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STUDIES ON SELENIUM AND/OR VITAMIN E ADMINISTRATION TO EGYPTIAN BUFFALO CALVES. I- EFFECT ON BLOOD SERUM SELENIUM LEVEL, DAILY GAIN AND SOME BLOOD CONSTITUENTS

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SUMMARY

A trial was conducted to determine the effect of selenium (Se) injection, vitamin E (orally) and Se+Vit E on blood serum selenium level, daily gain and some blood constituents (total protein, albumin, globulin, A/G ratio, total cholesterol, total lipids, GOT and GPT). Egyptian buffalo calves (15 males and 16 females) raised on Buffalo Research Station at Mehallet Mousa, Kafr El-Sheikh Governorate, were randomly assigned after weaning to four groups. The first group (8 calves) was injected with Se as sodium selenite intramuscularly in a dose of 0.125 mg/ kg body weight. The second group (8 calves) received vitamin E orally (200-400 mg/ head). The third group (8 calves) received Se+Vit E. Se or vitamin E divided into two doses and administered in two successive weeks and repeated every three months. The fourth group (7 calves) was kept as control. Treatment with Se+Vit E significantly ($P<0.05$) increased concentration of Se in blood serum of calves at intervals of 2, 14, 16 and 30 weeks after the onset of treatment. Daily body weight gain improved in treated groups by 42, 27 and 65 gm/ day for Se, Vit E and Se+Vit E groups, respectively. Blood biochemical constituents were not affected by different treatments, while interaction between treatment and intervals were significant ($P<0.01$) or ($P<0.05$) for blood constituents studied except total lipids.

Keywords: Buffalo, calves, selenium, vitamin

INTRODUCTION

Selenium is an essential nutrient for animals and diseases due to its inadequacy in livestock of a world wide distribution. Ruminants are subjected frequently to sever dietary deficiencies of this micro-element (Hidiroglou and Jenkins, 1975). Soil and therefore the pastures they carry, vary widely in their selenium content depending largely on their geological origin. A number of factors also reduce the availability of soil selenium to plants and in turn to animals. The animal essentiality for selenium is based on its incorporation into the enzyme glutathione peroxidase (GSH-Px). This enzyme catalyzes the breakdown of hydrogen peroxidas and lipid hydroperoxidases in body tissues and fluids. Depending upon this function, selenium plays a role in protection against hepatic damage due to oxidative stress (Stuart, 1987), in reproductive function in buffalo dams (Youssef *et al.*, 1988), and buffalo bulls (Omaima-Mahmoud, 1994). In immunological reactivity (Hassanin *et al.*, 1988); in muscular dystrophy and growth rate of calves (Gleed *et al.*, 1983), in growth rate of suckling buffalo calves (El-Ayouty *et al.*, 1996).

In the last few years, biological uses of selenium was considered as an economic tool in many breeding centers in different localities in ARE. Selenium functions are to a certain extent duplicated by vitamin E, but it is not capable for replacing the vitamin in all situations. Evidence suggests that requirement for vitamin E and Se are mostly independent (Stowe *et al.*, 1988, and Van Saun *et al.*, 1989).

No enough attention had been given to the Se and vitamin E status of the growing buffalo calves in Egypt. Some investigations on the buffalo calves at Mehallet Mousa Research Station declared that the growing calves are maintained slow growth rate (Metry, 1997), and encountered with some health problems, such as weakness. The favorable results obtained by Se-supplementation of buffalo dams (Awad *et al.*, 1985), proved that these animals raised on Se-deficient area. Therefore, the major objective of this study was to monitor serum Se, daily weight gain and some serum metabolites of buffalo calves supplemented with Se and/or vitamin E ($\propto$-tocopherol) at three months intervals during 30 weeks after weaning.

MATERIALS AND METHODS

The present study was conducted on 31 buffalo calves (15 males and 16 females) after weaning raised on Buffalo Research Station at Mehallet Mousa, belonging to Animal Production Research Institute, Ministry of Agriculture. The calves were divided randomly into four groups. The first group (8 calves) was injected intramuscularly with 0.125 mg Se/kg body wt. as sodium selenite. The second group (8 calves) was supplemented orally with 200-400 mg/ head vitamin E (dl-alpha-tocopherol acetate, Pharco Pharmaceuticals, Alexandria). The third group (8 calves), was treated with the same doses of Se+Vit E. The Se and vitamin E values were split into two equal doses, administered with one week interval. The treatments started after weaning (15 weeks-old) and repeated at three months intervals till the calves reached 45 weeks-old. The fourth group (7 calves) was kept without treatment as control.

