Observations on diseases of the dromedary in Central Somalia

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Dromedaries gathered at drinking water
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References
Introduction

The dromedary, one-humped camel or Arabian camel (Camelus dromedarius) and bacterian, the two-humped camel (Camelus bacterianus) of genus camelus (the Old World camelids, OWC) belong to the family of Camelidae, suborder of Tylopoda, order of Actiodactyla, class of Mammalia (Fowler, 1998).

The world camel population is estimated at 18.26 million. Somalia has the largest (34%) dromedary population in the world which is more than 6.24 million (Wilson, 1990; Anon, 1988) and the highest density (30%) of that population (1.87 million) is found in Central Somalia (Hiraan, Galgaduud and Mudug regions). Furthermore, there are 1.75 (28%) million in the northern, 1.21 (19%) million in the southern and 1.41 (23%) million in the trans Juba regions.

The economic importance of the dromedary for Somalia is due to milk and meat production. The dromedary is used for transport of milk, water and nomadic household migration. It is the unique to survive and produce under extreme arid and semi-arid conditions of Central Somalia.

The dromedary is used in recent years to supply milk to towns. Therefore, it kept in rural and around urban areas. Moreover, export dromedaries provide for a great deal of the country’s hard currency earnings. The hides of the dromedary are also exported to gain the hard currency.

The different research projects and institutions were conducted in 1980s to investigate the dromedary production and disease in Somalia.

The two main research projects were Camel Research Project at the Academy of Sciences and Arts and Camel Disease Research Project at the Faculty of Veterinary Medicine and Animal Husbandry, Somali National University.

The Serum and Vaccine Institute, the Institute of Trypanosomiasis in Afgoye and the Veterinary Laboratory in Beletweyne had participated to contribute the investigations on dromedary production and disease.

Camel Disease Research Project was designed by the Faculty of Veterinary Medicine and Animal Husbandry and German Agency for Technical Cooperation (GTZ) for the investigation of dromedary production and disease in Central Somalia (Moallin and Heuer, 1989).

The research investigations were initiated at the end 1986 and they were oriented for prospective monitoring survey in different localities according to ecological system (Riverine “Beletweyne”, semiarid “El Buur” and arid “Galkayo”) for about 3 years.
The owners of 17 selected herds have been routinely interviewed on clinical descriptions and the major cause of deaths where 655 dromedaries were observed (Moallin, 1988). A priority interest was given to more profound clinical and necropsy observations which followed by the laboratory confirmations in accordance with the local names of diseases and their importance to the nomadic households of Central Somalia.

The findings from the Projects and institutions were published in the international and local journals like Camel Forum series, the Bolettino Scientifico of the Faculty of Veterinary Medicine and Animal Husbandry and others were submitted to the First National Veterinary Symposium, 12-15 October 1986, Mogadishu, Somalia; to the Camel Seminar, 28 November-1st October 1988, Mogadishu, Somalia; to the Forum on Production, Marketing and Research, IGGAD sub-region, 5-7 June 1989, Mogadishu, Somalia and to the Workshop on “It is Possible to improve the Reproduction Performance of a Camel”, 10-12 September 1990, Paris, France.

The survey conducted in 1987-88 showed the young death rate was 20% whereas crude death rate was 13% in Central Somalia. The major causes of 92 deaths were attributable to the enteric disorders 25(27%), tick infestations 19(21%), lymphadenitis 17(19%), malnutrition 13(14%), sand ingestion 5(6%), trypanosomiasis 2(2%), encephalitis 2(2%) and others like camelpox, neck torsion disease (wry neck syndrome), delivery complication were each of them 1(1%). Lastly, there were accidental and not identified cause of 2(2%) and 4(4%) respectively.

Several diseases were revealed to be seriously affecting the dromedary herds of Central Somalia such as trypanosomosis, mange, camel contagious ecthyma, contagious skin necrosis, ticks and biting flies.

Whatever the cause of the diseases, there is absolutely the need of effective treatment and control to improve the dromedary herd productivity.

The exposition of these dromedary diseases are simplified for better understanding in viral, bacterial, fungal, parasites, plant poisoning, vitamin and mineral deficiencies.

Furthermore, it’s obviously interesting to observe each disease and underline to those have a major economic importance in the nomadic herds of Central Somalia.
1. Viral diseases

The dromedary is a resistant animal to the diseases, although there is a disease like camelpox which considered a very serious disease in the dromedary herds of Somalia.

The outbreaks of camel contagious ecthyma and camel papillomatosis are reported in the dromedary herds of Central Somalia. Rabies, camel influenza and calf diarrhea are also considered to cause disease in the dromedary.

A lot of viral antibodies like Parainfluenza 3 (Frigeri and Arush, 1979; Arush, 1982; Bornestein, 1988) and Bovine diarrhea virus (Bornestein, 1988) and Crimean – Congo haemorrhagic fever (Ergonul and Whitehouse, 2007) have been detected in the dromedary sera of Somalia, although these diseases have not yet been confirmed clinically to produce a disease.

1.1 Camelpox “Furuqa geela, Tuur-tuur”

Camelpox (CP) is a viral disease caused by Orthopoxvirus cameli (Orthopoxvirus, Poxviridae). The disease is mostly affecting the young dromedaries. It is highly contagious and severe disease of the dromedary. It’s widely reported among camels.

