

# BRUCELLOSIS AND SUSPECTED PARATUBERCULOSIS IN A NUBIAN IBEX (*CAPRA IBEX NUBIANA*) - A CASE REPORT

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## Abstract

A male Nubian ibex (*Capra ibex nubiana*) kept with domestic goats in a private collection, was presented in very poor body condition, with pendulous testicles, swelling and stiffness of the carpal joints. The ibex was sent for investigation to the Central Veterinary Research Laboratory, Dubai. Samples for routine histopathology, bacteriology, and parasitology were taken during necropsy. The results revealed focal proliferative enteritis with macrophages containing numerous acid-fast rods that indicate paratuberculosis. Subacute proliferative and suppurative arthritis in both carpal joints and large central necrotic abscesses with calcification in both testes was found. *Brucella melitensis* biovar 3 was isolated from testis and carpal joint. This is the first recognized case of brucellosis and paratuberculosis in Nubian ibex that highlight the risk to wildlife posed by domestic goats.

## Introduction

The Nubian ibex (*Capra ibex nubian*) is found from Syria to Sinai, in Arabian Peninsula, Egypt and Sudan east of the Nile, and in northern Ethiopia, which has been classified as endangered by IUCN (Nowak, 1999). Its population has declined from Asian and African parts of its range due to hunting, agricultural encroachment on its habitat, loss of water source due to human activity, disease and competition with domestic goat (Habibi, 1986; Krausman and Shaw, 1986; Schaller, 1977; Shackleton, 1997).

Brucellosis, the worldwide contagious zoonotic disease has been reported in different bovine species from the Palearctic Region. For instance, chamois (*Rupicapra rupicapra*): Bouvier *et al.* (1951, 1958); Garin-Bastuji *et al.* (1990), fallow deer (*Cervus dama*): McDiarmid (1951), reindeer (*Rangifer tarandus*): Golosov and Zabrodin (1959), and Spanish ibex (*Capra pyrenaica hispanica*): Leon-Veizcano *et al.* (1985), and alpine ibex (*Capra ibex*): Ferroglio *et al.* (1998). In North America, brucellosis is endemic in some population of bison (*Bison bison*), elk (*Cervus elaphus tarandus*) and caribou (*Rangifer tarandus tarandus*) (McMorquodale and Di Giacoma, 1985; Tessaro, 1986).

In the Middle East, brucellosis occurs in sheep, goat, camel and cattle but reports of brucellosis in wild animal species are rare. In Saudi Arabia, *B. melitensis* biovar 2 has recently been isolated in an Arabian oryx (*Oryx leucoryx*) (Ostrowski *et al.*, 2002).

Paratuberculosis or Johne's disease is a chronic infectious disease characterized by granulomatous enteritis, and chronic emaciation in domestic, zoo and wild ruminants (Fisher, 1999), which is caused by the *Mycobacterium avium paratuberculosis*. The infection usually occurs orally through pastures, water and litters contaminated with faeces (Fisher, 1999). In bovine chronic enteritis and diarrhea are the main symptoms of paratuberculosis but in small ruminants these symptoms may be moderate or completely absent (Carter *et al.*, 1995). The disease is well described in domestic cattle but little is known about its pathogenesis, and the course of infection in zoo and wild animals, even though the disease constitutes a major problem for many parks of wild animals worldwide (Fisher, 1999). The diagnosis and control of this disease is a challenge for veterinarians and bacteriologists. In the present case the diagnosis of paratuberculosis was based on histological findings. Two cases of *Mycobacterium paratuberculosis* infection were reported in free ranging Alpine ibex from two different herds in the Western Alps, Italy by Ferroglio *et al.* (2000).