The calves were fed daily on calves starter (1.5 kg/head) consisted of 40% yellow maize, 22% wheat bran, 20% linseed meal, 5% soybean meal, 5% maize glutin, 5% molasses, 2% calcium carbonate and 1% sodium chloride. Protein content (CP) of the starter was 17.5%. Also, the calves were fed on 1.0 kg/head clover hay (12.3% CP) or green clover and wheat straw (1.0 kg/head). At six months of age, the starter was replaced by concentrate mixture (2.0 kg/head), consisted of 22% yellow maize, 32% cotton seed meal, 26% wheat bran, 12% rice bran, 5% linseed meal, 2% molasses, 0.5% limestone and 0.5% sodium chloride. Protein content of the concentrate mixture was 16%. The wheat straw was replaced by rice straw (1.5 kg/head). The calves were group fed and the level of feeding was changed according to their age change (feeding system practices on the farm). The calves were watered twice daily and body weights were recorded at biweekly intervals. Daily weight gain (kg) for the entire experimental period (30 weeks) was calculated.

Blood samples from jagular vein were collected just before treatment, at 1 and 2 weeks after treatment and repeated at three months intervals (at 14, 15, 16, 28, 29 and 30 weeks after the initiation of the experiment). Serum was separated and stored at -20°C till analysis. Blood serum constituents were determined according to the following: Se (fluorometrically, just before treatment, at 2, 14, 16, 28 and 30 weeks after the initiation of the experiment); total protein (kits "bio Merieux", France); Albumin and transaminase enzymes (kits "Biochemical Trade Inc." U.S.A.); total lipids (kits "bio Merieux", France); cholesterol (kits "Stanbio" U. S. A.) and globulin (calculated by subtracting albumin concentration from total protein concentration).

The data of daily gain were analyzed using GLM procedure in SAS® program and the sex of the calf was included and the following model was used.

y_{ijk}=	$\mu + T_i + S_j + T_i{*}S_j + e_{ijk}$
y_{ijk}=	The observation on the calf;
μ=	Common mean;
T_i=	Fixed effect of the i^{th} treatment where is I=(1, 2, 3, and 4);
S_j=	Fixed effect of the j^{th} sex of calf where is j=(1 and 2);
$T_i{*}S_j$=	Interaction between the i^{th} treatment and j^{th} sex;
e_{ijk}=	The random error.

The data of metabolic profile and selenium concentration in blood serum were analyzed using model 3 in Harvey program (1987).

y_{ijkl}= $\mu + T_i + C_j(T_i) + I_k + I_k{*}T_i + e_{ijkl}$

y_{ijkl}= The observation on the calf;

μ= Common mean;

T_i= Fixed effect of the i^{th} treatment where is i=(1, 2, 3, and 4);

$C_j(T_i)$= The random effect of the j^{th} calf within the i^{th} treatment where is j=(1 to 31);

I_k= Fixed effect of the k^{th} interval where is k=(1 to 6) for selenium concentration, while k=(1 to 9) for metabolic profile ;

$I_k{*}T_i$= Interaction between the k^{th} interval and the i^{th} treatment;

e_{ijkl}= The random error.

RESULTS AND DISCUSSION

The least squares means of serum Se concentration arranged by treatment are in Table 1. Initial mean Se concentration in serum for the Se, Vit E, Se+Vit E and control groups ranged from 0.026 to 0.030 µg/ml (Figure 1). This range was higher than initial concentration of 0.020 to 0.025 µg/ml reported by Stowe *et al.* (1988) for the Holstein cows during dry period. Selenium injection with or without Vit E supplementation increased ($P<0.05$) serum Se level (0.034 and 0.033 µg/ml, respectively, vs. 0.028 µg/ml in control). This is in accordance with that reported by Droke and Loerch (1989); Stowe *et al.* (1992); Van Saun (1990) and El-Ayouty *et al.* (1991) who found that Se alone or in combination with vitamin E increased serum Se level. While, mean serum Se concentrations of Se group were consistently lower than in Se+Vit E group (Figure 1). It appears that both Se and Vit E are acting synergistically (Horton and Jenkins, 1978). On the other hand, Vit E supplementation alone increased serum Se level nonsignificantly compared with control group (0.029 vs. 0.028 µg/ml). The same results obtained in sheep by Whanger *et al.* (1977).

