

**Short communication:**

**Some observations on an incident of copper deficiency in local dairy calves in the Sultanate of Oman**

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Copper is needed for functioning of enzyme systems, as a component of various body pigments, red blood cells production and maintenance, and is involved in bone metabolism, central nervous system and heart function, Copper is interrelated with other minerals mainly Mo, S, Zn and other minerals in addition to protein.

With the exception of P, deficiency, of Cu is the most severe limitation to livestock in grazing areas of the tropics (Mc Dowel, et. al., 1983).

Ward (1977), categorized Cu deficiency into four groups where the feed contained high levels of Mo (more than 20 ppm); low Cu but significant amounts of Mo; deficient in Cu (less than 5 ppm); and normal Cu and low Mo, with high levels of soluble protein (rich in S) which eventually result in unavailable copper sulfide.

The major clinical signs of Cu deficiency include scours, pale membrane of the eyes and mouth, rough hair, slow growth and loss of body weight (but these are not necessarily visible in certain cases of Cu deficiency). Another symptom includes development of fragile bones, particularly the long bones, resulting in the difficulty of walking and the bones break easily (Mc Dowel et. al., 1983). Genetic variations in the susceptibility of animals to Cu deficiency were also reported (Wiener and Field, 1970).

Cases of Cu deficiency were reported in the Sultanate of Oman particularly among small ruminants. Ivan, et. al. (1987) reported cases of Cu - deficiency in goats in the Sultanate, however, it was rarely observed in cattle.

In this study two local (Zebu) dairy calves born at Rumais Livestock Research Station of the Sultanate of Oman, were observed to show signs of hind limb paralysis and lack of coordination with one of the calves completely unable to stand. The calves also had enlarged joints grossly indistinguishable from those of rickets (figure 1). The signs were typical of the acute forms of Cu deficiency observed by Ivan et. al. (1987) for small ruminants in the Sultanate of Oman. Accordingly, it was decided to collect serum samples from the abnormal calves and their dams and analyse them for Ca, P and Cu. For comparative purposes serum Ca, P and Cu were also determined for two normal Jersey calves, one normal crossbred (Jersey X local) calf and their dams. The three minerals were assayed using spectrophotometry (Perkin - Elmer 552 UV - VIS).

## RESULTS and DISCUSSION

Results of the serum concentrations for Cu (4 ml) and Ca and P (mg%) for the different breeds of calves and their dams were summarised in table 1. It was apparent from these results that all dams and calves of the different breeds showed normal concentrations for serum Ca and P. However, the abnormal calves had the lowest concentrations for serum Cu, both were below 0.6 ug/ ml which were indicative of Cu deficiency. With respect to the dams also the local ones were the lowest in serum Cu values. The only possible explanation to the low values of Cu serum concentrations in the Zebu calves and their dams may be due to the relatively low intake of concentrate fed to the local Zebu dams. The local Zebu dams were receiving approximately 3 kg concentrate/ head/ day in their previous lactation, whereas the dams in **the other** breed (Jersey and their crosses) were all receiving amounts more than 5 kg/ head/ day mainly because of the smaller body size and low production of the local Zebu cows. All the cows were receiving Rhodes grass (*Chloris gayana*) as the roughage component of the ration both as hay and green chop. It is worth mentioning that all the dams in this study were receiving trace mineralised salt - lick blocks free of Cu. However, according to Weiner and Field (1970) a genetic element may be in-

volved in the susceptibility of local dairy animals to Cu deficiency. Immediately after this study was concluded, all the dairy animals in the station were switched to trace mineralized salt blocks containing Cu and no abnormal cases were observed since then.

*Table 1: Serum concentration for Cu ( $\mu$ RI ml), Ca and P (mg%) for the different breeds of calves and dams.*

Breed and type of animal	Mineral and its concentration in serum		
	Cu ( $\mu$ g/ ml)	Ca (mg%)	P (mg%)
Local (Zebu)			
calf 1*	0.58	9.8	7.9
calf 2*	0.48	9.0	8.3
dam (1)	0.82	9.8	5.3
dam (2)	0.80	10.0	5.9
Jersey			
calf 1**	0.90	9.2	5.7
calf 2	0.70	8.5	5.8
dam (1)**	1.21	9.6	6.8
dam (2)	1.17	8.7	5.6
Cross - bred (Jersey X local)			
calf 1	0.86	<b>9.0</b>	<b>8.6</b>
dam (1)	0.98	<b>10.2</b>	<b>5.7</b>

\* The abnormal calves showing the signs of paralysis and incoordination, both were hypocitipremic with serum values < 0.60 ggi ml.

\*\*1 and (1) stands for the calf and its dam and slso 2 and (2).

**It may be concluded** that Cu deficiency could occur among cattle in the Sultanate of Oman, particularly among local Zebu and as a precau-

tionary measure feeding of Cu containing mineral blocks is highly recommended.

### ACKNOWLEDGEMENTS

Permission to publish this work by the Director of Animal Wealth Department, Ministry of Agriculture and Fisheries is gratefully acknowledged also the help in serum analysis by CVIL technicians and facilities is appreciated.

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### EXPLANATION OF PLATE

Figure 1 (a and b) illustrates signs of copper deficiency in one-week old local zebu calf:

- (a) Hind limb paralysis and lack of coordination;
- (b) enlarged (swollen) joints. serum copper was 0.58 µg/ml shown in table 1.

**Fig. 1 (a**



Fig. 1 ( )



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(facing p. 56)

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