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دراسات على صورة بعض العناصر المعدنية في مصل دم عجول الأبقار والجاموس باستخدام بديل اللبن طبقا لنظام الفطام المبكر

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أجريت دراسة باستعمال بديل اللبن على ثمانية عجول جاموس وعشرة أبقار حديثة الولادة قسمت كل من عجول الجاموس والأبقار الى مجموعتين تجريبية قياسية ٠

تركت العجول للتغذية على رضاعة الأمهات حتى عشرة أيام من العمر ٠

وتمت تغذية المجموعتين التجريبيتين على بديل اللبن حتى الأسبوع الرابع حيث أضيف لها البادئ والدريس حتى سن الفطام ٠

أما المجموعة القياسية فقد تركت للتغذية بنظام الرضاعة الطبيعية المباشرة على الأمهات حتى سن الفطام ، حسب النظام السائد في المزرعة ٠

أسفرت النتائج عن الآتي :

أن زيادة اليومية في وزن الجسم ارتفعت من ٣١١ الى ٦٣٣ جم/ يوم في عجول الجاموس ، ٥٥٣ الى ٥ر٦٥٥ جم/ يوم في عجول الأبقار بالمقارنة بالمجموعة القياسية (٣٤٩ ـ ٣٧٢ جم/ يوم ، ٢ر٢٤٤ ـ ٣٩٨ جم/ يوم) لعجول الجاموس والأبقار على التوالي٠

كما أسفرت النتائج البيوكيميائية للعناصر المعدنية عن انخفاض معنوي في مستوى الصوديوم في مصل الدم خلال فترتي ٧ ، ١٣ أسبوع من العمر في عجول الجاموس ولم تحدث أي تغيرات في مستوى الصوديوم في مصل دم عجول الأبقار ٠

كذلك فقد لوحظ أن تركيز البوتاسيوم قد ازداد زيادة معنوية خلال فترتي ٧ ، ١٠ أسبوع من العمر في عجول الجاموس والأبقار على التوالي ٠ وقد سجل المغنسيوم زيادة معنوية في الأسبوع ١٣ من العمر في كل من عجول الأبقار والجاموس وانخفض مستوى الفوسفور انخفاضا معنويا في الأسبوع ١٣ من العمر في عجول الأبقار ولم يلاحظ أي اختلافات معنوية خلال هذه الفترة في عجول الجاموس ٠

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STUDIES ON MINERAL PICTURE IN BUFFALO AND CATTLE CALVES REARED ON MILK REPLACER IN AN EARLY WEANING SYSTEM

(With 3 Tables and 4 Figures)

By
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(Received at 8/2/1987)

SUMMARY

In an experimental study using milk replacer (Kalbi lactal, Fa. Schaumann W. Germany), 8 buffalo calves and 10 cattle calves were used. Both buffalo and cattle calves were divided into experimental and control groups. All calves were left to suckle their dams up to 10 days, then he experimental groups were changed to be fed on milk replacer up to the 4th week where the starter was added, up to the weaning time (13 weeks). The control groups were fed on whole milk from their mohers.

Changes in body weight and daily body gain were recorded in both experimental and control groups. In addition blood serum sodium, Potassium, mangnesium and inorgamic phosphorus levels were studied in both groups along the experimental period.

The study revealed that the daily body gain was from 311-633 g/d for buffalo calves and 553-655.2 g/d for cattle calves. However, the daily body gain of the control groups were 349-372 g/d and 244.2-398 g/d for buffalo and cattle calves respectively.

The biochemical analysis revealed significant decrease in blood serum sodium at 7 and 13 weeks in buffalo calves while no significant variations were observed in cattle calves. Potassium achieved significant increase at 7 and 10 weeks in both cattle and buffalo calves. However magnesium recorded significant increase at 13 weeks in both cattle and buffalo calves. Inorganic phosphorus recorded a highly significant decrease at 13 weeks in cattle calves, while no significant variations were observed in buffalo calves during this period.

INTRODUCTION

The use of milk replacer in feeding newly born calves was arised from the increased demands of human being for animal milk in consumption. Little informations were available about feeding milk replacers to native buffalo and cow calves.

The study of blood serum mineral levels in newly born calves in regards to the feeding system is of great importance. BOUDA and JAGOS (1984) reviewed the values of sodium, potassium, calcium, magnesium and inorganic phosphorus. They reported that the levels of inorganic phosphorus in cow calves plasma was significantly higher than that in cows. The authors added that the changes in both sodium and potassium concentrations were detected

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mostly in diarhoea as a consequence of dehydration and acidosis. The lowest magnesium concentration in blood plasma was found in clinically cow normal calves 1-4 months old. REECE (1984) recorded that no significant differences were seen due to either sex or age or sex and age interaction for the palsma concentration of sodium or calcium. GROTH et al. (1983) studied the electrolyte load in calves following increased concentration of milk substitute and its prevention. They reported that the increased concentration of milk replacers above 250 g/L induce hypernatraemia and hyperchlorinaemia, however, plasma potassium level was not affected by milk replacer concentration.

