

Case Report

A Heavy Infection Macro-cysts of *Sarcocystis* Spp. Case in a Najdi Sheep at Buraidah Slaughter House, Qassim, Saudi Arabia

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Abstract: Background: Protozoal diseases caused by *Sarcocystis* species can cause serious damage in sheep and goats flocks, inducing decreased growth conversion rates and partial or complete condemnation of carcasses at the slaughter house. *Sarcocystis* spp. affecting sheep and goats are host specific for their intermediate hosts and family specific for their final hosts. They derive their name from the intramuscular cyst stage present in the intermediate host. Objective: Macro and micro identification of macro-cysts of *Sarcocystis* spp. affecting a Najdi sheep carcass. Method: Detection of macrosarcocystis during routine post mortem examination and identification the detected cyst by histopathological investigation. Result: The macroscopic sarcocystis were found cleared and scattered in almost all skeletal muscles including shoulder, chest and diaphragm as well as thigh. Both morphological and histopathological characteristics indicated that the detected cysts may be identified as *Sarcocystis gigantea*. Conclusion: It is a case study of macro-cysts of *Sarcocystis* spp. affecting local breed of Najdi sheep. It is considered a seldom detected case all over many years during meat inspection at Buraidah slaughter house. The possible control measures are those of simple hygiene. Farm dogs should not be housed in, or allowed access to, fodder stores nor should they be allowed to defecate in pens where livestock are housed. It is also important that they are not fed uncooked meat.

Keywords: Najdi Sheep, Macroscopic *sarcocystis*, Histopathology

1. Introduction

Sarcocystis spp. are cyst-forming coccidia that infect several livestock species causing sarcocystosis which responsible for the formation of cysts often observed in the skeletal and cardiac muscles. It has a high prevalence in sheep, resulting in serious injury in different organ systems, abortion, and death. There are two common *Sarcocystis* species affecting sheep, the first is *Sarcocystis tenella* (*S. ovis*) which is highly pathogenic to lambs causing fever, anorexia, weight loss, loss of wool, abortion, premature birth nervous signs and death. The Cysts are microscopic and located in the muscles of oesophagus, diaphragm, heart, tongue and central nervous system. The second species is *Sarcocystis gigantea* (*S. ovifelis*) which is moderately pathogenic to sheep with

macroscopic cysts found as small white cysts resemble grains of rice and commonly affect the oesophagus, tongue, diaphragm and skeletal muscle and their presence in the muscles and viscera of carcasses at the slaughterhouse causes economic losses due to the partial or total loss of carcasses. The sarcocystosis of sheep requires two hosts to complete its life cycle, where the cat acts as its definitive host in case *S. ovifelis*. Cats become infected when they feed on infected sheep carcasses. Ingested *sarcocystis* cysts develop in the cat to produce tiny spores which passed in cat faeces contaminating pasture and/or stock feed. Sheep is considered intermediate host which ingest *sarcocystis* spores when feeding on contaminated pasture or hay/grain. Spores move from the gut to small blood vessels where they multiply and move into muscle tissue and develop into cysts [1-5].

Identification of *sarcocystis* spp. in sheep is done by

morphological, ultrastructural, and molecular tests [2]. Morphologically, *sarcocystis* cysts appear as visible elongated cylindrical bodies in striated muscle and sometimes in unstriated muscle [6]. They occur as spindle to oval in shape and two stages were recognized, the peripheral metrocytes and centrally located banana-shaped bradyzoites [7]. Light microscopy [7] and Electron Microscopy (EM) [8] were applied for ultrastructural characteristics of *sarcocystis* spp. In Saudi Arabia, macroscopic cysts were usually detected on the oesophagus, where EM showed an ultrastructural similarities in the cyst walls and their parasite contents (metrocytes and merozoites) for all macroscopic cysts examined from sheep and goats. These were also enclosed by a secondary cyst wall. The primary cyst wall had many cauliflower-like protrusions supported by many fibellar structures, while the ground substance underneath them contained many dark, dense granules and usually extended into the cyst cavity dividing it into many compartments containing the parasites. The cyst parasites were the peripheral globular to spherical metrocytes, which were divided by endodyogeny and the central banana-shaped merozoites. Both metrocytes and merozoites had all characteristics of the Apicomplexa [8]. Furthermore, identification of *sarcocystis* spp. in sheep by PCR products of the 18S rRNA gene were successfully sequenced [9-11].

2. Materials and Methods

2.1. Meat Inspection

The routine post mortem examination of a Najdi sheep carcass revealed multiple macroscopic *sarcocystis* cysts. The tissue samples were collected from different affected muscles by *sarcocystis* macrocysts for histopathological examination.

2.2. Histopathological Investigation

Tissue specimens were preserved in 10% neutral buffered

formalin immediately after removal from the carcass for fixation. For routine paraffin wax histopathology, a portion of 1cm³ lesion from each of the affected muscle was incised, fixed in 10% formal saline, processed and stained with H&E as described by [12-14].

3. Results and Discussion

Sarcocystosis is a parasitic disease caused by varying *Sarcocystis* species infecting humans and animals. *Sarcocystis* spp. are cyst-forming coccidia that infect numerous animals species, including several livestock species. It is commonly found in small ruminants causing pathogenic effects [11].

