

A field study to determine equivalence of administering a live commercial BRSV/PI-3 intranasal vaccine to MDA+ve calves at Day 0 of life compared to 1 week of age

Kat Baxter-Smith¹, Richard Cooper², Graham Baird², Jude Roberts², Geert Vertenten³, Egon Thesing⁴

INTRODUCTION

Bovine Respiratory Disease (BRD) is a multifactorial disease of young cattle. Calves may be vaccinated early in life. However, calf immunisation may be adversely affected by interference from maternally-derived antibodies (MDA) or unfavorable environmental conditions (Chamorro et al., 2016). Consequently, the best time to vaccinate young calves against BRD is not evident. At present there is limited evidence demonstrating the efficacy of vaccinating MDA+ve calves intranasally before 5 days of age (Windeyer and Gamsjäger 2019)

OBJECTIVE

This trial aimed to demonstrate the efficacy of using Bovilis INtranasal RSP Live on the first day of life in colostrum-fed calves compared to animals vaccinated at 1 week of age by an equivalence study.

MATERIALS AND METHODS

Calves (n = 1028) on 7 commercial UK dairy farms were equally and randomly split into two groups at birth, given 4-6L colostrum from their dams within 12 hours (i.e. MDA +ve) then vaccinated with a live intranasal BRSV/PI-3 vaccine [Bovilis INtranasal RSP Live] on their first day of life (D0) or at one week of age (D7-10). Calves were not specifically challenged with virus; however, farms had a low level of respiratory disease and antibody testing of older youngstock confirmed recent exposure to field virus strains of BRSV and/or PI-3 on these farms. Measurements included antibiotic treatments, weight gains and morbidity/mortality data. Calves were weighed in the first week of life, at 3-4 weeks of age and at 8 weeks of age. Weight data were analysed using a mixed-effect regression model, with farm modelled as a random effect. Binary regression models were used for analysis of secondary outcomes of proportion of animals treated for respiratory disease and mortality risk. 354 animals were omitted from the full dataset analysis due to lack of colostrum, vaccination or weigh data. This left 674 records with DLWG 1st-3rd weigh.

Vaccinating MDA-positive calves on commercial UK dairy farms with a licensed BRSV/PI-3 vaccine [Bovilis INtranasal RSP Live] on the day of birth is equivalent in terms of morbidity, mortality and weight gain to vaccinating at 7 days of age. This gives producers the confidence to vaccinate the calf from birth, knowing there is no interference from MDA.



To download this paper, scan the QR code!

RESULTS

- Daily liveweight gain was used as the primary trial outcome, due to its close association with overall health and disease challenges, and in part to the poor sensitivity of detection of calf respiratory disease in the field.
- Sex, age at first weigh, last weigh, overall number of medical treatments and farm were all found to be significant ($p < 0.05$) in these models. Vaccine regime was not found to be significant ($p < 0.05$) in any of the models examined.
- Secondary trial outcomes were respiratory treatments administered, and deaths. Univariable analysis demonstrated no statistical difference between vaccine protocols for these outcomes.

FIGURE 1. Histogram of daily liveweight gain from 1st to 3rd weigh of all trial animals

