final report

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Prepared by: Leigh Bradbury

Beefcorp Calf Rearers

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Calf Respiratory Illness - effect of vaccination in one season.

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Producer Initiated Research Development.

Calf Respiratory Illness - effect of vaccination in one season.

Final Report.

March 10, 2009

The Project Objective:

Beefcorp in conjunction with contract calf rearers, Corowa Vet Clinic, Intervet and MLA, undertook a research project to see if two bovine respiratory vaccines, Bovilis MH and Rhinoguard, might assist in decreasing the occurrence of respiratory illness in three Victorian Calf Rearing Facilities in one rearing season (2006). These two vaccines are usually used mainly in older cattle to control respiratory disease in feedlots. In the preceding year (2005), a small investigative trial was conducted on a subset of calves on only two rearing properties, which suggested a positive effect. Thus the opportunity to repeat such a trial on more properties with a larger number of calves was considered appealing.

The incidence of respiratory disease in rearing facilities can vary from year to year. On average, it was estimated, based on experience from past years that approximately one quarter of all calf deaths and about 50% of all veterinary intervention is due to respiratory illness; about 15% of calves receive antibiotics in our rearing facilities. Ideally it was hoped that use of both vaccines might result in decreased mortality and treatment rates for respiratory disease. Collectively the vaccines protect against a viral and a bacterial component of respiratory disease.

The Methodology:

Three properties were used for this trial; Hocking, Savin and Byron. Each property was visited monthly by Dr Rowley Bennet and the Calf production managers at Beefcorp from May through until November; there were 6-7 visits during the period of the trial.

At each visit, calves of the minimum age were divided randomly into two groups, a vaccinated and non vaccinated (control) group. Animals were assigned to the control and vaccinate group at a ratio of one control per two vaccinates (1:2). This ratio was based on previous statistical advice based on the numbers of calves involved and the average rates of respiratory disease. Calves in the vaccine group were given one dose of Rhinogard (intra-nasal application) and one dose of Bovilis MH (subcutaneous injection) at the first visit. At the following visit, a second dose of Bovilis MH was administered (subcutaneously). Calves were one month of age or older at the time of first vaccination. Vaccinated calves were not permanently identified in any way so that trial participants, whilst were often present at the time of vaccination, would not easily remember which

animals were vaccinated and which were not. This is quite important to reduce bias in day to day detection and recording of treatments.

The role of each rearer was to record all treatments administered to calves, the reason/s for treatment (ie diarrhoea, respiratory disease etc) and details of any mortalities throughout the rearing period. This recording period extended from the time of vaccination until calves reached target weight and were sent to the next property – this period is historically the time when the highest rates of respiratory disease (and mortalities) are seen.

All data was compiled electronically and forwarded periodically to Kate Woodward at Intervet. This and additional data (birthdates, weight data etc) was compiled by Kate, with the assistance of BeefCorp records and individual rearers during and after the conclusion of the trial and consequently analysed by a statistician (Dr Nigel Perkins at Ausvet).

In March 2007 we held a rearing workshop which had a dedicated segment on the vaccine trial. Comments were recorded from all participants for use in the final report.

The Results:

NB. A detailed statistical analysis was performed on the entire dataset – the main conclusions of this analysis have been summarized (by Kate Woodward) for the purposes of this report.

The dataset included animal's birthdates, vaccination dates, dates of treatment (where treated), type of treatment (antibiotic used), date of death (if applicable) and weight information. Across the three properties, there were multiple different treatment regimes for respiratory disease (single and combination antibiotics). As treatment records indicated the reason for treatment, only treatments for respiratory disease were included in the analysis. Whilst rearers may suspect a specific cause of death ie respiratory vs non respiratory, as post mortems were not routinely performed, it is impossible to correctly classify each death with respect to its cause. Therefore all mortalities (respiratory and otherwise) were included in the analysis. Whilst this potentially introduces some bias, this is unavoidable and is applied evenly across both vaccinated and control groups and is therefore unlikely to invalidate the results.

