Field Trial Evaluation of Kolbin RC (*Rotavirus, Coronavirus/Escherichia coli*) Vaccine for Prevention of Neonatal Calf Diarrhea in Dairy Herd

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Abstract

In this study, the efficacy of a combination rotavirus, coronavirus/*Escherichia coli* vaccine (Kolibin RC) in a dairy herd of Mashhad suburb was evaluated. Thirty pregnant cows were selected and randomly sub-divided in two groups. Cows in one group (15 head in total) were vaccinated 6 weeks before calving and again 3 weeks later (no significant adverse reaction were noticed), cows in the other group (15 head in total) were left as unvaccinated controls. After calving, colostrum was collected from each cow and stored at 4°C separately until used for feeding calves. The quality of colostrum was assessed by use of colostrumeter which measured specific gravity. Blood samples were taken from jugular vein at 48 hours and weekly intervals for measuring hematology indices and serum total protein, albumin and serum protein electrophoresis. At each time, weight, length, heart girth and height of calves were measured. Also disease occurrence and weight gain were recorded for the one month of life. The results were analysed with statistic package SPSS 9 (t-test). P<0.05 was considered as significant. There were no significant differences between groups for hematology indices, total protein, serum protein electrophoresis concentration, disease occurrence and performance records. These results indicated that vaccination (Kolibin RC vaccine (of the dams during pregnancy were not helpful in reducing the incidence of neonatal diarrhea in new born calves in this herd.

Keywords: Rotavirus, coronavirus, *Escherichia coli* vaccine, colostrum, neonatal calf diarrhea

Introduction

Neonatal calf diarrhea is one of the most devastating diseases of the dairy industry with an estimated incidence as high as 10 to 15% and morbidity approaching 100% in severely affected herds(1). Affected calves develop severe diarrhea, leading to dehydration, electrolyte imbalance, and acidosis. Death, impaired performance, retarded growth, and the added time and expense of treating sick animals all contribute to economic losses. Infectious causes of calf scours include enteric strains of rotavirus and coronavirus, *Escherchia coli*, salmonella, strains of clostridia, coccidia and cryptosporidia. Non-infectious causes include environmental conditions (wet, drafty quarters, dirty pens, stress) and nutritional factors (over-feeding, poor quality milk replacer)(3,5). The disease can best be managed through a comprehensive control program that incorporates measures for minimizing environmental stress, optimizing nutrition, and protecting against agents throught vaccination. Vaccination of the dam during pregnancy so that she will develop and transfer maternal antibodies in her colostrum and milk is regarded as the most efficient means of protecting the newborn calf(2,4,6,7). In the present study, we conducted a field trial of a maternal combination vaccine which was available in Europe (Kolibin RC) and evaluated the efficacy for prevention of neonatal calf diarrhea in a dairy herd of Mashhad suburb.

Material and Methods

The study was conducted with 30 pregnant Holstein cows in a dairy herd of Mashhad suburb, capital city of Khorasan province which is situated north-east of Iran.

Thirty (30) pregnant cows were selected and randomly subdivided in two groups. Cows in one group (15 head in total) were vaccinated 6 weeks before calving and again 3 weeks later (no significant adverse reaction were noticed), whereas cows in the other group (15 head in total) were left as unvaccinated controls(10). After calving, colostrum was collected from each cow and stored at 4°C separately until used for feeding calves. The quality of colostrum was assessed by means of a colostrumeter which measured specific gravity(9). Blood samples were taken from the jugular vein at 48 hours and weekly intervals for measuring hematology indices and serum total protein, albumin and serum protein electrophoresis. At each time, weight, length, heart girth and height of calves were measured. Also, disease occurrence and weight gain were recorded for the one month of life. The results of the present study were analyzed by t-test using statistic package SPSS 9. Significant association was identified when P-value of less than 0.05 was observed.

Results

The results of measurements made are shown in Tables 1, 2 and 3. There were no significant differences between groups for hematology indices, total protein, serum protein electrophoresis concentration, disease occurrence and performance records.

Table 1: Mean ± SE of hematological findings in calves

Age/Group	Monocyte 1000/µl		Lymphocyte 1000/µl		Eosinophil /µl		Neutrophil 1000/µl		Total WBC 1000/µl		Total protein (gr/dl)	
	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control
48hours	0.06	0.10	4.18	4.25	8.08	34.00	4.88	3.43	9.25	7.8	6.41	6.52
After Birth	±0.02	±0.02	±0.65	±0.49	±8.08	±13.8	±1.46	±0.57	±2.06	±0.82	±0.29	±0.28
P Value	0.28		0.93		0.10		0.34		0.49		0.79	
First	0.05	0.12	4.68	4.09	6.22	24.16	2.86	3.00	7.61	7.59	6.28	6.22
Week	±0.01	±0.03	±0.75	±0.95	±6.22	±11.1	±0.78	±0.46	±1.34	±1.04	±0.24	±0.21
P Value	0.06		0.65		0.17		0.87		0.99		0.85	
Second	0.08	0.05	4.95	4.68	5.44	6.84	2.42	2.87	7.47	7.11	5.56	5.27
Week	±0.04	±0.02	±0.56	±0.96	±5.44	±4.81	±0.48	±0.59	±0.93	±1.02	±0.17	±0.27
P Value	0.50		0.83		0.85		0.59		0.80		0.38	
Third	0.06	0.03	4.30	3.32	4.30	12.00	2.56	1.96	6.85	5.48	5.61	5.79
Week	±0.02	±0.00	±0.59	±0.51	±4.30	±6.36	±0.46	±0.36	±0.90	±0.77	±0.27	±0.18
P Value	0.33		0.22		0.32		0.31		0.26		0.60	
Fourth	0.05	0.09	4.31	4.56	15.40	8.93	2.74	2.62	7.13	7.30	5.98	5.70
Week	±0.01	±0.02	±0.41	±0.89	±7.22	±6.15	±0.54	±0.46	±0.80	±1.17	±0.16	±0.19
P Value	0.80		0.80		0.50		0.86		0.90		0.27	

