

ARTIFICIAL INSEMINATION OF QUEEN BEES IN THE CONDITIONS OF UZBEKISTAN

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ABSTRACT

The article presents information on the effects of artificial insemination of queen bees to puberty and daily egg laying, as well as how many eggs queen bees lay after days. It has been shown that this innovative technology is of great scientific and practical value for the beekeepers in Uzbekistan, based on the development of advanced methods of artificial insemination of queen bees with the help of instruments. To prepare water solution, a dose of 2 mg of the drug Cefazolin was added to 250 ml of water. During the artificial insemination of queen bees, during their 14-15 days of age, they are fertilized with quality, and such fertilized queen bees have the ability to lay a large number of qualitative eggs.

KEYWORDS: *Queen Bee, Genital Vagina, Sperm Fluid, Carbon Dioxide, Egg, Frame-Net, Hook, Tube, Instrumental, Cage, Nucleus, Reproduction, Profitability.*

INTRODUCTION

Today, a number of positive activities are being carried out in Uzbekistan in branches of agriculture like development of beekeeping, which is considered its main field. In particular, the decision of the President of the Republic of Uzbekistan dated October 16, 2017 "On measures to further develop the beekeeping network in our republic" No. 3327, which is the legal basis for the sustainable development of the beekeeping industry, is of great practical importance in this regard. [1] Based on this decision, the beekeeping network began to develop rapidly, and the number of bee families exceeded 1.0 million by the end of 2021. And family productivity is improving ecologically.

For this purpose, in the conditions of Uzbekistan, it is appropriate to raise a large number of queen bees and conduct their artificial insemination.

In Europe, especially in Germany, beekeepers artificially inseminate up to 80% of queen bees. [2] Regardless of weather and climate changes, as a result of the introduction of innovative technologies, [3.4] queen bees have been artificially fertilized and increased their honey production several times. Daily egg laying and family productivity have increased several times [5]. As a result, the quality of queen bees can also meet the requirements of international standards.

Artificial insemination of queen bees was carried out for the first time in the conditions of Uzbekistan [6], queen bees were fertilized with the seeds of the purest male bees, the purity of the bee breed and its gene pool was preserved. As a result, an innovative technology of artificial insemination of queen bees was developed in the conditions of the republic. At the same time, the effect of this technology on the daily egg laying of the mother bees, on growth and development of the bee family, and their effect on the productivity of the family was studied based on the results of scientific research. It has been shown that this innovative technology is of great scientific and practical value for the beekeepers in Uzbekistan, based on the development of advanced methods of artificial insemination of queen bees with the help of instruments.

Method of research. For artificial insemination of queen bees, first of all, all parts of the artificial insemination instrument were disinfected. Alcohol, water solution and distilled water were used to disinfect the artificial insemination instrument. To prepare water solution, a dose of 2 mg of the drug Cefazolin was added to 250 ml of water. Artificial insemination instrument and all its equipments were disinfected in alcohol first, next in water solution, then in distilled water with the help of a special brush.

Reproductive matured male bees were selected for the extraction of sperm fluid. Male bees were squeezed in the abdomen, their genitals and sperm sac were removed, and their sperm fluid was withdrawn using a special syringe.

For artificial insemination of queen bees, appropriate special tubes were selected depending on the size of queen bees. Queen bees were placed in the tube of artificial insemination instrument, which were made unconscious with carbon dioxide gas (CO₂).



Figure 1. The process of injecting the male bee's sperm into the genitalia of the queen bee.

The aim and tasks of research.

The aim of the research: to develop the technology of artificial insemination of queen bees in the conditions of Uzbekistan.

Research tasks:

- artificial breeding of queen bees;

- breeding male bees for artificial insemination of queen bees.
- studying the condition of artificially inseminated queen bees, the day of egg laying and the number of eggs.

Research results - in March 2020, the best productive bee families were selected for male bee breeding and each of them was given 2 bee frames with male bee nests. Because in order to fertilize the mother bees, tomorrow's male bees must be cultivated in advance. At the end of April 2020, breeding of queen bees was started. In May, a sufficient number of queen bees were raised artificially and they were nurtured until they reached maturity, 10-14 days old, and were prepared for artificial insemination.[2.4]

The genital sheath of the queen bee was opened using special loops, and was slowly fertilized with sperm fluid. Fertilized queen bees were first kept in special cages, warm rooms, and then released into small families (nucleus), artificially fertilized queen bees are not well received by large bee families. Therefore, they were initially given to small bee families.

The number of artificially inseminated queen bees per day is given in Table 1 below.

TABLE 1.NUMBER OF ARTIFICIALLY FERTILIZED QUEEN BEES IN ONE DAY

Days	n	lim	M±m	Cv, %
Day 1st	83	60-98	83,0±15,1	22,4
Day 2nd	92	86-99	92,5±21,4	28,5
Day 3rd	92	72-112	92,0±19,8	26,1

Table 1 shows that in 2020, a total of 270 queen bees were prepared for artificial insemination. Of these, 3 queen bees were not fertilized due to their small size. A total of 267 queen bees were artificially inseminated qualitatively on the first day, 83, and on the second and third days, 92.

