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FIELD INVESTIGATIONS ON VITAMIN A DEFFICIENCY IN DAIRY BUFFALOE FARM

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SUMMARY

This study was conducted on a total of 35 lactating buffaloes and newborn calves of different ages belonging to an experimental farm station, Faculty of Agriculture, Zagazig University at El-Khattara, Sharkia Governorate. Abnormal signs appeared in lactating buffaloes, newborn calves as well as growing calve suspected to be duo to vitamin A deficiency.

Based on the history and clinical signs, examined buffaloes were divided into five groups. Ten buffaloes of different ages were used as control (group1). Five newborn calves were congenitally blind and their dams (group2). Other five growing calves showing xerophthalmia, conjunctivitis and corneal opacity (group 3). Some parturient dams developed placental retention and complicated purperium despite normal parturition (group 4). Other parturient dams developed subclinical mastitis (group 5). Blood samples were collected from the four groups as well as from the control ones.

Congenital hypovitaminosis A was suggested, low levels of vitamin A determined in blind newborn and their respective dams confirmed our diagnosis. The clinical signs in (group 2) were blindness, corneal opacity, weakness, incoordination and underdevelopment that usually followed by death. Lacrymation, conjunctivitis, exophthalmia, doming of the forehead and hydrocephalus were frequently observed among neonatal calves.

Growing calves (group 3) exhibited dermatitis, lacrimation, and conjunctivitis and reduced appetite. However, older animals had reduced appetite and low milk production.

The role of vitamin A in the pathogenesis of forementioned signs was discussed. Recommended

daily intramuscular injection of vitamin A was done for one week with dietary supply of the vitamin, results in stoppages of appearance of new cases, while blinded cases was still present.

INTRODUCTION

Vitamin A is necessary for vision, reproduction and maintenance of structure and function of epithelial cells (Phillips, 1982). Vitamin A deficiency, often in association, with general malnutrition, parasitic infestation, and diarrheal diseases, remains a major nutritional problem affecting livestock. The adverse effect of vitamin A deficiency is mostly reflected on the cornea of the eye that progressed from early xerophthalmia to irreversible changes and blindness (Goodman 1980).

However, the clinical signs of vitamin A deficiency depend on the growth stage of affected cattle, liver stores of vitamin A at onset of deficiency and the duration and the severity of deficiency (Kohlmeier& Barroughs, 1970). In calves, the signs include blindness, decreased appetite, poor growth, diarrhea, dermatitis, xerophthalmia, and pneumonia (Neilsen et al., 1966). In older cattle, they include blindness,convultions and diarrhea,(Whitehair, 1984 and Roberts 1986) also reported influence of vitamin A on reproduction. He stated that vitamin A requirements during pregnancy are higher than in the non-pregnant animals and higher for the female than the male. It's deficiency may result in keratinization and degeneration of the placenta, retained placenta, septic metritis, abortion, and stillbirth.

Reports regarding the clinical signs of vitamin A deficiency in cattle are mostly based on experimental studies. However, hypovitaminosis A in calves born to dams fed a ration is less documented.

Therefore, the present field study aimed to describe the clinical findings and circumstances associated with an outbreak of congenital blindness in newborn buffaloe calves. Reproductive disturbances retained placenta, septic metritis, abortion, and stillbirth in their dams are considered.

MATERIALS AND METHODS

The present study was conducted on the experimental farm station belonging to faculty of Agriculture, Zagazig University. This farm is located at EI-Khattara, Sharkia Governorate.

1- Animals and husbandry:

A total number of thirty-five buffaloes as well as their growing calves of various ages were included in this study. Clinical examination of animals was performed after Wilson,(1992) where the animals were classified into 5 groups. Group (1) consisted of ten clinically healthy animals of various ages and used as control . Group (2) included five neonatal born calves (15-20 days) showed blindness and their dams. Group 3 consists of five

growing calves (9-12 months) showed xerophthalmia and corneal opacity. Group (4) formed from five parturient dams developed placental retention and complicated purperium. Group (5) formed from five dams showed subclinical mastitis.

These animals received a ration consisted of commercial concentrate mixes (yellow corn, wheat bran, cotton seed cake, molasses, ground limestone, and common salt) and rice straw. They had no access to natural pastures, Vitamin A or its equivalents were supplemented in the ration or given parentally. However, salt mineral mixture was offered ad-libitum in the form of blocks. Clean treated underground water was freely available in concrete basin. Milking, on the farm, usually done twice a-day by hand and breeding was natural using fertile males. Vaccination program and dosing against parasites are regularly performed under veterinary supervision.

2- Clinical pathology:

Following clinical examinations and record analysis, blood samples were collected from all groups. Blood samples were collected from jugular vein in heparinized vacutainer tubes that chilled and protected from light. Plasma was immediately separated, frozen and used for quantitative determination of vitamin A after carrying out the Carr-Price reaction as reported by Varley et al., (1976). Milk from parturient animals representing the four quarters was screened for the presence of udder infection. White side test after the method described by American Public Health Association (1985) was performed.

