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BRIEF REPORT

Serological study of brucellosis in Argentine Creole sheep

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Abstract Ovine cattle was introduced into America during the Spanish conquest with the second journey of Columbus to the Antilles and was disseminated throughout the region. In 1587, sheep were introduced into Argentina, later developing into the ''Creole'' breed. We selected 486 animals from different Argentine provinces with the aim of determining the serological status of brucellosis caused by *Brucella melitensis* and *Brucella ovis*. For the detection of antibodies against smooth *Brucella* spp., the Rose Bengal test (RBT) was performed as screening test while the serum agglutination test (SAT) and 2 mercapto-ethanol (2ME) were run as a confirmatory technique. Moreover, for the detection of antibodies against rough *Brucella* spp., we used the rapid slide agglutination test (RSAT) for screening and an indirect ELISA (IELISA) as confirmatory assay. This study showed that the total positive percentage of brucellosis due to *B. ovis* was 2.9%. Excluding the animals mixed with the Suffolk breed; seropositivity would be 0.6%. All animals tested negative for brucellosis caused by *B. melitensis*.

PALABRAS CLAVE
Ovejas criollas de Argentina;
Brucelosis en ovejas;
Brucelosis

Estudio serológico de brucelosis en ovejas criollas de Argentina

Resumen El ganado ovino fue introducido en América durante el segundo viaje de Colón a las Antillas y rápidamente se diseminó por la región. En 1587 entraron a la Argentina las primeras ovejas, estas se adaptaron a las condiciones naturales y se desarrolló así la denominada «oveja criolla». Se seleccionaron 486 animales de diferentes provincias para conocer el estado serológico de la enfermedad producida por *Brucella melitensis* y *Brucella ovis*. Para detectar

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anticuerpos anti-*Brucella* en fase lisa se utilizó la prueba de rosa de Bengala (RBT) como tamiz y como confirmatorias seroaglutinación lenta en tubo (SAT) y 2-mercaptoetanol (2ME). En fase rugosa se realizó como tamiz la prueba rápida de aglutinación (RSAT) y ELISA indirecto como prueba confirmatoria (IELISA). Este estudio mostró un porcentaje de seropositividad de brucelosis causada por *B. ovis* del 2,9%. Excluyendo los animales cruzados con la raza Suffolk, la seropositividad sería del 0,6%. Todos los animales fueron negativos a brucelosis causada por *B. melitensis*.

Most of the ovines introduced into America during the conquest had been rejected from Iberian Churra, Mountain and Merino Spain sheep flocks. Because of their ability to live in the hot and humid tropical environment, they rapidly disseminated throughout the region, competing with domestic animals for plants and grass foods. They were gradually forced to move to Peru at the end of the 16th century, and in 1587 a significant number was introduced into Argentina by Juan Torres y Aragón.[10] These sheep found optimal nutritional conditions in the region and quickly expanded in the new environment. Zeballos in 1898 stated that in the course of time, their natural evolution developed into the ''Creole'' breed with special characteristics.[10]

The number of animals increased and in 1810 had grown to 3 000 000 ovines. In 1825 crossbreeding with Merino began, and in the following decades new crossbreeds were essayed in order to improve wool production. However, pure Creole sheep continued to develop in areas where the new breeds were unable to adapt.

Lynch et al.[6] stated that in spite of not having sanitary control, Creole flocks look healthy and with good adaptation to the environments. They are currently present in most Argentine provinces and should be considered a potential economic resource in areas where a population with low socio-economic status subsists, considering their adaptation to adverse soil and climatic conditions and consumption of low quality pastures.

Currently the ovine population in Argentina, including all breeds, is estimated to have reached 14–15 million animals, 8% of which belongs to the Creole breed [8]that is located mainly in the Northwestern and North Central regions.[6]

Brucellosis in sheep is mainly caused by *Brucella ovis* and *Brucella melitensis*. *B. ovis* produces a clinical or subclinical disease characterized by genital lesions in rams and placentitis in ewes. Therefore, the main consequences of the disease are reduced fertility in rams, frequent abortions in ewes, increased perinatal mortality and susceptibility of sheep breeds in the affected region.[9] However, *B. ovis* has not been conclusively implicated in human disease.

The relative importance of *B. melitensis* for sheep varies depending on the geographic region, and can be influenced by husbandry practices where goats and sheep are in close contact. The predominant symptoms in naturally infected sheep and goats are abortions, stillbirths and the birth of weak offspring. Some infected animals carry the pregnancy to term, but shed the organism.[9] Most cases of human brucellosis in the world are caused by *B. melitensis* that is almost invariably transmitted by direct or indirect contact with infected animals or their products. It affects people of all age groups and both sexes and usually presents as an acute febrile illness that may persist as relapse, chronic localized infection or delayed convalescence.

In Argentina, brucellosis caused by *B. ovis* has been found in all the regions were sheep are located while *B. melitensis* is not a major problem although few cases have been described.[11] However, in all these studies, Creole sheep were never considered and there is no information about the infection in this breed.[14]

The objective of this observational cross sectional study was to determine the serological status of brucellosis caused by *B. melitensis* and *B. ovis* in Creole flocks. The 486 ovines, including males and females, belonging to nine Argentine provinces were sampled by convenience, selecting sexually mature animals in 10 areas (Fig. 1). All animal manipulations were performed using protocols previously authorized by the National University of Lomas de Zamora (protocol A123/06)

1. Rio Cuarto-Córdoba: 39 (35 females) of a flock of 150 animals that had no contact with other animal species.
2. 25 de Mayo-Buenos Aires: 75 (62 females) of 653 animals, in close contact with bovines.
3. La Junta-Catamarca: 22 (20 females) of 85 animals belonging to one family with low income and resources which exploited the herd for their own consumption, including wool that was used to make handcrafted garments for commercial purposes. During the day, animals shared communal grazing land with other flocks, including goats and swine, belonging to other families sharing similar socioeconomic conditions. Sheep were kept by their shepherd throughout the night.
4. Iruya-Salta: 39 (33 females) of 250 animals belonging to seven families with similar conditions to the former region, families worked in groups looking after the large flock.
5. Malargüe-Mendoza: 87 (77 females) of 380 animals in close contact with sheep of different breeds, goats and bovines. The peculiarity of this area is that Creole ewes were crossbred with the Suffolk breed from Chile, where they are predominant, because they were in close contact during the summer.
6. Caspi Corral-Santiago del Estero: 46 (31 females) of 462 animals belonging to five families who shared the land during the day, also with goats and bovines. Sheep were kept at night in each family's own corral for protection.
7. Tafí del Valle-Tucumán: 27 (24 females) of 250 animals. The main characteristic of these animals was that they

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