Vet. Med. J. Giza 38, No. 1, 105-113 (1990).

EFFECT OF THE FEEDING PROGRAMME ON THE IMMUNE RESPONSE OF NEWBORN BUFFALO CALVES

BY

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(Received 2.12.1989).

INTRODUCTION

During the last few years, considerable research has been conducted on numerous aspects of feeding and raising young dairy calves (Ranjhan and Pathak, 1979; Mohamed, 1982 and Webster, 1984). One of the most essential requirements of good calf raising programme is that the calf should receive colostrum as its first feed (Walker, 1950 and Webster, 1984). Colostrum has a high content of protein (Ghoniem, 1944 and El Negoumy, 1957), particularly of immune lactoglobulins and associated antibodies which protect the calf against potential pathogens to which it may be exposed in early life (Tizzard, 1982). The significance of serum immunoglobulins derived from colostrum for the health of newborn calves was a subject of majorinterest for many workers (Kruse, 1970; Selman et al., 1971; Spare and Ramadwar, 1977; and Kishtwaria et al., 1983). Also there were a positive relationship between serum protein and immunoglobulin specially at 12-24 hours, 4 and 11 days of age (Nocek et al., 1984). The artificial rearing of buffalo calves was discussed by Mohamed (1982) and he discribed a feeding schedule for young calves.

Effect of the Feeding Programme on the Immune ....

The aim of this work was to compare the effect of natural suckling and artifical limited whole milk feeding for raising buffalo calves on growth rate, effective protection against possible infection through immunological status of calves induced by ingestion of sufficient amount of colostrum.

MATERIALS AND METHODS

Twelve apparently healthy buffalo calves from birth up to 8 months of age were used in this investigation. The animals were divided into two equal groups, each of 6 calves. The first group (control) was kept with their mothers in suitable pens provided with feed manger and water backets. While the second (experimental) group was separated from their mothers immediatly after birth. Every calf was isolated in a separate calf pen provided with water buckets. In the control group calves were left to suckle their mothers without limitation of amount of milk consumed from birth up to two months of age (weaning age). At 10 days of age a known amount of calf starter was offered free choice daily for calves and at 45 days of age (Mohamed, 1982); a good quality berseem hay was offered adlibitum daily. The weaning was carried gradually through out 15 days, while the experimental group was fed mother's colostrum and whole buffalo milk at a rate of 10% (Mohamed, 1982) of birth weight twice (5% every 12 hours). The feeding was done by teat feeder. At 10 days of age the experimental group was fed with starters in addition to milk feeding. At 45 days of age berseem hay was also offered free choic daily.

Blood samples were collected from each calf during the first day after birth, at one month of age then monthly. The serum was taken to determine total serum protein and electrophoretic pattern.

After 6 months all animals were injected subcutsneously (S/C) with 2 ml (10^8/ml) of sheep (Muller and Heilmann, 1984) red cells (SRBC), then serum was collected to anti SRBC antibody by passive haemagglutination test (Hegazi, 1979) at 7, 14 and 21 days after injection.

Phytohaemagglutinin (PHA) was injected S/C in a dose of 1 ml (50 mg) as sensitized antigen (Hegazi, 1981) and after 21 days the intradermal skin test was preformed (Hegazi et al., 1985) by injection of 0.1 ml of PHA (50 ug/ml) in the right side of the neck and the left side was injected with 0.1 ml normal saline and served as control. The skin fold thickness was measured before injection, 2, 24, 48 and 72 hours after intradermal injection. The data was stasticaly analyzed according to Snedecor and Cochran (1974).

RESULTS

Regarding to the results of avarage daily body weight gain/kg (Table, 1), revealed that the highest body weight gain/kg in experimental group was at first week,whilt the highest body weight gain in control group was in the second and third weeks after birth. The avarege total serum protein levels (g/100 ml) and their electrophoretic patterns in sera of calves of both control and experimental groups were determined in Table (2). It is clear that the total serum protein levels of control and experimental calves were nearly similar and revealed no significant difference except in 4th week of age the experimental group showed a significant rise in total serum protein level. The electrophoretic analysis revealed that the gamma globulin level in control group showed a significant difference and ranged from 1.18 - 2.18 gm/100 ml serum if compared with experimental group (0.44 - 1.44) at first week. While the level of gammaglobulin in both groups showed unsignificant difference 4-8 weeks after birth. The A/G ratio (Albiumin/Globulin) was significant

Table 1 : Avarage daily body weight gain / Kg.

