

Randomized clinical trial of ScourGuard® vaccine in dairy cows on colostrum brix score and transfer of passive immunity success in their calves

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Introduction

The use of a brix refractometer on dairy farms for colostrum management is becoming more common. This cow-side test can indirectly assess colostrum immunological quality and provide inputs to make decisions regarding colostrum feeding to calves. Achieving a high prevalence of transfer of passive immunity (TPI) success depends on factors such as colostrum immunological quality, volume of colostrum ingested, time delay between birth and ingestion of first colostrum meal, and level of bacterial contamination in colostrum. ScourGuard® vaccine (Zoetis, Kirkland, QC, Canada) is labelled in Canada for dairy cows as an aid for preventing calf diarrhea but it remains unclear if vaccinating the cows would yield greater colostrum brix score. Therefore, the first objective of the study was to quantify the efficacy of ScourGuard® vaccine in dairy cows for increasing colostrum brix score. The second objective was to quantify its efficacy for increasing TPI success in calves.

Materials and Methods

Holstein dairy cows from 13 commercial farms were enrolled in this randomized clinical trial conducted over a 1-year period. Herd selection was based on convenience (located within 30 km of the bovine ambulatory clinic, Université de Montréal, St-Hyacinthe, QC, Canada). At dry-off, participating cows were randomly allocated to one of two treatments: 1-No treatment (control group) or 2-two doses of ScourGuard® vaccine (as per label indications; 60 and 21 days before expected due date). Treatment allocation was blocked by farm. Treatments were administered by research staff and farmers were blinded to group allocation. At calving, a colostrum sample from the first milking was collected in a plastic vial and frozen by the farmers. Information about the volume of colostrum fed to the calf and the time delay between birth and feeding of first colostrum meal were recorded by the farmers. Colostrum samples were brought back to the ambulatory clinic and thawed to be tested for immunological quality using a digital brix refractometer (Atago 3810, Atago USA Inc, Belleville, WA). Farms were visited weekly to collect a blood sample from all calves (1 to 7 days of age). These samples were centrifuged and tested to quantify serum brix score using the same refractometer. Success of

TPI was defined as a serum Brix score of $\geq 8.4\%$. Statistical analyses were performed considering the individual animal as the unit of interest and herd clustering was accounted for in all models. Descriptive statistics as well as univariable and multivariable logistic/linear regression models were computed. Colostrum brix score, serum Brix score, and TPI success were considered as dependent variables. Data were analyzed using an intent-to-treat strategy.

Results

A total 902 dairy cows were enrolled in the study (452 control group cows; 450 vaccine group cows). Median herd size was 102 lactating cows (min: 31; max: 312) and median parity was 2 (min: 1; max: 10). Median colostrum brix score was 23.5% (min: 13.4; max: 31.3), median volume of first colostrum meal ingested by calf was 2.9 L (min: 1.2; max: 4.3), median time delay between birth and feeding of first colostrum meal was 4.5 hours (min: 0.5; max: 12.0), median serum brix score was 9.0% (min: 7.2; max: 10.5), and median proportion of TPI success was 78.1 % (min: 42; max: 92). Accounting for parity, colostrum volume, delay of feeding and herd clustering, ScourGuard® vaccine had no effect on colostrum brix score (control group: 23.2%; vaccine group: 23.7%; $P=0.78$). Accounting for parity, colostrum volume, delay of feeding, age of the calf at blood sampling and herd clustering, ScourGuard® vaccine had a beneficial effect on serum brix score (control group: 8.7%; vaccine group: 9.5%; $P=0.04$) as well as on the proportion of TPI success (control group: 72.2%; vaccine group: 83.4%; $P=0.02$).

Significance

Overall, these results suggest that vaccinating cows during dry-off period with ScourGuard® did not increase subsequent colostrum brix score but did increase the serum brix score as well as the proportion of TPI success in calves. A future herd-level study should investigate the risk factors influencing the efficacy of this vaccine in dairy herds for identifying herds that would benefit the most from such vaccination.