of the adult bird was at the level of 94.2 - 95.1%, the heritability of egg production ranged between h²sd - 17.7 - 19.8, the variability - Cv 23.2-33.8%, the output of young h²sd - in the range -12.8-19.1, Cv -17.4 - 21.9%; a comprehensive indicator of the yield of young stock from the h²sd laying hens is 17.7-24.9, variability -Cv-25.1-34.7%. The increase in the growth rate of live weight of young animals with a simultaneous improvement in the reproductive performance of poultry is explained by the intensive selection of quails according to leading signs, using new and traditional methods of selection and selection, as well as the standardization of live weight achieved by directed rearing of young animals.

Judging by the measurements of body articles (table 2) and the anatomical cutting of quails grown up to 6 weeks of age (table 3), the selected bird is characterized by compact physique, good muscularity of the main body articles, and relatively high output of the leg and pectoral muscles.

The created bird consists of two types (paternal and maternal) 12 microlines and 117 families. Comparative tests of bred quails with the original breeds of Pharaoh and Texas White confirmed the
feasibility of their breeding. The production cost of the created poultry was lower than that of the Pharaoh breed by 32.9%; Texas White - 12%.

It should be noted that the achieved productive indicators in poultry were obtained by feeding compound feeds with traditional nutritional ingredients for our country.

Table 2. Measurements of body articles at 6 weeks of age.

| Index                        | ♂          | ♀          |
|------------------------------|------------|------------|
| Torso length                 | 12.8±0.10  | 12.2±0.15  |
| Keel length                  | 7.7±0.32   | 7.5±0.19   |
| Shank length                 | 6.2±0.15   | 6.4±0.16   |
| Metatarsal Length            | 4.8±0.12   | 4.5±0.11   |
| Beak length                  | 1.2±0.11   | 1.2±0.10   |
| Chest circumference          | 18.2±0.29  | 18.9±0.25  |
| Chest width                  | 6.3±0.19   | 6.4±0.18   |

Table 3. Meat quality of quail at 6 weeks of age.

| Index                        | ♂          | ♀          |
|------------------------------|------------|------------|
| Live weight, g               | 332.4      | 361.1      |
| Slaughter yield, g           | 276.3      | 299.2      |
| %                            | 83.1       | 82.9       |
| The output of gutted carcass, g | 234.3   | 248.8      |
| %                            | 70.5       | 68.9       |
| The output of muscles of all | 151.2      | 153.1      |
| %                            | 45.5       | 42.4       |
| Including breast, g          | 72.8       | 74.0       |
| %                            | 21.9       | 20.5       |
| Foot, g                      | 44.5       | 45.5       |
| %                            | 13.4       | 12.6       |
| Skin with subcutaneous fat, g | 37.9     | 39.0       |
| %                            | 11.4       | 10.8       |
| Edible parts, g              | 197.4      | 206.5      |
| %                            | 59.4       | 57.2       |

4. Conclusion
As a result of the complex reproductive crossing of the breeds, the Pharaoh and the Texas White were bred individuals characterized by almost white plumage and satisfactory productive indicators.

In the selection of these quails (11 generations), complex polygenic constructions of quantitative traits were used in conjunction with the adaptive ability of the bird at the stages of growth, development and productivity.

This made it possible to improve meat-like body builds, increase the live weight of quail in slaughter age by 26.1%, increase the yield of quail from the laying hen by 8.3%.

In a comparative test of the created bird with the initial forms, it was found that the cost of production obtained from them was lower than that of the Pharaoh breed by 32.9%, Texas white – 12.0%.

The hatched bird is free from diseases of the leukemia complex, resistant to other diseases characteristic of the chicken poultry farm.

The State Commission of the Russian Federation approved this bird as a new domestic breed of quail with the name "Radonezh". A patent was obtained for the created breed (No. 6999 of January 21, 2019).

The breed is recommended for use in industrial, farming and individual subsidiary plots of the population.
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