Age / weeks	Group Control	Experimental
0 - 1	0.761 ± 0.10	1.118 ± 0.24@
1 - 2	1.095 ± 0.10	0.537 ± 0.10
2 - 3	1.095 ± 0.20	0.618 ± 0.10
3 - 4	0.714 ± 0.10	0.476 ± 0.12
4 - 5	0.785 ± 0.10	0.479 ± 0.10
5 - 6	0.714 ± 0.10	0.499 ± 0.04
6 - 7	0.499 ± 0.03	0.475 ± 0.04
7 - 8	0.428 ± 0.10	0.642 ± 0.05@@

± SR @ : P <0.05 @@ : P < 0.01

Table 2: Total serum protein (g/100 ml) and the electrophoretic pattern

Examination time	Group	Total serum protein	Albumin	Globulins Alfa	Beta	Gamma	Total Globulin	A / G Ratio
1 day	Control	5.03 ± 0.89	2.64 ± 0.59	0.66 ± 0.02	0.55 ± 0.03	1.18 ± 0.89	2.39 ± 0.90	1 09
	Experimental	5.12 ± 0.43	2.93 ± 0.20	0.90 ± 0.13	0.85 ± 0.22	0.44 ± 0.14	2.19 ± 0.45	1.33
1 Week	Control	7.23 ± 0.46	2.85 ± 0.24	1.08 ± 0.10	1.12 ± 0.20	2.18 ± 0.53	4.38 ± 0.80	1.65
	Experimental	7.14 ± 0.38	3.44 ± 0.30	1.23 ± 0.03	1.03 ± 0.10	1.44 ± 0.30	3.70 ± 0.32	0.93
1 Month	Control	6.41 ± 0.79	2.91 ± 0.45	0.99 ± 0.13	1.23 ± 0.34	1.28 ± 0.14	3.50 ± 0.41	0.83
	Experimental	7.14 ± 0.33	3.66 ± 0.22	1.13 ± 0.10	1.16 ± 0.30	1.19 ± 0.20	3.49 ± 0.40	1.03
2 month	Control	7.92 ± 0.42	4.01 ± 0.32	1.26 ± 0.20	0.97 ± 0.10	1.60 ± 0.50	3.91 ± 0.43	1.03
	Experimental	7.94 ± 0.38	4.06 ± 0.22	1.28 ± 0.10	1.09 ± 0.12	1.51 ± 0.21	3.89 ± 0.20	1.04

+ : A / G Ratio : Albumin / globulin ratio.

Table 3 : Immune response of calves in both control and experimental groups

Groups / Days	Antibody titres (geumetric mean) 7	14	21	Skin fold thickness after 72 hours/mm
Control	1 : 15	1 : 65	1 : 178	10.2
Experimental	1 : 15	1 : 26	1 : 126	7.9

decreased at first week in control group (Table, 2). The anti SRBC antibody detected by passive haemagglutination revealed significant increase in control group 21 days post priming if compared with the experimental group (Table, 3). The cell mediated immune response as detected by the intradermal skin test revealed a significant increase in skin thickness of control group, while the experimental group showed a slight increase of skin fold thickness.

DISCUSSION

The immune response of buffalo calves of natural suckling and artificial rearing using a limited amount of milk and starter was assayed. The total serum protein, electrophoretic pattern, antibody titre and intradermal skin test were assessed. The avarage daily body weight gain/kg revealed significant increase at 2nd and 3rd weeks in control group and this figures were higher than those findings obtained by Arora et al. (1973); Mehra et al. (1974) and Rai et al. (1977) in Indian buffalo calves fed with whole buffalo milk and starter. However, Ranjhan and Pathak (1979) stated that the body gain of buffalo calves ranges between 0.200 and 0.500 kg and this finding was in agreements with our findings.

It can be noticed that the serum protein level at birth was 5.03 $\pm$ 0.89 and 5.12 $\pm$ 0.43 g/100 ml of control and experimental groups respectively. These values were agreement with those recorded by Spare and Romadwar (1977 and Devaraj et al., 1985) in buffalo calves. These findings of total serum protein during the experiment were within the normal levels as estimated by Devaraj (1985) in Indian buffalo calves.

Buffalo calves suckling mothers showed higher significant level of gamma globulin analysed by electrophoretic pattern than the experimental group . These

findings were also observed by many authors as Slebodzinska and Slebedzinski (1982); Edwards et al. (1982) Petrie,(1984)and Soliman, (1984). These findings also comfirmed a rise in antibody level.

The cell mediated immune response assessed by the intradermal skin test revealed t t the normal suckling control group showed a rise in skin fold thickness if it is compared with those of the experimental group. The sensitization of buffalo calves with phytohaemagglutinin was the first trial in Egyptian buffalo calves. Thus the findings of skin fold thickness in both control and experimental groups were sensitized with the same manner to PHA, but in a different fold thickness. This may be attributed to the fact that the T-cell function of the control group (mother suckling) is more functioning than that of artificial suckling.

SUMMARY

The present investigation was preformed on 12 buffalo calves from birth up to 8 months of age.The impact of natural suckling and artificial rearing of using limited amount of milk for such calves on their growth rate,total serum protein and serum electrophoretic patterns were conducted from birth up to 2 months.After 6 months of age both control and experimental calves;the antibody response as well as skin test were preformed.The average values of daily body weight gain of the control (1.095) and the expermintal (1.428) calves were generally within normal limits. There was significant difference in total serum protein and electrophoretic patterns between the control and experimental calves. The antibody response revealed that there was a higher significant difference in the antibody titres of control group after 21 days following the priming dose than the experimental calves, while the changes in skin fold thickness were observed after intradermal skin test with phytohaemagglutinin but the difference lacked significance.

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