Multiple macroscopic sarcocystis were observed and distributed randomly throughout nearly all the muscles of a famous domestic Najdi sheep at Qassim Region, Saudi Arabia. They characterized by white, round, oval cysts or banana-shaped bradyzoites as demonstrated in figure 1 and described by [7].

The histomorphological features of both longitudinal and cross muscular sections of sarcocytosis were illustrated in "Figure 2". The longitudinal sections showed spindle shaped encysted protozoan (arrow) with well-defined wall containing several separated bradyzoites (arrow head), muscular degeneration, fat depositing (asterisk) as a result of necrosis and atrophy and mild inflammatory cells infiltrates "Figures 2, A & B". While, the cross muscular sections revealed sarcocysts with a well-defined wall (arrow head) containing several separated bradyzoites with centric pale halo (asterisk) and eosinophilic degenerative muscle fibers (arrow) "Figures 2, C & D".

The morphology of macroscopic sarcocystis found in the muscles of such case mostly resembled that of the *S. gigantea* cysts, where the diagnosis was based on the morphological as well as histopathological findings.

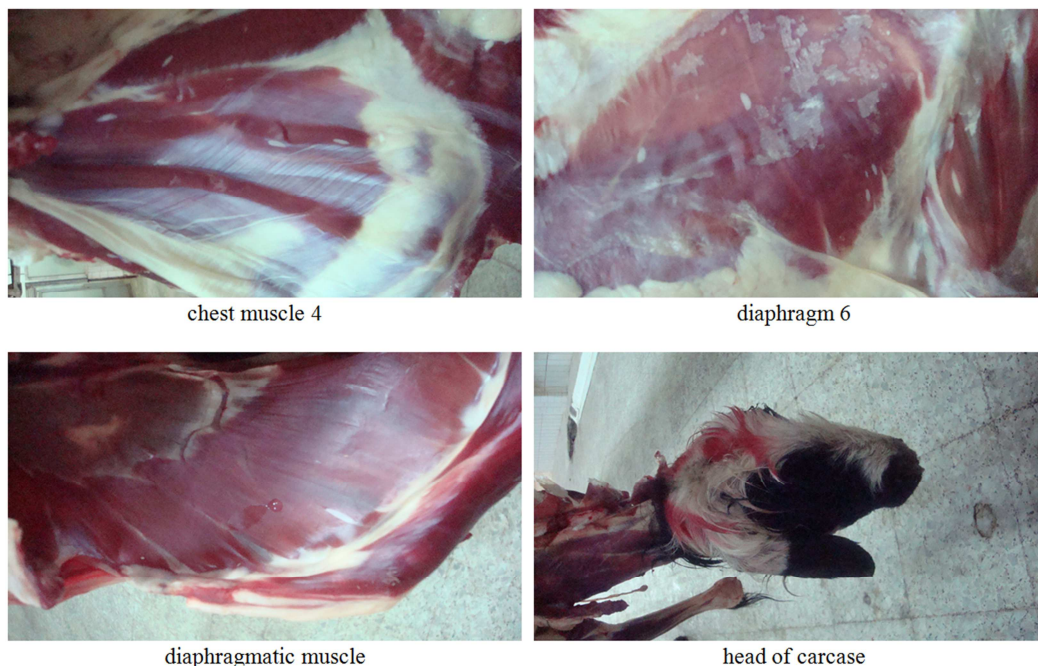


Figure 1. Chest and diaphragm muscular macroscopic sarcocytosis of a Najdi sheep carcass.

Sarcocystis muscular cysts are varying from microscopic to macroscopic size. Sheep can be infected by four species of Sarcocystis including *S. tenella*, *S. arieticanis*, *S. gigantea* and *S. medusiformis*. *S. tenella* and *S. arieticanis* are known as pathogenic parasites, which form muscular micro-cysts transferred by dogs, while *S. gigantea* and *S. medusiformis* are non-pathogenic and form macro-cysts transferred by cats [2, 10].

Further identification of either microscopic or macroscopic sarcocystis cysts affection in sheep can be performed by molecular assays [15].

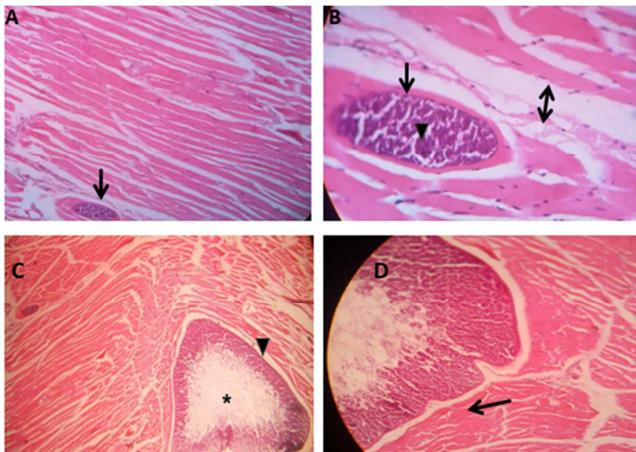


Figure 2. Histomorphology of muscular sarcocystosis (H&E, 10X and 40X).

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