Pox-like infections of parapoxvirus and papillomavirus have been found in dromedary herds of Central Somalia.

Camelpox was reported in the dromedary herds of the north and south west of Somalia (Mares, 1954; Kriz, 1982; Jezek et al, 1983).

The mild form is characterized after one week of incubation period by pustules on the nasal and oral mucosa.

The severe form is characterized by fever, papules, vesicles and pustules which covered by crusts on all parts of the body. Abortions and diarrhea have also been reported. Secondary bacterial infections may be involved.

The mortality rate is more than 30 %, particularly in young dromedaries in the outbreaks of camelpox.

Camelpox seems to not be infectious to humans (Kriz, 1982; Jezek et al, 1983).

The clinical signs of camelpox are very similar to those of camel contagious ecthyma except the former has more generalization and fatality.
The dromedaries recovered from the disease seem to have long immunity. There is no vaccine actually available in Somalia. Therefore, antiseptics and antibiotics are useful for secondary bacterial infections.

The diagnosis is only confirmed in the laboratory as the two diseases are close resembling.

1.2. Camel Contagious Ecthyma “Ajarre, Afburbur, Waafgaabo”

Camel contagious ecthyma (CCE) is caused by a parapoxvirus (Poxviridae). There is also ovine contagious ecthyma (Afrur, Afbur-bur) of goat and sheep which caused by a parapoxvirus.

Camel contagious ecthyma is mostly affecting the young dromedaries around 6 months to 2 years.

Camel contagious ecthyma virus was first isolated from outbreaks of camelpox in the south west of Somalia (Kriz, 1982).

Camel contagious ecthyma was observed in the south west of Beletweyne in 1986 and in several outbreaks in El bur and Galkayo districts during 1987-1989. The disease is considered the most widespread viral infection of the dromedary in Central Somalia (Moallin and Zessin, 1988), although the disease is probably endemic in Somalia.

The mild form was characterized by papula and proliferative pustules and scabs on the lips and muzzle (Fig. 1). The scabs usually dropped off within 2-3 weeks on the onset of the disease.

Figure 1 Young dromedary with proliferative pustules and scabs

In the severe cases, the entire head was swollen. The lesions around the mouth showed itches and hemorrhages. That may cause intake of food as calves become emaciated and death may be occurred. Conjunctivitis and lachrymation (2) may lead to the blindness.
The mandibular (Fig.2) and cervical lymph nodes were enlarged and lesions were found in the inguinal and genital regions (Fig.3). Bacterial secondary infections may be involved.

The disease is often occurred during rainy season where the transmission may be facilitated through browsing on thorny plants. The disease was found with high morbidity and low mortality.

An outbreak of Ovine contagious ecthyma was occurred in December 1986 in Central Somalia (Moallin et al.1989). There were no any simultaneous infections of camel contagious ecthyma and ovine contagious ecthyma as the nomadic households keep dromedary herds beside of goat and sheep flocks.

Camel contagious ecthyma infections to human beings have not yet reported.
Camel contagious ecthyma is confused with camelpox, camel papillomatosis, mange and ringworm, although camelpox is a fatal disease.

The pustules and scabs are sent to the laboratory for the diagnosis.

There is no vaccine available in Somalia, but topical antiseptics and antibiotics (spry) could be helpful for bacterial secondary infections.

1.3 Camel papillomatosis “Ruqbo, Buro”

Camel papillomatosis (Warts) is caused by papillomavirus (Papillomaviridae). Warts are benign neoplastic skin of human and animals.

The disease has been for the first time isolated from affected dromedaries during 1987/1989 in Beletweyne, El bur and Galkayo districts of Central Somalia (Munz et al, 1990).

The disease is mostly affecting the calves of about 2 years.

The wart lesions are usually found on the lips and nose (fig. 1). The generalized form is usually confused with camel contagious ecthyma.

Figure 1. Warts on the lips and nose
A various tumor nodules from small to the immense size (Fig. 2) are found on a body of a dromedary which persist and can be easily recognized.

![Image of camel](image)

Figure 2. Various tumor nodules on the body of an adult dromedary

Papillomatosis outbreaks occur during the rainy seasons and concur with those of camel contagious ecthyma.

Simultaneous infections of the two viruses in the dromedary herds of Central Somalia, presumably diagnosed as camel contagious ecthyma were observed. That may further complicate the differentiating of camelpox, camel contagious ecthyma and camel papillomatosis in the young dromedaries which require the laboratory diagnosis.

Surgical removal and cauterization of the warts is recommended. Papillomatosis is usually a mild disease, therefore no prevention is needed.

1.4 Camel encephalitis “Shimbir haad”

Camel encephalitis is becoming a mysterious disease of the dromedary herds of Central Somalia. Remarkable questions are posed by several researchers but it still not fully understood.

The dromedaries died for encephalitis were reported very low in Central Somalia.

The nervous disorders described in Central Somalia are rabies (Rabbiya), posterior paralysis or hindquarter paresis (Ruquus, Feel dabac) and Cephalopina titillator of nasal bot fly (Roor, Restless).
All these diseases are causing nervous symptoms which the herders generally refer to the “Shimber”. Therefore, further investigations are requested.