After that, artificially inseminated queen bees and daily egg laying were studied. Egg laying was not observed on the first day. On the second day of the study period, 29 queen bees laid an average of 72.5 eggs, on the third day, 135.5 eggs were laid, and on the following days, an average of 765.5 eggs were laid, and after that, the daily egg laying of the queen bees was found to increase day by day. During the study period, 258 out of 267 queen bees were found to be inseminated with good quality, and after 2 days, they began to lay eggs. 9 queen bees were discarded and destroyed due to poor quality and poor egg laying and poor fertilization. This is 3.4% of the total number.

Of the 258 artificially inseminated queen bees, 29 of them, or 11.2%, started laying eggs after 2 days. After that, 58 or 22.3% started to lay eggs on the third day and the remaining 171 on the fourth day. Initially, the queen bees started laying 61-78 eggs in one day, on the third and fourth days they started laying 120-150 eggs, and on the fifth, sixth and last days 581-950 eggs were laid, and their number of egg-laying increased day by day.



Figure 2. A frame is an overview of grid

In order to study the daily egg-laying of queen bees in the experimental and control groups, the number of eggs laid per day was measured and studied using a special frame-net device. A 5x5 cm wire is stretched inside the frame-net, and 100 worker bees can fit in each of its cells. Information on this is presented in Table 2 below.

TABLE 2. DAILY OVIPOSITION OF ARTIFICIALLY INSEMINATED QUEEN BEES

<i>Group</i>	<i>Days</i>	<i>lim</i>	$X \pm S_x$	<i>CV, %</i>
Control	2 nd day	98-129	113,5±0,44	22,5
Experiment	2 nd day	67-78	72,5±0,51	29,4
Control	3 rd day	186-231	208,5±0,64	23,5
Experiment	3 rd day	120-150	135,0±0,51	21,4
Control	5 th day	590-682	636,1±0,81	29,8
Experiment	5 th day	581-960	765±0,37	32,4
Control	6 th day	848-888	866,0±0,84	30,6
Experiment	6 th day	930-985	957,5±0,39	33,3

Artificially inseminated queen bees were quickly and well accepted by young bee colonies of 1-2 frames, because they accepted the inseminated queen bees as quickly as after 1-2 days without a mother and fully aware of their orphanhood. Honey bee families of 4-5 frames have received the queen bee badly. Therefore, no more queen bees were given to such families.

Our research works are the first attempts of beekeeping in the conditions of Uzbekistan. As a result, 267 queen bees were artificially inseminated with the help of instruments, and 2610 male bees' sperm fluid was used. Also, special attention was paid to the age and appearance of male bees.

TABLE 3. WEIGHT OF WORKER BEES HATCHED FROM EGGS OF ARTIFICIALLY FERTILIZED QUEEN BEES AND THEIR MATURATION PERIOD

<i>Groups</i>	<i>n</i>	Maturation of worker bees		Weight of worker bees of one day (mg)	
		<i>Lim</i>	$X \pm S_x$	<i>lim</i>	$X \pm S_x$
Control	40	13,5±14,9	14,2±0,05	98,4-103,3	103±0,18
Experiment	40	12,5±13,6	13,7±0,03	109,5-113,5	111,5±0,22

Economic effectiveness of research work - in order to increase the productivity of the bee family in the conditions of Uzbekistan, starting from early spring, it is aimed to organize many artificial breeding of queen bees and their artificial insemination.

There are more than 800,000 bee families in the apiary of "Trans Nam Bat servis" LLC in the city of Namangan, which, starting from early spring, produces many fertilized queen bees and bee packages of the Carpathian breed and sells them to the republics of Russia and Kazakhstan. In 2020-2021, we raised more than 1000 queen bees in our research work. Of these, 427 queen bees were artificially inseminated for two years.

For its internal needs, in order to replace the old queen bees, the beekeeping kept 212 artificially fertilized queen bees in their apiary and sold 215 to other farms in the region. The price of newly reproduced queen bees fertilized by this artificial method was estimated at 35,000 soums, and they brought a net profit of 14.9 million soums to the farm.

From the amount of profit received from the sale of artificially bred queen bees, the expenses for the relocation of the bee family are 1.5 million soums, 2.7 thousand soums for feed with sugar, 500 thousand soums for medicines, 5.0 million soums for monthly wages, CO₂ gas 600,000 soums were spent, totaling 103 million soums.

The beekeeping farm made a profit of 14.9 million soums from the sale of queen bees. The expenses made during the year are 10.3 million soums. The net profit is 4.6 million soums, and the rate of profitability is 69.1%.

CONCLUSIONS AND SUGGESTIONS. During the artificial insemination of queen bees, during their 14-15 days of age, they are fertilized with quality, and such fertilized queen bees have the ability to lay a large number of qualitative eggs.

It was found that the artificially inseminated queen bees were very fertile and laid eggs after the second day (72.5 eggs) and then constantly increased the daily egg laying and increased it to 765 eggs on the fifth day or 1055.2% more than the second day.

For artificial insemination of queen bees, it is recommended to use 14-15-day-old queen bees and keep them in separate nuclei for 1-2 days after fertilization and feed them with protein food.

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