Table 2 : Mean ± SE of serum total protein,albumin and serum protein electrophoresis level in calves

Age/Group	Globulin (gr/dl)		A/G		γ Globulin (gr/dl)		β Globulin (gr/dl)		α2 Globulin (gr/dl)		Albumin (gr/dl)	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
48 hours	3.62	3.63	0.81	0.81	1.92	2.09	0.92	0.82	0.75	0.71	2.78	2.81*
After Birth	±0.27	±0.25	±0.06	±0.05	±0.24	±0.18	±0.06	±0.05	±0.07	±0.07	±0.10	±0.11*
P Value	0.97		0.92		0.57		0.26		0.70		0.86	
First	3.19	3.19	1.03	0.95	1.61	1.71	0.83	0.85	0.64	0.62	3.09	3.02
Week	±0.21	±0.16	±0.08	±0.07	±0.20	±0.14	±0.03	±0.03	±0.03	±0.03	±0.13	±0.12
P Value	0.99		0.48		0.71		0.79		0.57		0.72	
Second	2.55	2.54	1.24	1.20	1.24	0.97	0.74	0.71	0.54	0.58	3.00	2.89
Week	±0.09	±0.20	±0.07	±0.10	±0.09	±0.11	±0.03	±0.04	±0.03	±0.04	±0.13	±0.16
P Value	0.97		0.78		0.08		0.55		0.58		0.59	
Third	±2.57	±2.72	±1.16	±1.15	±1.29	±1.34	±0.72	±0.80	±0.56	±0.58	±3.03	±3.06
P Value	0.47		0.86		0.77		0.34		0.81		0.89	
Fourth	2.59	2.48	1.32	1.31	1.07	1.02	0.77	0.74	0.69	0.69	3.39	3.22
Week	±0.08	±0.11	±0.06	±0.05	±0.26	±0.29	±0.03	±0.02	±0.04	±0.04	±0.13	±0.10
P Value	0.42		0.94		0.65		0.57		0.98		0.35	

Table 3: Mean ± SE of performance records in calves

Age/Group	Weight		Gird heart		Height		Length	
	Control	Test	Control	Test	Control	Test	Control	Test
48hours After Birth	40.60±1.19	4 2.46±1.48	76.73 ±0.90	77.33 ±0.92	79.40 ±0.79	78.73 ±0.91	107.2 ±1.06	105.86 ±1.23
P Value	0.33		0.64		0.58		0.42	
Fourth Week	48.16±1.33	48.80±1.50	84.80 ±1.32	84.60±1.05	82.93±0.78	81.73 ±0.62	115.20 ±1.13	115.26* ±1.01*
P Value	0.75		0.90		.24		0.96	
Total Period	7.44 ±0.90	6.33 ±1.07	8.07 ±1.34	7.26 ±0.76	3.53 ±0.68	3.00 ±0.85	8.00 ±1.09	9.4 ± 0.97
P value	0.38		0.35		0.71		0.42	

Discussion

Our results indicated that there were no significant differences between calves from vaccinated and unvaccinated dams with regard to for hematology indices, total protein, serum protein electrophoresis concentration, disease occurrence performance records. Vaccination (KolibinRC vaccine) of the dams during pregnancy was not helpful in the reduction the incidence of neonatal diarrhea in newborn calves in this herd (8). Vaccine does not have cross protection against field pathogen perhaps it has different serotypes.

Neonatal calf diarrhea is a complex, multifactorial disease and prevention should be considerate globally within the farm(3).

References

1. Amkerten IC, Basoglu A, Servinc M. (1999) Serum immunoglobulin concentrations in diarrhetic calves. Israel Vet Med Assoc; 54(1) ....???? pages

2. Barnett SC, Moore DA, Sischo WM, *et al.* (2003) Evaluation of Flunixin meglumine as an adjunct treatment for diarrhea in dairy calves. J Am Med Assoc.; 223(9):1329-1333

3. Bendali F, Bichet H, Sanna M, *et al.* (1999) Risk factor associated with diarrhea in newborn calves. Vet Res.; 30(5):509-522

4. Buckley A, Chapman AJ, Crouch CF, et al (2000) Lactogenic immunity following vaccination of cattle with bovine coronavirus. Vaccine; 19(2-3):189-196

5. Buckstein S, Tromp AM.(2000) The relationship between cryptosporidiosis and bovine virus diarrhea in calves. Israel Vet Med Assoc; 55(1) ...???? pages

6. Buntain BJ, Selman IE. (1980) Controlled studies of various treatments for neonatal calf diarrhea in calves of known immunoglobulin levels. Vet Rec; 107(11):245-248

7. Donovan GA, Bennett FL, Dohoo IR, *et. al.* (1998) Associations between passive immunity and morbidity and mortality in dairy heifers in Florida, USA. Prev Vet Med; 34:31-46.

8. Hirai T, Ishizaki H, Kohara J, *et. al.* (1997) Enhancement of passive immunity with maternal vaccine against newborn calf diarrhea. J Vet Med Sci 59(11):1023-1025

9. Krautil FI, Smith ML, Snodgrass DR. (1982) Diarrhea in dairy calves reduced by feeding colostrum from cow vaccinated with rotavirus. Res Vet Sci; 32:70-73

10. Logan EF, McNulty MS. (1987) Effect of vaccination of the dam on rotavirus infection in young calves. Vet Rec; 120(11):250-252