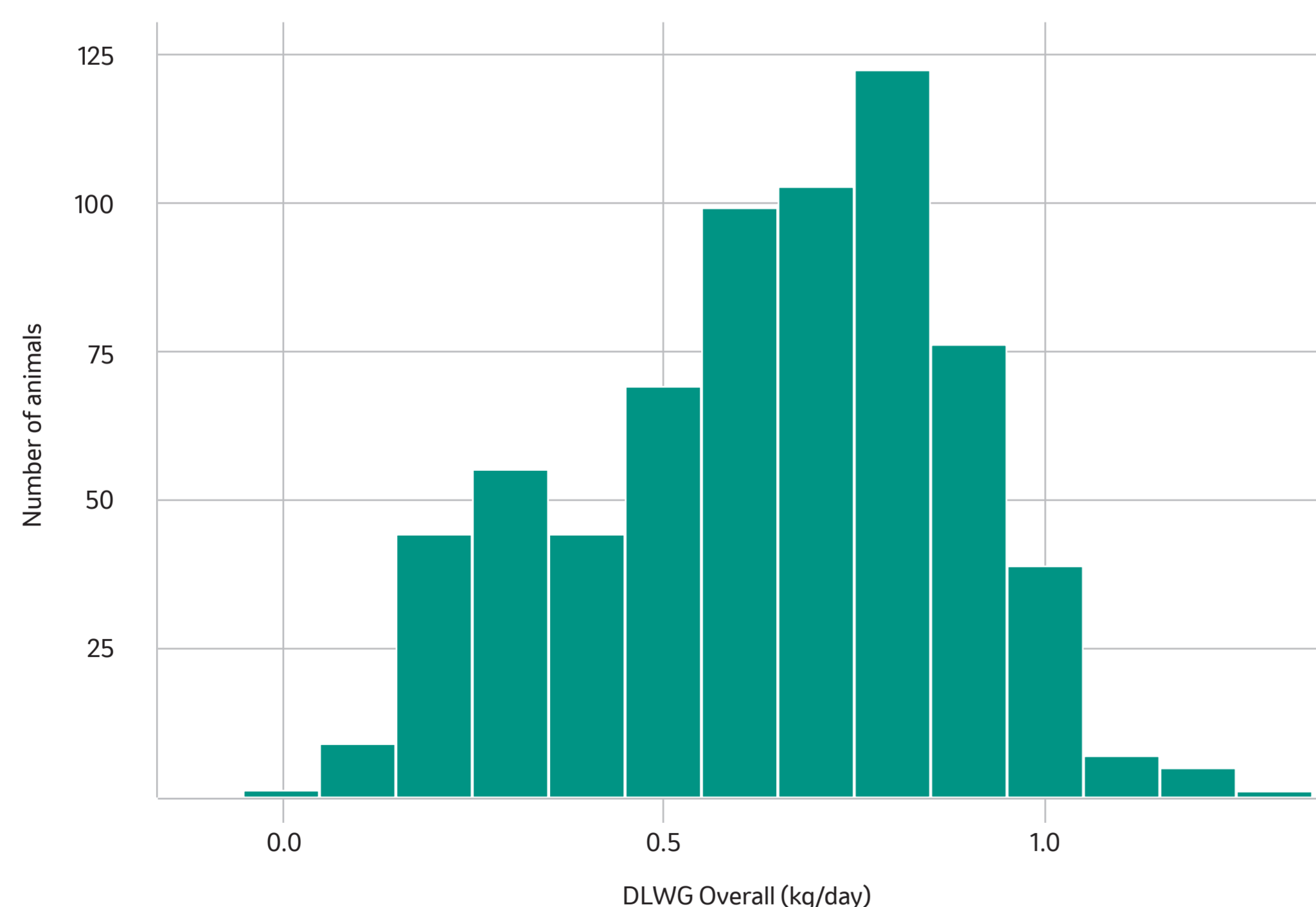


TABLE 1. All first disease treatments per farm and vaccine protocol group

| Farm | All treatments | | | | | | Total treated (%) |
|------|----------------|----|---------------|---------|----|---------------|-------------------|
| | D0 | | | D7 | | | |
| | None | 1+ | Treated (%) | None | 1+ | Treated (%) | |
| A | 61 | 34 | 35.8 | 60 | 31 | 34.1 | 34.95 |
| B | 38 | 5 | 11.6 | 43 | 5 | 10.4 | 10.99 |
| C | 91 | 12 | 11.7 | 94 | 11 | 10.5 | 11.06 |
| D | 30 | 0 | 0.0 | 31 | 0 | 0.0 | 0.00 |
| E | 31 | 8 | 20.5 | 30 | 13 | 30.2 | 25.61 |
| F | 30 | 12 | 28.6 | 27 | 16 | 37.2 | 32.94 |
| G | 55 | 0 | 0.0 | 80 | 0 | 0.0 | 0.00 |
| All | 336 | 71 | 17.4 | 365 | 76 | 17.2 | 17.33 |
| | 95% CIs | | 15.56 - 19.33 | 95% CIs | | 15.44 - 19.03 | |

No significant difference between D0 and D7 was found in the binary regression models

TABLE 2. First respiratory disease treatments per farm and vaccine protocol group

| Farm | Respiratory treatments | | | | | | Total treated (%) |
|------|------------------------|----|--------------|---------|----|-------------|-------------------|
| | D0 | | | D7 | | | |
| | None | 1+ | Treated (%) | None | 1+ | Treated (%) | |
| A | 84 | 11 | 11.6 | 85 | 6 | 6.6 | 9.14 |
| B | 38 | 5 | 11.6 | 44 | 4 | 8.3 | 9.89 |
| C | 91 | 12 | 11.7 | 94 | 11 | 10.5 | 11.06 |
| D | 30 | 0 | 0.0 | 31 | 0 | 0.0 | 0.00 |
| E | 38 | 1 | 2.6 | 39 | 4 | 9.3 | 6.10 |
| F | 33 | 9 | 21.4 | 30 | 13 | 30.2 | 25.88 |
| G | 55 | 0 | 0.0 | 80 | 0 | 0.0 | 0.00 |
| All | 369 | 38 | 9.3 | 403 | 38 | 8.6 | 8.96 |
| | 95% CIs | | 7.89 - 10.78 | 95% CIs | | 7.28 - 9.95 | |

No significant difference between D0 and D7 was found in the binary regression models

TABLE 3. Number and percent of deaths per farm and vaccinal treatment group

| Farm | Deaths | | | | | | Total died (%) |
|------|---------|----|-------------|---------|----|-------------|----------------|
| | D0 | | | D7 | | | |
| | N | Y | Died (%) | N | Y | Died (%) | |
| A | 92 | 3 | 3.2 | 87 | 4 | 4.4 | 3.76 |
| B | 41 | 2 | 4.7 | 48 | 0 | 0.0 | 2.20 |
| C | 92 | 11 | 10.7 | 95 | 10 | 9.5 | 10.10 |
| D | 30 | 0 | 0.0 | 31 | 0 | 0.0 | 0.00 |
| E | 39 | 0 | 0.0 | 43 | 0 | 0.0 | 0.00 |
| F | 41 | 1 | 2.4 | 42 | 1 | 2.3 | 2.35 |
| G | 55 | 0 | 0.0 | 80 | 0 | 0.0 | 0.00 |
| All | 390 | 17 | 4.2 | 426 | 15 | 3.4 | 3.77 |
| | 95% CIs | | 3.19 - 5.17 | 95% CIs | | 2.54 - 4.26 | |

No significant difference between D0 and D7 was found in the binary regression models

AUTHORS' AFFILIATION

- MSD Animal Health, Milton Keynes, United Kingdom
- Map of Agriculture Ltd. United Kingdom
- MSD Animal Health, Boxmeer, The Netherlands
- MSD Animal Health, Germany