The aim of the present study is to throw lights upon the biachemical variations of some mineral levels and their evaluations in newly born calves under an early weaning system using recent formula of milk replacers.

MATERIAL and METHODS

Materials :

Newly born 8 buffalo and 10 cattle calves one day old were used for the experimental work. Buffalo calves were classified into two groups, each one consisted of 4 animals. Cattle calves were also divided into two groups, every one consisted of 5 calves. The 1st group of each species was used for the experiment, and the 2nd was used as a control.

All experimental and control animals were kept under complete hygienic measures and clinical observation in the Animal Production Experimental Farm, Faculty of Agriculture, Assiut University. They were housed in a closed brns and were kept on a concrete-slatted floors with a straw bedding. All animals were allowed to exercise frequently and exposed daily to sun-rays in an open yards.

All calves were left to suckle colostrum for 4 days, then whole milk up to 10 days. The experimental groups were fed with milk replacer up to 4 weeks, then milk replacer, starter, clover (Trifolium alexandrinum) hay and water were freely offered at the weaning time. All calves were gradually changed from one feeding system to another. The minimum time for adaptation was 3 days to assure desired consumption of the diet and to avoid digestive disturbances according to feeding standers. Both control groups were fed on natural whole milk feeding system up to the 4th week, then they were changed gradually to the starter feeding. The biochemical structure of the milk replacer recorded by the manufacturer Table (1) and the percentage of the composition of the calf starter Table (2). The mean weaning weights of each calf both experimental and control groups were 90 Kg and 80 Kg for buffalo and cattle calves respectively. All calves were weighed at the begining of the experiment and successively every 10 days. All calves were proved to be clinically healthy during the period of the experiment.

Samples :

Blood samples were taken at the 4th week, then one sample every 3 weeks up to the weaning time. The samples were drained from jugular vein and transmitted to the laboratory of Dept. of Vet. Med. Faculty of Vet. Med. Assiut University. Blood serum was obtained according to BAUER et al. (1949) and transfered directly for biochemical analysis.

METHODS :

Milk replacer (Kalbi lactal, Fa. Schaumann W. Germany) was prepared for expermental studies by dissolving 125 g of milk replacer powder in one liter of warm water (45 °C) for cattle calves and 140 g/L for buffalo calves. Each animal received 1.5 L/d of the mixture at (38 °C). These amounts were increased gradually every 3 days to reach 6 litres at the

10th week. The milk replacer was offered to the calves individually by bucket twice daily at 8 a.m. and 4 p.m. The starter (16% protein), hay and water were added at the 4th week in a free amount up to the weaning day.

The biochemical analysis of sodium and potassium were carried out using flame photometric method (HAWK, 1979). Magnesium was determined colorimetrically according to BAUER et al. (1974). Inorganic phosphorus was analysed colorimetrically using test kits (BioMerieux, Bains, France) according to the method of ZILVERSMIT (1950).

The statistical analysis was performed using t-Test according to SNEDECOR & COCHRAN (1967).

RESULTS

The results of growth rates and daily body gain were recorded in Tabel (3, Fig. 1,2). The results of mineral analysis were recorded in Table (4) and Fig. (3,4).

DISCUSSION

It is important to say that the use of milk replacer is recommended especially in Egypt due to the increased demands to milk for human consumption. On the other hand milk replacer must be overcomed the body needs of the calf and schould give the maximum growth rates and daily body gain to equal if not superior than those given by feeding whole milk systems.

The present investigation revealed that calves fed on milk replacer gained significantly more weight than those fed conventionally either in cattle or buffalo calves Table (3) and Fig. (1,2).

It was observed that two buffaloe calves of control group reach the weaning body weight at 90 days and 2 calves reached the weaning weight at 105 days. However 2 cattle calves need 110 days and one need 120 days to reach the weaning weight. It was noticed that the body gain in bufalo calves was very high and rapid especially in the period of 7-10 weeks old. It still as so up to the weaning time where it became nearly equal to that in cattle calves at the 13th week. That could be attriputed to that the buffaloe calves were not completely adapted to fed milk replacer in short period. The values obtained came in accordance with GHONEIM et al. (1956) for native cattle and buffalo calves suckling their dams and were within the acceptable levels of N.R.C. (1971). Our results are noticebly lower than those reported by FAHMY (1972) and coincide with those obtained by EL-ASHRY et al (1975).

