Randomized trial assessing the effect of two types of multivalent intranasal vaccine at birth on respiratory disease, mortality and average daily gain in preweaned Holstein heifers

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Introduction

Intranasal vaccination soon after birth is a common protocol used on many dairy farms with a goal of reducing preweaning respiratory disease. Although several studies have assessed antibody titers post-intranasal vaccination, few have assessed clinically relevant outcomes. No studies have compared the efficacy of intranasal vaccination against viral agents with intranasal vaccination against viral and bacterial agents. Our objective was to assess the effect of these 2 types of intranasal vaccine products against a non-vaccinated control group on respiratory disease, mortality, and ADG in preweaned heifers.

Materials and methods

Our trial was conducted on a single commercial dairy farm in Western New York averaging 1,646 milking cows producing 41.3 kg/cow/day from February 2021 to February 2023. Newborn heifers were weighed at birth and tube fed 4 L of fresh colostrum followed with 2 L of bottle-fed colostrum at the second feeding. Heifers were housed in individual pens and fed 2 L of acidified waste milk twice daily until drinking well and thrifty, at which point they were comingled into pens of 21 heifers and fed ad libitum acidified waste milk from automated robotic feeders. Step-down weaning began at 42 d of age, and heifers were fully weaned at 56 d of age.

Following the second colostrum feeding, heifers were assigned via randomized block design by pen to vaccination group: 1) non-vaccinated control (control), 2) intranasal vaccination within 48 h of birth against bovine respiratory syncytial virus, infectious bovine rhinotracheitis virus, and parainfluenza3 virus (INFORCE 3®, Zoetis; IN-V), or 3) intranasal vaccination within 48 h of birth against bovine respiratory syncytial virus, infectious bovine rhinotracheitis virus, and parainfluenza3 virus, *Pasteurella multocida*, and *Mannheimia haemolytica* (BOVILIS® NASALGEN® 3-PMH; IN-VB). All vaccinations were administered by farm employees.

Respiratory disease was diagnosed by trained farm employees based on the presence of 2 or more of the following clinical signs: cough, decreased liquid feed intake, increased respiratory rate and/or effort, nasal or ocular discharge, or pyrexia (rectal temperature > 39.4 °C. ˚Mortality was defined as a dead or euthanized heifer. Respiratory and mortality cases were recorded in the farm herd management software (DairyComp, Valley Ag Software). Preweaning ADG was calculated from farm records based on birth and weaning weights. Our preliminary analysis compared respiratory and mortality cases among vaccination groups using a Chi-squared test and average ADG via an ANOVA.

Results

We randomized 1,529 heifers which included 24 control pens (heifer n = 505), 25 IN-V pens (heifer n = 524), and 24 IN-VB pens (heifer n = 500). Herd-level preweaning respiratory and mortality incidences were 32.9% and 1.3%, respectively. There was a difference ($P = 0.04$) in preweaning incidence of respiratory disease amongst vaccination groups with incidences of 35.8% (control), 34.2% (IN-V) and 28.6% (IN-VB). We found no difference ($P = 0.18$) in the mortality incidence amongst vaccination groups with incidences of 1.4% (control), 1.9% (IN-V) and 0.6% (IN-VB). Average daily gain was 0.94 ± 0.17 kg/d for control, 0.93 ± 0.17 kg/d for IN-V, and 0.93 ± 0.18 kg for IN-VB heifers and did not differ among vaccination groups ($P = 0.62$).

Significance

Our results suggest that intranasal vaccination against a combination of viral and bacterial agents within 48 h of birth reduces the incidence of preweaned respiratory disease but does not impact ADG. No effect of vaccination, whether against viral agents alone or viral and bacterial agents, was found on mortality incidence; however, our study was underpowered to detect a difference if one truly existed. As our study was conducted on a single dairy, our results must be interpreted with caution for dairy farms with calf rearing systems different to that of our study farm.

