



TREATMENT, PREVENTION AND CONTROL MEASURES FOR AMERICAN FOULDBROOD DISEASE IN BEES

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Annotatsiya. Maqolada asalarichilik xo'jaliklarida infeksiyon *amerikacha chirish*, kasalligining uchrab turishi to'g'risida so'z yuritilgan. Ushbu kasalliklar bahor fasllida yo faslining oxirgi oylarida ayrim hollarda kuzda qayd qilinishi bayon etilgan. Kasallik paydo bo'lishiga asosan asalarilarni sifatsiz oziqlantirish, qishlash davrida yuqori namlik haroratda uzoq qishlash va ari uyalarini o'z vaqtida dezinfeksiya qilinmaslik kabi omillar sabab bo'lishi ta'kidlangan. Kasallikni aniqlashda avvalambor yil mavsumiga, asalarichilik xo'jaliklarining epizootologik holatiga, klinik belgilariga e'tibor qaratilgan. Asosan asalarilar qishda uyadan chiqishi, uyaga kirish taxtasi usti suyuq axlat bilan ifloslanishi, uyadan yoqimsiz hid kelishi, ichkari devorlari axlat bilan bo'yalib, pastki qismida esa ko'p sonli o'lgan asalarilar mavjudligi, tirik arilarning qorin qismi shishgan holatlari, kasallikning yashirin davrida esa tashqi belgilarining yo'qligi yoki zaif bo'lib qolishi kabilar tahlil qilingan.

Аннотация. В статье рассматривается встречаемость инфекционной американской гнили в пчеловодческих хозяйствах. Отмечено, что эти заболевания регистрируются весной или в последние месяцы сезона, а в некоторых случаях и осенью. Отмечено, что



основными причинами заболевания являются некачественное кормление пчел, длительная зимовка при высокой влажности и температуре в период зимовки, несвоевременная дезинфекция пчелиных ульев. При диагностике заболевания в первую очередь обращают внимание на сезон года, эпидемиологическую обстановку в пчеловодческих хозяйствах и клинические признаки. Основными анализируемыми факторами являются вылет пчел из улья зимой, загрязнение летковой доски жидким пометом, неприятный запах из улья, внутренние стенки улья окрашены пометом, наличие большого количества погибших пчел на дне, вздутые брюшки живых пчел, отсутствие или слабость внешних признаков заболевания в латентный период.

Annotation. The article discusses the occurrence of infectious American foulbrood disease in beekeeping farms. It is noted that this disease is usually observed in the spring season or in the final months of summer, and in some cases, it can also appear during autumn. The emergence of the disease is mainly attributed to factors such as poor-quality feeding of bees, prolonged wintering under high humidity and temperature conditions, and the failure to disinfect beehives in a timely manner. When diagnosing the disease, special attention is given to the season of the year, the epizootiological status of the beekeeping farms, and the clinical signs. The main symptoms include bees leaving the hive during winter, contamination of the hive entrance board with liquid feces, an unpleasant odor emanating from the hive, staining of the inner walls with fecal matter, accumulation of a large number of dead bees at the bottom, and swelling of the abdomens of live bees. During the latent stage of the disease, however, external symptoms are either absent or appear only in mild form. These manifestations were thoroughly analyzed in the study.



Keywords: Bee, American foulbrood, honeycomb, worker bee, queen bee, pathogen, spore, disease, Bacillus larvae, beekeeping farms.

Relevance of the Study. Beekeeping is one of the most profitable branches of agriculture in our Republic. Beekeeping products such as honey and pollen are valued as food, medicinal, and cosmetic resources. Other bee products — propolis, bee venom, and royal jelly — serve as potent biostimulators widely used in medicine and cosmetology. Uzbekistan is historically recognized as one of the major centers for bee breeding and apiculture, and its sunny climate plays a vital role in promoting the development of this field. In recent years, several decrees have been adopted by the President of the Republic to regulate and modernize the beekeeping industry, increase the production of honey and bee products, and introduce innovative and advanced technologies into the sector. Measures are being taken to ensure the effective implementation of these decisions.

