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Plasma Levels of Some Vitamins and Elements in Aborted Ewes in Elazığ Region

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Abstract: This study, we aimed to examine the levels of vitamin A, E, selenium, zinc, copper, phosphorus, magnesium and total protein in blood of aborted ewes. Aborted and control (non aborted) Akkaraman ewes were used in living different regions of Elazığ. The levels of selenium, zinc, copper, phosphorus, magnesium, total protein, vitamin A and E were measured in plasma samples of aborted and control animals.

Present findings showed that concentration of vitamin E, selenium, copper, magnesium ($P<0.001$) and phosphorus ($P<0.05$) weresignificantly lower in aborted ewes than in control. However, there was no significant differences in zinc, vitamin A and total protein levels showed between two groups.

As a results indicated that the levels of vitamin E, selenium, copper, phosphorus and magnesium were significantly lower in aborted ewes than control ewes in Elazığ region and the high incidence of ewe abortion is believed to be due to deficiency of vitamin E, selenium, copper, phosphorus and magnesium.

Key Words: Abortion, Vitamin A, Vitamin E, Selenium, Ewe.

Elazığ Civarında Yavru Atan Koyunların Kan Plazması Bazı Vitamin ve Mineral Düzeyleri

Özet: Bu çalışmada Elazığ civarında yavru atan koyunların kan plazmasında A ve E vitaminleri ile selenyum, çinko, bakır, fosfor, mağnezyum ve total protein düzeylerinin belirlenmesi amaçlandı. Çalışmada, araştırma grubu olarak yavru atımı gösteren ve değişik bölgelede yer alan Akkaraman ırkı koyunlar, kontrol grubu olarak ise yavru atımı göstermeyen Akkaraman ırkı koyunlar kullanıldı. Kontrol ve yavru atan gruplarda yer alan tüm hayvanların kanları alınarak plazma A ve E vitaminlari ile selenyum, çinko, bakır, fosfor, mağnezyum ve total protein düzeyleri araştırıldı.

Kontrol grubuna kıyasla, yavru atan koyunların plazma E vitamini, selenyum, bakır, mağnezyum ($P<0.001$) ve fosfor ($P<0.05$) düzeylerinin önemli ölçüde düşük olduğu gözlendi. Bununla birlikte plazma çinko, A vitamini ve total protein düzeyleri açısından her iki grup arasında istatistiksel farklılığa rastlanılmadı.

Araştırmada sonuç olarak; Elazığ civarında yavru atan koyunların kan plazması E vitamini, selenyum, bakır, fosfor ve mağnezyum düzeylerinin düşük olduğu gözlendi ve yavru atımı ile bu vitamin ve minerallerin düzeyleri arasında ilişki gözlendi.

Anahtar Sözcükler: Yavru atımı, Vitamin A, Vitamin E, Selenyum, Koyun.

Introduction

Trace elements may function as cofactors enzymes, or stabilisers of secondary molecular structure. Their function has evolved from a recognition of their essential function in cell metabolism. There has been special interest in effects of dietary trace element deficiencies on physiological function, reproduction particularly. Severe dietary deficiencies of trace elements including copper, selenium and zinc are commonly seen in ruminants. Studies (1, 2) suggested that present of a close link

between reproductive performance of ruminants and levels of trace elements in their blood.

Selenium (Se) and vitamin E are essential nutritions and involved in several metabolic processes (3). Although these element deficiencies reveal similar metabolic and clinical signs in ruminants, they have independent roles in protecting tissue membranes against end products of some oxidative processes. Se is required for the formation of the enzyme glutathione peroxides which destroys potentially toxic peroxides, while vitamin E acts as a "scavenger" of any peroxidase that escapes destruction (3, 4).

A deficiency of vitamin E and Se may cause nutritional muscular dystrophy or white muscle disease in young ruminants (4) and congenital death if it occurs before birth (3 - 5).

Zinc (Zn) is widely distributed throughout the body with high concentrations in the skin, wool, hair and horn. It contributes to the formation of many metallo enzymes that are involved in arachidonic acid and prostaglandin metabolism, water and cation balances and membrane peroxidation (2). Zinc prevents skin diseases such as parakeratosis in all ruminants and it required for testicular development in rams and conception in ewes. Consequently, there is a close relationship between Zn and reproduction.

Copper (Cu) is a essential element for ruminants and its deficiencies occur in grazing animals in many parts of the world. Cu joins in formation of many enzyme systems and thus its deficiencies may result in is reflected in those metabolic and clinical symptoms related to these enzymes. Cu deficiency causes infertility in ruminants. Phosphorus (P) has been long recognised as an essential mineral for bone development, reproduction and energy transfer (1, 2).

Several elements including Zn, Cu and Se are essential elements for ruminants and are required for formation and progression of various enzyme systems. Enzyme activities increase in pregnancy. In addition, Zn, Cu and Se transfer at high rates from pregnant ewes to foetus (1, 2) and therefore, deficiencies of these elements may be cause ewe abortion.

Although the cause of abortion have not been well studied, it may be nutritional, infections or genetic, or even combinations of these. As previously mention, some minerals and vitamins including Se, Cu, Zn and vitamin E have very important effect on animal reproductive function. However, there is in sufficient information about the roles of these minerals and vitamins on ewe abortion.

It has been observed that symptoms of some vitamins and mineral deficiency in aborted ewes in Elazığ region. However, there was no available inform status of some vitamins and minerals in aborted ewes in Elazığ region.

