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دور بعض الأملاح المعدنية في تغذية العجول الجاموسي وعلاقتها بالانتاج
١ـ تأثير اضافة سلفات النحاس

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استخدم في هذه التجربة عدد عشرة ذكور جاموسي صغير لدراسة أثر اضافة سلفات النحاس الى العلائق الشائع استخدامها على الحالة الصحية والانتاجية . استمرت هذه التجربة لمدة ٩٠ يوما عند تغذية الحيوانات فيها على عليقة أساسية مكونة من البرسيم ومركزات تجارية مخلوطة بالردة . هذا وقد قسمت الحيوانات الى ثلاثة مجموعات الأولى تناولت العليقة الأساسية فقط بدون اضافات في حين اضيفت سلفات النحاس بمعدل ٢٥٠مجم/٥٠٠مجم الى غذاء كل من المجموعة الثانية والثالثة على التوالي، حيث تم خلطها مع المركزات التجارية . وقد تم تسجيل الزيادة في معدل أوزان الحيوانات على مدار التجربة ، كما تم ايضا تعيين مستوى كل من النحاس والزنك والمنجنيز والكالسيوم والفوسفور والماغنسيوم في مصل حيوانات التجربة وتم التوصل الى النتائج الاتية :

١ـ سجلت حيوانات المجموعة الثانية أعلى زيادة معنويه في الوزن.
٢ـ اضافة سلفات النحاس لعلائق الحيوان ليس له تأثير معنوى على مستوى هذا المعدن في الدم.
٣ـ امداد الحيوان بالنحاس نتج عنه انخفاض غير معنوى في مستوى الزنك في المصل كذلك وجد ارتباط بين مستوى كل من النحاس والزنك في كل من المجموعه الثانية (ر= ٢٢ر٠). والمجموعه الثالثة (ر = ٢٢ر٠).
٤ـ لم يتأثر مستوى المنجنيز معنويا باضافة النحاس للعلائق بينما وجد ارتباط سلبي في مستوى كل من النحاس والمنجنيز في المجموعتين الثانية والثالثة .(ر= ـ ٣٨ر٠)، (ر = ٣٢ر٠).
٥ـ وجد ارتباط سلبي بين مستوى كل من النحاس والكالسيوم في المجموعتين الثانية والثالثة (ر = ١٥ر٠)، (ر = ـ ١٥ر٠) على الترتيب .
٦ـ وجد ارتباط سلبي بين مستوى كل من مستوى النحاس والفسفور في المجموعة الثانية (ر = ـ ٠٤٧ر٠) في حين كان هذا الارتباط ايجابي في المجموعة الثالثة (ر = ٠٣١ر٠).
٧ـ وجد ارتباط ايجابي قوى بين مستوى كل من النحاس والماغنسيوم في المجموعة الثانية (ر = ٩٨ر٠) في حين كان الارتباط الايجابي اقل قوة في المجموعة الثالثة (ر = ٣٥ر٠).

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ROLE OF SOME MICROELEMENTS IN NUTRITION OF WATER BUFFALO AND ITS RELATION TO PRODUCTION
I- Effect Of Copper Supplementation

(With 10 Tables)

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SUMMARY

10 male buffaloe calves were used to investigate the effect of copper sulphate addition to the commonly fed rations on health and performance. The calves were divided into 3 groups provided that group I received no supplemental copper, the calves of group II and III were received 250 mg and 500 mg copper sulphate added to the concentrate mixture respectively. Body weight gain was recorded, blood analysis for copper, zinc, manganese, calcium, phosphorus and magnesium levels was conducted. The following results were recorded.

Calves of group II recorded, significant high body weight.

Copper sulphate supplementation insignificantly influence the serum copper, zinc, manganese, calcium and phosphorus levels.

After copper supplementation, there was negative correlation between serum copper levels and serum zinc, manganese, calcium and phosphorus levels.

Strong positive correlaion was domenstrated between serum copper and magnesium levels.

INTRODUCTION

Copper had been recognized as dietary essential for ruminants since 1930. Copper deficiency in cattle could be completely prevented by copper therapy or by herbage treated with copper compounds (BENNETTS et al., 1941. HAYSVW and SWEANSON, 1977). ENGLE et al. (1964), stated that addition of copper sulphate ata rate of 790 mag. to the ration of male calves could not significantly affect their body weight gain. Also ESSING et al. (1972) recorded that the average daily body weight gain, feed conversion and carcass quality were not affected by the level of copper sulphate fed.

BUGAKOU and KAVRUS (1983) reported that, addition of copper and other minerals to the silage as basal diet to cows resulted in increase of milk yield and improved health, viability and survival of newborn calves. KUZENETSOV et al. (1983) concluded that copper supplementation has no significant effect on milk production, milk fat and birth weight of the calves.