Least squares means for daily gain (kg) of male and female calves in different treatments during the entire experiment period (30 weeks) are presented in Table 2 and Figure 2. The highest daily gain (0.409 kg) was observed for Se+Vit E followed by Se, Vit E and control groups (0.386, 0.371 and 0.344 Kg, respectively). The Se, Vit Eand Se+Vit E treatments improved significantly ($P<0.05$) daily gain during the entire experimental period by 42, 27 and 65 gm than those of control group. At the end of experiment the increase in body weights were 8.82, 5.67 and 13.65 kg for the respective groups. These results are in parallel with results recorded by Stuart (1987) after supplementation of calves with intraruminal Se pellets. Wichtel *et al.* (1996) mentioned that Se in combination with

Table 1. Least squares means for serum Se level (µg/ml) of male and female buffalo calves injected with sodium selenite with or without vitamin E orally, supplemented with vitamin E orally and control groups

Item	Treatment				Intervals (week)					
	Se	Vit E	Se+ Vit E	ol	0	2	14	16	28	30
No. of observation	32	32	32	29	8	23	23	23	23	23
Serum Se (µg/ml)	.033[a]	.029[b]	.034[a]	.028[b]	.029[b]	.034[a]	.030[ab]	.032[ab]	.031[ab]	.029[b]
	±	±	±	±	±	±	±	±	±	±
Standard error	.001	.001	.001	.002	.003	.002	.002	.002	.002	.002

[a,b] Means with different superscript in the treatment or intervals are different (P<0.05).

Table 2. Least squares means for daily gain (kg) of male and female buffalo calves injected with sodium selenite with or without vitamin E orally, supplemented with vitamin E orally and control groups

Item	Treatment				Sex of calves	
	Se	Vit E	Se+ Vit E	Control	Male	Female
No. of animals	8	8	8	7	15	16
Daily gain (kg)	0.386[ab]	0.371[ab]	0.409[a]	0.344[b]	0.396[a]	0.359[b]
	±	±	±	±	±	±
Standard error	0.01	0.01	0.01	0.02	0.01	0.01

[a,b] Means with different superscript in the treatment or sex of calves are differ (P<0.05).

Vit E improved daily gain in calves. Droke and Loerch (1989) found that sick steers injected with Se and (or) Vit E tended to have slightly higher daily gains, but in healthy steers, the average daily gain was not affected. On the contrary, several investigators didn't demonstrate any effect of oral Se supplementation on body weight gain of calves (Abdelrahman & Kincaid 1995, and El-Ayouty *et al.*, 1996) and in pigs (Kornegay *et al.*, 1993).

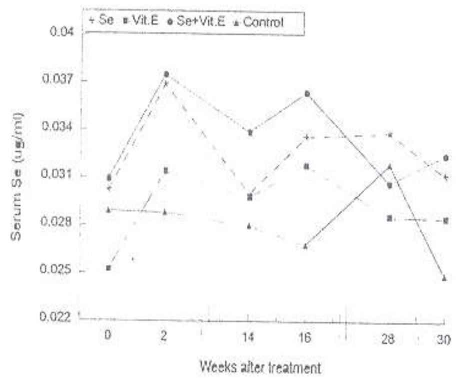

Figure 1. Serum Se concentration by intervals for treated and control groups.

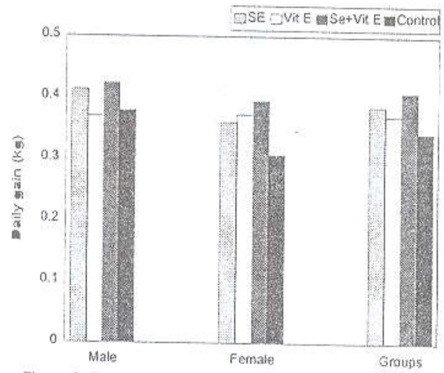

Figure 2. Daily gain (kg) for male and female buffalo calves during the whole experiment as affected by treatments.

Sex of calves (Table 2) affected significantly (P<0.05) daily gain (0.396 vs. 0.359 kg for male and female calves, respectively). Also, Se+Vit E treatment improved body weight gain in male and female calves (0.423 and 0.395 kg, respectively) compared with .379 and .308 kg for the respective sex in the control group (Figure 2).