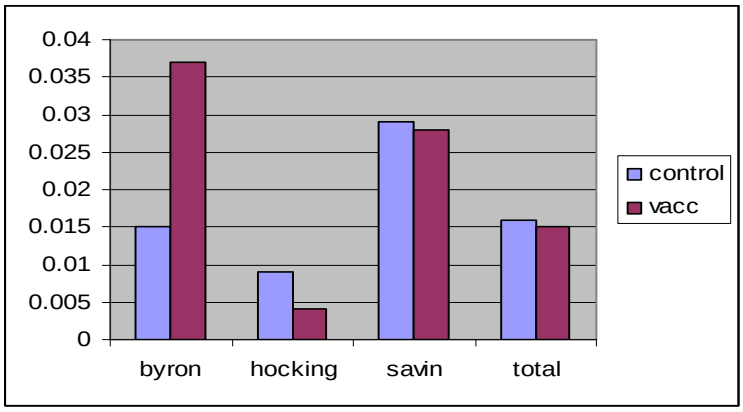
Due to various inconsistencies and missing data in the raw dataset (not unexpected in a dataset of this size), the final dataset that underwent analysis contained data from a total of **579 control** animals and **1174 vaccinated calves**, across the three locations (ie a total of **1753** animals). Calves were on average 36 days of age when they received their first vaccination and then received their second vaccination about 29 days later. A total of 27 animals died during the study.

Whilst there was some significant comparisons between vaccinates and controls on individual properties, overall, across the three properties, the analysis found no particular difference in the risk of death, treatment rate (for respiratory disease) or bodyweight between the vaccination group and the control group. *Ie Across the three properties, vaccination did not appear to reduce the risk of (treated) respiratory disease or death and furthermore did not appear to affect the growth rate of calves.* The analysis did find a strong association between treatment and risk of death ie animals that received antibiotic treatment were much more likely to die than those that did not receive any antibiotic treatment. It is worth noting that the rate of mortality was much lower than in previous years.

Mortalities - rate

A total of 9 control calves and 18 vaccinated calves died during the trial across the three properties. This equated to a combined total mortality rate of 1.5%. Across the three properties, there was no difference in the mortality rate between vaccinated and control animals (p = 0.9). Ie *Vaccination had no effect (positive or negative) on the risk of death.*

Graph 1 – mortality rates for each property and overall; control vs vaccinate

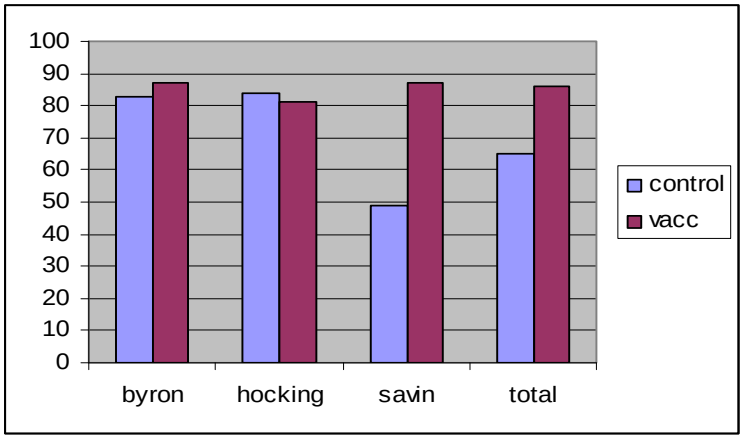


Nb. Due to the small number of deaths, statistical comparisons were not made within each location.

Mortalities – age at death

The average age of death was compared between the two groups – across the three properties, the average age of death in controls and vaccinates was 65 days and 86 days respectively. There is no statistically significant difference between these two ages (p = 0.18).

Graph 2 – Age in days at death for each property and overall; control vs vaccinate

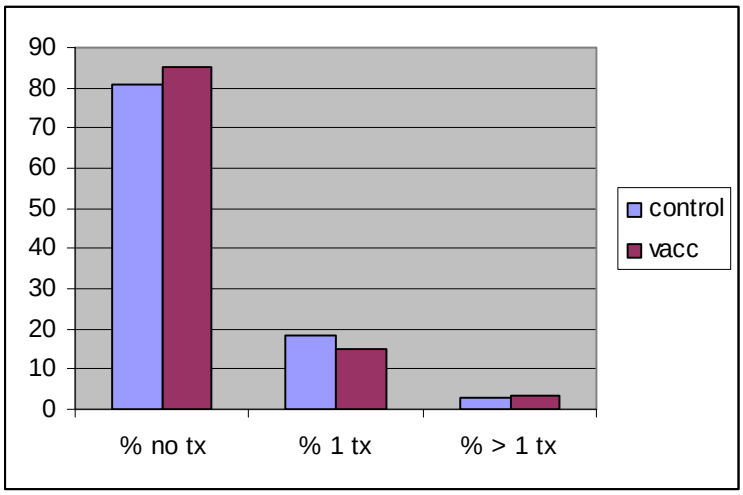


Treatment (for respiratory disease)

