

## EPIDEMIOLOGICAL ASPECTS OF SALINOMYCIN TOXICITY IN CAMELS (CAMELUS DROMEDARIUS)

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### ABSTRACT

*In Saudi Arabia, camels are raised on open system in variable size of herds; however they are supplemented with additional ration that includes barely, bran and Alfa-Alfa hay. Nonetheless, camel-owners are extremely cautious on the type and quality of feed supplements. Therefore, large scale of feed toxicity has not been experienced. The goal of this study was to describe epidemiological features of a neuromuscular illness that involved camel herds in the Southern region of the country during the summer of 2007. Twenty one camel herds were examined via a written survey and additional data were obtained from records at the local veterinary authority. Questions were focused on management, feeding and health aspects of camels. The morbidity rate ranged between 14 and 100%, while the mortality ranged between 33.3 and 85.6% and the case fatality was nearly 76.5%. On certain occasions camels were severely affected and clinical signs included recurrent regurgitation, incoordination, and ataxia, edema of the perineum region, pigmented urine and death within 1-2 days of exposure. On the other hand more mild disease that is characterized by signs of rear legs ataxia recumbancy was observed. The likely source of this toxicity, as reported by owners, was bran feeding. In conclusion, a sever epidemic of neuromuscular disease involved camels in the southern region of Saudi Arabia characterized by high morbidity and relatively high mortality. The source of this condition was feed toxicity and treatment was not rewarding.*

### الملخص العربى

الجوانب الوبائية للتسمم يالسالينومايسين فى الإبل

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يتم تربية الإبل في المملكة العربية السعودية في قطعان بأعداد مختلفة تتغذى بالإضافة للرعى على الشعير والنخالة والرودس الجاف، ولكن عادة ما يكون الملاك على درجة عالية من الحرص على جودة هذه الإضافات مما يقلص من احتمالات حدوث حالات تسمم على مستوى أعداد ضخمة، تمت في هذه الدراسة متابعة مرض عصبى عضلى لقطعان الإبل في المنطقة الجنوبية من المملكة العربية السعودية في صيف ٢٠٠٧، تمت متابعة ٢١ قطيع وعمل إستبانات للحصول على معلومات عن حالات التسمم من خلال الملاك والجهات البيطرية المحلية، تركزت الاستبانة على نظام الرعاية والتغذية والصحة للإبل، أوضحت النتائج أن نسب الإصابة تتراوح بين ١٤ - ١٠٠٪ ونسب الوفيات ٣٣٣-٨٥٦٪ بينما متوسط النفوق ضمن الحالات المصابة ٧٦٥٪، تبين أن البعض من الحالات مصابة بأعراض حادة متمثلة في تقيء، عدم توازن، ترنج، استسقاء حول فتحة الشرج وتغير لون البول والنفوق في يوم إلى يومين، هناك حالات أقل حدة مثل الترنج في الأرجل الخلفية، يتوقع أن مصدر التسمم حسب إفادة الملاك التغذوية بالنخالة. يستنتج أن هناك وباء عصبى عضلى للإبل في المنطقة الجنوبية من المملكة العربية السعودية يتمثل في نسب إصابة عالية و نفوق عالية وربما كان مصدره تسمم غذائى.

## INTRODUCTION

Camels in Saudi Arabia are raised mostly on open system in herds that range in size between few animals to several hundreds. Vaccination and deworming programs are not routinely practiced. Despite the fact that camels are allowed to graze freely in the dessert, feeding system also includes supplementation with concentrate such as barley and bran as well as Alfa-Alfa hay. Nonetheless, owners are very keen on the type and quality of supplied ration given to their animals.

Large scale epidemics among camel herds in the Kingdom of Saudi Arabia have not been reported. Previous reports of camel diseases showed relatively moderate prevalence such as Toxoplasma that had a prevalence of 16% based on serologic testing (Hussein et al., 1988). Food toxicity that involves large number of herds has not been documented. Finally, devastating disease that greatly impacts the health of camels and the economy of camel ownership has not been experienced in this country.

During the **summer of 2007**, camel herds in the Southern region of Saudi Arabia suf-

fered a great loss as a result of a neuromuscular disease. The report of the Ministry of Agriculture described traces of salinomycin and aluminum based on chemical analysis, as well as evidence of *Aspergillus clavitus* in the ration of affected herds. This article describes epidemiological aspects of this disease.

## MATERIALS AND METHODS

This study covered 21 camel herds located in two cities, Ranyah and Bisha, in the Southern region of Saudi Arabia. In order to have an insight on the origin of the outbreak, interviews with camel-owners from affected and non-affected herds have been conducted. Questions asked included: number of camels in the herd, breed, feeding management characteristics of animals affected and recent changes in management associated with onset of illness. Clinical examination of affected animals was conducted during the visits of affected herds. Other source of data was the local veterinary authority records of the outbreak events.

## RESULTS

Early cases of this outbreak were reported

during the second of July 2007. The earliest signs developed within 20 min to 5 hours of feeding in the second day after feeding. Some camels were severely affected and had signs of recurrent regurgitation, pigmented urine, recumbency, staggering gait, and death within 24-48 hours of onset of the disease. On other occasions, the disease was more mild and characterized by weakness, ataxia -mainly in the rear limbs- and decumbency. Some of the recumbent camels remained relatively bright and had fairly normal appetite. Ventral edema and swelling especially of the hind legs and edema of the perineum region were noticed. In the later farm, the illness lasted more than a month. Treatment approaches included vinegar, sodium thiosulphate supportive therapy such as vitamin E/Se and anti-inflammatory. Treatment showed no significant outcome.

