Zinc deficiency in ruminants
-Hypozincemia-

A primary zinc deficiency due to low dietary zinc in ruminants is rare but does occur? Many factors influence the availability of zinc from soils, including the degree of compaction of the soil, and the nitrogen and phosphorus concentration.

- The risk of zinc deficiency increases when soil pH rises above 6.5 and as fertilization with nitrogen and phosphorus increases.
- Some legumes contain less zinc than grasses grown on the same soil, and zinc concentration decreases with aging of the plant.

Several factors may deleteriously affect the availability of zinc to ruminants and cause a secondary zinc deficiency. These include

- The consumption of Immature grass, which affects digestibility
- The feeding of late-cut hay, which may be poorly digestible
- The presence of excessive dietary sulfur.
- The contamination of silage with soil at harvesting can also affect the digestibility of zinc.

Clinical findings

- Alopecia in various body regions
- Parakeratosis with Abnormal skin (rough skin, thickened, wrinkled, cracked and with dandruff
- Pale mucous membranes
- Intermittent diarrhea
- Decreased milk production in milking animals
- Decreased growth rate
- Swelling of joints and Stiff gait
- Pica

Alopecia in different body regions (Cattle)

Dandruff with thickening of the skin (Cattle)

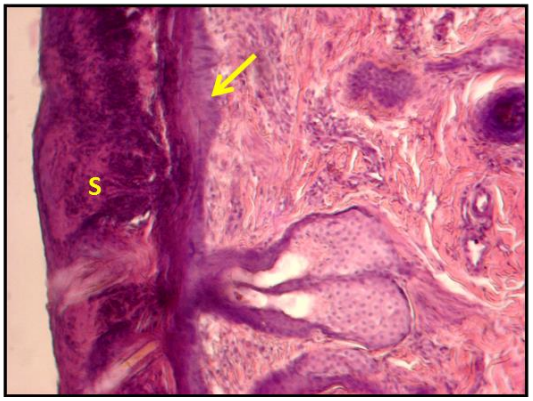
A sheep affected with zinc deficiency. Skin lesions could be seen.

The neck of a sheep affected with zinc deficiency. Note the cutaneous lesions.

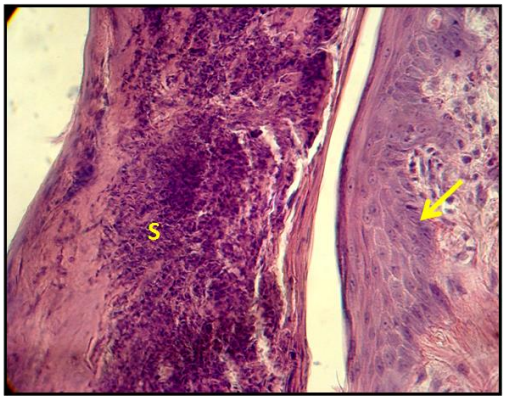
A buffalo calve affected with zinc deficiency. Skin lesions on various parts of the body could be seen (arrows).

The head and neck of a buffalo calve affected with zinc deficiency. Note the cutanous lesions (arrows).

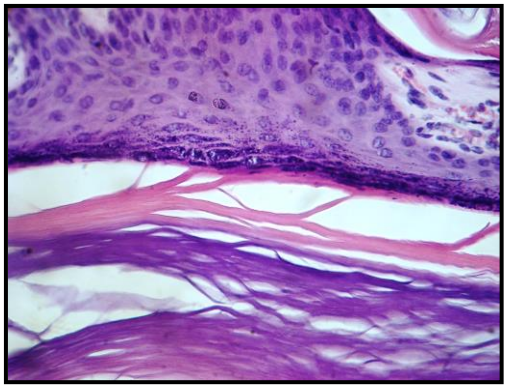
Microscopic lesions of the skin of zinc deficient animals were in the form of epidermal hyperplasia, parakeratosis, hyperkeratosis, acanthosis and the formation of thickened adherent scale.