The Presidential Decree of the Republic of Uzbekistan dated October 16, 2017, No. PQ-3327, “On Measures for the Further Development of the Beekeeping Sector,” plays a significant role in advancing and improving the beekeeping industry. Bees are rightfully considered one of the seven treasures of nature. Their honey, venom, royal jelly, propolis, and pollen serve as remedies for numerous diseases, while beeswax is regarded as an important raw material for various industries. Through the cross-pollination of plant flowers, bees contribute to the health and diversification of plant species, facilitate the development of high-yield varieties, and increase crop productivity. Approximately 80% of all known plant species on Earth reproduce and produce fruit, seeds, or yield as a result of cross-pollination. Moreover, about four-fifths of these cross-pollinated plants rely on insects for pollination, making the role of bees invaluable to humanity. However,



protecting these unique insects from various harmful environmental and biological factors remains a pressing issue today. In particular, American foulbrood disease — one of the most dangerous infections affecting bees — causes considerable economic losses to beekeeping enterprises. [1]

Research Objective. The aim of this study is to provide practical assistance to beekeeping farms in the rapid detection, treatment, and prevention of infectious diseases affecting bees.

Research Materials and Methods. The research was conducted in several privately owned apiaries located in different districts of the Republic. The investigation began with the examination of bee colonies, which was carried out in a cool area where the ambient temperature did not fall below +14 °C. The general condition of the bee colonies was found to be satisfactory. A complete inspection was performed when the air temperature ranged from +16 °C to +18 °C. During the inspection process, the beekeeper maintained strict hygiene: hands were clean, and a white or black coat free from any strong or unpleasant odors (such as perfume, cosmetics, onion, garlic, gasoline, kerosene, or sweat) was worn. The examination of the hive was conducted using a smoker. Smoke was gently introduced into the hive entrance two to three times, and after waiting for approximately 1–1.5 minutes, the hive cover was carefully opened. One edge of the inner cover was slightly lifted, and the frames were slowly removed for close observation and analysis.

American Foulbrood Disease. American foulbrood is an infectious disease affecting 7–9-day-old bee larvae. The disease typically manifests during the second and hottest half of the summer season. Infected larvae die, decompose, and become sticky and thread-like, resembling melted glue.

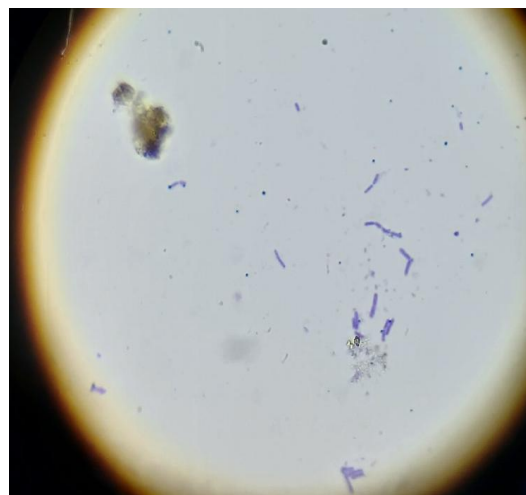


Gradually, the decayed mass dries out and becomes difficult to remove from the cell. The cell cappings over dead larvae darken, become perforated, and collapse — a characteristic sign observed across all bee breeds. The causative agent of American foulbrood is *Bacillus* larvae (now known as *Paenibacillus* larvae) — a Gram-positive, spore-forming, motile bacillus with rounded ends, occurring singly or in short chains. Diagnosis of American foulbrood is based on epizootiological data, characteristic signs of brood damage, and laboratory examination results. For laboratory analysis, samples are sent in plywood or wooden boxes, with combs separated from each other and from the walls by wooden slats. Comb samples must not be wrapped in paper. Moldy samples are considered unsuitable for testing. Laboratory diagnostics of American foulbrood include microscopic examination of cultures obtained from pathological material and subsequent isolation and identification of the pathogen. [3]