Regarding the mineral analysis, it was observed that, sodium recorded a significant ($P < 0.05$) decrease at 7 weeks and 13 weeks in buffalo calves Table (4). However, its level recorded no significant changes in cattle calves along the period of the experiment Table (4). A significant ($P < 0.05$) increase was observed in potassium levels 7th week in cattle calves and 10th week in buffalo calves. Magneium values recorded significant ($P < 0.05$) increase in both cattle and buffalo calves at the 13th week.

Inorganic phosphorus recorded a highly significant (P 0.01) decrease at the 13th week in cattle calves, however, it recorded no significant variations in uffalo calves.

The overall picture of mineral values indicated that the variations were within the normal physiological lemits if compared with the levels of each species. Our results coincided with those of (BOUDA and JAGOS, 1984). The authors reported that the changes observed in both sodium and potassium were mostly due to diarrhoea as a consequence to dehydration

and acidosis. The authors added that, the effect of the end concentration of milk replacer also had a significant effect on the levels of sodium and potassium especially if concentration exceeds 250 g/L, however, in the present study the final concentration was 125 g/L and 140 g/L for buffalo and cattle calves respectively. However REECE (1984) stated that the age and sex had no effect on the concentration of sodium and potassium.

The variation of inorganic phosphorus levels especially in cattle calves mostly related to the advances in age (OLTNER, 1983 and REECE, 1984).

The increase in magnesium level in cattle and buffalo calves contradict with the opinion of BOUDA and JAGOS (1984), as they reported that the magnesium level normally decrease in calves 1-4 months old.

Lastly it could be concluded that the use of milk replacer in an early weaning system in both cattle and buffalo calves may improve the body weight and daily body gain while the changes observed in the mineral levels are of minor importance.

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ACKNOWLEDGEMENT

The authors would like to express their gratitude to Fa. Schaumann, W. Germany which participated in the work by giving milk replacers as a gift.

MINERAL PICTURE IN CALVES REARED ON MILK REPLACER

Table (1)

Chemical composition of milk replacer Kalbi lactal, Fa Schaumann, W. Germany

Item	%	Item	%
This milk replacer contains:			
Skim milk poder	80.0%	Lactose	10.0 %
Animal fat (raffiniet)	4.4%	Wheatbran (mehl)	3.5 %
Plant fat (raffiniet)	1.1%	Praemix (Vitamins, trace elements and growth stimulating substances).	1.0 %
Crude protein	27.0%	Lysin	1.98%
Crude fat	5.0%	Calcium	1.00%
Crude fibre	1.0%	Phosphor	1.00%
Crude ash	8.5%	Sodium	0.40%
Additives / Kg milk replacer:			
Vitamin A	100.00 I.U	Vitamin E	100 mg
Vitamin D_3	10.000 I.U.	Spiramycin	80 mg

Table (2)

Composition of the calf starter*

Ingredients	%		
Ground soybean	40.0%		
Ground maize	40.0%	Grude protein % starter	16.0%
Wheat bran	17.0%	Crude protein % clover	12.0%
Limestone	2.0%	El-Ashry et al. (1975), Allam (1986).	
Salt	1.0%		

*: The constituents of the calf starter can be altered according to the availability in the country. Soybean protein is attractive for two reasons, firstly its high nutritive value and secondly its availability as a by product of oil industries.

Table (3)

Mean body weight and body gain in buffalo and cattle calves fed milk replacer, starter and hay (experiment) and whole milk fed calves (control)

Item	Periods in weeks			
	4	7	10	13
I- Buffalo calves:				
Body weight x (exper)	45.58	52.8	68.3	73.4
SE	1.9	5.4	8.8	9.7
Body gain g/d	300	311	605	633
Body weight x (contr)	45.33	55.0	67.0	77.0*
SE	10.7	10.0	6.0	5.5
Body gain g/d	315	349	370	372
II- Cattle calves:				
Body weight x (exper)	37.53	48.5	66.7	74.47
SE	5.3	8.1	8.0	8.1
Body gain g/d	530	553	640	655.2
Body weight x (contr)	25.87	32.4	44.0	45.2* (67.0)
SE	2.0	5.5	6.3	6.2 (6.7)
Body gain g/d	240	244.2	370	398

MINERAL PICTURE IN CALVES REARED ON MILK REPLACER

Table (4)

Mean mineral values of calves fed milk replacer, starter and hay (exper.) and whole milk fed calves (control)