Serum proteinogram in different treated groups and according to the intervals of experiment was postulated in Table 3 and Figure 3. The effect of treatment was more obvious significantly (P<0.01) on albumin fraction. It might be reflected on A/G ratio significantly (P<0.01) particularly in Vit E group compared with control one (1.57 vs. 1.24). Morozov *et al.*, (1984) demonstrated that there was no effect of sodium selenite treatment on calves 2-4 weeks old on total protein and its fractions. However, it indicated that after selenium absorption, selenium associated with plasma protein (McConnell and Levy, 1962). Shamberger (1983) mentioned that albumin is immediate acceptor of injected selenium which intensified its synthesis. Moreover, the higher albumin concentration obtained in the present study might be indicated the normal health status of calves (Jagos, *et al.*, 1981). Serum protein levels and its fractions increased significantly (P<0.01) with lowering of A/G ratio by successive intervals of the experament

(Figure 3). Jensen (1978) reported that serum protein and its fractions are related to age. Furthermore, El-Ashry *et al.* (1994) found that plasma protein increased gradually after 6 months old Egyptian buffalo hefiers and reached the maximum at 15 months-old. However, Katunguka-Rwakishaya *et al.* (1985) cited that plasma protein in calves decreased consistantly within age between 4 and 22 weeks. They added that A\G ratio decreased within the same period, similar with our results.

Table 3. Least squares means ±SE of serum proteinogram of Se (injection), vitamin E (orally), Se plus Vit E treatments and control groups of buffalo calves

Item	Obs	protein gm/100 ml	albumin gm/100 ml	globulin gm/100 ml	A/G ratio
Overall mean	279	6.96±.04	4.12±.01	2.40±.05	1.34
Treatment:		NS	**	NS	**
Se	72	$6.98\pm.08^{a}$	$4.10\pm.03^{b}$	$2.41\pm.10^{a}$	1.31^{b}
Vit E	72	$6.86\pm.08^{a}$	$4.20\pm.03^{a}$	$2.27\pm.10^{a}$	1.57^{a}
Se+Vit E	72	$7.02\pm.08^{a}$	$4.09\pm.03^{b}$	$2.44\pm.10^{a}$	1.24^{b}
Control	63	$6.97\pm.09^{a}$	$4.08\pm.03^{b}$	$2.49\pm.11^{a}$	1.22^{b}
Intervals:		**	**	**	**
Initiation of treatment	31	$6.79\pm.09^{cd}$	$4.03\pm.04^{b}$	$2.49\pm.11^{b}$	1.05^{c}
week-1	31	$6.28\pm.09^{d}$	$4.10\pm.04^{b}$	$1.60\pm.11^{c}$	2.02^{a}
week-2	31	$6.35\pm.09^{d}$	$4.11\pm.04^{ab}$	$1.86\pm.11^{c}$	1.78^{ab}
week-14	31	$7.20\pm.09^{ac}$	$4.21\pm.04^{a}$	$2.38\pm.11^{b}$	1.39^{bc}
week-15	31	$6.82\pm.09^{bc}$	$4.11\pm.04^{ab}$	$2.39\pm.11^{b}$	1.24^{bc}
week-16	31	$7.34\pm.09^{a}$	$4.21\pm.04^{a}$	$2.66\pm.11^{b}$	1.20^{c}
week-28	31	$7.11\pm.09^{ab}$	$4.09\pm.04^{b}$	$2.49\pm.11^{b}$	1.21^{c}
week-29	31	$7.24\pm.09^{ab}$	$4.18\pm.04^{a}$	$2.54\pm.11^{b}$	1.12^{c}
week-30	31	$7.47\pm.09^{a}$	$4.00\pm.04^{b}$	$3.20\pm.11^{a}$	1.02^{c}

NS Non significant. ** Significant (P<0.01).

a,b,c,d Values with different superscript in the same column within item are differ significantly (p<0.01).

