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RESULTS OF MONITORING CATTLE BRUCELLOSIS IN THE FERGANA VALLEY

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Abstract. This article presents the results of monitoring the epizootic situation of brucellosis among farm animals, particularly cattle, in the Fergana Valley. The studies were conducted on animals kept in farms and private household holdings in Andijan, Fergana, and Namangan regions. During the study, blood samples were collected and examined using enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR) methods. A total of 2,775 animals were examined by ELISA, including 1,235 cattle, 920 sheep, and 620 goats. As a result, seropositive reactions were detected in 15 animals, with an overall seropositivity rate of 0.54%. The ELISA-positive rate was 1.05% in cattle, 0.22% in sheep, and 0% in goats. Using PCR, 243 cattle were examined, of which 11 yielded positive results, corresponding to a positivity rate of 4.53%. Molecular testing indicated that the detected pathogen was associated with *Brucella abortus*. The findings demonstrate the importance of combining serological and molecular diagnostic methods for effective surveillance and control of cattle brucellosis in the Fergana Valley.

Keywords: cattle, brucellosis, *Brucella abortus*, *Brucella* spp., Fergana Valley, epizootiological monitoring, ELISA, PCR, serological diagnosis, molecular diagnosis.

Introduction One of the important tasks of the veterinary service in the Republic of Uzbekistan is to ensure that the population has access to high-quality and safe food products, promote the sustainable development of livestock production, and maintain epizootic stability among agricultural animals. Increasing the volume of livestock production, improving animal productivity, and preserving breeding quality are directly associated, first and foremost, with protecting animals from infectious diseases.

Brucellosis is one of the infectious diseases that causes significant economic losses to the livestock sector and is capable of persisting for long periods and spreading among farms. The disease is zoonotic and is therefore of considerable epidemiological importance from both veterinary and medical perspectives.[1,4,5]

Brucellosis in animals, particularly in cattle, can lead to adverse consequences such as reproductive disorders, abortion, retained placenta, infertility, and decreased productivity. In some cases, the disease may progress without clinical signs or in a latent form, which limits the possibility of detecting it based solely on clinical manifestations. Therefore, regular laboratory diagnostics and epizootiological monitoring are considered essential components of the brucellosis control system.

One of the main causative agents of bovine brucellosis is *Brucella abortus*. The long-term persistence of the infection in farms may be associated with factors such as uncontrolled movement of animals, introduction of newly purchased animals into herds



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without veterinary inspection, use of common pastures, failure to promptly isolate animals that have aborted, and non-compliance with veterinary and sanitary requirements.[2,6]

The Fergana Valley is one of the regions where livestock farming is well developed, with cattle-breeding farms widely distributed across Andijan, Fergana, and Namangan regions. The movement of animals between farms and regions, livestock exchange, and the presence of various forms of livestock farming necessitate regular epizootiological monitoring of brucellosis in this area.

Serological methods play an important role in the laboratory diagnosis of brucellosis. Enzyme-linked immunosorbent assay (ELISA) enables the detection of antibodies produced by the animal's body against *Brucella* antigens. Polymerase chain reaction (PCR), one of the molecular diagnostic methods, allows the detection of genetic material specific to *Brucella* spp.

Therefore, a comprehensive assessment of serological and molecular diagnostic results contributes to a more thorough evaluation of the epizootic situation regarding brucellosis and to improving the effectiveness of laboratory monitoring.[3]

Objective of the Study The aim of this study is to conduct laboratory monitoring of the epizootic status of brucellosis among cattle and other agricultural animals in Andijan, Fergana, and Namangan regions of the Fergana Valley, analyze the results of ELISA and PCR testing, and assess the main epizootiological factors influencing the spread of the disease.

Materials and Methods The study was conducted on agricultural animals kept in farms and private household farms in the Andijan, Fergana, and Namangan regions of the Fergana Valley.

During the monitoring process, blood samples were collected from a total of 2,775 animals, including 1,235 cattle, 920 sheep, and 620 goats.

The collected blood samples were transported to the laboratory in accordance with veterinary and sanitary requirements, and blood serum was separated. Serological testing was performed using the enzyme-linked immunosorbent assay (ELISA) method to assess the presence of antibodies against brucellosis.

Animals that showed positive reactions based on the ELISA results were recorded separately. For molecular diagnosis in cattle, DNA was extracted from biological materials, and *Brucella*-specific genetic markers were examined using polymerase chain reaction (PCR).

PCR results were evaluated against appropriate positive and negative control samples. Based on the molecularly positive samples identified, the *Brucella* species was determined.

