

Selection of Female Silkworm Moths Conducive for Increasing Silk Productivity

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Abstract: *The article outlines the problems of today on egg-production industry of the republic, the influence of the quality of industrial eggs prepared by egg-producing factories on the volume and qualitative range of produced cocoons, raw silk and silk fabric, as well as, some methods for solving this problem by selecting producer moth according to body parameters.*

Keywords: *egg, moth, cocoons, morphology, breeding, line-breeding, reproductive and productive traits, genetic parameters, industrial eggs, silkiness, fertilization,*

1. INTRODUCTION:

The transition of the economy to market relations has fundamentally changed the requirements for cocoon raw materials and natural silk products. Silkworm cocoons produced in the republic are not fully competitive in the world market.

The fragmentation of feeding in rural households, deviations in agricultural technology of feeding, disease spread, poor quality of industrial eggs are not complete list of factors that reduce the productivity and quality of cocoons. To eliminate these shortcomings, it is necessary, along with raising the level of agricultural technology for the rearing of cocoons, to achieve reforms of the system of breeding and egg-production. Egg-production enterprises of the republic need the introduction of new technological methods that improve the hereditary and productive properties of industrial eggs.

A number of researches were conducted in sericulture directed to perfection of egg-production technology (E.N.Michailov, 1950, 1958; E.N.Michailov, S.M.Gershenson, 1958; P.A.Kovalev, 1960, V.A.Strunnikov 1960; A.M.Safonova, 1973; U.N.Nasirillaev, 1985; A.Z.Zlotin, V.N.Krichenko, O.M.Juravel, M.V.Rokhmail, N.P.Zalznak, 1994 and et al). Silkworms are mainly selected at the stage of eggs, larva, cocoon and pupa [1].

2. MATERIALS AND METHODS:

Morphoanatomical, physiological, hereditary features of the silkworm have been studied in sufficient detail, effective methods of selection and harvesting have also been developed. Despite the fact that the level of manifestation of many reproductive traits is determined by the exterior and physiological state of the moths, the effect of the body parameters of the female moths on the fertility and productivity of the generation has not been studied. In the "Basic state of the methodology of breeding of the silkworm" the selection of moths has not been provided, but it has been proposed only to discard moths with defects. Nevertheless, the number and weight of eggs in the batch, the average egg mass are completely dependent on the size of the female moth and its physiological state [2].

Studies aimed at establishing the variability, heredity indices of the body of moths and their correlation with reproductive and productive features, the development of methods for evaluating and selecting producer female moths, which contribute to a significant improvement in the quality of breeding and industrial eggs produced in Uzbekistan, are of great actuality in sericulture industry. Thus, our work is devoted to the study of the complex of questions of the influence of bodies and physiological state of female moths on the reproductive and productive parameters of the generation of silkworm.

The purpose of the study was the scientific justification and development of a method for evaluating and selecting female producer moths conducive for the increase of reproductive and productive characters of silkworms in the process of selection, breeding and preparation of industrial eggs.

To achieve this goal, the following tasks are to be solved:

- to determine the variability of female moth by weight and body measurements, as well as by reproductive traits;
- to establish the degree of heritability and correlation relationships between the parameters of producer moths and signs of fertility and productivity;
- to study the influence of selection of female moths on the qualitative characteristics of generation;
- on the base of genetic parameters, to develop a methodology for evaluating and selecting female moths in breeding, rearing of breeds and preparing industrial eggs.

3. RESULTS AND DISCUSSION:

We have studied the genetic and statistical parameters of female moths by weight and body measurements in breeding families, elite and tribal batches of cocoons of silkworm stations and egg-producing plants. Based on the study of ordered series and distribution curves of moth batches, the nature of the variability of moths is determined. The correlation coefficients between the parameters and the reproductive, productive features of female moths were calculated, the possibility of effective selection of female moths by body size was theoretically substantiated.

The practical significance of the experiment focuses on the development, based on the determination of genetic and statistical parameters of a method for evaluating and selecting female moths.

The application of our developed methodics will significantly increase the number and weight of eggs in the batch, the viability of the caterpillars, the mass of the cocoon and silk shell of breeds that are propagated at breeding sericulture stations and egg-producing plants. One of the main advantages of the methodology suggested by us for selecting female moths is a significant improvement in the quality of breeding and industrial eggs at egg-producing enterprises of the republic. We also offer the introduction of a method for selecting female moths according to body parameters into the “Basic state of the methodology of breeding of a silkworm”.

To solve the abovementioned problems, it is necessary to ensure a sharp improvement in the quality of both breeding and industrial eggs, to develop and implement modern technology of worm feeding which helps to obtain high-grade, high silk, defect-free breeding and industrial cocoons; in this set of issues, a special attention should be paid to the quality of prepared eggs.