1.4.1 Rabies “Rabbiya”

Rabies (Rhaboviridae, genus Lyssavirus) is a viral disease of man and animals including the dromedary. The disease is mainly transmitted by biting dogs and wild carnivores.

There are two stages; the furious and paralytic. The furious is the most predominant in the dromedary which is characterized by restless, agitation, severe itches, frothing and muscular tremor. The affected dromedary bites everyone encountered.

Paralytic stage may be followed. The attempts of the dromedary to yawn (Khuura) are observed and the affected dromedary always dies.

Rabies is rarely reported in the dromedary herds of Central Somalia which followed by biting infected dogs.

The suspected dromedary should be observed for two weeks. The hippocampus is usually used for rabies confirmation.

As a viral disease, there is no treatment except the vaccine. The carcass should be destroyed and avoided by wild carnivores.

1.4.2 Posterior paralysis “Ruquus, Feel dabac”

Posterior paralysis or Hindquarter paresis is Rabies like disease described in the dromedary herds of Central Somalia of unknown etiology with paralysis or paresis of posterior legs.

Rabies like disease was also reported in Somalia (Arush, 1982; Somac / Sarec, 1982), although there was no any isolation from the suffering dromedaries.

The affected dromedary is found lying on the ground with little efforts of movements but the death always occurs.
1.5 Camel influenza  “Durey, Hergeb, Oh”

Camel influenza is a disease mentioned by camel herders which still needed to be fully elucidated. A several viral and bacterial infections may be included.

Influenza like epidemics were previously reported in Somali dromedaries (Aguardra, 1958; Somac / Sarec, 1982). Respiratory symptoms with rhinitis and conjunctivitis were observed in dromedaries without any isolation of the responsible of the disease.

Influenza A (Orthomyxoviridae, Influenzaviruses) was only reported in the severe outbreaks of respiratory disease among bacterian camels in Mongolia (Yamnikova et al. 1993).

The clinical signs are fever, cough, bronchitis and pneumonia. There are also more eye, ocular and nasal discharges.

Influenza A is considered a health hazard for humans.

There is no treatment for camel influenza, although antibiotics are useful for secondary bacterial infections.

1.6 Calf diarrhea “Doox”

Calf diarrhea is a severe disease of the young dromedaries of Central Somalia. The disease may be caused by viral diseases with the complication of bacterial infections.

The enteric disorders were considered the highest (27%) cause of deaths, followed by ticks infestations (21%), lymphadenitis (18%) and malnutrition (15%) among dromedaries in Central Somalia.

Rotavirus (Reoviridae) and cronavirus (Coronaviridae) were detected in the young dromedaries with diarrhea in UAE and Sudan (Warnery et al. 2002).

Feces from young dromedaries should be submitted to the laboratory for viral confirmation.

Calf diarrhea is very difficult to control. Rehydration of young dromedaries and the use of antibiotics for secondary bacterial infections are the best choice.
2. Bacterial diseases

2.1 Anthrax “Kud”

Anthrax is reported in Somalia (Mares, 1954) and it is a very dangerous infectious disease of man and animals including the dromedary.

The disease is caused by a highly pathogen bacterium of Bacillus anthrax with an aerobic spores. The B. anthrax spores can survive for many years in the soil. Therefore, the dromedary in a good condition at herding night may found dead at the morning of the next day.

The clinical symptoms include high fever (40°C) and bloat. Some dromedaries may develop painful edema on the throat and neck. Blood usually comes from natural orifices. The diarrhea is occasionally described. Sudden death usually occurs without any previous signs.

The dromedary owners believe that the most neonatal deaths are attributed to the Anthrax.

The disease could be transmitted mechanically by biting flies like Tabanids and Stomoxys. There is a febrile disease (Kulule) by biting flies in the dromedary herds of Central Somalia which described by the herders.

There is no rigor mortis. Blood is dark-red and poorly clotted. Petichiae and ecchymoses are found on the whole carcass.

The suspected dromedary is never submitted to the necropsy to avoid the contamination of the soil. A small amount of blood is sufficient for the diagnosis. A smear or a culture is used to confirm the diagnosis.

The carcasses should not be opened and they must be incinerated. The equipment must be disinfected. Penicillin, streptomycin and oxytetracycline are used for anthrax. There is a good vaccine available, therefore the dromedaries are recommended to be vaccinated.

2.2 Tetanus “Afdhuur, Qalal”

Tetanus is a disease of humans and animals. The disease has been sporadically described by the owners of the dromedary herds of Central Somalia.

The disease is caused by Clostridium tetani which is strictly an anaerobic with spores and it is found on the soil and feces.
The spores of C. tetani may be introduced through wounds or puncture wounds and multiply in the tissues with reduced oxygen. The spores of C. tetani can spread through wounds or injures to the blood vessels and lymph nodes and produce the highly lethal neurotoxin which may reach to the central nervous system and cause classical neurological signs of tetanus.

The clinical signs of tetanus are jaw spasm, stiff neck, rigid tail and erected ears.

Antibiotics like penicillin are used. Tetanus antitoxin is also available and artificial feeding is recommended. Dromedaries should be vaccinated before castration as cases of tetanus may follow it.

The stiff neck syndrome similar to tetanus has been reported on the dromedaries of East Africa with muscle spasm and neck stiffness (Schwartz and Dioli, 1992).

