

Camel Haemorrhagic Septicaemia ('Camel HS') and 'Swollen Glands'

Outbreaks of *Pasteurella multocida* and *Mannheimia haemolytica* infections in camels have been reported in various countries in Africa and Asia (Wernery, 2002). Despite the fact that the aetiological agent of a HS-like disease in camels remains to be identified, the term 'Camel HS' is commonly being used (review see Wernery, 2002), implying that it is the same disease as HS of cattle and buffaloes, i.e. a highly fatal disease caused by *Pasteurella multocida* Carter serotype B:2 and E:2.

HS-like disease of camels or 'Camel HS' is endemic in North Kenya and outbreaks occur regularly (Schwartz and Dioli, 1992). During participatory assessments 'Camel HS/Swollen Glands Syndrome' was ranked by pastoralists in northern Kenya and in northern Somalia among the first to fourth most important health problems of their camels (Gluecks, 2010). The same researchers studied the possible involvement of *P. multocida* and other Pasteurellaceae in this disease/syndrome of unknown aetiology in northern Kenya. In the aftermath of outbreaks of HS-like disease in camels no carrier state was found for *P. multocida* Carter serotypes B:2 and E:2 in all camel populations screened in endemic

Camel HS areas of North Kenya (Gluecks et al., 2010). A KARI/KASAL² funded participatory epidemiology study investigated the relationship between

'Camel HS' and 'Swollen Glands Syndrome' (SGS) in North Kenya but focusing on endemic SGS (Wako 2012b). In this study, SGS was ranked as the most important disease of camels followed by respiratory diseases, Camel Pox and Wry Neck. Enlarged superficial lymph nodes, lacrymation, fever, recumbency, bad odour and high mortality were heavily associated with SGS. The latter is a disease of unclear aetiology and is endemic in camels in North Kenya. It is thought by some to be 'Camel HS'. According to Mochabo et al. (2005) the Rendille rank SGS as the 4th most important disease among their camel herds.

New Emerging Diseases

Emerging infectious diseases are a relatively new concept, defined as infectious diseases or drug-resistant infections that have recently increased in incidence or geographical range, recently been discovered (or caused by newly evolved pathogens) or recently jumped into new species (Khalafalla and Bornstein, 2012).

²Kenya Agricultural Research Institute/Kenya Arid and Semi-Arid Lands Programme

In 2006 a disease characterised by absence of any clinical symptoms, low morbidity and an almost 100% case fatality rate in adult female and male camels in good body condition was reported in Ethiopia (Wernery et al. 2006, Dawo 2010), in Somalia and in 2007 in Kenya (Gluecks and Younan, 2010). Investigations of the so called 'Sudden Death' outbreaks in Ethiopia (Wernery et al., 2006), in Somalia and in Kenya (Gluecks and Younan, 2010) failed to demonstrate any causative agent. No Morbilli virus antigen could be found in post mortem samples nor PPR antibodies in camel sera tested. Mortality rates of 'Sudden Death' in camels were 6.6% in Kenya and 3.7% in North Somalia (Gluecks and Younan, 2010).

The first documented outbreak of peste des petits ruminants (PPR) in camels was reported from Ethiopia in 1996 (Roger et al., 2000, 2001). The outbreak was characterized as a highly contagious respiratory syndrome exhibiting fairly high morbidity and low mortality rates. Outbreaks of a disease syndrome linked to PPR were seen in eastern Sudan in 2004 (Khalafalla, 2010). The clinical and epidemiological picture of the confirmed and suspected outbreaks of PPR, respectively in north eastern Africa show different clinical pictures: a per acute disease exhibiting sudden death in all age groups (mortalities in Sudan: 53% adults >5years and 47%

four years and younger), abortions and diarrhoea with high mortality rates which occurred in Sudan in 2004 (Khalafalla et al., 2010), and an acute respiratory disease with low mortality rates was seen during the early outbreaks 1992-1996 in Ethiopia (Roger et al., 2000). The epidemiology of PPR related sudden deaths differed from the 'Sudden Deaths' seen in Somalia and Kenya in 2006/2007, which affected exclusively camels aged 4 years and above and produced no respiratory symptoms, no abortions and no diarrhoea (Gluecks and Younan, 2010). The different forms of the disease syndrome may be explained by the involvement of other pathogens as secondary invaders or to genetic variations of the PPRvirus (PPRV). The latter hypothesis was found plausible when Kwatiek et al. (2011) detected lineage III of PPRV isolated from camels in Ethiopia in 1997 and lineage IV from dromedaries infected by PPRV in Sudan 2004.