The obtained results were grouped according to animal species and laboratory diagnostic methods and expressed as absolute numbers and percentages.

Research Results The results of serological and molecular diagnosis of brucellosis in animals kept on farms and in private household farms in the Fergana Valley are presented in Table 1.



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As shown by the data in the table, a total of 2,775 agricultural animals were examined using the ELISA method, of which 15 animals showed a positive reaction. The overall seropositivity rate was 0.54%.

Table 1.

Results of testing animals for brucellosis in the Fergana Valley using ELISA and PCR methods

Animal species	ELISA tested, head	ELISA positive, head	ELISA positive, %	PCR tested, head	PCR positive, head	PCR positive, %	Identified Brucella species
Cattle	1 235	13	1,05	243	11	4,53	Brucella abortus
Sheep	920	2	0,22	–	–	–	Brucella melitensis
Goats	620	0	0,00	–	–	–	Brucella melitensis
Total	2 775	15	0,54	243	11	4,53	–

Note: In this study, PCR testing was performed only in cattle.

When analyzed by animal species, the highest serological positivity rate was observed in cattle. A total of 1,235 cattle were examined using the ELISA method, and 13 animals showed a positive reaction, corresponding to a positivity rate of 1.05%.

Of the 920 sheep examined, 2 showed a positive reaction by ELISA, with a positivity rate of 0.22%. Among the goats, 620 animals were examined, and no positive reactions were detected by ELISA.

As part of the molecular diagnosis of brucellosis in cattle, 243 animals were examined using the PCR method. Of these, 11 animals showed positive results, corresponding to a PCR positivity rate of 4.53%. Molecular testing indicated that the detected pathogen was *Brucella abortus*.

Thus, the results of the monitoring study demonstrated the need for regular laboratory surveillance of brucellosis in the Fergana Valley.

Analysis of Epizootiological Factors

During the study, the epizootiological conditions of the farms where animals with laboratory-positive results were kept were also analyzed.

Factors that may increase the risk of brucellosis transmission among farms included uncontrolled movement of animals between farms, introduction of newly purchased animals into herds without prior quarantine, use of common pastures, failure to promptly isolate animals that had aborted, and inadequate compliance with veterinary and sanitary requirements.

In particular, reproductive-age female cattle play an important role in the epizootiology of brucellosis. Environmental contamination with abortion materials,



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placenta, and other biological discharges may increase the risk of infection spreading within a farm.

Therefore, quarantining and conducting laboratory testing of newly introduced animals, immediately isolating animals that have aborted, and strictly complying with veterinary and sanitary measures are of great importance in reducing the risk of brucellosis transmission.

Discussion

The results obtained demonstrated the presence of serologically positive reactions for brucellosis among agricultural animals in the Fergana Valley. Although the overall seropositivity rate by ELISA was 0.54%, differences were observed among animal species.

In cattle, the ELISA positivity rate was 1.05%, which was higher than the 0.22% observed in sheep. No serologically positive results were detected among goats.

Among the cattle examined by PCR, a positivity rate of 4.53% was recorded. In this regard, it is important to take into account the specific criteria used to select the 243 cattle included in the PCR testing. Therefore, rather than directly comparing the 4.53% PCR positivity rate with the 1.05% ELISA positivity rate obtained from all 1,235 cattle, it is more appropriate to evaluate them as separate diagnostic groups.

The use of serological and molecular methods at different diagnostic stages expands the possibilities for brucellosis monitoring. ELISA is used to detect the immune response to brucellosis in animals, whereas PCR enables the detection of *Brucella*-specific genetic material.

In this regard, when organizing laboratory monitoring of brucellosis under the conditions of the Fergana Valley, it is advisable to complement the results of serological screening with molecular diagnostics when necessary.

Conclusion

1. A total of 2,775 agricultural animals kept on farms and in private household farms in the Fergana Valley were examined using the ELISA method, and positive reactions were detected in 15 animals. The overall seropositivity rate was 0.54%.

2. The highest serological positivity rate by animal species was recorded in cattle, with positive reactions detected in 13 out of 1,235 cattle examined. The ELISA positivity rate in cattle was 1.05%. In sheep, this rate was 0.22%, while in goats it was 0%.

3. A total of 243 cattle were examined using the PCR method, and 11 animals showed positive results. The PCR positivity rate was 4.53%, and the results of molecular testing indicated an association with *Brucella abortus*.

4. The results of the study demonstrated the need to use ELISA and PCR as complementary diagnostic methods in the laboratory monitoring of brucellosis.

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