Zinc Deficiency (Hypozincemia) in a Lamb: Clinical Field Case

Alhaji, N.B. and Musa, I.G

State Veterinary Hospital, Niger State Ministry of Livestock and Fisheries Development
Minna, Nigeria

Corresponding author’s e-mail: nmbida62@yahoo.com
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Abstract
The purpose of this report was to present the clinical and pathological features of hypozincemia observed in a clinical field case and the effects of the administered treatment in the affected lamb. Zinc deficiency was diagnosed in a lamb flock of a four sheep; sucking lamb, dam, a ram and ewe in Minna, Nigeria. Skin lesions, anorexia, alopecia, depression, wool eating, flexed knees and a markedly stiff gait were observed in the lamb. The respiratory and heart rates were significantly higher (p<0.05) in zinc deficient lamb than in the apparently healthy ewes and ram in the flock. Pathology of skin of the zinc deficient lamb revealed mainly parakeratosis accompanied by hyperkeratosis in the lesions. The animals responded rapidly to oral administration of zinc sulphate. This investigation revealed that zinc deficiency in lambs and probably other young sheep could result in wool eating and considerable economic losses because of damage to the quality of skin. We recommend that Zn, Fe and Cu be added to the diets of lambs to avoid wool eating. There is no documented report available on wool eating in sheep in this part of Nigeria and therefore suggest that research on biochemical and hematological analyses be conducted on flock of local sheep fed mainly leguminous diets to assess normal values and as well carry out surveillance of the syndrome for control.

Keywords: Zinc deficiency, lamb, field case, wool eating, Nigeria.

Introduction

Wool eating or wool plucking is a type of allotriophagia that occurs in sheep, especially in lambs. It is reported that a deficiency of minerals, such as calcium, phosphorus, sodium chloride, copper, zinc, manganese, cobalt, as well as vitamin or a protein deficiency might be the cause of the disease. Only few reports are available on natural zinc deficiency in sheep in the literature due to the facts that pastures rarely contain less than 20 mg zinc kg⁻¹ DM and that sheep are able to absorb zinc very efficiently at low intakes. The young rapidly growing lambs achieve their high requirements for zinc from the ewes’ milk which is rich in zinc (around 7 mg L⁻¹). Among factors that predisposes sheep to zinc deficiency are increased calcium and phosphorus intake (decreases zinc absorption), diets rich in legumes (high calcium) or home-made high-phosphorus grain supplements (corn-soybean, corn-oats-barley) with no added minerals, elevation of soil pH above 6.5 and increased soil fertilization with nitrogen and phosphorus. Clinical signs and abnormalities present in lambs with wool eating disease include growth retardation, diarrhea, poor appetite, salivation, abnormal hooves, swollen joints and stiff gait, hair loss, parakeratosis, and compromised disease resistance. The clinical signs varied with the age of the animals; the younger sheep and lambs are mostly affected, while adults are relatively less affected.
Pathologically, the cutaneous lesions include alopecia, scaling and crusting of the skin of the face, neck, distal extremities, mucocutaneous junctions, parakeratosis and sometimes hyperkeratosis. The purpose of this report was to present the clinical and pathological features of hypozincemia observed in a clinical field case and the effects of the administered treatment in the affected lamb.

Materials and methods

The clinical field case: A suckling lamb weighing about 10kg and aged about two months in a flock of four sheep in a back yard farm in Minna, Nigeria was reported to the State Veterinary Hospital with chief complaint of eating wool of other ones in the flock. The flock composed of two ewes; one ram and the lamb and were fed on a basic ration of soya bean bran, bean leaves and occasionally left to graze on a nearby field. The entire flock was examined and the lamb was the only one found to be affected with wool eating condition (hypozincemia). Temperature, pulse and respiratory parameters were taken on both apparently healthy and the sick lamb.

Clinical and pathological investigations were conducted on the lamb. All the sheep in the flock were also examined for blood, gastrointestinal and external parasites. Skin specimens were collected from the alopecic patches of the lamb and fixed in 10% formalin solution for 48 hours, trimmed to suitable size, washed, dehydrated, cleared in xylol, embedded in paraffin wax, sectioned at 4-5 µ thickness, stained with hematoxylin and eosin. They were examined with a light microscope (x100).

