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# **Camel Diseases in Jordan**

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## ABSTRACT

Data relating to camel diseases in Jordan is scarce, from both a clinical and pathological point of view. Thus, an epidemiological study was designed to study camel diseases based on systematic methods. A total of 369 living and 156 slaughtered camels of different sex, age and breeds in four different areas of Jordan were used. These areas include Al-Badia, Amman, Al-Ramtha and Jordan Valley. After a general clinical examination, blood, fecal and skin samples were taken. Also, samples were taken from slaughtered camels with lesions for bacteriological and histopathological examinations.

According to the result of the study, the incidence of the diseases and/or conditions was classified into 3 different categories: common, less common and rare. Among the common diseases and/or conditions were: 98% gastrointestinal parasites, 100% tick infestation, 83% mange, 44.2% hydated cyst, 33% trypanosomiasis, 33% nasal myiasis, and 21.79% plastic foreign bodies. Less commonly occurring diseases were mastitis, 3.5% pneumonia, 2.1% ringworm, 1.2% liver abscess, 1.92% onchocerciasis and 1.9% infertility. Very rare conditions were rabies, tetanus, tumors and congenital defects. Among the most common respiratory infections were nasal myiasis, pneumonia, pulmonary congestion, emphysema, and pneumoconiosis. Common digestive disorders were impaction, foreign bodies and enteritis. Infertility is the major cause of early culling of female camels. Dystocia, retained placenta and vaginal prolapsed, although rarely occurring conditions, were sometimes seen in camels in Al-Badia region.

Key Words: Diseases, Epidemiology, Jordan, Camels.

# **INTRODUCTION**

The deserts of Jordan cover an enormous area extending from the highland foothills to Syria, Iraq and Saudi Arabia borders. The deserts comprise some 80% of the country's total land area. Although united by their harsh desert climate and vegetation type, camels can be raised there. Bedouin adapt themselves in a remarkable way to the fast pace of change and yet at the same time conserve their traditions. Their joys are those of the simple life. They raise only one-humped camels that share with men the hardships of living and travelling in arid regions.

There are two species in the genus Camelus: the dromedary, or Arabian camel, (*Camelus dromedarius*) which gets its name from the Greek word  $\delta o \rho \mu o \varsigma$  meaning "running", and C. bacterianus, the Bactrian camel named after the area of Bactriana in Central Asia (Higgins, 1984). The one-humped camel is a creature of the desert and is used for riding, packing, plugging, milling oil, and pulling water from wells and carts. Its hair is utilized in making carpets and clothes. The camel has great economical potential and is anticipated to make a significant contribution to the Bedouin in solving their problem in transportation, food shortage and milk supply (Abudl-Rahman, 1973; Chatty, 1986).

The total number of camels in Jordan is about 18 000 head (FAO, 1995). All are one-humped camels and are commonly found in certain parts of Jordan such as Al-Badia, Al-Ramtha, Jordan Valley and South of Amman. The Bedouin are very attached to this animal which has shared their desert life for so many centuries, and quite large herds are still kept in Jordan Badia. However, in the future an increase in livestock production is expected to occur. So far, this fact has not included the camel. This may be, in part, due to the living habit of the camel in arid and semiarid areas, effect of the severe drought situation, neglect, and high death rates due to improper veterinary services may prohibits full use of this animal (Al-Ani, 1997).

Systematic studies of the disease conditions of camels in Jordan are few and the published literature consists entirely of parasitic diseases (Sherkov, *et al.*, 1976a; Saliba, 1977; Al-Yaman, 1985; Abdel-Hafez, *et al.*, 1986; Sharief *et al.*, 1996). Serological survey of Rickettsia and Chlamydia antibodies in domestic ruminants

in Jordan were also published (Sherkov, *et al.* 1977b; Schmatz *et al.*, 1978). Unfortunately, epidemiological studies of the most common camel diseases in Jordan are almost completely lacking. The current investigation was undertaken to provide data on the common camel diseases and/or conditions in Jordan.

#### **MATERIALS AND METHODS**

A total of 369 camels of different sexes, ages and locations were used in this study. Camel herds were regularly examined during the period from April 1996 to February 1998. These areas include: Al-Badia (230 camels), Al-Ramtha (36 camels), South of Amman (30 camels) and Jordan Valley (73 camels). Information on camel health, type of feeding, management method and treatment regime was obtained. The skin and the udders were subjected to careful clinical examination by visual observation and palpation. Samples of blood (257 samples with and without anticoagulant), fecal (150 samples), milk (7 samples), skin scraping (32 samples) and nasal swabs (22 samples) were collected. Direct method, flotation method and sedimentation methods were performed on all fecal samples.