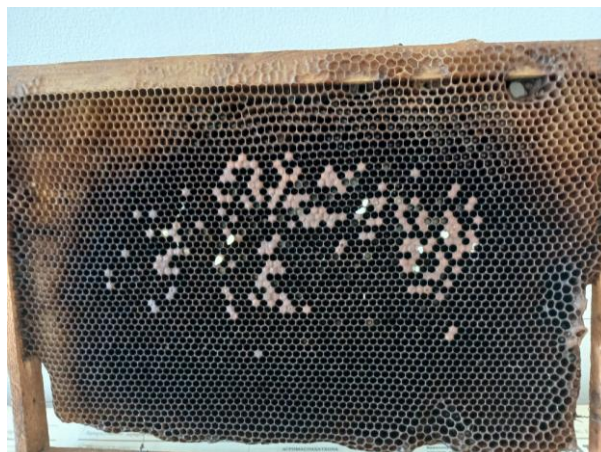
During the inspection, contamination of bee frames, the presence of dead bees at the bottom of the hives, and a characteristic glue-like odor were observed. These findings suggested a suspicion of American foulbrood disease. Comb samples measuring approximately 10×15 cm containing diseased and dead larvae were collected and sent to the laboratory for analysis. It was recommended to melt and destroy the wax of the suspected infected bee colony. All remaining hives were examined, and prophylactic treatment with the preparation Apiflox was advised. In the laboratory, a suspension was prepared from the collected samples. From this suspension, inoculations were made onto GPQ and GPA nutrient media, which were then incubated in a thermostat at $+37^\circ\text{C}$ for 24–48 hours. The grown cultures were Gram-stained and examined microscopically. The causative agent, *Bacillus* larvae (currently classified as *Paenibacillus* larvae), was identified as a motile,



Gram-positive rod measuring $2-5 \times 5-0,8 \mu\text{m}$, with spores of varying thickness forming at the ends of the cells. It was determined that the optimal growth temperature for the bacillus was between $+34^\circ\text{C}$ and $+37^\circ\text{C}$, with an optimal pH range of 6.8–7.2. [2], [5], [9: 25-27]



Figures 1–2. Microscopic appearance of Bacillus larvae — the causative agent of American foulbrood — grown on GPB medium.



*Figure 3. The process of treating
with
infected bee frames*



*Figure 4. Bee frame infected

Bacillus larvae, the causative
agent of American foulbrood*

Treatment and Prevention of the Disease. To treat and prevent the spread of the disease, the bees were administered medicinal sugar syrup for 5–7 days, applied 3–4 times, at a dosage of 100–150 ml per hive. The syrup was prepared using a 1:1 ratio of sugar to water, with the addition of Apiflox (1.0 g per liter) and Oxibactocid (2.0 g per liter) or equivalent therapeutic preparations. The suspected hives were kept under regular monitoring, and as a result of the applied measures, the further development of the disease was successfully prevented. [7: 5-15]



Control Measures. The affected bee colonies were isolated and, in the evening, transferred onto disinfected hives equipped with artificial wax foundations. Honeycombs from diseased colonies were melted down into wax, which was then sterilized in an autoclave at 127 °C for 2 hours. The soil beneath the hive locations was removed and treated with bleaching powder (1 kg per 1 m²). The hives themselves were disinfected using 10% hydrogen peroxide and 5% alkaline formaldehyde solution. [2], [5].

Conclusion. Many diseases affecting bees exhibit nearly identical symptoms. Therefore, only qualified specialists can accurately diagnose the illness and apply effective treatment methods. At the very first signs of disease, it is advisable to collect bee samples and contact the nearest veterinary laboratory for examination. In addition to infections, various bird species that feed on bees can also cause serious harm to colonies. One of the most effective ways to prevent bee diseases is to maintain strong and healthy colonies, have them examined annually by a veterinary specialist according to zoo-veterinary regulations, and consistently implement preventive and control measures against common infections. Proper care of bee colonies greatly influences honey yield. Productivity also depends on regularly relocating hives to areas rich in nectar-bearing plants and selecting high-quality bee breeds. Above all, maintaining the health and vitality of the bees should be a top priority for every beekeeper.

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