When treatment data from all three properties was combined, control animals were 1.3 times more likely to require treatment compared with vaccinated animals (p = 0.03). ie *there is a tendency for vaccination slightly reducing the risk of treatment.*

At two properties (Hocking and Savin) there was no difference in the proportion of control vs vaccinated animals requiring treatment for respiratory disease ie *vaccination did not appear to have a protective effect.* At the third property (Byron), control animals were 2.6 times more likely to require one or more treatments (p = 0.006) ie *it appeared that vaccination did have a protective effect at this site.*

Graph 3 – Overall percentage of animals receiving no treatments, one treatment and more than one treatment control vs vaccinate



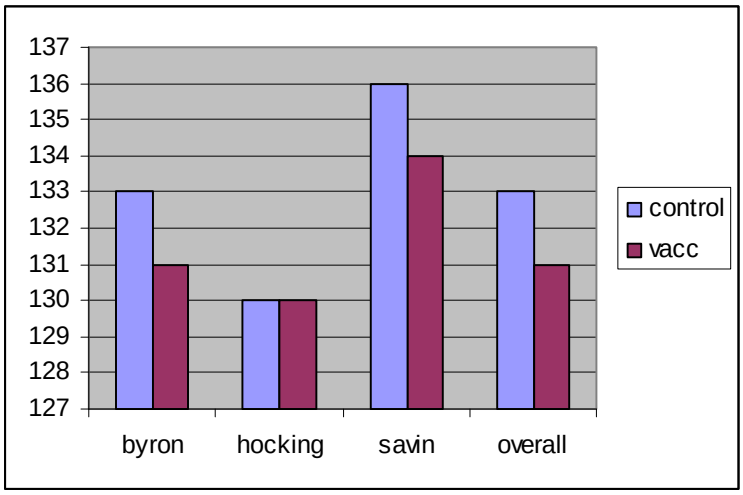
Treatment & mortality

Due to the relatively low number of deaths, it was only valid to look at these variables using the total data across all three properties. Analysis showed a significant difference in the prevalence of death in treated animals vs non treated animals; *treated animals were 5.5 times more likely to die compared with untreated animals ($p < 0.01$).* This probably indicates that once animals are detected by rearers as being sick enough to require treatment, they are in fact perhaps suffering from significant disease. This may have implications for BeefCorp in terms of reviewing the ways in which they detect disease as well as the treatment regimes that are prescribed for sick animals.

Weight data

Due to the complexity of the type of weight data available ie animals were weighed on various different dates across the three properties, the statistician analysed the weight data using a multivariable model that adjusted mean weight for age. Based on this model, there was *no significant difference* between the mean weight at average age in vaccinates vs controls, across the three properties.

Graph 4 – mean weight (at average age) at each property and overall; control vs vaccinate



Comments/Discussion

It is perhaps disappointing that there were not clearer cut differences in treatment and mortality rates between vaccinated and control animals as this would have provided useful information to BeefCorp as whether or not vaccination is a worthwhile intervention on their rearing enterprises. However, it must be remembered that this trial only measured the effect in one particular season, which, due to the variation in incidence of respiratory disease from year to year, cannot be reasonably expected to provide results that can be used to make management decisions for every year.

As mentioned, these particular vaccines protect against one viral and one bacterial component of the bovine respiratory disease complex. They are vaccines specifically developed to be used in the respiratory disease complex seen in older feedlot cattle. It may be that the respiratory disease complex experienced by reared calves is sufficiently different in its specific causes to mean these vaccines may have limited potential. Vaccines used overseas to control respiratory disease in young calves generally contain more components to accommodate for the wide range of viruses and bacteria that are often incrimated as causes of the disease. There are no specific multi-component respiratory vaccines registered for use in calves in Australia (hence the desire to investigate what effect can be achieved with what is currently available).

Prior to the statistical analysis, BeefCorp decided that based on the available data, there was insufficient evidence to consider investing the cost in vaccinating animals for future years, as they felt the benefits from vaccination were minimal. However, it was also appreciated that compared to previous years, the treatment and mortality rates were very low Ie there was minimal respiratory disease.

