

having CCM. Bacteria isolated were 36 *E. coli*, 8 *Klebsiella pneumoniae*, 5 *Enterobacter agglomerans* and 1 *E. aerogenes*. The efficacy of this bacterin was 17%, 93%, and 63% for administration schedules 1, 2, and 3. Eight ribotypes were found among the *E. coli* isolates, 6 of *K. pneumoniae* and 2 of *E. agglomerans*. Results suggest

that: 1) the administration of a bacterin dose at calving is required to reduce the incidence of CCM during lactation; 2) considering that more than one ribotype for each coliform bacteria were found, there was an enzootic rather than an epizootic distribution of those bacterial species on the farm.

## Characterization of the immune response in calves vaccinated with novel *Salmonella dublin* vaccines

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The purpose of this study is to characterize the humoral, cellular, and mucosal immune responses of dairy calves to a subunit vaccine of *Salmonella dublin*. Through detergent extraction and ion exchange chromatography, the outer membrane protein porin was purified, then complexed to 7 separate adjuvants. Calves were divided into 9 groups of 8 calves each. Seven groups of calves received different porin- adjuvant combinations; one group received the antigen without an adjuvant, and one group of calves served as unvaccinated controls. The vaccines were administered subcutaneously to the calves at 1, 3, and 5 weeks of age.

Serum titers of IgM, IgG1, and IgG2, and nasal secretion titer of IgA to *S. dublin* porin and lipopolysaccharide were measured by ELISA at variable intervals for 5 months. Cellular immune responses were also monitored at variable intervals over a 5-month period. A commercially-available ELISA specific for bovine

gamma interferon (G-IFN) was adapted to measure the calves' cellular immune response to the different antigen-adjuvant combinations.

Additional data collection included pre- and post-vaccination complete blood count and physical examination. Reaction at the injection sites were also monitored. Preliminary data from the study will be presented and discussed.

In the future, the porin-adjuvant combination determined to elicit the strongest cellular immune response, as measured by the G-IFN ELISA, will be the first vaccine tested in future *S. dublin* challenge studies in calves. The combination that elicits the highest salivary IgA titer will also be tested in initial challenge studies.

Partial funding for this project was provided by the American Association of Bovine Practitioners.