

The only large-scale field trial evaluating the effectiveness of a pre-calving scour vaccine in dairy cattle.

QUICK READ

- An extensive, two-part field trial evaluated a commercially available rotavirus, coronavirus, and *E. coli* combo-vaccine on dairy farms in Ontario, Canada, to assess whether pre-calving scour vaccines work when administered to dairy cows under typical production conditions. All farms had isolated either *E. coli*, coronavirus, rotavirus, or a combination in fecal cultures.
- The two-part hypothesis looked at whether (Part A) calves from dams vaccinated with a pre-calving scour vaccine perform better than herdmates whose dams did not receive the vaccine, and/or (Part B) whether calves on farms where all dams received pre-calving scour vaccine outperformed calves born on farms that didn't administer pre-calving scour vaccines at all.
- Part A revealed no statistical differences between vaccine and placebo groups regarding proportion of calves treated for scours. In Part B as well there was no significant difference in the proportion of calves that cultured positive for scour pathogens. In fact, the trend was higher on farms that used a scour vaccine (66%) versus farms that did not (64%).
- Vaccinating for the three scours pathogens was not effective in preventing calf diarrhea or calf mortality under the conditions of this field trial.
- Pre-calving scours vaccines can fail for a number of reasons. It is estimated that even under perfect conditions, cows respond to a vaccine only 80 percent of the time, leaving 20 percent of vaccinated calves unprotected.

Study Objective

Determine the efficacy of a combination rotavirus-coronavirus-*E. coli* vaccine on dairy farms in southwestern Ontario.

Study Design

The field trial was separated into two parts, A and B. Prior to the trial all farms had isolated either *E. coli*, coronavirus, rotavirus, or a combination in fecal cultures, suggesting these pathogens as the cause of scours infections within the calf program.

In Part A, 321 dams on 15 farms were randomly assigned to a vaccination or placebo group. On eight of the 15 farms, half of the dams received the vaccine. On seven of the farms, 80 percent of dams were vaccinated. In total, 208 dams (65%) were vaccinated and 113 (35%) received the placebo.

In Part B, 23 farms participated, with 11 farms randomly assigned a vaccination program and 12 farms randomly assigned no vaccination program. All doses of the vaccine were administered by the farmers. Culturing history proved all farms were comparable in terms of microbiological status.

Results

PART A

Part A concluded with 182 live-born calves in the vaccinated group and 95 live-born in the placebo group. Across both groups, 23.5% (65) of live-born calves were treated for disease during the first two weeks of life; most cases (25%) were diarrheal disease. There were no statistical differences between vaccine and placebo groups regarding proportion of calves treated for scours.

All calves received their dam's colostrum for their first feeding. Most farms continued feeding the dam-to-calf-specific colostrum/transition milk through day 3 to 4.

All measurements were statistically similar between herdmates regardless of whether the calf consumed colostrum from a vaccinated dam or if the calf's dam was not vaccinated. There was no difference in:

- Death loss day 1 - 14
- Treatment rate or the proportion treated specifically for scours
- Days to first treatment or total treatment days
- ADG over the 14-day period

PART B

Part B concluded with no statistical difference between weight gain, duration of treatment, or percent treated for scours. Mortality rate differences were inconclusive.

PART A AND PART B

The pre-calving scour vaccine was not effective in protecting individual calves from disease in general or scours in particular, or in improving weight gains or reducing evidence of infection. That's because while the vaccine did increase *E. coli* antibodies in colostrum, levels for coronavirus and two different strains of rotavirus did not differ significantly from titer levels against those viruses in colostrum from unvaccinated dams.

Additionally, a herd immunity phenomenon, meaning one that suggests the vaccinated proportion of the herd protects the unvaccinated proportion by reducing pathogen pressure and transmission, was proven irrelevant; it had no impact within this trial.

Why Vaccines Fail

It is estimated that even in perfect conditions, cows respond to a vaccine only 80 percent of the time. This would leave 20% of the calf-crop unprotected from scours. Additionally, not all vaccinated cows will experience an effective immune response. Despite widespread use of pre-calving scours vaccines, calf diarrhea is a major cause of disease and economic loss among unweaned calves.¹ Studies show that cows don't always get vaccinated and that the vast majority of operations administering booster vaccines to cows are not following minimum label requirements that drive effectiveness.² Another obstacle to effective vaccination is timing: Farmers must vaccinate within a specific time frame, and the dam has to calve within the right time frame to be at peak antibody level when giving colostrum; all dam-level scours vaccines require two vaccinations to provide primary vaccination and then one annual booster every year thereafter; and quality colostrum must be fed within 12 hours of birth because antibodies are not transferred in utero.

SOURCES

1. USDA. Dairy 2007 Part II: Changes in the U.S. Dairy Cattle industry, 1991-2007. Fort Collins: USDA-APHIS-VS, CEAH; 2008. pp. 57–61
2. Protocol Drift in Dam-Level Scour Vaccine Programs Putting Calves at Risk for Scours & Draining the Pocketbook



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