Eggs output was quantified by means of the McMaster technique and generic determination was performed on third-stage larvae reared in fecal culture. Milk samples were subjected to California mastitis test, somatic cell counts and bacteriological isolation. Skin scrapings were subjected to fungal and ectoparasites examination. Antibody to brucellosis was examined on all blood samples by Rose Bengal test, complement fixation test and ELISA test. Blood smear samples were stained by Gimesa stain and examined for *Trypanosomia evansi* infection.

Since the only camel slaughterhouse is available in Al-Ramtha, a total of 156 camels intended for slaughtering at Al-Ramtha abattoir from April 1996 to February 1998 were used. Shortly before and following slaughter, the entire carcasses were inspected. Any lesion, of any origin, was carefully examined and photographed, and samples from it were submitted for bacteriological and histopathological examinations.

## RESULTS

Our study showed that camels in Jordan suffer from the following diseases:

### **Parasitic Infection**

The prevalence of gastrointestinal helminthic infestation in Jordanian camels was very high (98%). Mixed helminthes infestation was 51% while single parasitic infestation was 47%. Nine different species of gastrointestinal tract worms were identified in camels. They were classified according to the site of loading in the gastrointestinal tract and liver. Two abomasal worms were identified, Haemonchus longistipes and Camelostrongylus mentulatus, with prevalence rate of 12% and 35%, respectively. Five small intestinal were identified and their prevalence worms rates were Trichostrongylus probolurus (56%), Ascaris spp (18%), Nematodirus dromedarii (2%), Cooperia oncophora (10%) and Moniezia expansa (33%).

Two large intestinal and liver worms were identified, *Trichuris* ovis and *Fasciola hepatica* with prevalence rates of 23% and 2%, respectively. Three cases of onchocerciasis were diagnosed in Al-Ramtha abattoir, with a prevalence rate of 1.92%. Small nodules were observed on the skin of the neck region and ligamentum nuchae of the neck region. The nodules contained live, degenerate or calcified worms of *Onchocerca fasciata*, in addition to inflammatory cells. 100% of the camels examined in different parts of Jordan were infested with large numbers of ticks.

Two types of ticks were identified. These included *Hyalomma dromederii* and *Hyalomma anatolicum*. Ticks may be present on any part of the camel's body, but the predilection site was a perennial, inguinal and exial region, between the toes and around the ears, eyes and lips. Sarcoptic mange, due to *Sarcoptes scabiei var cameli*, was diagnosed in camels. The incidence varies according to the treatment regime used by the Bedouin. The infection was 83% in camels that were not treated against mange.

However, infestation rate was very low in camels continuously treated with ivermectin or insecticides. Mange causes alopecia, intense irritation and anxiety. Affected animals do not put on weight. Debility arising out of this greatly reduces the output of draught camels and quality of meat. Larval infestation of camel nasal *Cephalopsis titillator* was present in 33% of the camels examined in September and October. Most cases developed no obvious signs. Others developed clinical signs of nasal discharge, restlessness, frequent sneezing and snoring on inspiration. The nasal cavity was congested and had dark mucus in which some larvae were entangled (Fig. 1). Of the camels examined following slaughtering, 44.2% suffered from hydated cyst. The cysts were of variable sizes and 63% were found in the lung alone, 24.9% in the liver (Fig. 2) and 12.1% involving many organs of the same animal. Trypanosomiasis, due to *Trypanosoma evansi* infection was diagnosed in camels.

The prevalence rate of diagnosis was 33% by direct smear stain technique. The highest rate of infection was diagnosed in Jordan Valley from April to September. Affected camels with acute form of the disease showed signs of fever, anorexia, weakness and severe anemia.