SANDER and SANDERS (1984) stated that daily milk yield and health improvement occurred after copper supplementation to dairy cows. This study is a trial to study the copper supplementation to the commonly fed rations on health body weight of Egyptian buffalo calves.

MATERIAL and METHODS

10 male buffaloe calves, 8-14 months old, apparently healthy has experimented on. They were individually kept in seperate pens at the calf disease Research Centre, Faculty of Veterinary Medicine, Cairo University. Calves alloted into 3 groups, all calves were fed basal ration composed of green barseem, commercial concentrate mixture and wheat bran for 90 days, calculated to cover the requirements of buffalo calves acording to RANJHAN and PATHAK (1979). Group I received no copper supplementation while the 2nd and 3rd groups were fed on the basal diet to which 250 and 500 mg. copper sulphate were added respectively.

Blood samples were collected at 15 days before supplementation and 1, 7, 23, 53, 93 days following copper summplementation. Serum copper level detected by the method described by EDEN and GREEN (1940) and modified by VENTARA and KING (1951), calcium by BARON and BELL (1957), magnesium by HEAGY (1984) modified by ORANGE and RHEIN (1951), phosphorus by FISKE aand SUBBAROW (1957), zinc and manganese by atom absopriton spectro photometer. Fod samples were analysed for crude protein, crude fibre ether extract and ash by the methods described in AOAC (1975) and PEARSON (1976).

Body weight gains were estimated before the start of the experiment and at 15 days intervals after the supplementation.

Chemical composition and trace elements contents of the basal ration used shown in Tables (1 & 2). In table (3) data for the amounts of copper sulphate supplemented and total copper received by each calf in the different groups.

RESULTS

The results are illustrated in Tables (4, 5, 6, 7, 8, 9 and 10).

DISCUSSION

The effect of copper supplementation on the serum zinc level may be explained by the chemical parameter concept, which suggest that metal ions which has similar chemical formula to copper, will interfere with its metabolism in vivo.

From data in Table (8) one can proved that serum copper and calcium levels were insignificantly correlated in both copper supplemented in groups II and III , also no significant differences due to copper supplementation were gained between groups. The obtained data agree with those recorded by PAL et al. (1970).

The average serum phosphorus levels of the experimental calves during the experiment illustrated in Table (9) statistical analysis of the results, revealed that the copper supplementation did not significantly affect the average serum phosphorus levels in the three groups. there was insignificant correlation between the average serum copper and phosphorus levels for group II and slight positive correlation between the average serum copper and phosphorus levels of group III. Regarding Table (10), the serum magnesium levels was the least affected by copper

supplementation. There is significant positive correlation between serum copper and magnesium levels in group II while less significant correlation coefficient was recorded between these elements in group III.

From the present study it could be concluded that supplementation of rations with 250 mg copper sulphate improved the body weight gain of the buffalo-calves which clarify that the Egyptian feeding stuffs commonly incorporated in buffalo-rations do not fulfill the complete needs of copper for that animals.

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Table (1)

Ingredients, amounts and chemical composition of each feed stuffs of the basal ration fed to calves during experiment I

Ingredients	The basal ration in Kg.	Chemical composition % on DM basis						
		Moisture	Dry matter	Crude protein	Ether extract	Crude fiber	Nitrogen free extract	Ash
Green berseem *	10.2	87.75	12.25	1.7	0.61	3.23	4.78	1.93
Commercial concentrate mixture **	4.0	7.5	92.5	17.31	5.3	16.21	46.72	6.96
Wheat bran.	0.25	8.3	91.7	19.07	4.5	9.62	54.69	5.07

* : Analysis on fed basis.

** : Ingredients of commercial concentrate mixture : (Tanta for oil and Soap Co.).

- Undecorticated cotton seed cake.
- Ground yellow corn.
- Wheat bran.
- Rice polish.
- Molasses.
- Ground lime stone.
- Common salt.

Table (2)

Mineral composition of the basal ration

Ingredients	Calcium %	Phosphorus %	Magnesium %	Copper mg/Kg	Zinc mg/Kg	Manganese mg/Kg
Green barseem	1.38	0.36	0.94	18.75	38.25	22.5
C.C.M.	0.76	0.83	1.05	23.75	103.25	46.96
Wheat bran	0.25	1.49	0.62	27.5	118.25	108.25

Table (3)

Amounts of copper sulphate supplemented and total copper (mg) received by each calf in different groups

Groups	Amount of copper in basal ration mg / Kg DM	$CuSO_4 5H_2O$ added mg	Calculated copper added mg	Total copper mg/Kg DM of ration	Total copper received / calf / day mg
I	22.6	non	non	22.6	117.52
II	22.6	250 mg	63.65	34.84	181.16
III	22.6	500 mg	127.3	47.1	244.92

Obtained data were statistically analysed for determination of the correlation coefficient, analysis of variance and for determination of Least significant differences by Sarhan 1962.