## History

In August 1998, 18 domestic goats (*Capra hircus*) were introduced into an enclosure of five Nubian ibex (*Capra ibex nubiana*) kept in a private collection in the United Arab Emirates. During February 1999, these animals were screened for brucellosis using the Rose Bengal Test (RBT) and three goats and one male ibex (Ibex 1) were found serologically positive. The positive goats were culled but the ibex (Ibex 1) was kept for further investigation because no published report of brucellosis from Nubian ibex is on record. The ibex (Ibex 1) was in poor body condition, had pendulous testicles and swollen carpal joints. The animal was euthanized and a thorough postmortem examination was carried out. The right cervical

lymph node was enlarged and contained an abscess. Testes were enlarged and subacute pneumonia of the right frontal lobus was diagnosed.

Histological examination showed severe necrotizing orchitis, moderate infiltration of the intestinal mucosa with macrophages, multifocal subacute catarrhal to suppurative pneumonia. *Corynebacterium pyogenes* was isolated from the lung lymph node. Alpha-haemolytic *Streptococcus* sp. was isolated from the testis but no *Brucella* sp. was found.

The remaining goats and ibex were vaccinated against brucellosis with BIO-REV 1 (*Brucella melitensis* Rev 1 strain, Live freeze-dried vaccine, Biopharma, Morocco). These animals were also vaccinated against clostridiosis (Imotoxan, Merial, France), pasteurellosis (Lysopast, Merial) and mycoplasmosis (Caprivax vaccine [Contagious Caprine Pleuropneumonia (CCPP)], Kenya Vaccine Production Institute).

About 20 months later another vaccinated ibex (Ibex 2, about five years old) was presented with inappetence, poor body condition, reluctance to walk, lameness, swollen carpal joints and bilateral enlarged pendulous testicles. The ibex was euthanised and investigation was carried out in the CVRL, Dubai.

### Pathology and Microbiology

The carcass of the male Nubian ibex (Ibex 2) showed moderate/poor body condition and weighed 43 kg. Most of the body lymph nodes, the carpal joints and testicles were swollen. Both testicles contained yellowish pus (Figure 1) and both carpal joints showed chronic proliferative arthritis (Figure 2). Focal thickened intestinal mucosa was found (Figure 3).

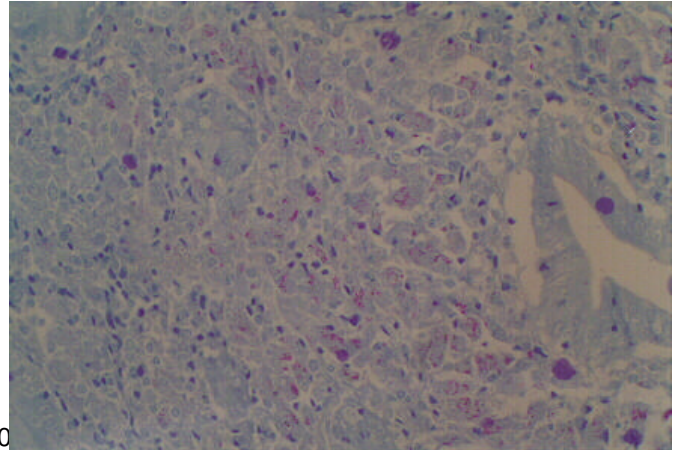
**Figure 1.** (below left) Testicles contained yellowish pus.

**Figure 2.** (below right) Carpal joints showing chronic proliferative arthritis.



**Figure 3.** (below left) Focal thickened intestinal mucosa.

**Figure 4.** (below right) Focal proliferative enteritis with macrophages containing numerous acid-fast rods.



Histology revealed:

1. Subacute, proliferative and suppurative arthritis in the carpal joints.
2. Large central necrotic abscesses with calcification in both testes.
3. Focal proliferative enteritis with macrophages containing numerous acid-fast rods (Figure 4) which gives an indication of paratuberculosis.

Attempts to isolate bacteria were carried out from carpal joints, body and intestinal lymph nodes, and testicles. *Brucella* sp. was isolated from sample taken from testicles and carpal joints. The isolate was cultured and sent to Veterinary Laboratory Agency, Weybridge, UK, for classical typing and has typed as *Brucella melitensis* biovar 3.