3-Treatment:

All diseased animals in the farm were treated with daily intra-muscular injection of vitamin A for one week.

4- Statistical analysis:

The obtained data were analyzed according to Snedecor and Cochran (1982).

RESULTS

1 - Clinical findings:

Neonatal blind calves (group 2): were mostly weak, incoordinated, walking more slowly or stand quite. They were obviously miserable, lie down whenever they could and slouched when made to stand., and were unable to suck their mothers. The incoordinated calves were immature, underdeveloped and usually die within 1-7 days although they had received her mother's colostrum using clean sterilized bottle equipped with artificial nipple. Birth weights were generally below normal. Diarrhea, nasal discharges, and lacrimation were frequently noticed in blind calves. Eye examinations revealed that the pupils were dilated and the pupillary light reflex, in dark

room, was absent.). Moreover, the carpal joints appeared thickened and the forehead appeared doming with moderate degree of hydrocephalus (Fig. 1).

Xerophthalmia, conjunctivitis, corneal opacity were also noticed in growing calves (group 3), they were lazy, usually recumbent, had reduced appetite and looking miserable. The skin exhibited patchy dermatitis with loss of luster and fading of the hair (Fig.2). Dehydration as well as emacia tion also noticed. Visual deficiency was suggeste in some calves because they blunder into obsta cles despite the bright sunlight. Where as, the pu pils were not dilated but reacted slowly to light re flex. However, lachrimation, nasal discharges a well as diarrhea was noticed among some. Where as, body temperature was nearly normal (37.5 38.5°C).

In parturient dams milk production rate was gen-

Table (1): Vitamin A (µg/100ml) in the plasma of calves and their dams (mean±SE).

Group / Parameter	Group (1)	Group (2)	
	Control	Newborn	Dams
Vitamin A µg%	a 15.18± 0.45	b 5.16±0.56	c 9.68±0.29

Values with different superseript letter in the same category are significantly different from each other at P<0.05.

Table (2) Vitamin A (µg/100ml) in the plasma of growing calves and dams suffering from retained placenta and subclinical mastitis (mean (SE).

Group / Parameter	Group (1)	Group (3)	Group (4)	Group (5)
	Control	Growing calves	Retained placenta	Subclinical mastitis
Vitamin A µg%	15.1±0.45	** 7.10±0.30	** 7.95±0.67	** 10.17±0.46

** Highly significant different at P<0.01.

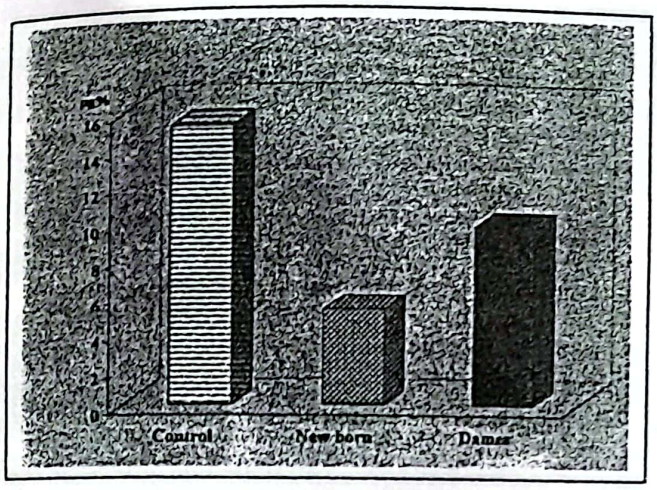

Fig. (1): Mean values of vitamin A in the plasma of newborn calves and their dams.

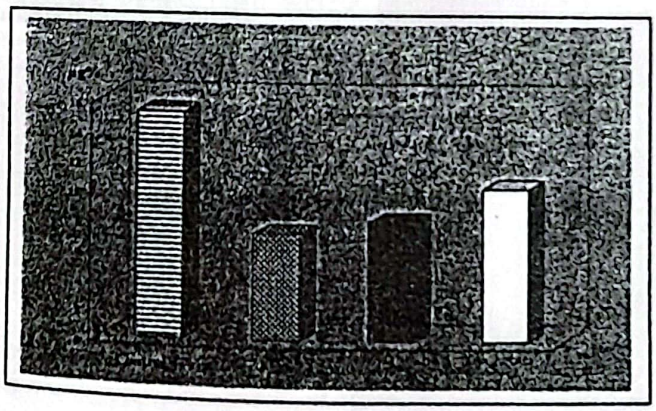

Fig. (2): Mean values of vitamin A in the plasma of growing calves and buffaloes suffering from retained placenta and subclinical mastitis.

(1) A blind buffaloe calf exhibiting weakness, incoordination , bone deformities and doming of the forehead with moderate degree of hydrocephalus.

Fig.(2): A growing buffaloe calf showing emaciation, dermatitis and loss of luster with fading of hair.

erally low (averaged 6 kg/head/day). Moreover, some animals developed retention of placenta with consequent endometritis and cervicitis (group 4) as felt by rectal palpation. Postpartum uterine involution was also delayed (30-40 days) and open days were much extended (105-160 days). However, subclinical mastitis was also recorded (group 5) in some parturient animals as indicated by white side test.

