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FURTHER STUDIES ON VITAMIN E AND SELENIUM IN BUFFALOES IN EGYPT III-THE EFFECT OF THEIR ADMINISTRATION TO PRGNANT BUFFALOES ON SERUM AND MILK VITAMIN E AS WELL AS ON BLOOD SELENIUM LEVELS OF DAMS AND CALVES

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INTRODUCTION

NMD "nutritional muscular dystrophy" occurs in all farm animal species but is most important in young rapidly growing calves, lambs, and foals born from dams which have been fed for long period usually during winter months on diet low in selenium and vitamin E (Blood et al. 1983).

Vitamin E, selenium or both have been utilized successfully to prevent vitamin E-selenium deficiency (Allaway, 1973; Underwood, 1977; Whanger et al. 1978 and El-Neweehy,1982).

Although appricable increase of tocopherol concentration in milk of cows following supplementation with vitamin E has been reported by Parrish (1949) and Merk and Grasemann (1961), Safford et al. (1954),found no correlation between incidence of NMD and tocopherol concentration in dams milk. On the other hand Hogue et al. (1962) and Hidiroglou et al. (1970),reported that α tocopherol is utilized for the prevention of NMD in lambs when given direct to them but not when given to the ewes. With this in mind, the present work was planned not only to study reflection

of the E-selenium status of buffalo-dams on incidence of the disease in their calves but also the effect of selenium and E-selenium administration during late stage of pregnancy on vitamin E level in their milk and serum as well as blood selenium levels of them and their calves under Egyptian conditions.

MATERIAL AND METHODS

A total number of 110 animals raised in Mehallet Mousa Farm, Animal Production Research Institute, Ministry of Agriculture, were used in the present study. These animals included 30 apparently healthy pregnant buffaloes. 15 non-pregnant buffaloes of 3-4 years, 45 apparently healthy, and 10 NMD affected buffalo-calves. These animals were divided into 4 groups. The first one was of 15 untreated dams which were used and their calves (15) as control gorup. The second group was of 15 pregnant buffaloes which were given 2 I/M injection of 10 ml selenium solution (1 ml contained 1 mg sodium selenite) with 5 days intervals in both 8th and 9th month of pregnancy. The third group was also of 15 pregnant buffaloes but were given 10 ml injacome E-selenium (each ml contained 150 mg DL α tocopherol acetate and 0.5 mg sodium selenite pentahydrate) which was obtained from F. Hoffman La Roche, Co Ltd. Basle Switzerland, in the same manner as in the second group. The last one was 10 untreated buffaloes, chosen as 10 dams of 10 buffalo-calves proved to be naturally affected with NMD. Buffalo-calves were collected from their corresponding dams soon after parturition and kept under close clinical observation till weaning. Milk and serum samples were collected from all above mentioned buffaloes, 7 days after parturition with exception of the last group where these samples were collected once symptoms of NMD appeared on their calves. Milk samples were used for estimation of vitamin E level (Roese Gottfried and Schweiz 1964). On the other hand serum samples were used for estimation of α tocopherol levels according to the

method described by Hashim and Schnuttringer (1966), using n-hiptane as extracting substances and bathophenano-throline as indicator. Heparinized whole blood samples were also collected from all above mentioned dams and their calves. Whole blood samples were used for estimation of whole blood selenium levels (according to the method of Olson (1969) in Hoffman La Roche Ltd Laboratories. The detection limit of this method is approximately 15 ng Se-gm substance. Diagnosis of NMD in naturally affected calves was confirmed both biochemically and by P.M. examination beside histopathological examination of muscle samples collected from died and emergency slaughtered affected calves. Statistical analysis was performed according to Steel and Torrie (1960).

RESULTS AND DISCUSSION

The results obtained are shown in Tables 1&2. On studying the reflection of vitamin E status of buffalo-dams on incidence of NMD in their off springs, it was found that in buffaloes of NMD affected calves both serum (0.06914±0.00213 mg/100 ml) and milk (59.88 ± 6.72 ug/gm milk) viatamin E levels were significantly low when compared with those of untreated dams of normal calves (0.4557±0.133 mg/100 ml) and (93.0± 7.55 ug/gm) respectively. These findings were generally in agreement with those reported by Parrish; (1949); Blaxter & Sharman (1953); Welch *et al.*(1960) and Ganther (1971), while it was not in agreement with those reported by Swingle *et al.* (1956) and Ljesevic and Terzic (1977). Milk and serum vitamin E levels in buffaloes of normal calves were relatively higher than those reported by Lyfard and Cloby (1967 a) in beef cows, while were nearly similler to those reported by Ferrando *et al.* (1971) in milking cows and El-Neweehy (1982) in buffaloes. On the other hand, it was found that while E-selenium administration to pregnant buffaloes was accompanied with significant increase in their serum (0.5408±0.0968 mg/

Table (1): Vitamin E levels in serum and milk of treated and untreated buffaloes.

