EFFECT OF DROUGHT ON VITAMIN A IN SHEEP AND GOATS

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ABSTRACT

The experiment was designed to assess the effect of drought on vitamin A in 100 sheep and 100 goats of both sexes belonging to farmers stock of area in and around Jaislmer district. The overall mean values of vitamin A (µg/dl) were 23.709±0.904 and 24.590±0.890, respectively in sheep and goats. The range of vitamin A was from 10 to 34 in sheep and from 12 to 38 µg/dl in goats. A significant effect ($P \leq 0.05$) of age and sex was observed on the mean value of serum vitamin A in sheep while a significant effect ($P \leq 0.05$) of sex and non significant ($P \geq 0.05$) of age was observed in goats.

Key words: Sheep, goat, vitamin A

Introduction

Sheep and goats have their role in economy of arid and semi arid tract is paramount since they are the backbone of landless and small farmers. Although low rain fall and scanty vegetation (karnani *et.al.*, 2014) are common to this area. Generally during drought particularly in western part of Rajasthan the changes are into environment includes scarcity of water and scarcity or no vegetation. These changes in external environment affect the internal environment of animal thereby disturbing homeostasis. Fine balances between intake of various nutrients and their utilization by the body for various purposes no longer exist during stress due low availability of most nutritional factors like carbohydrates, proteins, vitamin A and D and minerals. Vitamin A deficiencies are most common during drought. They reduce the reproductive efficiency in most species. Determination of vitamin A level in serum is very useful in the evaluation of vitamin A status of animals (Rucker and Morris, 1999). An important note, which underscores the importance of having some knowledge of vitamin A chemistry and physiology, is that night blindness is not uncommon in sheep that have been grazing on dry weathered pasture for long periods such as during prolonged drought and its determination helps to assess degree of deficiency so that suitable measures can be undertaken to correct them.

Materials and Methods

The experiment was designed to evaluate the effect of stress due to drought on vitamin A in sheep and goats (up to 5 years of age) .The effects of sex and age were also determined on various parameters during drought. The animals belonged to farmers stock of drought stricken area of western part of Rajasthan particularly area in and around Jaislmer district. The animals belonged to similar environmental habitat and managemental practices. Field grazing pattern was adopted for the animals. Animals browsed *Ziziphus nummularia* leaves and also received small amounts of loppings of *Prosopis cineria* trees. Blood was collected from jugular vein under complete aseptic condition in to the test tubes without anti coagulant to collect serum. After collection serum was stored at -20 ºC. Serum vitamin A was determined by Carr and Price reaction as described by Varley, (1988). To determine the effect of age and sex the mean values were campared statistically by using 't' test (Snedecor and Cochran, 1967) from the respective mean value.

Results and Discussion

The overall mean values of vitamin A (µg/dl) were 23.709±0.904 and 24.590± 0.890, respectively in sheep and goats. The range of vitamin A was from 10 to 34 in sheep and from 12 to 38 µg/dl in goats.

The overall mean values of vitamin A in the present investigation were in accordance with the values obtained by Marsh and Swingle (1955), Ralston and Dyer (1959), Smith *et al.* (1964) and Tucker *et al.* (1967) in sheep and Molokwu (1978) in goats. The overall mean values of present investigation were lower than those reported by Dwaraknath and Pareek (1971) and Ghoshal and Dwaraknath (1976) in sheep and Kaneko *et al.* (2008) in sheep and goats. According to Kaneko *et al.* (2008) plasma retinol concentration in excess of 30 µg/dl generally indicates that vitamin A is not limiting.

A significant ($P \leq 0.05$) effect of sex was observed on the mean values of vitamin A in both sheep and goats. The mean values were significantly higher in females than males in sheep and goats. Dwaraknath and Pareek (1971) also noted effect of sex on vitamin A levels in sheep being higher in ewes than rams and their mean values were higher than mean values of male and female sheep in present investigation. Moore (1957) stated that the male have got higher vitamin A than the male. Probably female sex hormones play some role in the absorption and metabolism of the vitamins (McDonald, 1980).

In sheep vitamin A means values were significantly ($P \leq 0.05$) higher in animals of above 2 years age group than 0-2 years age group. However, in goats a non-significant ($P > 0.05$) effect of age was observed.

On the basis of reports of earlier workers and clinical signs appeared, it is observed that in 32 sheep the value of

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Table 1: Effect of drought on Vitamin A in sheep and goats

S.N.	Effects	Vitamin A in Sheep	Vitamin A in goats
1.	Overall (100)	23.709 ± 0.904 (10-34)	24.590 ± 0.890 (12-38)
2. a.	Sex Male (30)	16.299± 1.264 (10-34)	14.066± 1.078 (10-20)
b.	Female (70)	26.885^{b} ± 0.948 (14-34)	27.671^{b} ± 0.781 (14-34)
3. a.	Age 0-2Yrs (51)	21.333± 1.353 (10-34)	22.803 ± 1.255 (10-34)
b.	Above 2Yrs (49)	26.183^{b} ± 1.097 (10-34)	24.408^{a} ± 1.265 (10-34)

(i) Figures in the parentheses indicate numbers of animals for the effects and range for the different parameters.
(ii) In sex effect mean values of all parameters of female animals have been compared with respective mean values of animals.
(iii) In age effect mean values of all parameters of the animals of above 2 years of age group have been compared with respective mean values of animals of below 2 years of age group
(iv) Mean superscribed by letter "a" do not differ significantly (P>0.05) and letter "b" differ significantly (P≤0.05) from the respective means (male and 0 to 2 tears age group)

vitamin A ranged from 10 to 20 µg/dl and in 16 goats the value ranged from 12 to 20 µg/dl. According to Kaneko *et al.* (2008) in sheep the normal range of vitamin A is from 20 to 45 µg/dl. The history and clinical signs which appeared in sheep and goats ring the course of present investigation it was concluded that effect was very mild in case of goats even though the lower values were almost similar. It may be due to the use of different feeding regimen as the animal belonged different farmers. History included reports of abortion and night blindness in few animals having lower range of vitamin A. On appearance the condition was poor. It was noted in the present investigation that even though the vitamin A levels were low but symptoms were not severe according to that in all the animals. It probably indicated towards vitamin A hardiness in desert areas (Ghosal and Dwaraknath, 1976). However, Dwaraknath and Pareek (1971) reported the value of vitamin A in sheep of semi arid locations as 40.67± 0.8 µg/dl which were maintained solely on pala *(Ziziphus nummularia).*

Marsh and Swingle (1955) suggested that in sheep high protein ration prevented the vitamin A deficiency. However, in our investigation there was severe protein deficiency. It might be one of the reasons of low vitamin A levels. As per Swenson (1996) vitamin A deficiency leads to changes in epithelial tissue of eye. Altered cells are more susceptible to microorganism invasion followed by increase in severity of disease. During growth vitamin A deficiency causes defects in the remodelling of bone. Some symptoms of this type were observed in the course of present investigations which were probably due to vitamin A deficiency.

Screening of animals for vitamin A levels and history divulged the facts that all the animals were not receiving the daily recommended levels of intake of vitamin A and carotenes. According to Ewan, (1996) and Saini *et al.* (2017) due to drought conditions as only those plant products were available which were low in carotenes and only satisfied the bulk requirement of the most of the animals.

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