2.3 Diarrheal diseases

“Shimbir calooloed, Shuban”

Diarrhea is a consequence of many diseases such as viral, bacteria and parasites including salmonellosis and gastrointestinal helminths.

The main symptom is diarrhea, sometimes with bloodiness. The affected dromedary becomes emaciated.

Feces are examined for the presence of bacterial as well as eggs of helminths.

The treatment is depend on the cause whatever antibiotics or anthelminths.

2.3.1 Salmonellosis

Salmonella (Enterobacteriaceae, Salmonella) infections are found in all animals.

The disease is reported in the dromedaries of Somalia (Cheyne, 1977; Andreani et al., 1978). Salmonella bredney and S. scholerae – suis are isolated from dromedaries in Somalia.

Salmonella can cause fever, diarrhea and abortion. Hemorrhagic diarrhea with dehydration and high rate death is found in the young dromedaries whereas the chronic enteritis is very common in the adult dromedaries.

Salmonella in association with colibacillosis, rota and cronaviruses are considered the principal cause of calf diarrhea with high mortality (Wanery and Kaaden, 2002).
Salmonellosis is a zoonosis. Therefore, preventive measures must be taken in consideration for meat consumption. The dromedary is considered an important reservoir for salmonella and could be a health hazard for humans.

The diagnosis of salmonellosis in the dromedaries suffering from enteritis should be submitted to the laboratory.

Antibiotics like Ampicillin and Amoxycllin are recommended for salmonellosis. Inactivated vaccines are also used.

2.4 Abortion and infertility “Dhicis, Dhalma la’aan”

The survey conducted in 1988 in Central Somalia showed the fertility rate was 60% with the first age calving at 6 years and the gestation length was 13 months with calving intervals mostly at 2 years. The female dromedary was not exceeded 2 calves in breeding life (Moallin and Mohamud, 1990). Therefore, the birth rate is very low which determined by late of first calving, long gestation and long calving intervals.

The abortion (Dhicis) has often described by the dromedary herders who seek the veterinary assistance in the complicated deliveries. The infertility (Dhalm la’aan) is rarely reported. Different viral, bacterial and parasites are causing abortion and infertility in the dromedary herds of Central Somalia.

The diseases responsible for abortion are brucellosis, camelpox and trypanosomosis.

2.4.1 Brucellosis

Brucellosis (Brucellae, Brucella) is a disease of human and animals which may be involved in the dromedary abortion.

Brucella species are B. melitensis and abortus which both of them can infect dromedaries.

Brucellosis is considered one of the most important zoonoses. Therefore, the nomadic people can be infected with the consumption of unheated milk.

Surveys of the prevalence of brucellosis have been conducted by Bishop (1979), Anonymous (1981), Andreani et al (1982), Bornstein (1984) and Bornstein (1988) on the dromedaries of Somalia with 4%, 10.4%, 5.0-7.8%, 8.5-11.5% and 1.3% respectively.
The brucella infection is revealed by serological investigations with the low incidence of 1.3% and 0.3-1.9% of dromedaries in Central Somalia (Moallin and Zessin, 1990; Bauman and Zessin, 1992). Therefore, the prevalence of brucellosis in the dromedaries confirms the low spreading of the infection in the nomadic herds of Central Somalia.

The most important clinical sign is abortion. The infection may cause still born calves and the reduction of milk.

The diagnosis of brucellosis is very difficult as there are other diseases which could be involved in the dromedary abortion like salmonellosis and trypanosomosis. Brucella abortus and melitensis have been isolated from milk, vaginal swabs, aborted fetus and lymph nodes of infected camels. Blood and milk are used for antibody detection whereas placenta, stomach and lymph nodes for the isolation of brucella.

The positive dromedaries are recommended to be slaughtered and the vaccinations of the others are implemented for the elimination of brucellosis from the entire herds.

2.5 Mastitis “Carar, Candha barar”

Dromedaries can produce 6 to 8 liters per day and the lactation period is about 18 months. High concentration of Vitamin C and insulin have been found in the milk of dromedaries.

Mastitis is inflammation of mammary gland and the cause of a huge loss of milk production which is essential for the life of nomadic households and the population of towns and cities.

Mastitis has been reported in the dromedaries of Somalia (Abdurahman et al, 1991; Arush et al, 1984).

Bacterial infections are the most commonly responsible for the dromedary mastitis, without treatment, the infected quarters drop gradually the milk production.

The most predominant bacterial infections are staphylococcus and streptococcus spp.

The clinical signs are swelling, hot and painful of the udder. There are also fever, depression and anorexia of the affected dromedary.

The mastitis is very carefully treated with antibiotics through infusion.
2.6 Camel pneumonia

“Dhuguta”

Pneumonia is the inflammation of the lungs. Various viral, bacterial, fungal and parasites infections are found in dromedaries with respiratory diseases.

Camel pneumonia has been widely reported among dromedaries in Somalia.

The prevalence of pneumonia was 31% in the dromedaries slaughtered at Beletweyne abattoir. Therefore, the disease is considered one of the major diseases in Central Somalia.