Another emerging and dramatic disease in camels and domestic ruminants occurring irregularly with epizootic episodes seen in Kenya and some neighboring countries is Rift Valley Fever (RVF), a zoonotic arthropod-borne viral disease. It is characterized by high mortality rates in neonatal naïve animals, very high abortion rates in pregnant animals (especially in sheep, goats and camels) and by

significant numbers of humans being infected.

Rift Valley Fever is endemic in sub-Saharan Africa. The disease was first recognized in sheep in the Rift Valley in Kenya around 1900 (Swanepoel and Paweska, 2011). The causative pathogen was isolated 1930. Already Scott et al. (1963) associated their findings of antibodies to RVF virus in camels to a previous outbreak of abortions among the same camel population they were investigating in Kenya. Epidemics occur in this region when heavy rainfalls stimulate infected mosquito eggs to hatch, and large numbers of naive animals are present. Large outbreaks affecting sheep and cattle occurred in Kenya in 1930-31, 1968 and 1978-79 with smaller outbreaks at irregular intervals in the years in between (Swanepoel and Paweska, 2011). A large outbreak of RVF occurred in north-eastern Kenya and adjoining southern Somalia in 1997-1998 and also affected camels, but with the greatest losses among sheep and goats (Woods et al., 2002). Extensive outbreaks of the disease occurred also in other regions of Kenya and in Tanzania (Woods et al., 2002). There were heavy losses of livestock. Livestock owners reported losses of 70% of their animals. The most recent larger outbreak of RVF in Kenya was 2006/7 affected camels, small ruminants and humans (Bird et al., 2008). The infection caused a

very high prevalence of abortions in dromedaries.

Human cases are thought to be caused by the arthropod vectors and occupational exposure to aerosols of blood and tissues (amniotic fluids) or direct contact with infected animals, especially during slaughter. RVF virus has been isolated from raw milk (Woods et al., 2002). Large numbers of people may succumb to the infection during large outbreaks (Swanepoel and Paweska, 2011). During the 1997-98 outbreak in Kenya an estimated 27,700 humans in one district only (Garissa) were infected, of these 170 died with haemorrhagic fever symptoms (Woods et al., 2002). In humans the most common form is a self-limiting disease with flu-like symptoms. However, ocular disease, encephalitis and cases of fatal hemorrhagic fever may also occur in humans.

Following the 2006/7 RVF outbreak, epidemiological studies were carried out in Kenya and Tanzania (Jost et al., 2010). Somali pastoralists proved to be adept at recognizing symptoms of RVF and risk factors such as heavy rainfall and mosquito swarms. *Sandik*, which means “bloody nose,” was used by Somalis to denote disease consistent with RVF. Somalis reported that *sandik* was observed in the 1997/98 outbreak. Pastoralists communicated valuable

epidemiological information for surveillance and early warning systems that were observed before international warnings were communicated (Jost et al., 2010).

Rift Valley fever first appeared outside Africa in 2000, when outbreaks were reported in Saudi Arabia and Yemen.

A few of the other diseases mentioned above, such as dermatophilosis, ``Swollen Glands, HS and camel calf diarrhoea caused by *Isospora orlovi* may be included among new and emerging diseases (Khalafalla and Bornstein, 2012).

The importance to the poor of livestock including camels

“The contribution livestock makes to the total household income is as important to households falling below the poverty line as it is to those above it in 78% of all the districts in Kenya” (Perry et al., 2002). Livestock in ASAL contribute significantly more to the total household income for poorer households than for those with household income levels that place them above the poverty line. In the above areas camels contribute significantly to livestock production. The impact of animal disease are proportionally greater for the poor, who are more exposed to animal disease risk and have less capacity to cope with it than the better-off (Perry et al., 2002). Pastoralism is thought

to replace agro-pastoralism in some areas of Sub-Saharan Africa due to the predicted climate changes (Thorntorn et al., 2002). In areas where the growing period will be too short and no longer will support crop cultivation, pastoralism may become the only sustainable source of food production. In view of this, more efforts to promote the husbandry and veterinary services of the camels including diagnosis, control, prevention and treatment of diseases of these important food security animals are essential to be addressed.

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