Over 1185 camel were affected with a case fatality of 76.5 %. (90<sup>6</sup> animals died). In affected herds, morbidity rate ranged between 14 to 100%, while the mortality ranged between 33.3 to 85.6%. The disease was confined to old animals while young animals were not affected.

Among ration ingredients, bran feeding was common among affected herd. Eight herds with bran free ration had no disease ( $P=0.004$ ). Moreover, in some affected herds, some animals remained disease free as they were fed from different patch of feed. Nevertheless next to affected herds, several other herds were found normal despite the purchase of feed from similar sources. Drinking water was not associated with the illness since, in many occasions, affected and non-

affected herd were supplied from the same water source.

## DISCUSSION

This study is the first to describe large scale epidemic of food toxicity among camels. Bran feeding is becoming popular among camel owners to compensate for poor grazing. Salinomycin, Aluminum and Asperagallius were accused for the current condition based on the reports provided by the Ministry of Agriculture. Careful investigation of camel owners revealed no evidence of fungal contamination of the provided ration supplements. In addition, chemical laboratory analysis showed that the level of aluminum residues in the examined rations was within the acceptable values (Hussein, 2007).

The use of salinomycin as growth promoter and a coccidiostatic drug has been practiced in poultry feeding. Accidental poisoning of pigs revealed severe disease characterized by behavioral changes, reluctance to stand, elevated body temperature, ataxia, dark urine and death (Plumlee, et al., 1995). While in horses, signs included generalized weakness, anorexia, colic, ataxia, poor performance, and recumbency (Rollinson et al 1987, Aleman et al., 2007). Other animal species reported with salinomycin toxicity included cattle (Bastianello, 1996), cat (Van der Linde-Sipman et al., 1999), sheep (Synge 1989), as well as birds such as turkeys (Van Assen et al., 2006) and ostrich (Bird et al., 1997).

In camel, Wrenery, et al. (1998), was described a severe outbreak of salinomycin toxicity affecting 120 camels with 56

deaths. Affected animals showed weakness, incoordination, recumbency, ventral edema, myoglobinuria and death. These symptoms were identical to those described in this study. Camels seem to be very sensitive to salinomycin. Severity of the disease in this study varied between herds. In certain occasions, the disease was very severe resulted in over 85% mortality. Clinical signs included of short duration of illness, anorexia, ataxia, recumbency, pigmented urine. On other incidences the disease was milder manifested by signs of ataxia and recumbency. Such variation is likely to be related to the amount of contaminated feed introduced to animals.

This study was limited to two regions that were hit with the disease. Ranyah was one of the most severely affected areas with the total number of lost animals exceeded 1000 camels. Unfortunately difficulty in reaching owners restricted our attempts to gather more data. In addition more attempts were made to collect samples and perform postmortem on affected animals but the announcement of the government to provide financial compensation to owners made it very unrewarding to try obtaining further data.

The owners mostly agreed on a common source of toxicity. Bran obtained from trucks. However, certain owners that obtained bran from the same source had no disease. This is likely to be due to the presence of salinomycin residues in localized foci of feed bags. More interesting, some owners experienced mortality of over 80% within short time period probably because of the concentration of the toxin. Further investigation showed that the remain-

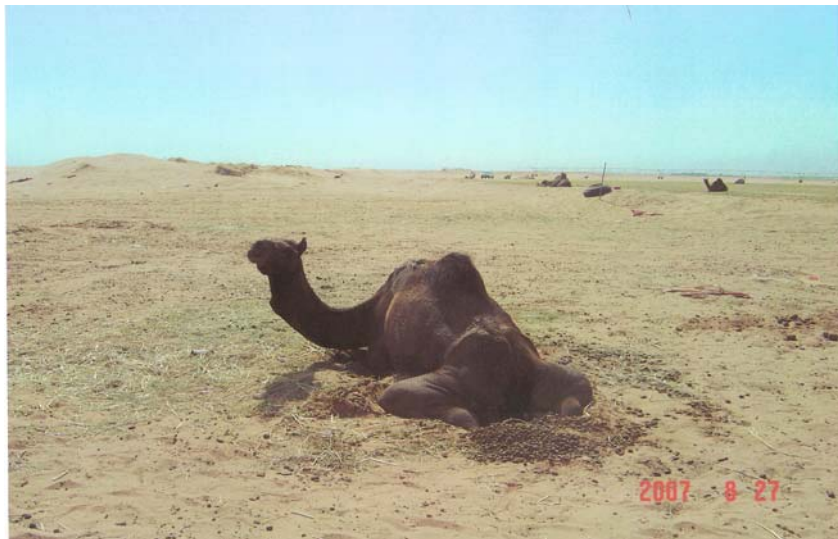
ing animals that survived the disease did not receive bran.

Treatment attempts were not fully successful. Lack of professional experience and shortage in medical supplies may partially explain treatment failure. However, previous treatment trials of salinomycin toxicity were mostly directed toward supportive therapy such as Vitamin E/Selenium, corticosteroids, sodium thiosulphate, vitamin B1, IV fluid and diuretics (**Wrenery 1998**). The most popular treatment of salinomycin toxicity is activated charcoal. In case of toxicity in which the cause of the toxicity is not detected, universal antidote is given. Such approach was not taken. Appropriate attention can not be overemphasized toward the health and well-being of camels knowing that high value of camels and the increase in the number of events related to camel showing business in the region.

In conclusion, massive epidemic has been reported in camel herds in two regions located in the Southern part of Saudi Arabia as a result of feed toxicity. The disease is characterized by neuromuscular signs that are associated with high morbidity and mortality. Treatment showed no positive outcome especially in severely affected cases.

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**Fig. 1 :** Camels affected with salinomycin toxicity showed lateral sitting with splayed rear legs.

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