Staphylococcus spp in association with E. coli, Pseudomonas auriginosa and citobacter freudi were isolated from lungs with pneumonia infiltrated with abscesses in the dromedaries slaughtered at Beletweyne abattoir (Moallin and Zessin, 1990).

Lung abscesses with purulent bronchitis were found in 15 slaughtered dromedaries and isolated hemolytic streptococci and Staphylococcus (Vitovic and Vladic, 1983).

Staphylococcus spp., E.coli, Diplococci and Pseudomonas spp were isolated from altered lungs in 6(3%) of 200 slaughtered dromedaries (Abdurahman, 1987).

The clinical signs are fever, lacrimation, purulent nasal discharge and loss of appetite. There are also depression, dyspnea and cough.

An epidemic of respiratory disease ‘Sonbobe’ was reported in Somali region of Ethiopia (Bekele, 1999). The main clinical signs were high fever, depression, cough and watery nasal discharge leading to the mucopurulent. Some dromedaries died within 9 days. Oxytetracycline was the most effective. Pasteurella haemolytica was isolated from lungs, thoracic fluid and blood of these dromedaries.

The treatment of camel pneumonia is well known by the herders using antibiotics like oxytetracycline called “Oksa”. There are also Procaine penicillin G and Gentamycin in combination with anti-inflammatory drugs like Dexamethasone.

2.7 Tuberculosis

“Fin, Qaaxo”

Tuberculosis (Mycobactericeae, Mycobacterium) is the disease of human and animals. The serotypes of Mycobacterium tuberculosis (M. tuberculosis) and Mycobacterium bovis (M.bovis) were isolated from dromedaries in Somalia (Pellegerini, 1942; Casati, 1957; Angrisani, 1962).

The most affected organs are lungs, mesenteric, mediastinal and retropharyngeal lymph nodes. There are also pleura, liver, kidneys and spleen. Miliary nodes are seen on the lungs and other organs.
The disease was rarely reported in the nomadic herds of Central Somalia.

Tuberculosis is very dangerous zoonoses. Therefore, the disease plays a major role among nomadic people in Somalia as they usually consume raw milk.

The diagnosis of tuberculosis is very difficult and none of the tests available can confirm the disease with certainly. A definitive diagnosis requires cultural methods, isolation and identification of the Mycobacterium.

The control of tuberculosis on intradermal tuberculin test in the dromedary herds is still unpracticed.

There is another respiratory disease called “Shafow, shafduleel” which rarely reported in the dromedary herds of Central Somalia. This disease could be reminded the tuberculosis.

2.8 Lymphoadenitis “Qarar, Qandhir barar”

Lymphadenitis is a widespread disease in the dromedary herds of Central Somalia. The dromedaries died for lymphadenitis were considered 19% in Central Somalia.

The lymphadenitis in young dromedaries is the most severe. The affected calves show warm, painful and swellings of lymph nodes. These lesions may develop to the chronic and become abscesses. The abscesses are also found on the neck and legs. The opened lymph nodes contain yellow and creamy pus. The herders believe that is caused by tick infestations.

Lymphadenitis is also observed in adult dromedaries. The cervical lymph node is the most involved with abscesses.

Staphylococcus spp was isolated from a lower cervical lymph node with abscesses of an adult dromedary slaughtered at Beletweyne abattoir of Central Somalia (Moallin and Zessin, 1990).

Skin abscesses are observed on the head, shoulder, abdomen and legs of dromedaries and several bacterial species were isolated from these abscesses.

The cleaning affected skin lesions and draining the abscesses with the use of antibiotics (spry or injection) are indicated to be effective.
2.9 Contagious skin necrosis “Maca”

Contagious skin necrosis is a very serious disease of the dromedary in the Hiran region of Central Somalia.

Streptococcus aglactiae and salt deficiency were reported as the main causes of the disease in the north of Somalia (Peck, 1939; Edelsten, 1974).

The hard, warm and painful swellings of skin necrosis appear first which develop into abscesses. The abscesses are mostly round as a size of a Somali shilling on the neck, shoulder, abdomen, hindquarters and flanks.

Dermatophilosis of Dermatophilus congelensis were reported in dromedaries suffering from skin necrosis in neighboring Ethiopia (Samuel et al, 1998) and Kenya (Bornstein, 1995). Whether contagious skin necrosis and dermatophilosis are identical, similar or different needs to be further elucidated.

Penicillin, streptomycin, gentamycin and oxytetracycline are indicated as a choice of treatment with the addition of salt.

2.10 Foot rot “Fiix, Maal, Sabaad”

Foot swollen is caused by bacterial infections penetrating through injuries. The disease is widely distributed in the dromedary herds of Central Somalia.

Swellings and abscesses are observed on the foot. Lameness may be seen in the severe cases.

The cleaning of the infected foot and the use of antibiotics as chloranphenicol whether spry or ointments are indicative.
3 Fungal diseases

A lot of fungal species may produce skin lesions, therefore those causing dermatophytosis (ringworm) are the most widespread in camels.

3.1 Ringworm (Dermatophytosis) “Boogo dawaco, Cambaar cad”

Dermatophytosis is an infestation by fungi of skin, hair and nails. The domestic animals are very susceptible.

Ringworm is a disease caused by dermatophytes. The disease is widespread in the dromedary herds of Central Somalia affecting mostly the calves.