#### **Respiratory System**

Several types of bacteria were isolated from the nasal cavity of healthy and diseased camels. These included Pasteurella haemolytica, Streptococcus spp., Staphylococcus spp., Actinomyces pyogenes, Escherichia coli, and Micrococcus spp. Pneumonia due to bacterial infection were present in 10.3% of the lungs examined. Bacteria were isolated from 16 pneumonic lungs. The predominant isolates were Pasteurella haemolytic (9 lungs, 56.3%), Actinomyces pyogenes (3 lungs, 18.8%) Escherichia coli (2 lungs, 12.5%), and Streptococcus spp. (2 lungs, 12.5%). Bacteria were also isolated from lungs with infected hydatid cysts. There was a positive correlation between the type of bacterial isolation from the nasal cavity and pneumonic lungs. Other lung lesions were pulmonary congestion (Fig. 3), lung emphysema (Fig. 4) and pneumoconiosis (Fig. 5).



Fig. 1: The larvae of camel nasal myiasis in the cavity of a camel



Fig. 2: Hydated cysts in the liver of a camel



Fig 3: A severely congested lung of a camel



Fig. 4: Camel lung with pulmonary emphsema



Fig. 5: Pneumoconiosis in the lung parenchyma

## **Digestive System**

Of the Camels, 34 (21.8%) had rumen impacting by foreign bodies. The type and location of foreign bodies were studied. Plastic was the most common (64.7%), rope and leather were less common (23.5%), and mixed types of foreign bodies (11.8%). All were found in the rumen and reticulum. Also, the incidence was higher in adult camels than calves.

Diarrhea and enteritis were very common in newly born calves. Of 21 calves born in severe winter, 4 died due to colibacillosis. The condition occurred during the first 2 weeks of calf life. *E. coli* was isolated from the intestinal contents. Liver abscess was diagnosed in 1.2% of the livers examined following slaughtering. The most common bacteria were *Actinomyces pyogenes*, *Staphylococcus aureus*, *Streptococcus viridans*, and *E. coli*, The abscesses were of varying sizes and locations.

## Nervous system

Rabies was diagnosed in 8 of 180 camels. Signs were largely related to the nervous system characterized by hyperaesthesia,

anorexia, excessive salivation, paralysis and death. Rabies virus antigen was detected by fluorescent antibody test in all brains submitted. Tetanus was diagnosed in one case following deep wound infection. Signs of spasms of the jaw, stiff neck and stiff gait were seen.

#### **Reproductive system**

Of the genitalia examined, 3 (1.9%) had uterine infection due to *Actinomyces pyogenes*. Luteal cyst was diagnosed in one case. The cyst was large, single and thick-walled. It was filled with grayish brown fluid (Fig. 6). Mastitis is observed in camels. Of 7 lactating camels examined, one had chronic mastitis from which *Staphylococcus aureus* was isolated, 4 with subclinical mastitis and 2 with normal udders.

#### Skin, muscle and joints

Singular or multiple skin abscesses were a very common condition seen. Caseous lymphadenitis abscess was seen quite frequently in camels in Jordan. Skin wounds of varying degrees were seen on different parts of the body. Two camels developed severe saddle sore following long journey (Fig. 7). A pure culture of *Staphylococcus aureus* was isolated from both cases. Fighting wounds were commonly seen following male camel fighting during rutting season. Foreign bodies and fly struck greatly influenced the physical appearance of wounds.

Foreign bodies such as nails, thorns and sharp pebbles commonly penetrated the footpad. Affected camels became lame, sore and reluctant to move. One case of chronic suppurative arthritis of the joint was seen. *Cryptococcus neoformans* was isolated in pure culture. Ringworm caused by *Trichophyton verrucosum* was diagnosed in 3 adult camels in Jordan Valley with cutaneous lesions on the neck and chest area. *Tr. schoenleinii* was diagnosed in a herd of yearling camels in a Al-Badia. Affected camels showed heavy incrustation on different parts of the body. The lesions typically consisted of an area of alopecia and a prominent whitish asbestoslike accumulation of scales. Cutaneous melanoma was seen in one 21-year-old male camel. A firm, raised gray-black nodule on the skin of the neck was observed.



Fig. 6: Luteal cyst on the ovary of a camel



Fig. 7: Infected saddle sore of a camel following a long journey

# Serological testing

Brucellosis was diagnosed in 0.5% of the camels examined by Rose Bengal test and complement fixation test. Sero-epidemiological investigation of common camel viral diseases was not included in the present study.

