



The Technical Cooperation Programme Between
The Ministry of Agriculture & the Food and Agriculture
Organization of the United Nations in Kingdom of Saudi Arabia

2011 - 2016

UTF/SAU/044/SAU



THE SELENIUM IN CAMEL

THE CHALLENGES FOR A GOOD BALANCE



Dr. Bernard Faye, F. Al-Zuraiq



A photograph of two camels in a desert landscape during the golden hour. The camel in the foreground is in sharp focus, looking towards the right. The second camel is in the background, slightly out of focus, also looking right. The background shows a vast, flat desert under a bright, hazy sky with some distant trees on the left.

THE SELENIUM IN CAMEL

the challenges for a good balance

The minerals are a part of the feeding resources essential for the animal life. The deficiency can occur even in the desert where the minerals are a dominant element in the landscape. So, the camel can be affected by mineral deficiency or in some occasions by mineral toxicity. Some minerals are necessary in high quantity for the general metabolism and body structure (calcium, phosphorus, potassium, sodium, magnesium), other minerals play an essential role for enzymes activities in general metabolism of the animals, but the requirements are in very low quantity (copper, zinc, manganese, iron, iodine, cobalt and so on). Selenium is one of these elements. It enters in the composition of an enzyme (glutathione-peroxidase) which plays a central action in the cell protection by anti-oxidative activity. Many studies in domestic animals have shown that selenium supply is linked to a better immune system by the protection of the cells involving in immunity process (white blood cells). Selenium is also involved in reproduction performance and in muscle metabolism. A lack of selenium can lead to infertility, muscle degenerative and heart failure.

Selenium deficiency is common in some places of the world where selenium is in low quantity in soils and plants. Such situation is generally more common in arid areas. In KSA, selenium deficiency in camel is regularly observed because soil and plant deficiencies occur in several places of the Kingdom. An important part of the camel calf mortality cases could be attributed to heart muscle dystrophy which is the main symptom of selenium deficiency in young animals (photo 1). The muscle degenerative impact of the lack of selenium can have a high consequence on the muscle activity and especially on race animals where this activity is strongly requested but also in young animals at their growing time.



Photo 1. Heart muscle degenerative in a young camel (Photo R. Seboussi)

However, if the requirements for cattle, sheep, goat and horse are well known for long time, the informations concerning selenium requirements for camel in general and camel race in particular are very recent. There is little evidence to date of clinical deficiencies. Only a few results on plasma or blood values in field conditions in different areas from Morocco, China, Saudi Arabia or in some zoological parks are available in the literature. Selenium deficiency has been observed also in young camels with temperate feeding conditions in France. Some data have been collected recently in Emirates and the results allow confirming that the normal selenium blood level in camel without selenium supplementation is around 100ng/100ml. In supplemented animals, the serum values could increase up to 200 ng/ml even more. A deficient situation could be considered when values are below 50 ng/ml.

In milk, the Se concentration is comparable to blood concentration, i.e. around 100 ng/ml but it is decreasing after one month of lactation. The protection of the young could be done easily by the supplementation of the mother at the end of pregnancy. Indeed, the correlation between milk concentration and blood concentration in the mother before calving is very high. Camel seems to present an apparent good efficiency of Se transfer in milk, higher than in other ruminants.

Elsewhere, if blood and organ references are available in camel, the metabolism of selenium in that species is not yet well known. In the main cases, farmers and owners of race camels applied the recommendations given for cattle. This practice could be debatable. Indeed, in an experiment, achieved in Morocco, comparing cow and camel where similar selenium supplementation supplied animals (with 2mg/day for 2 months which is the double dose generally proposed for cattle), it has been observed a strong higher increasing of plasma selenium in camel (10 times the blood level before supplementation) than in cow (2 times). It has been concluded that plasma selenium level was a very sensitive indicator of oral selenium supply in camel. But, it was not possible to confirm if there is a specific sensitivity of camel to selenium deficiency or toxicity. Indeed, the selenium depletion was also faster in the above mentioned trial. After one month without supplementation, the plasma selenium level returned to “normal”. It seemed to indicate a better efficiency of selenium absorption and excretion in camel compared to cattle. From this observation, many questions appear.



Photo 2. Muscle discolouration in a camel receiving 8mg/day selenium additive (Photo R. Seboussi)

Indeed, one important aspect in race camel is the selenium supply. As it is considered that selenium is beneficial for muscle activity, selenium supplementation is very common in racing camel farms. Now, the limit between selenium requirements and selenium toxicity could be very narrow in camel according to the previous observation. In Emirates, it has been observed that muscle discolouration occurs in 2 years-camel after 8 mg daily selenium supplementation for 2 months (see photo 2). However, there is one reference only on selenium toxicity in camel.

The clinical signs of selenosis occurred within two weeks after contamination with hair discoloration, followed by alopecia more severe in animals receiving a higher quantity of selenium (up to 16 mg/day). Enlargement of the inferior cervical lymph node was seen in all intoxicated animals. Camels tended to sit alone. Urinary excretion increased and dark watery diarrhoea was also observed. Loss of appetite, thus loss of weight and weakness appeared. Tears with pale mucous were present as well as evidence of impaired vision. Dyspneic respiration and pain at auscultation appeared and camels adopted the sternal decubitus position and tended to rest their neck extended. Salivation occurred and finally camels showed no desire to eat and drink. The tail was elevated. Fissured pads appeared after few weeks, provoking difficult walk (Photo 3).



Photo 3. Fissured pads with necrosis on foot of camel intoxicated with selenium (Photo R. Seboussi).

Finally, what is the advice to the camel owners? According to dietary Se supply and mean weight of the animal, selenosis (selenium intoxication) appeared with 0.05 mg/kg LW Se supply only showing a higher sensitivity of camel than, other animals to selenium toxicity. Severe intoxication occurred with 16 mg Se supplementation, i.e. 0.10 mg/kg LW. These values were 5 times lower than those for sheep and cattle. Based on these results, **it seems essential to limit Se supplementation in camel at 0.01-0.02 mg/kg LW, i.e. approximately 4-8 mg per day for adult animals or 0.5-1 ppm in the diet.** It has been demonstrated also that diet including barley (1 kg/day) is favourable for a better selenium status during pregnancy. At reverse, the distribution of selenium by injection at the end of pregnancy has a low incidence on the selenium status in milk after calving. A recent study achieved in the camel project has underlined also the advantage of organic selenium compared to inorganic selenium for the selenium status of the animals.

FOR MORE DETAILS

For more details:

Faye B., Seboussi R., 2009. Selenium in camel – A review. Nutrients. 1, 30-49.

Althamna O.M., Bengoumi M., Faye B., 2012. Selenium and copper status of camels in Al-Jouf area (Saudi Arabia). Trop. Anim. Health Prod., 44, 551–556.

Faye B., S. Saleh, G. Konuspayeva, A. Musaad, M. Bengoumi, R. Seboussi, 2013. Comparative effect of organic and inorganic selenium supplementation on selenium status in camel. J. King Saud Univ. Sci, 26, 149-158

Faye B., Althamma O., Musaad A., Konuspayeva G., Bengoumi M., 2014. Effect of selenium injection in pregnant camels on selenium status of their new-born and milk. Emir. J. Food Agric., 26(4), 342-348.

THE SELENIUM IN CAMEL

the challenges for a good balance

**Improvement of research for sustainable development of
camel production in the Kingdom of Saudi Arabia**

UTF/SAU/044/SAU