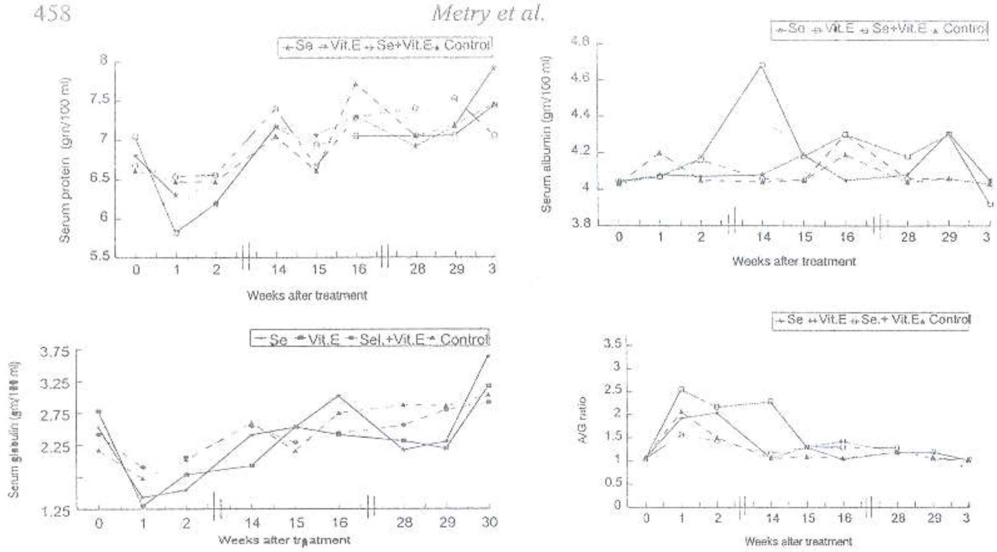

Figure 3. Blood serum protein, albumin, globulin and A/G ratio of buffalo calves injected sodium selenite (0.125 mg/kg BW) with or without vitamin E orally (200-400 mg/head), vitamin E and Control groups on three occasions 0-2 wk, 14-16 wk and 28-30 wk after the initiation of the experiment.

Interaction of treatment with intervals was significant (P<0.01) in serum proteinogram (Figure 3). It may be due to the effect after the successive treatment (at wk-2, wk-16 and wk-30). Serum globulin level i.e. in control and Se groups was 2.49 and 2.44 gm/100 ml, respectively. These values were less than 4.30 mg/ ml plasma globulin level during the last 8 weeks of gestation in Egyptian buffalo (Metry *et al.*, 1994).

Serum GOT and GPT (Table 4 and Figure 4) were not affected by Se and/or Vit E supplementation. The overall means were 44.30 and 18.70 μ/l, respectively, which are within the normal ranges (22-71and 5-29 μ/ l) recorded in normal Holstein-Freisian calves reported by Vagher *et al.* (1973). However, serum level of GOT greatly increased in hepatic damage in cow (Holtenius and Jacobsson, 1964). Furthermore, Dotta and Robutti (1972) and Kursa (1975) detected that calves with clinical muscular dystrophy showed increases in GPT. While, the effects on serum GOT and GPT levels were prominent (P<0.01) by the intervals of the experiment and its interaction with treatment.

Table 4. Least squares means ±SE for serum GOT, GPT, cholesterol and total lipids as affected by Se (injection), vitamin E (orally) and Se plus Vit E treatments for buffalo calves

Item	Obs	Serum GOT μ / l	Serum GPT μ / l	Total lipids mg/100 ml	Cholesterol mg/100 ml
Overall mean	279	44.33±0.67	18.72±.34	443.4±5.9	85.1±1.5
Treatment:		NS	NS	NS	NS
Se	72	45.61 ± 1.32^{a}	$19.50\pm.66^{a}$	438.3 ± 11.6^{a}	83.3 ± 2.9^{a}
Vit E	72	45.09 ± 1.32^{a}	$18.05\pm.66^{a}$	438.1 ± 11.6^{a}	84.6 ± 2.9^{a}
Se+Vit E	72	42.34 ± 1.32^{a}	$18.56\pm.66^{a}$	447.0 ± 11.6^{a}	87.3 ± 2.9^{a}
Control	63	44.29 ± 1.41^{a}	$18.76\pm.71^{a}$	449.9 ± 12.4^{a}	85.2 ± 3.1^{a}
Intervals:		**	**	**	**
Initiation of treatment	31	43.19 ± 2.0^{b}	$19.70\pm.93^{bc}$	474.0 ± 12.0^{ab}	80.7 ± 2.8^{bc}
week-1	31	41.54 ± 2.0^{b}	$14.02\pm.93^{c}$	365.5 ± 12.0^{c}	73.5 ± 2.8^{c}
week-2	31	40.57 ± 2.0^{b}	$16.11\pm.93^{c}$	421.0 ± 12.0^{b}	79.7 ± 2.8^{c}
week-14	31	43.00 ± 2.0^{b}	$18.02\pm.93^{bc}$	427.3 ± 12.0^{b}	91.6 ± 2.8^{b}
week-15	31	51.89 ± 2.0^{a}	$17.08\pm.93^{c}$	434.9 ± 12.0^{b}	91.3 ± 2.8^{b}
week-16	31	56.31 ± 2.0^{a}	$18.09\pm.93^{bc}$	451.8 ± 12.0^{b}	86.1 ± 2.8^{bc}
week-28	31	42.45 ± 2.0^{b}	$23.33\pm.93^{ab}$	453.0 ± 12.0^{b}	84.2 ± 2.8^{bc}
week-29	31	31.20 ± 2.0^{c}	$14.39\pm.93^{c}$	459.2 ± 12.0^{b}	70.1 ± 2.8^{c}
week-30	31	48.80 ± 2.0^{ab}	$27.69\pm.93^{a}$	503.5 ± 12.0^{a}	108.6 ± 2.8^{a}

NS Non significant. ** Significant ($P<0.01$). ^{a,b,c} Values with different superscript in the same column within item are differ significantly ($p<0.01$).

