DYNAMICS OF ANTIBODIES TO KOLIBIN NEO IN COLOSTRUM AND MILK

Background

Kolibin Neo is a polyvalent, inactivated vaccine. It is administered to pregnant cows and heifers to provide passive immunisation of calves via colostrum and milk, against gastro-enteric diseases caused by rotavirus, coronavirus and enteropathogenic *E. coli* strains.

Study Objective

To demonstrate colostral and lactogenic immunity of calves suckling from vaccinated dams.

Study Design

Fifteen pregnant Holstein cows without antibodies to rotavirus, coronavirus and *E. coli* were enrolled in the study. Ten of these cows were vaccinated with Kolibin Neo twice, at an interval of 21 days. Sensitiser vaccination took place 5 - 7 weeks before calving and the booster was administered 2 - 4 weeks before calving. Five cows were left unvaccinated, as a negative control group.

Colostrum and milk were collected from vaccinated dams to determine the levels of antibodies against the individual antigens included in the vaccine.

Newborn calves were fed with colostrum and then with milk from their mothers for 4 weeks. Efficacy (passive immunity in the calves) was measured by challenging the calves with an antigen mixture of 50 x 10^8 CFU *E. coli* K32 : K99, $10^{6.5}$ $TCID_{50}$ bovine coronavirus and $10^{6.0}$ $TCID_{50}$ bovine rotavirus. Calves were challenged at 4 weeks of age, and observed for clinical signs for 14 days after administration of the challenge mixture. All 15 calves were challenged, 10 from vaccinated dams and 5 born to unvaccinated dams.

Results

The mean level of antibodies in colostrum and milk for each antibody can be seen on Figures 1 - 3. There were high and protective antibody levels maintained over the 4 weeks of the study.

No clinical symptoms of gastrointestinal disease were recorded in calves fed for 4 weeks with colostrum and then with milk from dams vaccinated with Kolibin Neo after administration of the challenge mixture. All five calves in the control group, without colostral and lactogenic immunity, developed severe watery diarrhoea, and all calves died within eight days from administration of challenge. Clinical observations are shown in Table 1 and Figure 4.

