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WOOL SHEDING IN SHEEP AND ITS RELATION WITH SOME ESSENTIAL ELEMENT DEFICIENCIES

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ABSTRACT

Some deficiency symptoms have been observed in ewes at the Gözlü State Farm (in Konya) with regard to some nutritionally essential minerals. At first sight, wool sheding was the most considerable symptom related to sulphur and zinc deficiencies. To be able to explain the causes of the symptoms clearly, feed, blood and wool samples from the wool sheding ewes were collected. After determining certain mineral concentrations in these samples, the results suggest that there are multielement nutritional disease situations in ewes at the Gözlü State Farm.

ÖZET

Gözlü Devlet Çiftliği (Konya) koyunlarında bazı essansiyel element noksanlıkları semptomları görüldü. İlk bakışta koyunlarda yapağı atımının çinko ve kükürt noksanlıklarındaki durumlara benzerlik gösterdiği saptandı. Bu semptomların nedenini açıklayabilmek için yapağı atan koyunlardan kan, kıl ve yem numuneleri toplandı ve bazı mineraller yönünden analizleri yapıldı. Alınan sonuçlar Gözlü Devlet Çiftliğinde koyunlarda çok yönlü bir beslenme hastalığı söz konusu olduğu kanısını ortaya koydu.

INTRODUCTION

It has been known for many years that, more than 15 elements are essential for animal life and these element deficiencies, imbalances and toxicites are severely inhibiting the livestock industry in many developing countries /1,2/. Growth retardation, loss of hair, depigmented hair, skin disorders, non-infectious abortions, diarhae, anemia, loss of appetite, skeletal deformities, tetany, low fertility and pica are the observed clinical signs /3,4/.

Zinc and sulphur are among these essential elements,

and are very important for wool and hair growth in animals /5,6/. Sulphur is required in metabolism for the synthesis of proteins, hormones, thiamine and detoxifying compound. Sulphur deficiency causes poor weight gain, poor feed efficiency and poor wool growth. Wool and hair contain large amounts of cystine and they should contain 4 and 5 % sulphur, respectively /9/. Low S diets resulted in a gradual failure of appetite, body weight, emaciation, wool pulling and finnaly death. Depreaved appetites evidenced by chewing on wooden pens, pulling and consumption of wool were observed in all sulphur deficient animals. In sheep, zinc deficiency causes loss of body wool and appearance of thick wrinkled, pink skin. Slipping of wool, swelling and lesions around hooves, and periorbital regions of the eyes, excessive salivation, anorexia wool eating and growth retardation are general common symptoms of zinc deficiency in sheep /9/.

The urinary excretion of nitrogen and sulphur was greatly elevated in the zinc deficient animals /10/. The great interest, is also the evidence obtained by Oberleas and Prasad /11/. They pointed out that a relationship exists between zinc intake and utilization of seed proteins. These proteins can be equal in quality to animal proteins for growth promotion, when supplemented with zinc.

Similar to zinc and sulphur, copper is also one of the important elements for wool production in sheep /1,5/.

After noticing some clinical deficiency symptoms of zinc and sulphur, the wool shedding of Akkaraman ewes at the Gözlü State Farm is examined in this study. For the determination of certain minerals, and for the discussion of their relation to wool sheding of the ewes; feed; blood and wool samples were collected and tested.

MATERIALS AND METHODS

The Gözlü State Farm (Konya) is in the interior part of Anatolia. The wool sheding of Akkaraman ewes is an important problem for the farm for the last two years. Wool sheding appears in December and continue up to spring, and cause economical loss. It starts from the tail of the ewes and continues through the cidago region, and all sides of the body. Percentage of sheding is higher among the Akkaraman ewes (about 80 %) than other species. The problem was reported to our institute by

the local veterinary service of Konya. They had sent some wool and blood samples but the samples were not suitable to carry out the necessary analyses. Visiting the Farm in 1983 May, about 40 blood and wool samples from each, including 7 different feed samples were collected and tested.

Analyses of Samples

Zinc, iron, copper, manganese, sulphur, magnesium, calcium and phosphorus concentrations of feed; zinc, copper, iron concentrations of serum samples were determined by wet ashing and using FAAS (Beckman-1272) /12-18/. Sulphur and phosphorus concentrations of the feed samples and sulphur concentration of the wool samples were determined by a spectrophotometric method using an U.V. and visible spectrophotometer (Variant Techtron U.V. and Vis. Spec. - 635) /19/. Ca and Mg concentrations of the feed samples were analysed by wet ashing and using Ca-Mg analyser (Beckman Ca-Mg analyser) /20/. The wool samples were washed with bidistilled water, then filtered. Wet samples were washed again with 0.5 % Triton-X-100 rad rinsed with bidistilled water then reagent grade acetone and dried between filter papers in an oven at 70°C for 1 hour. Wet ashing procedure was used for wool samples to determine zinc, copper, iron and manganese concentrations using FAAS /21,22/.