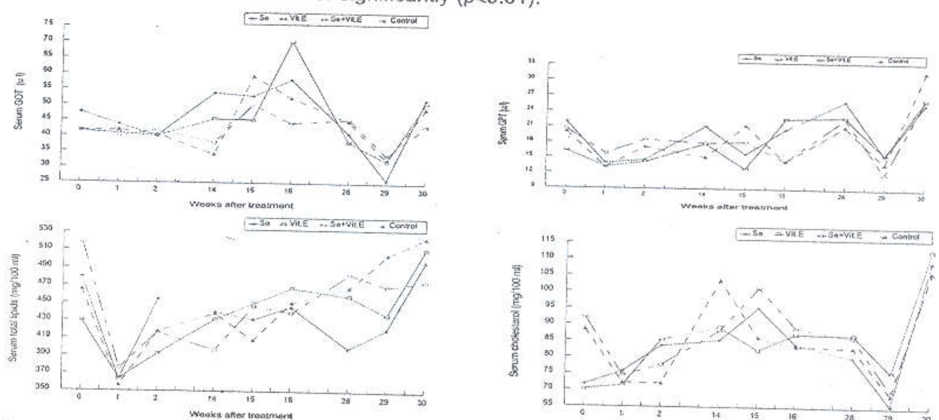

Figure 4. Blood serum GOT, GPT, total lipids and cholesterol of buffalo calves injected sodium selenite (0.125 mg/kg BW) with or without vitamin E orally (200-400 mg/head), vitamin E and Control groups on three occasions 0-2 wk, 14-16 wk and 28-30 wk after the initiation of the experiment.

Temporary decrease of their level may be due to the repeated supplementation of Se and/or Vit E. El-Ayouty *et al.* (1991) cited that the activity of GOT differed from time to time during the experiment without significant differences between the Se-treated and control calves. The overall means of serum total lipids and cholesterol concentrations (Table 4 and Figure 4) were 443.0 and 85.0 mg/100 ml, respectively. Serum cholesterol level is lower in comparable with that in cows (93-172 mg/ 100 ml) as recorded by Arave *et al.* (1975) and Baumgatner (1979), but higher than the range of 39-45 mg/ml in lactating buffalo (Metry *et al.*, 1994). Effect of treatment during the experiment was not obvious. While, serum total lipids and cholesterol levels were significantly increased ($P<0.01$) by successive intervals. In the same pattern (Arave *et al.*, 1975) proved that serum cholesterol increased with increasing age of calves.

CONCLUSION

One of the most surprising features of this experiment was the absence of clinical disease among even the unsupplemented animals, inspite of their low blood serum concentration of Se. Dispite this absence of disease, the evidence suggested that supplementing the buffalo calves with Se and/or vitamin E significantly improved daily gain. Additional studies are needed in different geographical locations to establish the effects with higher doses and shorter intervals between injections.

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REFERENCES

Abdelrahman, M. M. and R. L. Kincaid, 1995. Effect of selenium supplementation of cow on maternal transfer of selenium to fetal and newborn calves. J. Dairy Sci., 78:625-630.

Arave, C. W., R. H. Miller and R. C. Lamb, 1975. Genetic and environmental effects on serum cholesterol of dairy cattle of various ages. J. Dairy Sci., 58: 423-427.

Awad, Y. L., R.H. Youssef and M.F. Mikahail, 1985. Influence of pre-partum selenium treatment on the reproductive pattern of Egyptian buffaloes and on the born calves. Egypt. J. Vet. Sci., 22: 55-64.

Baumgatner, W., 1979. Working values for laboratory diagnosis in cattle. II. Menirals in serum and blood status. Zentralblatt fur Deterinarmedizin, 26 A:279-289.

Dotta, U. and B. Robutti, 1972. A study on the serum levels of glutamic of the oxaloacetic and glutamic pyruvic transaminases, aldolase and creatine phosphokinase in normal calves and calves with muscular dystrophy. Folia Veterinaria Latina, 2: 310-325.

Droke, E. A. and S.C. Loarch, 1989. Effects of parenteral selenium and vitamin E on performance, health and humoral immune response of steers new to the feedlot environment. J. Anim. Sci., 67:1350-1359.

El-Ashry, M. A., A. Z. El-Basiony, A. M. El-Serafy and M. F. Sadek, 1994. Probitic (LBC) in buffalo heifers rations: 2. Effect on some blood parameters. Egyptian J. Anim. Prod., 31:15-25.

