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SEROLOGICAL MONITORING RESULTS OF BRUCELLOSIS IN CATTLE, SHEEP, AND GOATS IN THE FERGANA VALLEY

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Abstract: This article presents the results of serological monitoring of brucellosis among farm animals in the Fergana Valley. During the study, the enzyme-linked immunosorbent assay (ELISA) was used to detect specific antibodies against *Brucella* spp. antigens in blood serum samples collected from cattle, sheep, and goats. A total of 2,775 animals, including 1,235 cattle, 920 sheep, and 620 goats, were subjected to serological testing. As a result of the examination, positive serological reactions were detected in 15 animals, with an overall seropositivity rate of 0.54%. By animal species, the highest serological reactivity was recorded in cattle (1.05%), followed by sheep (0.22%), while no positive results were detected in goats. The obtained results indicate the presence of serological reactivity to brucellosis among animals in the Fergana Valley. To confirm the etiology of infection in serologically positive animals, the use of polymerase chain reaction (PCR), bacterial isolation, and molecular identification methods is recommended.

Keywords: brucellosis, *Brucella* spp., cattle, sheep, goats, serological monitoring, enzyme-linked immunosorbent assay, ELISA, PCR, serological reactivity, Fergana Valley.

Introduction Brucellosis is one of the infectious diseases that can be widely distributed among farm animals and causes significant economic losses to livestock production. It is also of considerable importance from veterinary and sanitary perspectives. The disease is mainly manifested by reproductive disorders, abortions, premature expulsion of the fetus, birth of weak offspring, and reduced productivity [1,3]. In some cases, the infection may occur without clearly pronounced clinical signs. Therefore, laboratory diagnostic methods, in addition to clinical observation, are essential for assessing the epizootic situation of the disease [2,4].

Serological methods are widely used in practical veterinary diagnostics for the detection of brucellosis. In particular, enzyme-linked immunosorbent assay (ELISA) enables the detection of specific antibodies against *Brucella* antigens in animal blood serum. The results of serological monitoring provide important information for the preliminary assessment of the epidemiological and epizootological risks associated with infection in a particular area.

The development of livestock production in the Fergana Valley, the movement of animals between regions, the maintenance of animals under different farming systems, and breeding activities necessitate regular monitoring for brucellosis. In this regard, studying the serological status of different animal species in the region is important for assessing the risk of disease spread and improving diagnostic surveillance [5].



Date: 15th August-2026

The aim of the study was to determine the level of serological reactivity to brucellosis in cattle, sheep, and goats in the Fergana Valley and to comparatively assess the proportion of positive results among different animal species.

Materials and Methods

The study was conducted using blood serum samples collected from cattle, sheep, and goats kept on farms in the Fergana Valley.

During the study, a total of 2,775 animals were subjected to serological testing, including 1,235 cattle, 920 sheep, and 620 goats.

An enzyme-linked immunosorbent assay (ELISA) was used to detect specific antibodies against *Brucella* spp. antigens in the blood serum samples. The obtained results were grouped according to animal species, and the seropositivity rate was calculated using the following formula:

Seropositivity rate (%) = Number of positive results / Number of animals tested × 100.

The serological test results were comparatively analyzed according to animal species.

Results During the study, blood serum samples from a total of 2,775 animals were serologically tested for brucellosis. Positive serological reactions were detected in 15 animals. The overall seropositivity rate was 0.54% (Table 1).

Table 1.

Serological Testing Results for Brucellosis in Different Animal Species in the Fergana Valley

Animal species	Number of animals tested	Number of positive animals	Number of negative animals	Seropositivity (%)
Cattle	1 235	13	1 222	1,05
Sheep	920	2	918	0,22
Goats	620	0	620	0,00
Total	2 775	15	2 760	0,54

In cattle, 1,235 animals were tested, of which 13 showed a positive serological reaction. This corresponded to a seropositivity rate of 1.05%, which was the highest among the animal species studied.

Among sheep, 920 animals were tested, and 2 animals showed a positive serological result. The seropositivity rate in sheep was 0.22%.

A total of 620 goats were subjected to serological testing, and no positive serological reactions were detected. Accordingly, the seropositivity rate in this group was 0.00%.

Overall, the majority of serologically positive results were recorded in cattle. Of the 15 positive results in total, 13 were detected in cattle and 2 in sheep.

This difference among animal species indicates the need to strengthen serological monitoring for brucellosis in cattle. However, the detection of serological positivity does not always independently confirm the presence of active infection in animals. Therefore, it

Date: 15th August-2026

is important to subject animals with positive serological reactions to additional laboratory and molecular testing.

Discussion The results of the conducted studies showed that 0.54% of the animals examined in the Fergana Valley demonstrated serological reactivity to brucellosis. When analyzed by animal species, a serological reactivity rate of 1.05% was recorded in cattle, which was higher than that observed in sheep and goats.

The detection of 13 positive results in cattle indicates the need to strengthen diagnostic surveillance for brucellosis in cattle farms in the region. The detection of 2 positive results in sheep suggests that serological reactivity associated with infection may also occur among small ruminants.

The absence of positive results in goats indicates that no serological reactivity was detected in the group examined within the scope of this study. However, this finding cannot be interpreted as a definitive conclusion that brucellosis is absent from all goats in the region. To reach such a conclusion, it is necessary to increase the sample size, conduct stratified monitoring by farms and geographical areas, and apply additional diagnostic methods.

An important aspect in the etiological interpretation of serological results is that antibodies detected by ELISA may indicate the presence of an immune response associated with *Brucella* infection; however, the ability to definitively identify the *Brucella* species based solely on serological results is limited. Therefore, species-level conclusions concerning *B. abortus* or *B. melitensis* should be verified using PCR, bacterial isolation, biotyping, or other confirmatory molecular methods.

In particular, testing biological samples obtained from serologically positive animals by PCR makes it possible to detect *Brucella* spp. DNA and confirm serological findings at the molecular level. This approach is also important for detecting cases in which the infection may occur in a latent or subclinical form.

Thus, integrating serological monitoring with molecular diagnostics makes it possible to more accurately assess the epizootic situation of brucellosis in the Fergana Valley, identify high-risk groups, and plan subsequent veterinary and sanitary measures.

Conclusion

1. A total of 2,775 cattle, sheep, and goats in the Fergana Valley were subjected to serological testing for brucellosis.
2. Positive serological reactions were detected in 15 animals, resulting in an overall seropositivity rate of 0.54%.
3. By animal species, the highest seropositivity rate was recorded in cattle (1.05%), followed by sheep (0.22%). No positive serological results were detected in goats.
4. The majority of positive serological results were recorded in cattle: 13 positive results in cattle and 2 in sheep.
5. The obtained results indicate the presence of serological reactivity associated with brucellosis among animals in the Fergana Valley.



Date: 15th August-2026

6. It is not advisable to definitively identify the *Brucella* species based solely on serological results. To clarify the etiological diagnosis, the use of PCR, bacterial isolation, and molecular identification methods is recommended.

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