The well known dermatophytes are the two genera; Trichophyton and Microsporum.

The main symptom is the loss of hair on the middle of abdomen but could be also observed in the neck, head, legs, shoulder and flanks of young dromedaries.

The disease is dangerous for human beings.

Samples from scrapings on the lesions are examined for the presence of hyphae and spores and for the differentiation of dermatophyte genera.

The affected parts are cleaned with warm soapy water and treated with tincture of iodine and other fungicides.
4. Parasitic diseases

Parasitic diseases can drastically reduce the production of milk, meat and hides and cause a substantial economic loses in the country.

4.1 Trypanosomiasis

Trypanosomiasis (Trypanosoma spp.) is a disease of human and animals and it is the most important protozoal disease in the dromedaries.

The disease is mostly caused by trypanosoma evansi but others may occur like T.simiae (Pellegrini, 1948; Dirie et al., 1989). T.evansi can seriously infect many species of animals including dromedaries.

Trypanosomosis is a well known disease by the dromedary owners of Central Somalia. The prevalence of infection was 58% of dromedaries in Somalia (Ceille, 1987) and 7.2-56% of dromedaries in Central Somalia (Bauman and Zessin, 1992). The latter discrepancy of positivity is depending on the test used.

The disease is widespread and mechanically transmitted by biting or blood sucking flies and insects. The main vectors are Tabanids and Stomoxys. Other insects may transmit the trypanosome considering minor importance. Contaminated needles are also considered as a potential source of disease transmission.

The clinical signs are fever and edema which may appear on the neck and abdomen of dromedaries. There are also anorexia, loss of condition, reduction of the hump and high mortality.

Anemia and loss of condition with fetid odor of urine is also observed in the chronic form. The infested dromedaries may be persisted for years ending in emaciation and death. The disease can cause abortion and still birth. For that reason, the disease limits the productivity of milk and meat.

The disease is mostly occurred in chronic form which is usually fatal in untreated dromedaries.

The affected animals are diagnosed with the microhematocrit centrifugation technique (MHCT) in the field and quickly treated.

Suramin (Naganol, madax geel), Quinapyramine sulfate (Antrycide) and Isometamidium (Samorin) are considered the most indicative for treatment and prevention of trypanosomiasis.
4.2 Nematodes (Roundworms)

Nematodes (roundworm) belongs to the Phylum Nemathelmintha whereas the flukes and tapeworms (cestodes) to the Phylum Platyhelmintha (Flatworm).

4.2.1 Gastrointestinal helminths “Goriyaan, Caal”

The dromedaries carry on helminths (Worms) throughout the year with heavy infestations during the rainy season.

Trichostrongylidosis (Trichostrongylidae), strongiloidosis (Strongyloidae), trichuriosis (Trichuridae) are usually found in the dromedary herds of Somalia.

Trichstrongylidosis is widely reported with a considerable morbidity and mortality in ruminants and camels. The most relevant genera are Trichostrongylus, Haemonchus, Nematodirus, Ostertagia and Cooperia.

Haemonchus species are blood sucking parasite causing wounds and hemorrhages on the stomach of camels with anemia, anorexia and diarrhea. The death of infested dromedaries may sometimes follow.

Strongyloides is a common parasite of small intestine of dromedaries which may cause severe enteritis and death.

Trichiuris species are usually found in cecum and colon of the dromedaries and they irritate them to produce catarrhal enteritis and hemorrhages similar to haemonchosis.

The most important clinical signs of gastrointestinal helminths are diarrhea, constipation, anemia and emaciation as the worms are in competition with the dromedary certain nutriments. The death of infested dromedaries may sometimes occur.

Feces samples are requested for the diagnosis.

4.2.2 Filariasis

Filariasis (Onchocercidosis) of the dromedary is caused by a Dipetalonema evansi (Onchocercidae). The microfilarias have been occasionally seen in the peripheral blood of the affected dromedaries in healthy condition.

A microfilaria has been detected in blood of a dromedary herd in the eastern Beletweyne. Therefore, the incidence of infestation is very low in Central Somalia.

The adult form is localized in spermatic artery, pulmonary and diaphragmatic arteries.
The heavy infestation may cause emaciation, arteriosclerosis and heart failure.

The concentration techniques are used for the detection of microfilariae in the blood of infested dromedaries.

The anthelmintic drugs as Fenbendazole, Oxbendazole, Mebendazole, Thiabendazole, Tetramisole hydrochloride (Nilverm), Levamisole and Ivermectin are good effective for the control of gastrointestinal worms in the dromedary herds. Ivermectin drug is also used for the treatment of filariasis.

4.3 Cestodes (Tapeworms)

Cestodes belong to Phylum Platyhelmintha (Flatworms).

4.3.1. Hydatid cysts (Echinococcus hydatidosus)

The echinococcus hydatidosus (Taeniidae) is the larvae of the adult worm of echinococcus granulosus. The adult worm is found in the intestine of dog and wild carnivores. Echinococcosis is very important zoonosis in the dromedaries.

Hydatidosis is very common in Somalia and it is particularly found in the lung and lever of slaughtered dromedaries.

A high infestation of hydatidosis was found in lung and liver. The cysts are observed in 17 (21%) lungs and 13 (16.5%) livers of 79 apparent healthy dromedaries slaughtered at Beletweyne abattoir.