Table (4)

Daily Dry mater intake, body weight development and body weight gain of different groups

Group	No. of Animals	Average DM intake Kg	Daily total Copper intake mg/ calf	Average initial body weight		Average final body weight		Average total gain Kg	Average daily gain Kg
				Kg	%	Kg	%		
I	2	5.2	117.52	180.0	100	255.0	141.7	57	0.833
II	4	5.2	181.16	166.5	100	266.5	160.0	100	1.11*
III	4	5.2	244.92	177.5	100	257.75	145.5	80.25	0.892

* : Sinificant difference P / 0.05 , L.S.D. significant in group II.

COPPER SUPPLEMENTATION

Table (5)

Average serum copper level in buffalo calves during the experiment

Time of Sampling	Group I Mg/100 ml	%	Group II Mg/100 ml	%	Group III Mg/100 ml	%
Preliminary period	74.01	100	74.95	100	74.96	100
After copper supplementation						
1 Days	73.93	99.9	75.99	101.34	81.73	109.03
7 Days	72.37	97.78	97.42	129.98	97.42	129.96
23 Days	83.50	112.82	100.20	133.69	102.98	137.38
53 Days	83.49	112.80	121.77	162.47	109.59	146.20
93 Days	83.50	112.80	116.90	155.98	104.38	139.20

NON significant differences in average serum copper levels between groups and also at diferent times after supplementation (P / 0.05).

Table (6)

Average serum zinc levels for buffalo-calves during the experiment

Time of Sampling	Group I Mg/100 ml	%	Group II Mg/100 ml	%	Group III Mg/100 ml	%
Preliminary period	88.07	100	75.96	100	82.06	100
After copper supplementation						
1 Days	87.17	98.90	81.00	106.60	84.98	103.55
7 Days	90.91	103.22	83.36	109.74	72.89	88.80
23 Days	86.69	98.40	85.39	112.10	94.04	114.60
53 Days	75.34	85.50	73.38	96.60	81.67	99.53
93 Days	77.92	88.48	65.43	86.13	59.26	72.20

NON sinificant differences in average serum levels of zinc n between groups (P / 0.05).

Table (7)

Average serum manganese levels of buffalo calves

Time of Sampling	Group I Mg/100 ml	%	Group II Mg/100 ml	%	Group III Mg/100 ml	%
Preliminary period	2.33	100	1.98	100	3.0	100
After copper supplemetations						
1 Days	2.33	100	3.26	164.6	2.1	70
7 Days	3.26	139.9	3.02	152.5	4.41	147.0
23 Days	1.40	60	1.16	58.60	2.1	70
53 Days	2.33	100	2.33	117.7	1.86	62
93 Days	2.79	119.7	1.63	82.30	1.16	38.7

NON significant differences in averae serum manganese levels between groups (P/___ 0.05).

Table (8)

Average serum calcium levels of buffalo calves during experiment

Time of Sampling	Group I mg/100 ml	%	Group II Mg/100 ml	%,	Group III Mg/100 ml	%
Preliminary period	14.39	100	16.93	100	15.22	100
After copper supplementation						
1 Days	17.69	122.93	14.85	87.71	15.74	103.42
7 Days	18.59	129.19	15.74	92.97	16.04	105.39
23 Days	17.69	122.93	13.94	82.34	14.54	95.53
53 Days	17.69	122.93	14.69	86.77	16.34	107.36
93 Days	16.79	116.68	16.79	99.17	13.34	87.65

COPPER SUPPLEMENTATION

Table (9)

Average serum phosphorus levels of buffalo calves during the experiment

Time of Sampling	Group I Mg/100	%	Group II Mg/100	%	Group III Mg/100	%
Preliminary period	7.1	100	7.04	100	7.22	100
After copper supplementation						
1 Days	7.23	101.83	8.04	114.2	7.9	109.42
7 Days	8.17	115.1	7.08	100.57	8.55	118.42
23 Days	8.16	114.93	8.47	120.31	8.82	122.16
53 Days	7.65	107.75	7.90	112.23	7.39	102.35
93 Days	6.48	91.27	6.78	96.31	6.47	89.61

NON sinificant differences in average serum phosphorus levels between groups (P/__ 0.05).

Table (10)

Average serum magnesium levels of buffalo-calves during the experiment

Time of Sampling	Group I Mg/100 ml	%	Group II Mg/100 ml	%	Group III Mg/100 ml	%
Preliminary period	3.96	100	4.24	100	4.17	100
After copper supplementation						
1 Days	4.15	104.79	4.14	97.64	4.54	108.87
7 Days	3.93	99.24	4.23	99.76	4.00	95.98
23 Days	4.08	103.03	4.52	106.60	4.16	99.76
93 Days	4.21	106.31	4.90	115.57	4.77	114.38

NON significant differences (P/__ 0.05).