RESULTS AND DISCUSSION

Blood sera Zn, Cu, Fe, P, Ca and Mg concentrations are shown in Table-1. Zn and Cu concentrations of blood sera were found lower than the normal values. Spairs and Papasteriodin /23/ reported that under Greek condition cattle seriously affected with lesions due to zinc deficiency had a plasma Zn concentration of 40 to 60 µg/100 ml, animals having mild signs of deficiency had 60 to 100 µg/100 ml, while normal animals had more than 200 µg Zn per 100 ml plasma. Normal levels of plasma are 80-120 µg/ml for sheep and cattle. The zinc content in the feed in this area was 20-30 ppm of dry weight. The average feed Zn content of the Gözlü State Farm was found about 8.04 ppm/DM. (lower than the Greek condition), (Table-2). The mean wool Zn content was found to be 58.12±3.31 ppm (Table-1) which is also lower than the normal values. Burns et al. /24/ had reported wool Zn as 115 ppm. For the other part of Anatolia wool zinc content of sheep is about 215 ppm /25/.

TABLE-1. Blood serum zinc, copper, iron, and wool zinc, copper, iron manganese sulphur means and standard errors of the means of the Gözlü State Farm Akkaraman ewes.

Samples	Zn	Cu	Fe	Mn	S
Sera (40)*	0.78±0.03 µg/ml	0.54±0.03 µg/ml	0.92±0.02 µg/ml	-	-
Wool (40)*	58.12±3.31 ppm/DM	4.29±0.25 ppm/DM	99.00±5.56 ppm/DM	14.58±0.78 ppm/DM	0.89±0.04 %

(*) number of samples

TABLE-2. Feed samples average mineral concentrations of the Gözlü State Farm.

Feed Samples	Zn ppm/DM	Cu ppm/DM	Fe ppm/DM	Mn ppm/DM	S %	Mg %	Ca %	P %
Grass	15.00*	5.20	110.00	67.00	0.08	0.21	0.47	0.40
Sainfoin (dried)	3.00	1.00	75.00	8.80	0.08	0.19	0.30	0.29
Sainfoin (green)	6.40	2.60	125.00	35.00	0.09	0.21	1.13	0.53
Cotton seed meal	20.00	1.40	94.00	9.70	0.20	0.60	0.16	0.75
Hay	11.00	1.60	120.00	80.00	0.09	0.48	1.45	0.75
Straw	0.40	1.10	25.00	9.00	0.07	0.09	0.10	0.24
Wheat and Barley mixture	0.45	1.40	50.00	13.00	0.15	0.60	0.02	0.43
Average values	8.04	2.04	85.57	31.79	0.11	0.34	0.52	0.49

(*) each value represents two tests

The mean wool sulphur content of the Gözlü State Farm Akkaraman ewes was found to be 0.89±0.04 %, which is also much lower than the normal values /9/ (Table-1). As in the Zn content of the wool in the other parts of Anatolia wool sulphur content was found about 2.5 % which was on the marginal level and higher than the Gözlü State Farm ewes wool sulphur content /25/.

Hartmans /26/ claims that the copper concentration in liver and plasma are better indicators of deficiency. The normal plasma copper concentration in sheep is 0.7-1.3 µg/ml. It is 0.1-0.2 µg/ml in primary and 0.4-0.7 µg/ml in secondary copper deficiency. Gözlü State Farm ewes blood plasma copper concentration was found to be 0.54±0.03 µg/ml which is lower than normal and reflects secondary copper deficiency /27/. Wool Cu content of the ewes was found to be 4.29±0.25 ppm (Table-1) which is lower than the normal. It is about 1/3 of the normal level /1,24/. Seven different feed samples from the Gözlü State Farm had average Cu content of 2.04 ppm/DM (Table-2). Forage should contain at least 5 ppm to meet the requirement in sheep /28/.

Fe, Mn, S, Mg, Ca and P concentrations of feeds, Fe concentrations of sera and Fe and Mn contents of wool were found in normal ranges /22,23,29/.

CONCLUSION

In Turkey some mineral deficiencies in livestock are known for many years /30/. But these are mostly diagnosed by clinical syndrom of the diseases, such as selenium deficiency in lambs (white muscle diseases). If the deficiency state of an element is severe, clinical syndrom helps the veterinarian to diagnose, as in selenium deficiency. If deficiency state is on the marginal level, the animal can survive but in this case it is difficult to differentiate the cause of the deficiency since symptoms in mineral deficiencies are mostly similar to each other. In this condition as in the Gözlü State farm needs more sensitive techniques for the feed and animal tissue samples for different essential elements. For these elements research findings have been greatly faciliated in recent years by the development of several analytical tools. According to the results of the feed, blood and wool mineral concentrations Gözlü State Farm ewes have multielement deficiencies; like copper, zinc and sulphur. Sulphur content of the feed is on the normal level, but wool sulphur is very low (Tables-1,2). This probably comes from zinc deficiency since the urinary excretion of sulphur is greatly elevated in the zinc deficient animal /10/ and there is a relationship

between zinc intakes and utilization of seed proteins /11/. As a result it can be said that sheep at Gözlü State Farm need supplement of zinc, copper and probably sulphur in their feed. A supplementation trial has been planned after the mating season of the ewes in 1983.

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