El-Ayouty, S. A., A. M. Abd-el-Khabeir; Bahira I. Kamel and A. M. Abd-Elhamid, 1991. Effect of selenium supplementation on growth and blood selenium in growing calves. J. Agric. Sci. Mansoura Univ., 16:2786-2791.

El-Ayouty, S. A., G. H. Metry, A. A. Gabr and M. A. A. Abd El-Hady, 1996. Selenium nutrition of suckling buffalo calves. Egyp. J. Anim. Prod., 33:123-136 (suppl.).

Gleed, P.T., W. M. Allen, C.B. Mallinson; G. J. Rowlands; B. F. Sanson and M. J. Vagg, 1983. Effects of selenium and copper supplementation on the growth of beef steers. The Vet. Record. 22:388.

Harvey, W.R., 1987. User's guides for LSMLMW and MIXMDL PC-2 version. Mixed model least squares and maximum likelihood computer program. Mimeograph. Columbus, Ohio.

Hassanin, H., A. El-Ged, R.H. Youssef, Nour, B. Bishara and Y. L. Awad, 1988. Influence of supplemental selenium and vitamin E on immunological reactivity of sheep vaccinated with clostridial vaccine. Alex. J. Vet. Sci., 4: 311-317.

Hidiroglou, M. and K. J. Jenkins, 1975. Effect of selenium and vitamin E, and copper administration on weight gains of beef cattle raised in a selenium deficient area. Can. J. Anim. Sci., 55:307.

Holtenius, P. and S. O. Jacobasson, 1964. Rep. 3rd. Int. Meet. Dis. Cattle, Copenhagen.

Horton, G. M. J. and W. L. Jenkins, 1978. Hematological and blood chemistry changes in ewes and lambs following supplementation with vitamin E and selenium. Br. J. Nutr., 40:192-203.

Jagos, P., J. Bouda, V. Dvorak and J. Ondroda, 1981. Comparison of biochemical values in the blood plasma of healthy and diseased calves in a large capacity calf house. Vet. Med., 26: 573-580.

Jensen, P.T., 1978. Quantitative studies on immunoglobulins, albumin and total protein in serum from young normal calves. Nordisk Veterinaer Med., 30: 145.

Katunguka-Rwakishaya, E.; H. Larkin and W. R. Kelly, 1985. Some hematological and blood biochemical components in conventionally reared calves. Irish Vet. J., 39: 118-123.

Kornegay, E.T., J.B. Meldrum and W.R. Chickering, 1993. Influence of floor space allowance and dietary selenium and zinc on growth performance, clinical pathology measurements and liver enzymes, and adrenal weights of weaning pigs. J. Anim. Sci., 71: 3185-3198.

Kursa, J., 1975. Activity of some enzymes in calves with nutritional muscular dystrophy. Vet. Med., 20: 489-494.

McConnell, K. P. and R. S. Levy, 1962. Presence of selenium-75 in lipoproteins. Nature (London) 195: 774-776.

Metry, G. H., 1997. Effect of two feeding systems on the performance of male and female buffalo calves. International Conference on Anim. Prod. & Health. Dokki, Cairo, Egypt. p. 257-267.

Metry, G. H., R. M. Khattab and R. H. Youssef, 1994. Effect of steaming up and feeding in early stage of lactation on some blood constituents in Egyptian buffaloes. J. Agric. Sci. Mansoura Univ., 19:2469-2478.

Morozov, L. V., E. V. Prygunova and N. G. Zhirnova, 1984. Activity of malate dehydrogenase and its isoenzymes and some indicators of protein metabolism in cattle treated prophylactically with selenium for muscular dystrophy. Sbornik Nauchnykh Trudov Mosovskaya Veterinarnaya Akademia. 57-60.

Omaima-Mahmoud, M. H., 1994. Studies on some biological effects of selenium supplementation in buffalo bulls. Ph. D. Thesis, Faculty of Sci., Cairo Univ.

SAS® User's Guide: Statistics, Version 6.03 Edition, 1988. SAS Inst., Inc., Cary, NC.

Shamberger, R. J., 1983. "Biochemistry of selenium". Plenum press. New York.

Stowe, H. D., J. W. Thomas, T. Johnson, J. V. Marteniuk, D. A. Marrow and D. E. Ullrey, 1988. Responses of dairy cattle to long-term and short-term supplementation with oral selenium and vitamin E. J. Dairy Sci., 71:1830-1839.