# DISCUSSION

Parasitic infections are of big concern to camels in different parts of the world (El-Bihari, 1980; Al-Ani, et al., 1990; Al-Ani and Al-Shareefi, 1995). Our study showed that camels in Jordan are highly infested with gastrointestinal parasites. 94.4 to 100% of the camels examined were found to be infected. Moreover, mixed infestations comprised of two or even three parasites present in the same camels were diagnosed. These findings were in agreement with the findings of Selim and Rahman (1972) in Egypt and Altaif (1974) in Iraq. Onchocerciasis due to Onchocerca fasciata has been reported quite frequently in camels in Saudi Arabia, Iraq and Egypt (Al-Yousif and Hussein, 1994) Tick infestation is common throughout the year. Commonly found ticks on dromedaries are Hyalomma ssp, Rhipicephalus ssp and Amblyomma ssp (Schwartz and Dioli, 1992). Sarcoptic mange and Trypanosomiasis range among the most important camel diseases in Jordan. They are responsible for great economic losses. Both diseases are also of big concern to camel keepers in neighboring countries such as Iraq, Syria and Saudi Arabia (Al-Ani, 1997).

Geographically, camel nasal flies occur wherever camels live (Zumpt, 1965). Infection rates of 47%, 81% and 74% were reported from Iraq, Egypt and Sudan, respectively (Soliman, 1965, Al-Ani, *et al.*, 1991). It is interesting to mention that incidence of Brucellosis in Jordanian camels was lower than what has been reported in Chad (26%), Kenya (14%), Saudi Arabia (12%), Iraq (7%) and United Arab Emirates (1.5%) (Al-Ani and Al-Shareefi, 1990; Afzal and Sakkir, 1994).

Ringworm is considered rarely reported in camels (Al-Ani, 1997). Ringworm due to *Tr. dankaliense*, *Tr. verrucosum*, *Tr. schoenleinii*, *Tr. mentagrophytes*, *Microsporum canis* and *M. gypseum* has been reported in camels from Iraq, Egypt, Somalia, and Saudi Arabia (Al-Ani *et al.* 1995). Inflammation of the lung is a common occurrence in camels (Al-Ani, 1990). All ages were affected. Multifactorial etiological factors including viral, fungal, parasitic, bacterial and stress were reported in camels (Al-Ani, 1997).

The most important predisposing factors for respiratory disease outbreaks among camels are sudden climatic changes, poor management, low level herd health status and bad nutrition (Schwartz and Dioli, 1992).

Foreign bodies in the rumen, gastrointestinal tract parasites and enteritis are the most common diseases of the digestive system in camels. In a study in Egypt, 30.7% of the camels brought to the abattoir had a foreign body in the rumen. Traumatic pericarditis was also diagnosed (Fahmy, *et al.*, 1995). Enteritis and neonatal deaths were of significant values. Infection with *Salmonella spp, E. coli* and *Mycobacterium paratuberculosis* has a great economic magnitude especially in young animals (Wernery and Kadden, 1994). Infertility has been commonly reported in camels (Al-Ani, *et al.*, 1992). Inactive ovaries, luteal and follicular cysts and uterine infection were reported in camels in different parts of the world (Shalash and Nawite, 1963; Abdo *et al.*, 1969; Musa, 1984; Al-Ani, *et al.* 1992). These conditions are responsible for early slaughtering of the shecamels due to conception failure (Al-Ani, *et al.* 1992).

Although rabies in camels has supposedly been observed in many African and Asian countries, very little has been published on this subject. Recent reports of rabies in camels have appeared from Morocco, Mauritania, Oman, Somalia and United Arab Emirates (Wernery and Kaaden, 1994). Dogs and wild animals are the main source of infection to camels.

Injuries of varying degree of severity are a common problem in camel management (Schwartz and Dioli, 1992). During the rutting season fighting wounds among male camels is a common problem. Common sites for bite wounds are the withers, hump, front legs and scrotum. The footpad and the pedestal pad are predisposed, by their function, to penetration by foreign bodies. Humid and wet weather increase the liability by softening the horn (Schwartz and Dioli, 1992).

# CONCLUSION

In conclusion, camel diseases quite frequently occur in Jordan. According to the incidence of the diseases, we could classify camel diseases in Jordan into 3 different categories: common, less common and rare. Among the common diseases and/or conditions were gastrointestinal parasites, nasal miasis, ectoparasites, hydated cyst, *Trypanosomiasis* and plastic foreign bodies in the rumen. Less common occurring diseases were cutaneous fungal infection, liver abscess, mastitis, infertility, retained placenta, metritis, newly born calf diarrhea, and brucellosis. Among rare cases were rabies, congenital defect and tumors.

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