Only 2 (2.5%) fertile cysts were found on the lungs and none on the livers of those dromedaries (Moallin and Zessin, 1990). Therefore, the lung is the most infested by hydatid cysts and the affected lung may develop respiratory disorders. The fertile cysts were very rare suggesting that the dromedary contributes little to the echinoccocosis cycle.

The infested organs are omitted for dog feeding to interrupt the cycle dog-dromedary. The man is very rare to be infested with the disease, In spite of that, the dog cycle is the most important source of human infections as dromedary pastoralists are considered the highest risk for hydatidosis.

Hadatid cysts are often detected at the abattoir and in the laboratory.

Anthelmintic drugs are used for treatment of infested dogs.
4.3.2 Coenurus cerebralis

Coenurus cerebralis (Taeniidae) is a larvae cyst of the adult tapeworm of Taenia multiceps which occurs in the small intestine of dogs and wild carnivores.

The larvae are localized in the brain of ruminants and dromedaries causing nervous disorders similar to those of “Shimbir”.

The disease is not yet confirmed in Central Somalia; therefore care should be taken to differentiate from other nervous diseases.

The diagnosis is based on the necropsy.

4.3.3 Cysticercus dromedarii

Cysticercus dromedarii (Taeniidae) is the larvae of adult tapeworm of Taenia hyaenae which usually found in the muscles of dromedaries and ruminants (Kaufmann, 1996). The adult is localized in the small intestine of hyena.

C. dromedarii cysts are very large and the infested meat is not dangerous for human but it needs to be eliminated.

C. dromedarii is detected at the necropsy.

4.4 Mange (Order Astigmata – Mites, Subclass Acaria, Class Arachnea, Phylum Arthropoda)

4.4.1 Sarcoptic mange    “Cadho, Cambaar”

Mange is highly contagious and damaging the skin of infested animals. T.evansi and sarcoptes scabiei are the most economically important in camels.

Mange is a very serious disease of the dromedary in Central Somalia. Human beings are also involved.

The Mange is mostly caused by Sarcoptes scabiei (Sacoptidae), although, there are Psoroptic (Psoroptidae, Psorotes sp.), Chorioptic (Psoroptidae, Chorioptes sp.) and Dermodectic mange (Demodicidae, Demodex sp.) with little incidence in dromedaries.

The affected dromedaries show papula on the head, lower neck, thighs, flanks, shoulder and inguinal regions. The lesions in severe cases may spread anywhere of the body.
Severe itches are also observed; therefore the dromedaries are biting the affected parts. That is leading into the thickness, alopecia and more exudation of scabs which disturb seriously the dromedaries.

Mange could be confused with ringworm and other skin diseases; therefore the differential diagnosis is requested to the laboratory. The scrapping samples from the lesions are examined for the presence of the mite.

Mange is treated with injectible endectocides or macrocyclic lactones such as Ivermectin and showed to be very effective.

4.5 Ticks (Order Metastigmata) and tick paralysis “Shillin, Muqle”

Ticks have been widely reported in domestic animals including dromedaries in Somalia (Prgram, 1976; Scaramella et al., 1989).

Tick infestations are widespread among dromedary herds of Central Somalia. The dromedaries died for heavy tick infestations were considered 21% in Central Somalia.

The owners are continuously seeking the veterinary assistance. Ticks are usually active during the year, although it seems to be more abundant during the rainy season.

The Hard ticks (Family Ixodidae) genera infesting dromedaries are Hyalomma, Amblyomma and Rhipicephalus. Hyalomma species are the most predominant ticks in Somalia whereas H. dromedari is the most widespread among dromedaries. There are also soft ticks (Family Argasidae) of Ornithodoros savignyi.

Ticks are found in inguinal, perineal and axillary regions. The ticks are also found in ears, nose and eyes.

Ticks cause irritations and anemia. The heavy infestation of ticks can cause injuries of biting site and wounds. Pyoderma may occur in consequence.

Ticks may play an important vector role in the transmitting diseases like bacteria, rickettsia and viruses. Several tick borne diseases including Barur virus (Butenko et al., 1981) and kismayo virus have been isolated from R. pulchellus ticks of dromedaries in Somalia.

Tick paralysis is a disease called Muqle by owners and it is rarely reported in Central Somalia. Tick paralysis has been reported on dromedaries of northern Somalia (Pegram, 1976; Catley and Mohammed, 1995). Many tick species can produce neurotoxin and cause paralysis of the dromedaries (Gothe and Nritz, 1991).
Regular inspections with the use of chemotherapeutics like flumethrin (Bayticol) and Ivermectin are the most effective for tick control. Nevertheless, a lot of acaricides are becoming less efficient for the long period of applications.

4.6 Biting and sucking flies (Order Dipterida)  

“Qaniin, Baal”

Most of flies are part of Suborder Brachicerina except Mosquitoes which are part of Suborder Nematocerina.

The biting and sucking flies recorded in Central Somalia are Camel nasal bot fly, Hypobosca camelina (Takar), Glossina (Dhoog), Mosquitoes (kaneeco), Tabanus (cadcade?), Lucilia spp. (garbo or kilmi?) and others like riibi and qamadhar.

The larvae of several flies can cause Myiasis (wounds) on the skin of the dromedaries.