## Discussion

Nubian ibex can be considered susceptible to brucellosis and paratuberculosis, but so far the infections have never been reported in this subspecies. Serological evidence of brucellosis, occasionally supported by the isolation of bacteria in a variety of animal species has been reported by a number of authors (Davis, 1990). Assessment of clinical disease in detail has rarely been done in antelopes (Sachs and Staak, 1966, Madsen and Anderson, 1995). The recent report of *B. melitensis* in Arabian oryx illustrates the risks of disease transmission from domestic animals (Ostrowski *et al.*, 2002). In this case study, one of the five ibex was found to be seropositive to brucellosis, however, no *Brucella* organism was isolated.

Twenty months later a second ibex was showed clinical signs of suggestive brucellosis. At necropsy, severe chronic orchitis and arthritis as well as proliferative enteritis was found. *Brucella* sp. was isolated from testis and joints and paratuberculosis was concluded on the basis histological findings.

*B. melitensis* is a major cause of ovine, caprine and human brucellosis (Alton, 1990; Scrimgeour, 1995). Ovine and caprine brucellosis eradication programs are in progress in the Middle East. In Saudi Arabia, the main reservoirs for *B. melitensis* are sheep and goats (Radwan *et al.*, 1983). It is also possible that wildlife could act as reservoirs or disseminators under favorable circumstances.

A survey was conducted on 150 antelopes (Nubian ibex [*Capra ibex nubiana*], Arabian oryx [*Oryx leucoryx*], Scimitar horn oryx, [*Oryx dammah*], Beisa oryx [*O. gazella beisa*], Gems bok [*Oryx gazella*], Gazelles [*Gazella dorcas* and *G. gazella cora* ], etc.) maintained in the original collection from which the ibex were taken. No serological evidence of *Brucella* sp. was found using RBT.

The goat farm under investigation had a history of abortion and 14% of goats were serologically positive for brucellosis using the RBT. It is possible that infected goats transmitted the disease to the ibex though the mechanism of transmission is unclear. Infection may be acquired from the contaminated environment through oral ingestion, via the conjunctiva, mucous membranes or vaginal discharges of goats during mating at the post partum estrus (Hughes, 1972). From the above discussion it can be assumed that the *Brucella* infection found in the ibex most likely to be transferred from the domestic goats where *B. melitensis* is endemic.

This case illustrates the disease risks that exotic ungulates may be exposed to from domestic animals. In the Middle East region endangered ungulates, Arabian oryx (*Oryx leucoryx*) and Arabian tahr (*Hemitragus jayakari*) are maintained at various breeding centers. It is important that any new ungulate introduced to a collection is subjected to strict quarantine. *Brucella* spp. should be included in the list of diseases to be screened for, when new animals are introduced to a collection. Veterinarians should be aware of the limitations of the various tests for brucellosis. It is also important to establish a buffer zone around exotic ungulate collections to reduce the risk of disease transmission from domestic animals. In all cases quarantine is suggested.

In this case study *Brucella* spp. was isolated from the Nubian ibex which was initially seronegative and then vaccinated. Twenty months later, clinical evidence of brucellosis was confirmed. It is likely that the ibex was infected before vaccination but serological tests failed to detect the evidence of early infection or exposure to *Brucella* spp. False negative reactions have been observed by RBT during early incubation of brucellosis (Radostis *et al.*, 1994). The sensitivity of RBT varies considerably depending essentially on the source of sera and batch of the RBT antigen used in the test (MacMillan, 1997). It is also possible that the immunity derived from the vaccine was sub-optimal. The effect of concurrent disease, paratuberculosis and *Corynebacterium pyogenes*-infection on the immunity of Nubian ibex is also an unknown factor in the pathogenesis of the disease.

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