Of course, it is impossible to expect a satisfactory yield of healthy caterpillars and high-quality cocoons from low-quality eggs. It should be regretfully acknowledged that the quality of breeding and industrial eggs produced at the republic's egg-producing enterprises does not fully meet the requirements of silkworm breeders and silk industry. A существующая схема и технология племенного дела с тутовым шелкопрядом, разработанные и внедренные во второй половине прошлого века, имеют ряд существенных недостатков. And the existing scheme and technology of breeding with a silkworm, developed and implemented in the second half of the last century, have a number of significant drawbacks. The current “Basic state of the methodology for breeding of silkworm” (1983) and “Basic state of the preparation of industrial hybrid eggs” (1984) do not fully ensure the conservation of the hereditary and productive features of the breeds achieved by the breeders by the time they are transferred to breeding silkworm stations and egg-producing plants.

Multiple experimental analyzes noted a decrease in silk productivity of breeds at the last stages of reproduction by more than 9-12 percent (U.N. Nasirillaev, 1967, 1985; U.N. Nasirillaev, S.S. Lezhenko, G.Yu. Mustafaeva, 1996).

In order to increase the yield and quality of breeding cocoons, K.M. Rozhdestvensky and Z. Ikramov developed a technological map regulating breeding feeding. One of the important conditions for ensuring the success of breeding feeding is the correct determination of the time of laying the eggs in the incubation for revitalization. Kh. Allaberganov experimentally established the optimal starting dates for spring breeding feeding, which contribute to improving the quality of the prepared eggs.

In the process of obtaining eggs the work with moths is to be paid attention to. However, researches in this direction are extremely few. Female moths perform a very important function for the continuation of the species, which consists of the formation and laying of eggs of the next generation. With the exception of the works of E.F. Poyarkov, the anatomy, morphology, physiology, and functionality of the silkworm moths have been remained less studied. Normally, fertilized moths lay eggs of female and male in a ratio of 50:50. The investigations of A.A. Tikhomirov, B.L. Astaurov, V.A. Strunnikov succeeded in developing a method for producing parthenogenetic (female) and androgenetic (male) generation by the influence of temperature on unseeded silkworm eggs. Searches in the direction of obtaining a 100 percent hybrid eggs are possible if high accuracy of division by gender is achieved [3].

Researches by scientists and the experience of manufacturers showed that one of the essential reserves for improving the quality of eggs is the selection of breeding cocoons of the first day of curling, moths of the first day of hatching from cocoons and eggs.

Among all the methods used in breeding and egg-production, the most effective one is selection. The effect of both individual and massive selection by signs, particular quantitative, depends on the level of variability, heritability and correlation relationships between them. The main parameters characterizing the variability are the arithmetic mean of the population or sample (\bar{x}), standard deviation (Q) and coefficient of variation (C_v) [4].

Familiarization with the literature showed that the possibility of selection is determined by the levels of variability of signs of productivity and fertility in the populations of animals and birds.

In her studies, A.M.Safonova determined the variability of a group of features characterizing moth fertility in the division of silkworm breeds, and the author assessed the homogeneity of batches by the coefficient of variability.

Extensive-scale studies devoted to define the degree of variability of the signs of silk productivity in the lots of super-elite and elite cocoons at Fergana breeding station were carried out by U.N. Nasirillaev;

Table
Technological parameters of silkworm varieties

Breeds	Cocoon mass Cv, %	Shell mass Cv, %	Silkiness Cv, %
C.5 marked	11,9	14,6	10,2
SANIISH 17	12,5	12,9	12,2
SANIISH 21	12,9	12,3	9,2
SANIISH 30	12,5	14,0	11,5

4. CONCLUSION:

It is obvious from the abovementioned that the variability of the silkworm is determined by reproductive, productive and technological characteristics, however, in the literatures on the variability of the parameters of silkworm moths this is practically absent.

Moth selection experiments were carried out at the scientific research institute of sericulture using the perspective breeds Orzu, Yulduz and regionized breeds SANIISH 8 and SANIISH 9. Some experiments were performed at Andijan breeding and silk station and Samarkand egg-producing plant.

Investigations on the variability and heritability of moth measurements and their relationship with farm valuable traits of silkworms were carried out for the first time by us. Prior to this, there were no methods for measuring the parameters of moths, nor methods for their interpretation. Therefore, experimental works started with the development of methods for determining parameters of the body of moth– producer; mass and body measurement.

Also, our investigations showed that the length, width and body of the moth are the most convenient for instrumental measurement.

Experiments to study the quality of the generation of female moths with different weight indicators and body measurements were carried out on breeding families of large cocoon breeds Orzu and Yulduz. The selection of female moths with medium and large body sizes provides not only an increase in the number and mass of eggs in the batch, but also the productive properties of the generation.

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