Financially in a year like this the use of the vaccine would be more of a cost than a cost benefit but this may not be the case if the disease pressure was higher.

In reality, as respiratory rates can seem to vary significantly from year to year, and also across location, the cost benefit of an intervention such as respiratory vaccination is difficult to accurately assess.

Feedback from key trial participants;

Neil and Jan Hocking
Trial Site.

The 2006 IBR & Bovilis MH trial went very smoothly. The start of the year in comparison to 05 & 07 was very mild with minimal changes in the weather for the early season calves.Although there was a large number of calves in the trial here, yarding, treatment and identifying the calves was easily undertaken due to a few reasons. Being able to utilise sheep yards on our property when the calves were young enabled large numbers to be quickly processed. The use of the sheep yards also allowed a number of people to access the calves with ease which included the administering of the vaccines and the identification of all calves within the program. Identifying the calves at different stages of the trial was made easy with the use of an Aleis hand scanner. At any stage a calf's status could be known with the use of this scanner. There was no visual identification as to which calves were treated or control.
After the early treatment of the calves the only down side was calves became hesitant to enter the yards.
As the year progressed the respiratory issues became more prevalent due to the increase in calf numbers and the changeable weather.
On face value we really didn't see any difference between the control group and the vaccinated group. I will be interested to see the data.

Damian & Ena Byron

Trial Site.

The trial ran very smooth and it was good that Beefcorp keep records reducing the amount of paperwork we had to look after. Our only real task was to record health issues and help on vaccination days.

It was a fantastic year to rear calves and we had limited losses. I feel this year we were not challenged as much by respiratory disease as compared to other years. I could not confidently say we saw a direct benefit from the trial but we were not challenged which unfortunately clouds the results.

Doug & Cate Savin

Trial site

We felt that the trial did little to assist us as calf rearers in the control of pneumonia. However the long term benefit may be of an advantage but that is yet to be seen.

In a different year we may see a better response but the time, effort and costs are hard to justify based on the result we have personally seen.

In terms of the trial we were happy to be involved and would be keen to look at other trials or initiatives in the future.

Due to the results of the trial very little has changed in terms of the management at facilities. One real benefit has been the education and the importance of keeping good records. Although we have moved on from some rearers in the trial, the ones that have stayed are now excellent at keeping records due to the measures we put in place during the trial.

We did learn in the trial however that not all people are or should be involved in trials. Some people really let us down in terms of their data and this was a real disappointment. In future trials I would really look at the quality of the participants rather than trying to get greater data sources.

In March 2007 we had a very positive workshop which discussed some of the data and effectiveness of the trial. It was attended by about 25 people including both vets. Dr Kate Woodward presented information from use of the vaccine in the previous year. It was decided (by BeefCorp) that we would not go ahead again with the trial as we did not see an economic benefit.

Improvements:

In hindsight it would have been good to run the trial over more than just 1-2 seasons, to assess its effect in a year where the incidence of respiratory disease was higher. I would also do more preparation with the participants as I underestimated the workload required.

It is disappointing that it has taken so long to get the data analysed and the final results; delays were unavoidable, given various staffing issues at Intervet, including Kate's 12 months of maternity leave. Unfortunately this could not be helped but in future it would be preferable that more than one person involved might be in a position to adequately prepare data for the statistician.

Future:

As a group I think the producers certainly enjoyed the trial and felt that we learnt a lot. I would encourage other groups to get involved with this initiative and

certainly look at doing another trial ourselves. There were various “hidden issues” we faced during the course of the trial and afterwards, mostly associated with recording and managing such a large dataset, both from a rearer/trial participant and a company perspective. In hindsight it may have been possible to have been better prepared for these sorts of challenges and perhaps MLA has resources that could assist with this? The process of undertaking and completing this PIRD has certainly reinforced the importance of selecting the most appropriate people to be involved with such a project.

PIRD Management:

In terms of the management of PIRD’s I feel it was very good. Unfortunately I haven’t got to meet Gerald Martin but have had good correspondence from email. I think as part of the initial PIRD application, Gerald or a representative should personally meet the applicant and maybe go over in more detail what is expected and give some helpful hints. It would also give MLA a better understanding of our business and our objectives.

We have appreciated MLA’s involvement and apologise for the delay in the data presentation. Although we didn’t get the results we would have hoped for we are all wiser for the experience and are more prepared both physically and mentally for any future involvement in trials.