Period	Group	Soidum mEq. / L.	Potassium mEq. / L	Magnesium mEq. / L.	Inorganic Phosph. mEq / L.
I- Cattle calves:					
4	exper.	81.6-98.6	4.5 -6.4	0.8 -3.1	25.0 - 62.5
weeks		89.7 -14.5	5.04±0.4	1.5 10.6	40.6 ± 7.9
	contr.	76.5-93.5	2.7 -5.4	2.0 -3.2	37.5 - 50.0
		86.1 ± 5.0	3.9 ±0.8	2.5 ±0.4	41.7 ± 4.2
7	exper.	95.2 -102.0	3.3 - 3.5	0.8 - 1.6	12.6 - 50.0
		97.3± 0.2	3.4 ± 0.05*	1.2 ± 0.2	40.6 ± 9.4
	contr.	41.8 -96.9	2.4 - 3.4	0.8 - 0.9	48.0 - 62.5
		93.5 ± 1.7	2.7 - 0.3	0.84±0.03	53.5 ± 4.5
10	exper.	88.4-100.0	2.4 - 3.1	0.8 - 2.8	12.5 - 50.0
		94.8± 2.5	2.8 ± 0.2	2.0 ± 0.4	31.3 ± 10.8
weeks		88.4-93.5	2.4 - 3.5	0.8 - 3.2	48.0 - 62.0
	contr.	91.2 ± 1.5	2.9 ± 0.3	1.6 ± 0.8	53.5 ± 4.5
13	exper.	88.4 - 93.5	2.7 - 3.2	2.0 - 3.2	12.5 - 37.5
weeks		90.1 ± 1.2	2.96±0.1	2.8 ± 0.9*	23.9 ± 5.2**
	contr.	83.8 -93.8	2.6 - 3.8	0.8 - 2.2	50.0 - 52.5
		87.7 ± 3.1	3.10±0.4	1.6 ± 0.4	50.8 ± 0.8
II- Buffalo calves:					
4	exper	74.8 -95.2	2.8 - 4.5	0.4 - 3.6	12.5 - 62.5
weeks		85.4 ± 4.3	3.3 ± 0.4	1.9 ± 0.8	46.9 ± 11.83
	contr.	62.9 -103.7	3.29 - 5.81	1.2 - 2.8	50.0 - 62.0
		81.6 ±11.9	4.6 ± 0.7	1.7 ± 0.5	54.0 ± 4.0
7	exper.	76.5 - 91.8	3.1 - 5.6	0.8 - 3.6	37.5 - 50.0
		85.0 ± 3.2*	3.9 ± 0.6	2.1 ± 0.8	46.9 ± 3.1
weeks		93.5 - 96.9	3.71 - 4.8	0.8 - 1.2	49.0 - 50.0
	contr.	95.2 ± 0.98	4.1 ± 0.3	1.03 ± 0.1	49.7 ± 0.3
10	exper.	55.0 -96.0	3.1 - 5.1	0.8 - 3.6	25.0 - 50.0
weeks		90.95± 2.5	3.98 ± 0.4*	2.7 ± 1.3	43.5 ± 6.1
	contr.	78.4 -91.8	2.9 - 3.1	1.2 - 3.6	50.0 - 51.0
		86.2 ±4.02	2.97 ± 0.1	2.3 ± 0.7	50.3 ± 0.3
13	exper.	75.3 -90.1	2.9 - 4.1	3.1 - 3.6	37.5 - 56.0
weeks		85.6 ± 3.5*	3.5 ± 0.3	3.3 ± 0.1*	49.4 ± 4.2
	contr.	93.5 -103.7	3.71 - 5.81	0.8 - 2.8	50.0 - 62.5
		98.0 ± 2.99	4.8 ± 0.6	1.6 ± 0.6	54.0 ± 4.0

** Highly significant ($P < 0.01$) * Significant ($P < 0.05$)

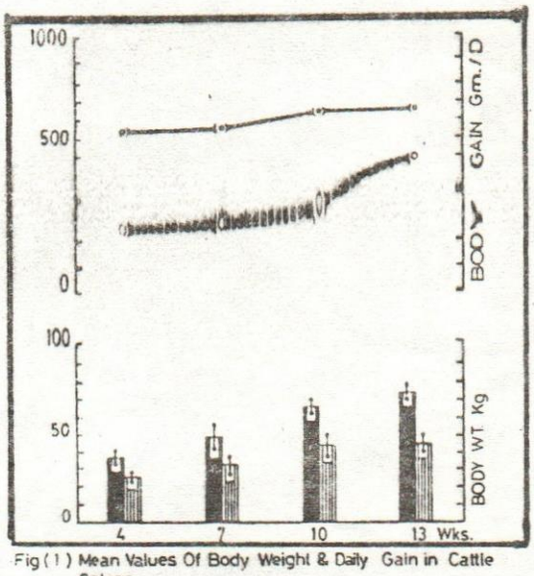

Fig (1) Mean Values Of Body Weight & Daily Gain in Cattle Calves.