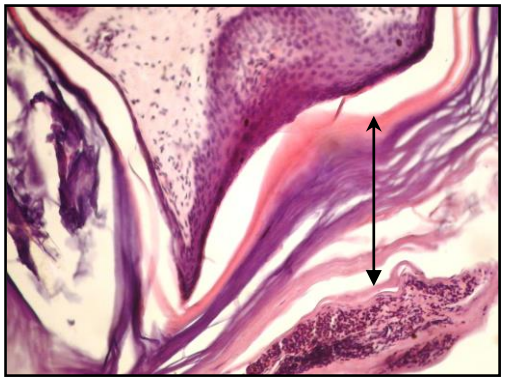
Cross section of the skin lesion of a calf affected with zinc deficiency. Note the increased thickness of the epidermis (arrow), the para-keratotic hyperkeratosis, and the moderate acanthosis leading to the formation of thickened adherent scale (S). H&E. 165x.



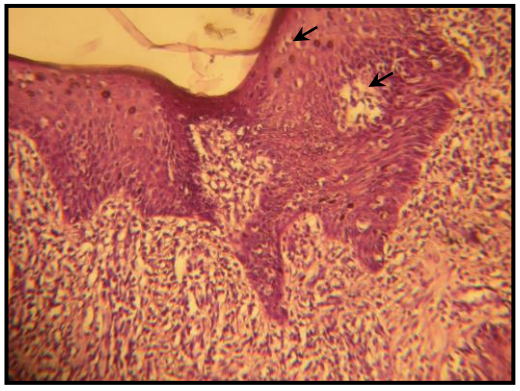
Cross section of cutaneous lesion in a calf affected with zinc deficiency. Note the thickened epidermis (arrow) and the thick adherent scale (S). H&E. 370x.



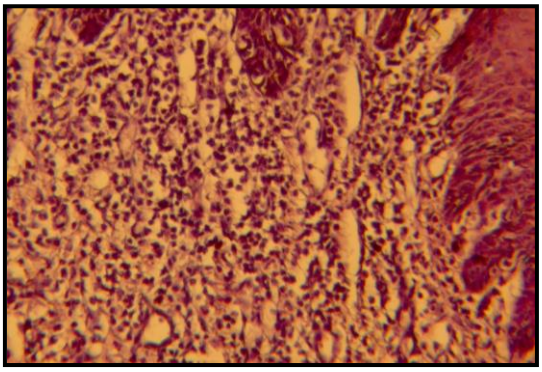
Cross section of the skin lesion of a sheep affected with zinc deficiency. Note the presence of parakeratosis, hyperkeratosis and acanthosis. H and E stain.



Cross section of the skin lesion of a sheep affected with zinc deficiency. Note epidermal hyperplasia with marked hyper-keratosis. The parakeratotic hyperkeratosis and acanthosis form the thickened



Cross section of the skin of a buffalo calf affected with zinc deficiency. Note the nucleated cells of the strarum cornum, the increased thickness of epidermis, ballooning degeneration of the stratum spinosum (arrows), and the infiltration of mononuclear cells in the dermis. H & E 160X.



Cross section of the skin of a buffalo calf affected with zinc deficiency. Heavy infiltration of mononuclear cells into the dermis particularly around blood vessels. H & E 160X.

Clinical pathology…
1-Skin biopsy will confirm the diagnosis of parakeratosis.
2-Evaluation of Zinc in serum: Serum zinc levels may have good diagnostic value. Normal levels are 80-120 µg/dL (12.2-18.2 µmol/L) in sheep and cattle.

Treatment…
1-In outbreaks of parakeratosis,zinc should be added to diet immediately at the rate of 200 mg of zinc sulfate or carbonate per kg of feed.
2- The injection of zinc at a rate of 2-4 mg/kg BW daily for 10 days.
3- The oral administration of zinc at the rate of 250 mg zinc sulfate daily for 4 weeks.