4.6.1 Cephalopina titillator (Roor)

Cephalopina titillator (Sangale) is the larvae of Camel nasal bot fly (Oestridae, Bot flies). The fly deposits the larvae of C. titillator in the nostrils which migrate to the nasal cavity of dromedaries causing irritations, heavy congestion, hemorrhages and meningitis.

During September 1988, a disease called Restless syndrome “Roor” which was affecting seriously the dromedary herds of eastern Galkayo was reported by herdsmen with aggressive and restless which followed by the death of dromedaries.

Seven adult dromedaries with nervous disorders were selected to be slaughtered in the abattoir. Massive larvae of C.titillator were found in the nasal cavity of all dromedaries which were causing a considerable damage on the mucosa of nasopharynx and nasal sinuses as a consequence of restless, sneezing, coughing and difficult breathing.

The larvae are usually a common parasite of nasal cavity”Sangale” of the dromedary herds of Somalia. Although, the high pathogen of the larvae in eastern Galkayo is still unknown.

The disease could be confused with rabies, coenurus cerebralis, intoxications and other neurological disorders like “Shimbir”.

The diagnosis of C.titillator is confirmed at the necropsy.

Subcutaneous injection of Ivermectin is indicative.
4.6.2 Lucilia

The Lucilia fly (Calliphoridae) is widespread throughout the world. The larvae feed on necrotic tissue.

The larvae may cause myiasis (wounds) of the dromedaries. The wounds are found on the neck, shoulder, flanks and on other parts of the body. The fly deposits the eggs on the wounds. The larvae can cause a considerable stress on the infested dromedaries, rubbing and biting the wounds.

Insecticides are used for larvae. The wounds are cleaned after the removal of necrotic tissue. Ivermectin is also effective.

4.6.3 Tabanids (Horse flies)

Tabanids (Tabanidae) are biting flies and the most important vector of T. evansi of camel trypanosomiasis. They can also transmit anthrax and other bacterial infections.

Tabanids are large and robust flies with strong wings which attack furiously on dromedaries’ abdomen and ventral regions causing irritations and stress. They also feed on the blood of dromedaries which leads to emaciation and loss of productivity.

4.6.4 Stomoxys

Stomoxys (Muscidae, Muscid flies) is a vector of T. evansi of camel trypanosomiasis. It is also a vector for several bacterial and viral infections.

The fly feeds on dromedaries causing irritations and stress as well as milk reduction.

The febrile disease (Kulule) is reported by the herders as transmitted by biting flies and the disease needs to be elucidated.

4.6.5 Hippobosca camelina

Hippobosca camelina (Hippoboscidae, Louse flies) is continuously causing nuisance to the dromedary and it may transmit T.evansi of camel trypanosomiasis.
4.6.6 Mosquitoes (Suborder Nematocerina)

Mosquitoes cause severe irritations and nuisance to the dromedaries.

Aedes species (Culicidae – Mosquitoes) are vectors of D. evansi of camel filariasis.

Several insecticides are available for the control of flies.
5. Plant poisoning

Plant poisoning is rarely described in the dromedary herds of Central Somalia.

Two calves were poisoned in El bur district by eating “ciin” plant. The calves showed bloat and respiratory disorders. One of them died and the other survived.

Another two adult male dromedaries for export were observed at Beletweyne abattoir which showed respiratory disorders followed by a quick death. One of the dromedary’s internal organs was yellow without clotted blood.

Plant poisoning from Capparis tomentosa “Gomorr or Gomboor” is mentioned in the dromedaries (Dirie and Abdirahman, 2003). The dromedary loses coordination and collapses after few days. The toxicity of the plant was implicated in the cause of wry neck syndrome which was produced in dromedaries using the leaves of the plant (Idris et al. 1979).

The prevention of plant poisoning often is very difficult.
6. Vitamins and Mineral deficiencies

The dromedary is usually a resistant animal for the harsh environment conditions.

Several nutritional deficiencies on the dromedaries are reported in Central Somalia.

6.1 Wry neck syndrome (Bent neck disease)

There is a disease called wry neck syndrome (Faje or Judaan). The disease has been rarely reported in the dromedary herds of Central Somalia and it may be caused by Vitamin B deficiency (Guleed and Bornstein, 1986). The disease may be implicated in the cause of plant poisoning of Capparis tomentosa “Gomorr and Gomboor”, although the exact aetiology of the disease is still to be elucidated.

The affected dromedary presented inappetence, loss of movement co-ordination, weakness, paralysis of hind legs and S-shaped bending in neck region. Therefore, the dromedary has inability to move its neck for grazing which often dies.

6.2 Salt deficiency

Salt deficiency is involved in the occurrence of contagious skin necrosis (Maca) considering a very serious disease of the dromedary at south west of Beledweyne.

Sand ingestion is in a common disease in El buur district where the dromedaries show enteric disorders followed by deaths. The dromedaries died for sand ingestions were considered very low in Central Somalia.

The sand ingestion may be caused also by salt deficiency. Therefore, salt of 140g is regularly supplied for disease prevention and the improvement of the dromedary health.

6.3 Arthritis

Arthritis has been seen in the dromedary herds of Central Somalia which may be caused by a phosphorus deficiency.
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