Treatment was instituted using Vitalyte™ with active ingredients of zinc sulphate (12000mg) and other minerals that include vitamins, copper sulphate (12000mg), magnesium sulphate (12000mg), manganese sulphate (12000mg), methionine, excipients, sodium chloride, calcium and potassium among others at dosage of 1g per 10kg body weight orally and weekly for 8 weeks. Diet was not changed during treatment.

Result

The entire flock was significantly free of blood, gastrointestinal and external parasites. The affected lamb repeatedly bites off the wool of other sheep and when tied to an object; it started eating the wool on its own body. Most of the eating occurred over the hip, belly and shoulders. Furthermore, clinical signs observed include anorexia, depression, wool eating, alopecia, crusty skin, cracked and weak hair loss, flexed knees and a markedly stiff gait and diarrhea (Figure 1). Clinical parameters of the affected lamb with hypozincemia and non affected sheep are summarized in Table 1. The body temperature in hypozincemic lamb was similar to the apparently normal sheep, while respiratory rate was significantly higher (p<0.05) in zinc deficient lamb than in normal ewes and ram. The heart rate was significantly higher (p<0.05) in the lamb than in other sheep (Table 1).

Pathology of the skin revealed mainly hyperkeratosis accompanied sometimes by parakeratosis. Clinical status of the lamb improved rapidly after third week of treatment and 8 weeks later, it recovered fully (Figures 2–3). The apparently normal sheep were also given mineral supplements (mineral salt licks).

Table 1. Clinical parameters of the affected lamb with hypozincemia and non affected sheep

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Diseased lamb</th>
<th>Normal ewe1</th>
<th>Normal ewe2</th>
<th>Normal ram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body temperature (°C)</td>
<td>39.6</td>
<td>39.3</td>
<td>39.6</td>
<td>39.8</td>
</tr>
<tr>
<td>Respiratory rate (per min)</td>
<td>63.00</td>
<td>24.00</td>
<td>24.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Heart rate (per min)</td>
<td>130.00</td>
<td>77.00</td>
<td>76.0</td>
<td>78.0</td>
</tr>
</tbody>
</table>
Discussion

It is observed that faulty feeding and trace element deficiencies could cause wool eating in lambs, sheep and goats, which can lead to considerable economic losses. Clinical signs of wool eating, such as alopecia, parakeratosis, hair loss; growth failure and stiff gait were observed in this case. Similar clinical findings have been reported in natural wool eating in sheep and goat. Sheep fed experimentally with rations poor in zinc have reported to have quickly developed alopecia or brittle wool after seventeen days of the experiment. Furthermore, severe alopecia and wool eating syndrome have been found in sheep with zinc deficiency. In the present observation, anorexia was a main clinical feature exhibited by zinc deficient lamb. In humans with zinc deficiency, the reduced appetite has been attributed to reduced ability to taste (hypogeusia) and smell foods (hyposmia). Pathologic lesions of the skin of hypozincemic lamb described in this case were typical of zinc deficiency observed by some authors. Parakeratosis and in some cases hyperkeratosis are the main pathological lesions observed in this case. Similar changes have been to be attributed to the involvement of zinc in skin cells replication.

Based on the outcome of this case, it is observed that wool eating features in the lamb is the result of reduced zinc and other trace elements values in the dam from which the lamb is suckling. Similarly, sheep, lambs and goats fed for a long time with certain rations that are poor in zinc, copper, sulfur and trace elements have developed deficiency syndromes. The recovery in affected lamb in the present case was seen three weeks after treatment and complete recovery at eight weeks. Similar findings have reported after administration of 40mg of zinc sulfate in a capsule orally each day for 10 to 14 days to severely affected rams. Also, the ewes were given capsules of zinc carbonate orally several times weekly. Clinical status of the affected animals improved rapidly with zinc supplementation.

Figure 1. Lamb tied and has eaten its own wool showing alopecia and parakeratosis.

Figure 2. Lamb responding to treatment with zinc sulphate after week three.

Figure 3. Lamb has recovered after treatment with zinc sulphate in week eight.
References