This study, we aimed to examine the levels of vitamin A, E, Se, Zn, Cu, P, magnesium and total protein in blood of aborted ewes in Elazığ region. In addition, the present study was undertaken to determinate relationships between the concentrations of those and ewe abortion.

Materials and Methods

The study was conducted on 40 health (not aborted) as control and 148 aborted Akkaraman ewes from different flocks of Elazığ region in Turkey. Their ages ranged between 1.5 to 3.5 years and weighing between 30 to 45 kg at the sampling time of experiment. Jugular blood samples from each animals of aborted (within 24 hours after abortion) and control animals were taken using vacutainer tubes and plasma was extracted and stored -20°C.

Blood samples were taken on January (at the 3th or 3.5th months of pregnancy) when pastures were dry and covered by snow. The control and aborted animals were randomly selected from farms of university and breeding farms.

Zn and Cu were determinated according to Hudrik et al. (6) by using atomic absorption spectrophotometer. The levels of plasma vitamin A (7) and E (8) were determinated by spectrophotometricaly. Selenium level was determinated with method of Whetter and Ullrey (9) using a spectroflouremeter. Magnesium (Mg) was determinated with titan yellow method described by Aras and Ersen (10). Plasma P and total protein concentrations were measured with a autoanalyser (Technicon RA-XT).

Statistical analysis (unpaired student t- test) was evaluated by stat view 512™ packed programme.

Results

The mean values, standard derivation (SD), differences values of aborted and control animals are presented in table 1 which shows status of vitamin E, Se, Cu and Mg in plasma of aborted ewes to be significantly lower ($p<0.001$) than control group. However there is a less significant differences ($P<0.05$) between P levels of aborted ewes and control group. Status of Zn, vitamin A

and total protein were almost the same in both groups.

Table 1. Status of vitamin A, E, Cu, Zn, Se, P, Mg and total protein in plasma of aborted and control ewes.

	Control Group n=40	Aborted Group n=148
Vitamin A (µg/100 ml)	22.70±6.81	24.70±6.06
Vitamin E (µg/100 ml)	153.50±19.87	110.70±49.70**
Selenium (µg/100 ml)	11.01±0.58	9.33±0.96**
Zinc (µg/100 ml)	136.50±26.24	133.90±26.76
Copper (µg/100 ml)	120.10±25.57	90.80±28.25**
Phosphorus (mg/100 ml)	5.51±0.73	5.00±1.00*
Magnesium (mg/100 ml)	2.25±1.35	0.83±0.69**
Total Protein (g/100 ml)	6.12±2.10	6.90±1.87

Statistical significant (*P<0.05, **P<0.001)

Discussion

Taylor et al. (11) reported that there may be a relationship between Se deficiency and bovine abortions. However, Stuart and Oehme (12) noted that a cause of abortion in cows and sows in North America was due to Se deficiency.

New Zealand study showed that in areas where nutritional muscular dystrophy in lambs is severe, a high proportion of the ewes are barren. But feeding Se reduced embryonic mortality from 26 to 3% (13). In the South Island of New Zealand, Se deficiency decreased the proportion of ewes that conceived by 9 and 15% when they were fed with a diet rich in Se (14). Kott et al. (15) reported that preweaning survival of lambs was increased by ewe treating with either Se or vitamin E.

Se and vitamin E status in aborted ewes were statistical lower (P<0.001) than in control ewes (Table 1). This is supported by results of those (11-15). In contrast to our results, Nicotra et al. (16) observed that plasma levels of vitamin E showed no significant differences between 40 women with habitual abortion and controls.

The low Cu content in diet of the ewe either prevented implantation or induced embryonic loss and foetal death (17). In a study (1), nine ewes were fed a severely Cu deficient diet; five of which did not become pregnant and died between 23 and 34 weeks of the experiment and; of the remaining four ewes, two aborted and two produced stillborn lambs.

Unanian and Feliciano-Silva (18) informed that Cu status in aborted goats were lower and high incidence of early abortion could be associated with deficiency in copper. In addition, Anke et al (19) reported that Cu deficiency in ruminants caused abortion.

Cu levels (Table 1) were significantly lower in aborted ewes than in control ewes (P<0.001). These results are in agreement with the reports of McChowell et al. (17), Hidiroglou (1), Unanian and Feliciano-Silva (18) and Anke et al. (19).

Lylod et al. (20) reported that relationships were characterised between liver concentrations of P and other some elements and cause of death in pre-weaned Michigan lambs. Unanian and Feliciano-Silva (18) informed that high incidence of early abortion in goats could be associated with deficiencies in P, Mg and total protein. In this study, status of Mg and P were significantly lower (P<0.05, P<0.001) in aborted ewes than in non aborted ewes and results of Lylod et al. (20) and Unanian Feliciano-Silva (18) were supported to these results. However, in contrast to total protein result of Unanian Feliciano-Silva (18), total protein levels in this study wasn't differ in between two groups.

Naturally occurring Zn deficency is rarein livestock. In general, information as to the roles Zn may play in reproductive processes has been obtained primarily from studies on experimentally induced Zn deficiencies (1). Pond and Wallece (21), informed that there was no effect of dietary Zn supplementation on survival lambs. Zn status of ewes didn't statistically differ between two groups (Table 1). This observation was confirmed by the results of Hidiroglou (1) and Pond and Wallece (21).

In this study, we observed that levels of vitamin E,

selenium, zinc, copper, phosphorus, magnesium in blood of aborted ewes of Elazığ region were low and it may be role on ewe abortion.

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