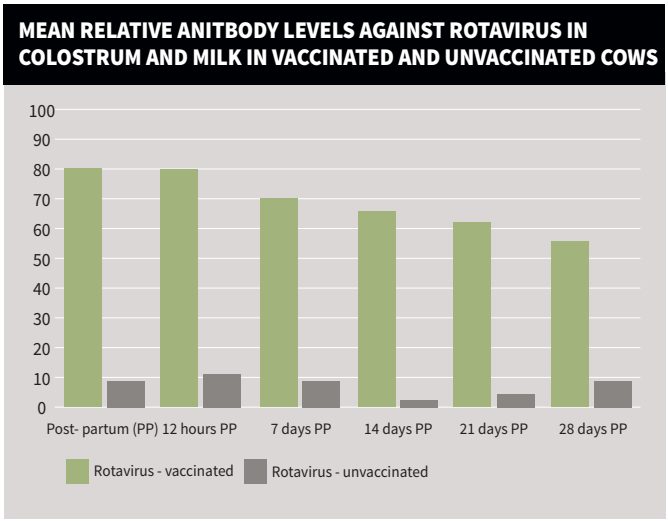


Figure 1. Colostral and milk antibodies against bovine rotavirus

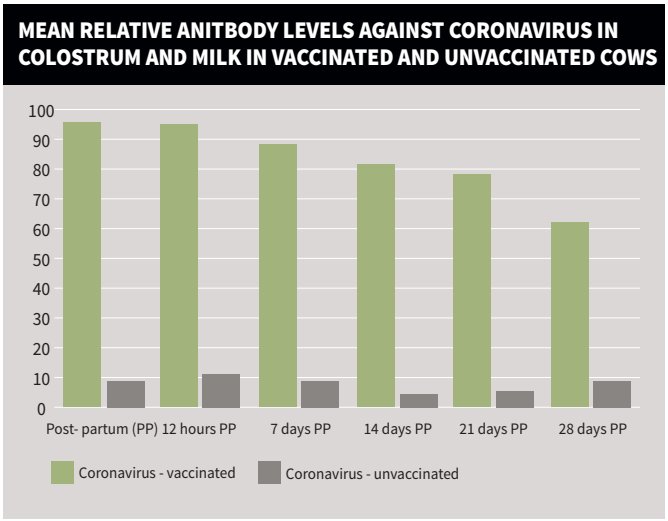


Figure 2. Colostral and milk antibodies against bovine coronavirus

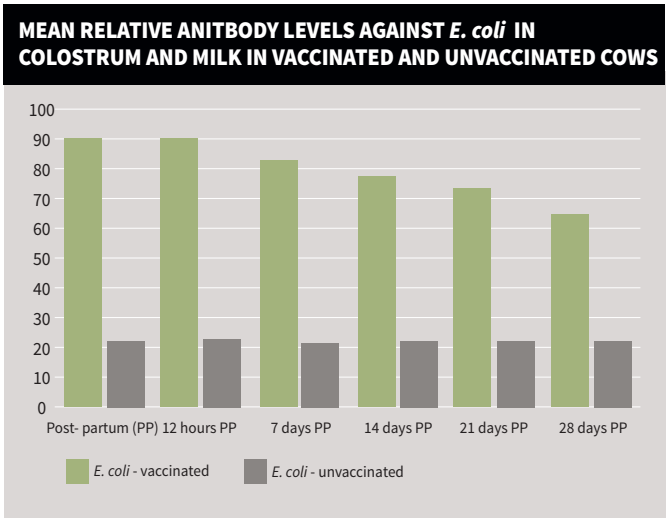
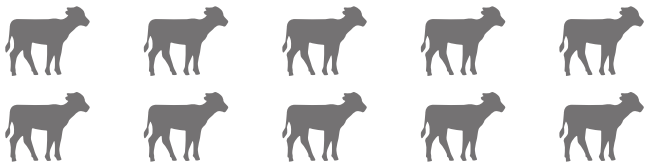


Figure 3. Colostral and milk antibodies against E. coli

Calves from vaccinated dams (treatment)

Calves from vaccinated dams, fed colostrum and milk from their dam for 4 weeks then challenged with antigen mixture of 50 x 10^8 CFU *E. coli* K32 : K99; $10^{6.5}$ $TCID_{50}$ bovine coronavirus and $10^{6.0}$ $TCID_{50}$ bovine rotavirus and observed for 14 days remained healthy, showing no clinical signs.



Calves from unvaccinated dams (control)

Calves from unvaccinated dams, fed colostrum and milk from their dam for 4 weeks then challenged with antigen mixture of 50 x 10^8 CFU *E. coli* K32 : K99; $10^{6.5}$ TCID50 bovine coronavirus and $10^{6.0}$ $TCID_{50}$ bovine rotavirus all developed diarrhoea, apathy and died within 8 days of the challenge.

Calf no.	TIME AFTER ADMINISTRATION OF CHALLENGE ANTIGEN MIXTURE	
	Calves from vaccinated dams	
	Week 1	Week 2
1	No clinical signs observed in any calf from Kolibin Neo vaccinated dams	No clinical signs observed in any calf from Kolibin Neo vaccinated dams
2		
3		
4		
5		
6		
7		
8		
9		
10		
	Control calves from unvaccinated dams	
	Week 1	Week 2
11	D, A, X	
12	D, A, X	
13	A, D	X
14	D, A, X	
15	A, D, X	
Key:	*A apathy D diarrhoea*	*X death*

Table 1: Clinical observations of calves for 14 days after administration of the mixture of challenge viruses and E. coli

RESULTS FROM CALF CHALLENGE STUDY FOLLOWING FEEDING COLOSTRUM AND MILK

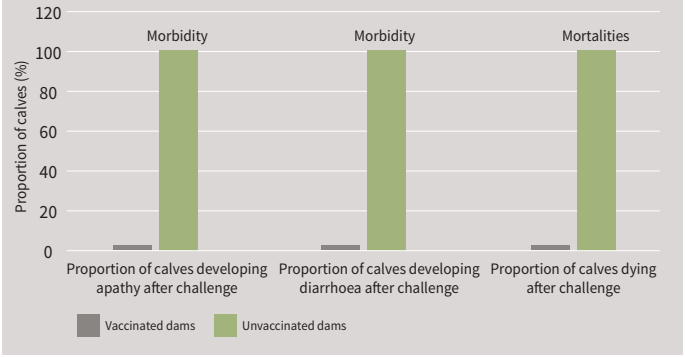


Figure 4. Morbidity and mortality following enteropathogen challenge of calves

Discussion

Cows vaccinated with Kolibin Neo have high antibody levels in their colostrum. These high antibody levels persist in the milk for at least 4 weeks.

Calves born to vaccinated dams that suckle, or are fed with colostrum collected from vaccinated dams, obtain passive protective immunity that protects them against infection with rotavirus, coronavirus and enteropathogenic *E. coli* for the first 4 weeks of life. Ingestion of colostrum and milk from vaccinated dams also provides local immunity in the gastrointestinal tract of calves.

Conclusion

High levels of antibodies to all 3 antigens were still present in milk 28 days after calving, (at least 42 days after the sensitiser vaccination). Vaccination of dams prevented clinical symptoms and mortality in all of their calves, whilst calves from unvaccinated dams all died. This demonstrates that a long duration of immunity is achieved in calves when vaccination is administered to pregnant cows, and the calves are subsequently fed colostrum and milk from these vaccinated dams.

Passive immunity in newborn calves persists for at least 4 weeks after their birth if they are fed with colostrum and milk from mothers vaccinated with Kolibin Neo. This immunity protects calves from morbidity and mortality from gastrointestinal disease caused by rotavirus, coronavirus and *E. coli*.