Exp gr. Cont. gr. S.E.

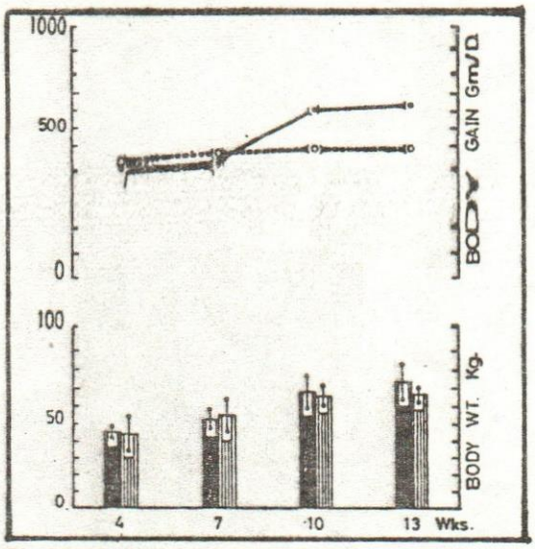

Fig.(2) Mean Values of Body Weight & Daily Gain in Buffaloe Calves.

Exp gr Cont. gr. S.E.

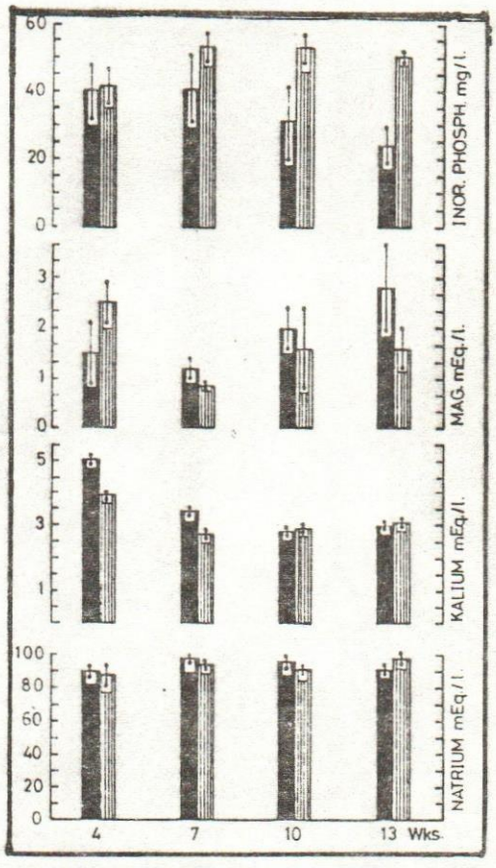

Fig.(3) Mineral levels of cattle calves
Exp. gr. Cont. gr. S.E.

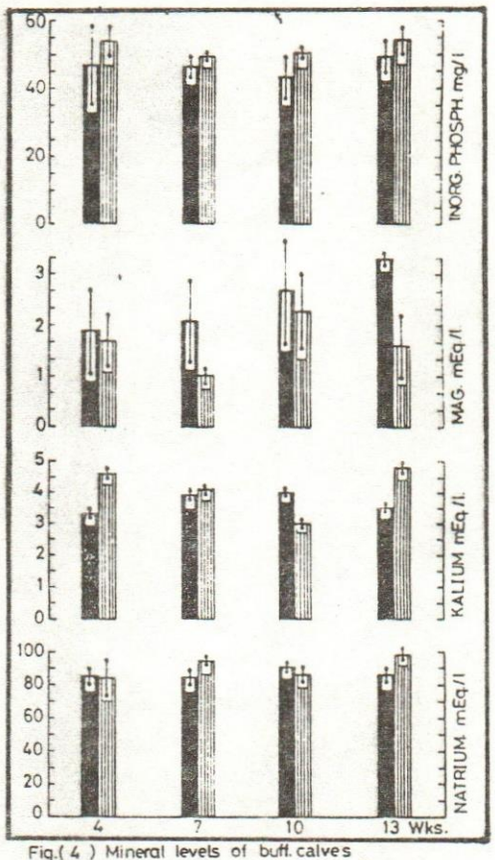

Fig.(4) Mineral levels of buff. calves
Exp. gr. Cont. gr. S.E.