Stowe, H.D. and T.H. Herdt, 1992. Clinical assessment of selenium status of livestock. J. Anim. Sci., 70:3928.

Stuart, R.L., 1987. Factors affecting vitamin E status of beef cattle. In: Proc. Roche Tech. Symp., The role of vitamins on animal performance and immune response. Daytone beach, Florida, U.S.A., p 67.

Vagher, J. P., B. Pearson, S. Blatt and M. Kaye, 1973. Biochemical and hematological values in male Holstein-Friesian calves. Am. J. Vet. Res. 34: 273.

Van Saun, R. J., 1990. Rational approach to selenium supplementation essential. Feed stuffs, January, 15:15.

Van Saun, R. J.; T. H. Herdt and H. D. Stowe, 1989. Maternal and fetal vitamin E concentration and selenium-vitamin E interrelationships in dairy cattle. J. Nutr., 119:1128.

Whanger, P.D., P.H. Weswig, J. A. Schmitz and J. E. Oldfield, 1977. Effect of selenium and vitamin E on blood selenium levels, tissue glutathione peroxidase activities and white muscle disease in sheep fed purified or hay diets. J. Nutr. 107:1298.

Wichtel, J. J., A. L. Craigie, A. D. Freeman, H. Alvarez and N. B. Williamson, 1996. Effect of selenium and iodine supplementation on growth rate and on thyroid and somatotropic function in dairy calves at pasture. J. Dairy Sci., 79:1865.

Youssef, R. H., Y. L. Awad, A. A. Zaki and L. H. Bedair, 1988. Effect of selenium treatment of buffaloes during late pregnancy on serum gonadotrophins. Assiut Vet. Med. J., 20: 35-40.

دراسات على معاملة عجول الجاموس المصرى بالسيلينيوم مع أو بدون فيتامين هـ

١- التأثير على مستوى السيلينيوم فى سيرم الدم ومعدل النمو اليومى وبعض مكونات الدم.

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أجريت هذه الدراسة لتقدير تأثير حقن السيلينيوم أو كبسولات فيتامبين هـ المعطى عن طريق الفم أو المعاملة بالسيلينيوم + فيتامين هـ على مستوى السيلينيوم فى سيرم الدم وكذلك على معدل النمو اليومى وبعض مكونات الدم (البروتين الكلى و الألبيومين و الجلوبيولين و نسبة الألبيومين إلى الجلوبيولين و الكوليستيرول الكلى والليبيدات الكلية والنشاط الانزيمى GOT - GPT) فى عجول وعجلات الجاموس المصرى.

تم تنشئة ٣١ عجل جاموسى (١٥ذكر ، ١٦أنثى) بمحطة البحوث بمحله موسى بمحافظة كفر الشيخ. حيث قسمت الحيوانات عشوائيا عقب الفطام (عمر ١٥ أسبوع) الى أربعة مجاميع.

١. المجموعة الاولى : (٨ عجول وعجلات) حقنت فى العضل بالسيلينيوم فى صورة (Sodium selenite) بجرعة قدرها ٠,١٢٥ ملليجرام /كجم من وزن الجسم.

٢. المجموعة الثانية : (٨ عجول و عجلات) تناولت كبسولات فيتامين هـ عن طريق الفم (٢٠٠-٤٠٠ملليجرام/رأس).

٣. المجموعة الثالثة : (٨ عجول وعجلات) عوملت بالسيلينيوم + فيتامين هـ .

جرعات السيلينيوم وفيتامين هـ تم تقسيمها الى جرعتين وتم استخدامها فى خلال أسبوعين متتاليين وتم تكرار المعاملة كل ٣ شهور (حتى عمر ٤٥ أسبوع).

٤. المجموعة الرابعة : (٧ عجول وعجلات) وكانت مجموعة المقارنة (بدون معاملة).

أدت المعاملة بالسيلينيوم + فيتامين هـ الى رفع تركيز عنصر السيلينيوم فى سيرم دم العجول والعجلات معنويا بعد المعاملة باسبوعين ، ١٤ ، ١٦، ٣٠ أسبوع. تحسن معدل النمو اليومى للعجول

والعجلات فى المجاميع المعاملة بالسيلينيوم ، فيتامين هـ ، سيلينيوم + فيتامين هـ بمقدار ٤٢ ، ٢٧ ، ٦٥ جرام/يوم على التوالى عن مجموعة المقارنة . لم تتأثر مكونات الدم بالمعاملات المختلفة ، بينما كان تأثير التداخل بين المعاملة والفترات الزمنية للتجربة تأثيرا معنويا على مكونات الدم التى درست فيما عدا الليبيدات الكلية.