2- Laboratory findings:

Vitamin A levels in blind newborn and their respective dams (group 2) are presented in table 1. These values were generally lower than the normal control values. Also plasma level in-groups (3, 4 and 5) were significantly decreased in comparison to control ones.

3-Treatment:

The clinical signs and history of the farm were greatly suggestive of hypovitaminosis A. Low levels of vitamin A recorded in the plasma of blind calves as well as their dams confirmed this suggestion. Therefore, vitamin A was injected for all animals at the therapeutic dose for one week. The attendant veterinarian follows out these recommendations. Moreover, the green season just had begun and berseem offered to all animals. No more cases of blind newborn were recorded.

DISCUSSION

Vitamin A is of major economic importance in groups of animals fed prepared rations and is intimately concerned with optimal health and performance (Radostits et al., 1995). During deficiency of the vitamin, the normal mucosal surfaces became atrophy and eventually replaced stratified squamous keratinized mucosa (Jones and Hunte 1983) that predispose the animal for various alterations.

Animals on the farm we have examined had been fed on ration consisted of commercial concentrate mixes and rice straw. They had no access of natural pastures or green fodders. Moreover, vitamin A or its equivalents were not supplied in the ration or given parenterally. Commercial concentrates and rice straw contain little amounts of beta-carotene (Lotthammer, 1979). Thus, vitamin A deficiency was suggested, although vitamin A or beta-carotene contents in the ration was not determined as the source of commercial concentrates has been recently changed.

The clinical appearance of livestock suffering from vitamin A deficiency depends upon the duration of the deprivation and the age of the animal at which that deprivation is imposed. Hypovitaminosis usually terminates pregnancy, or result in delivery of dead or weak calf with congenital defects Involving especially the eyes (Roberts, 1986). Moreover, vitamin A deficiency was early reported in calves born to dams fed a deficient ration (Moore et al., 1935). The calves were born dead, or weak, incoordinated and blind at birth.

Vandeflugt and Prozesky (1989) also reported similar observations in calves born to vitamin A deficient dams. Therefore, blindness, weakness, incoordination, stillbirth as well as dead - born calves recorded in the present study may be attributed to congenital hypovitaminosis A. Moreover, low levels of vitamin A recorded in the plasma of new-borns and their respective dams confirmed our diagnosis.

Bone lesions observed in the present study were doming of the forehead, mild hydrocaphalus and thickening of the carpal joints. Such lesions were produced experimentally (Hayes et el., 1968) and were associated with congenital blindness in calves born to vitamin A deficient dams (Vanderlugt and Prozesky, 1989). These lesions may related to defective remodeling of bone during growth consequent upon vitamin A deficiency (Hayes et al., 1969 & Davis et al., 1970).

Diarrhea, nasal discharge, conjunctivitis, and dermatitis recorded in growing calves (group 3) may be due to epithelial metaplasia (Jones and Hunt, 1983 and EL-SAYED 1999) together with impaired phagocytosis (Chandra, 1980) caused by Vitamin A deficiency predispose the animal for Various alterations (Heimboldt et al., 1953). Concentration of vitamin A was moderately low in comparison to their dams. The vitamin A concentration was apparently correlated with severity of clinical signs. These data are indicative for deficiency and in accordance with data previously reported by Davis et al.,(1970).

It has been shown that beta-carotene and vitamin A improve the phagocytic function and alleviate the immunosuppressive effect of elevated cortisol during the peripartum period in cows (Daniel et al., 1990). Moreover, administration of vitamin A before parturition had reduced the incidence of placental retention by 16.5%, postpartum endometritis by 13.3%. The fertility was also improved by 13.4% and open days were 13 days shorter than untreated controls (Valyushkin and Kurieka, 1993). Whereas, vitamin A and beta-carotene levels were found to be significantly reduced in cows with mastitis (Johnston and Chew, 1984), placental retention, and endometritis (Tiftik and Nizamlioglu. 1993). Therefore, retention of the placenta, endometritis, and mastitis recorded in-group (4 & 5) may be due to epithelial metaplasia and impaired phagocytosis owing to vitamin A deficiency. This suggestion was supported by the low levels of vitamin A detected in the plasma of those cases, but we could not be certain that vitamin A was the sole defect.

We could conclude that vitamin A is an essential ingredient in the ration of animals and beta-carotene is the major natural source. Congenital hypovitaminosis may be result in abortion, delivery of dead, stillborn, or weak and incoordinated calves. Blindness, conjunctivitis, diarrhea, dermatitis, placental retention, endometritis and mastitis are commonly associated with vitamin A defi-

ciency. Therefore, we recommended that pregnant and lactating animals should receive adequate amounts of vitamin A or its equivalents. Moreover, growing calves should not be ignored and their vitamin A requirements necessary for normal growth and maintenance of good health should be supplied.

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