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Carryover and persistence of maternal antibodies against brucellosis in buffalo calves

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Brucellosis is an important zoonotic disease affecting many species of domestic animals and characterised by abortions, infertility, retention of placenta and stillbirth in cattle and buffalo. It is widely prevalent in India (Sandhu *et al.* 2001 and Renukaradhya *et al.* 2001). In humans it is very painful syndrome and produces various symptoms like fever, chills, sweating, headache, fatigue and joint pain. Great economic losses are caused by the disease (Singh *et al.* 2002) because of reproductive problems in animals and loss of man-days in humans in addition to treatment costs. Treatment being unreliable and very cumbersome in humans and imprudent in animals, only way to check the malady is the prevention and control programmes in animals. Calfhood vaccination is still the best and most economical option as other measures are not practicable in India owing to diverse socio economic, religious and cultural factors. But no detailed study have been undertaken to evaluate the carryover of immunity of calfhood vaccine from dam to buffalo calf and then time of persistence of these antibodies in the calf. Present study was undertaken to determine the ideal time of calf hood vaccination in buffalo calves. This information will help in calculating optimum age of calfhood vaccination in buffalo calves so that the vaccine provides best protection to the calves and without interference with maternal antibodies.

Buffaloes (21) nearing parturition were selected randomly from a dairy farm. All the buffaloes were earlier vaccinated against brucellosis by calfhood vaccine (*Brucella abortus* strain-19). Milk titre of all the animals against *Brucella abortus* was checked by tube agglutination test (Sharma *et al.* 1968) at day 0, day 1, day 2, day 3 and day 4 after parturition, taking the day of parturition as day 0. Concurrently serum samples from respective calves were obtained and screened for brucellosis by Rose Bengal plate test (Alton 1975) and serum tube agglutination test to find out the carryover of maternal antibodies to the calves. Serum titre was checked at day 0 (birth date), day 1, day 3, day 7, day 14, day 21, day 28 and at 2 and 3 months. RBPT antigen and *B. abortus* plain antigen (for STAT) were procured from Indian Veterinary Research Institute, Izatnagar (India). Data were analysed by SPSS statistical software.

Milk titre of 21 buffaloes was checked for brucellosis for 4 days after parturition. Mean milk titre of buffaloes for brucellosis declined consistently from 126.19 ± 37.98 on day 0 to 54.76 ± 14.9 on day 4 (Table 1). Geometric mean also decreased consistently from day 0 to day 4. It indicated that maximum amount of *Brucella* antibodies in colostrums are present on the day of parturition after which these start declining. So it is advisable to feed first day colostrum to the calves for providing maximum protection against brucellosis. The high standard deviation indicated a lot of variation in *Brucella* titre in animals. Skewness characterizes

Table 1. Variation of dam colostrum *Brucella* titre

Days postpartum	0 day	1 day	2 day	3 day	4 day
Mean	126.19	114.76	81.90	66.67	54.76
Std. error of mean	37.988	30.037	24.384	18.725	14.906
Geometric mean	47.18	44.16	35.05	29.72	25.20
Median	20.00	20.00	20.00	20.00	10.00
Std. deviation	174.083	137.645	111.742	85.810	68.310
Kurtosis	2.268	-1.270	.833	2.242	-1.071
Skewness	1.629	.839	1.500	1.590	1.012

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Table 2. Variation in calf serum titre

Days postpartum	0 day	1day	3day	7day	14day	21day	28day	2month	3months
Mean	26.19	49.05	64.29	56.19	39.52	19.52	12.86	6.19	1.43
Median	20.00	40.00	40.00	40.00	40.00	20.00	10.00	10.00	.00
SE of mean	7.543	9.510	15.623	14.433	6.229	2.801	1.844	1.460	1.043
Std. deviation	34.565	43.578	71.594	66.142	28.544	12.836	8.452	6.690	4.781
Kurtosis	12.105	2.401	7.996	13.685	-1.301	-.776	4.584	-.498	12.578
Skewness	3.351	1.714	2.675	3.409	.509	.724	1.581	.626	3.530

the degree of asymmetry of a distribution around its mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Median titre of 20 in first 3 days indicated that half the numbers have titre that are greater than the median, and half have titres that are less.

The mean of serum titre of the new borne calves was tested from day 0 onwards up to 3 months according to pre-planned schedule. Mean serum *Brucella* titre of calves on day 0 was detected to be 26.19 ± 9.5 (Table 2) indicating that some antibodies are present in the calves prior to birth. This may be due to passive transfer of antibodies from dam to calves *in utero* (Radostits *et al. 2000*), even though the quantity is not sufficient to provide adequate immunity to calves. High standard deviation and positively skewed data indicated significant variation in the titre of various calves born. With the feeding of colostrum, the mean calf serum titre against *Brucella* increased to maximum of 64.29 on day 3. After day 3 it started decreasing consistently up to 3 months (Fig. 1) when it was negligible (1.43). At 3 months of age, 1 calf was having titre of 20 and another of 10 while all other calves were showing negative titre. It indicated that though the calves were being fed milk all this period, the titre against brucellosis decreased to negligible amounts. It may be due to decrease in antibodies in milk of dam.

It ensues from above that maternal antibodies are present in colostrum of dams vaccinated against brucellosis and transfer of these antibodies to calves start from day of birth. These antibodies persist in the calves at the maximum up to 3 months of age. No previous data could be traced for this, however, in cow calves it is recommended that vaccination should be done after 6 months of age or from 6-8 months of age. But in buffalo calves, as this study indicated, there is no need to wait for such a long period as the maternal immunity wanes in 3 months and would not interfere with vaccination. So it is recommended to vaccinate the buffalo calves any time after 3 months of age.

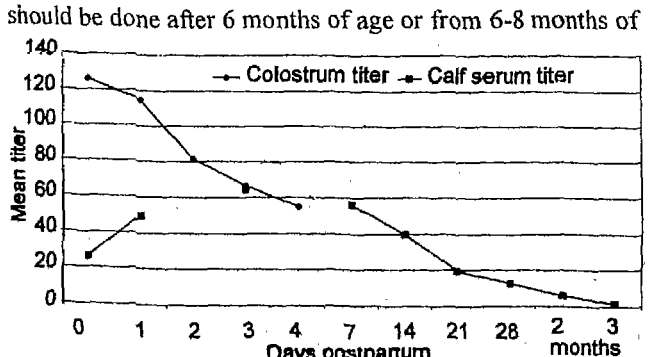

Fig. 1. Variation in brucellosis titre in dam milk and calf serum.

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SUMMARY

The present study was conducted to determine the ideal time of persistence of *Brucella* antibodies in buffalo calves. The results revealed that maternal antibodies are present in colostrum of dams vaccinated against brucellosis and transfer these antibodies to calves start from day of birth. It is recommended to vaccinate the buffalo calves any time after 3 months of age.

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