Type of dams treatment	No. of dams	Serum vitamin E (mg/100 ml)	Milk vitamin E (µg/gm milk)
Untreated dams of normal calves	15	0.455700±0.13300***	93.00± 7.55***
Selenium treated dams	15	0.242940±0.08690**	102.33±32.90***
E-selenium treated dams	15	0.540815±0.09680***	298.60±50.80***
Untreated dams of NMD naturally affected calves	10	0.069145±0.02134	59.88± 6.72

* P<0.05

** P<0.01

*** P<0.001

100 ml) and milk vitamin E levels (298.6±50.8 ug/ml), selenium administration lead to marked improvement in milk (102.33±32.9 ug/gm) but with sever drop in serum vitamin E levels (0.2429±0.0869 mg/100 ml). All when compared with both untreated buffaloes of normal calves and buffaloes of NMD naturally affected calves. Our results were nearly go side by side with those reported by Parrish (1949); Hamed & Decker, (1959); Erickson et al. (1963); Nelson et al. ,(1964); Hidiroglou et al. (1965); Jenkins et al. (1971) in Cattle and (1974) in sheep and Kovac and Verzgula (1978), while were not in agreement with those reported by Moukhtar (1966); Gardiner & Hogue (1967) in ewes and Jenkins and Hidiroglou (1972). Drop in serum α tocopherol level after selenium administration was reported before by El-Neweehy (1982). The significiant increase observed in serum vitamin E level after E-selenium administration may be attributed to involvement of selenium in mobilization and utilization of vitamin E from ewes to milk or lamb tissues (Ammerman and Miller, 1975).

Similarly, whole blood selenium levels were significantly low in buffaloes of NMD naturally affected calves (68.98±26.21 ng/ml) and their affected calves (72.43±34.58 ng/ml) when compared with that of untreated buffaloes of normal calves (76.0±36.106 ng/ml) and their calves (83.41±46.174 ng/ml).

Meanwhile, while significant increase occurred in whole blood selenium levels in E-selenium treated dmas (146.496±18.969 ng/ml) and their calves (115.496± 15.766 ng/ml), highly significant increase was observed after selenium administration in both buffalodams (170.079±40.117 ng/ml) and their calves (253.468± 173.845 ng/ml). All when compared with those of untreated dams with their calves and dams of NMD naturally affected calves with their calves.

Although, blood selenium levels in normal calves of untreated dams was nearly similler to those reported

Table (2): Whole blood selenium levels in buffalo-dams and their corresponding calves.

Type of dams treatment	No. of dams	Whole blood Selenium (ng/ml)	No. of calves	Whole blood selenium level (ng/ml)
Untreated dams of normal calves	20	76.000±36.11*	20	83.413± 46.17**
Selenium treated dams	15	170.079±40.12***	15	253.468±173.84***
E-selenium treated dams	15	146.090±18.97***	15	115.490± 15.77***
Untreated dams of NMD naturally affected calves	10	68.980±26.218	10	72.430± 34.580

* P<0.05

** P<0.01

*** P<0.001

by Linklater et al. (1977) it was considered to be relatively higher than those reported by Tompson et al(1976); Van Fleet (1980), who considered level below 50 ng/ml indication of E-selenium difficiency and El-Neweehy (1982) in buffalo calves. Similarly low blood selenium level in both dams of NMD affected and NMD affected calves was reported by Jacbsson et al(1970); Linklater et al. (1977) and Parr (1977).

Significant increase observed in blood selenium levels in both dams and their calves after both selenium and E-selenium administration to the dams during pregnancy, was reported before by Hidiroglou et al.(1969), Jacbsson et al. (1970), Jenkins et al. (1970); Scott (1970); Nilslannek (1973); Jenkins et al. (1974), Oldfield (1974); Allen et al. (1975) and El-Neweehy (1982).

This increase in whole blood selenium levels in calves may be attributed to efficient passage of selenium through placenta to the featuses during pregnancy (McConnell et al. 1971; Shearer & Hadjimarkos 1973; Johnson et al. 1974; Salantiu, 1975 and Perry et al. 1978).

From the present study, it could be concluded that vitamin E levels was significantly low in both serum and milk of dams of NMD naturally affected calves. Not only E-selenium administration to pregnant buffaloes was accompanied with significantly higher levels of vitamin E in their serum and milk, but also blood selenium levels of them and their calves. On the other hand selenium administration was followed by marked improvement in milk vitamin E levels, but with severe drop in their serum vitamin E level. While blood selenium levels were significantly low in both dams of NMD naturally affected calves and their affected calves, selenium administration to pregnant buffaloes was accompanied with highly significant increase in blood selenium levels of them and their calves.

SUMMARY

* On studying reflection of vitamin E and selenium maternal status of buffalo-dams on their calves, it was found that: 1- Both serum and milk vitamin E levels were significantly low in dams of Nutritional Muscular Dystrophy (NMD) naturally affected calves. Blood selenium levels were also significantly low in them and their affected calves. All when compared with those of untreated dams of normal calves and their calves. 2- While significant increase occurred in serum and milk vitamin E levels in E-selenium treated dams, selenium administration was accompanied with marked improvement in their milk but with severe drop in serum vitamin E levels. 3- Simillar significant increase was observed in blood selenium levels in both selenium and E-selenium treated pregnant dams and their calves.

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