

2001/Q07



Producer Research Support

Tick Fever Immunity

Dayboro Farmers Group



The Project

Tick fever is a common disease of cattle in northern Australia. It is caused by the organisms *Babesia bovis*, *B. bigemina* or *Anaplasma marginale*, transmitted by the cattle tick *Boophilus microplus*. In Queensland, *B. bovis*, *B. bigemina* and *A. marginale* accounted for 80 percent, seven percent and 13 percent of confirmed tick fever outbreaks between 1990 and 2002, respectively .

The Tick Fever Research Centre (TFRC) of the Queensland Department of Primary Industries (QDPI) currently produces the only tick fever vaccines in Australia based on live attenuated strains of *B. bovis* and *B. bigemina* and of *A. centrale*, a usually benign parasite that induces partial immunity to *A. marginale*. Indications are that a single inoculation of these vaccines provides adequate to excellent protection against challenge for the life of the animal. TFRC recommends a one off vaccination ideally given to cattle at three to nine months old.

In mid 2001, a group of the Dayboro dairy farmers discussed the possible benefit of using a second tick fever vaccination after experiencing sporadic cases of the disease in vaccinated animals. Anecdotal evidence from one farmer indicated a second inoculation would remove these problems.

Several theories for outbreaks in vaccinated cattle were mooted:

- incorrect or poor handling of the vaccine;
- poor efficacy of the vaccine itself;
- reduced infectivity of the vaccine;
- a hot strain of the parasite; and
- failure of cattle to mount an adequate immune response.

Objectives

1. assess whether a two vaccination regime is more effective than the traditional one vaccination regime;
2. increase the efficacy of vaccinations from 95 percent to 99 percent (estimated values); and
3. reduce losses caused by tick fever outbreaks occurring in vaccinated animals.

What was done?

Producers in south east Queensland volunteered cattle in the ideal age group, to be vaccinated with trivalent vaccine (three germ blood) and bled for analysis. A total of 518 Friesian, Jersey and Droughtmaster heifers and steers from eight herds were made available for the project. All cattle were managed according to the normal routine of their respective farms.

Animals were identified, ear tagged and vaccinated with two millilitres of standard commercial TFRC live trivalent tick fever vaccine. Five to ten millilitres of blood was taken from the tail vein of each animal.

The Dayboro Farmers Group investigated the possible benefit of using a second tick fever vaccination after experiencing sporadic cases of the disease in vaccinated animals.

Preliminary evidence does not support a two shot vaccination program for all animals, but may be worthwhile to protect valuable animals such as stud bulls and replacement dairy heifers.

The proportion of animals exposed to tick fever prior to vaccination was particularly high on some properties. In order to obtain more robust information, a larger cohort of data from cattle that have not been exposed to natural infection of tick fever would need to be collected.

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Key points

- Preliminary evidence does not support a two shot vaccination program for all animals, but may be worthwhile to protect valuable animals.
- Test results are reported as positive or negative and are not a quantitative measure of immunity. Some animals that test positive are still susceptible to clinical tick fever under some circumstances.

Producer Research Support

MLA Producer Research Support offers support funding of up to \$15,000 over three years for groups of producers keen to be active in on-farm research and demonstration trials.

These activities include:

- Producer Initiated Research and Development
- More Beef from Pastures demonstration trials
- Prime Time Wean More Lambs demonstration trials
- Sustainable and productive grazing grants.

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Blood samples were analysed to determine the level of immunity from natural (cattle tick transmitted) exposure. Cattle were revaccinated and another blood sample taken three months later to identify animals that did not seroconvert after a single vaccination. A further three months later, fresh blood samples were assessed for antibody response to the revaccination.

Although recognised blood management protocols were followed to prepare the assays for testing, early in the trial it was discovered that the bigemina assay was inconsistent with poor repeatability. This was unable to be rectified, so this aspect of the trial was eliminated. Results were reported as (R) positive, (NR) negative or (S) inconclusive or suspect and entered into excel spreadsheets for later analysis.

What happened?

The decision to store all samples before analysis meant that information on the level of natural exposure prior to initial vaccination was not available until all animal sampling was completed.

During the trial timeframe, 35 percent of animals were seronegative, and five percent suspect to *B. bovis* ELISA at the first bleed and 39 percent to *Anaplasma* CAT. Many animals were not available for all three tests, and many had been vaccinated prior to the first test. A total of 233 animals from the first test were suitable for inclusion in the trial.

B. bovis

After initial vaccination only five animals remained non-reactive, with three animals suspect to the *B. bovis* ELISA. Three of the non-reactive animals were not available for the third test. Two of the suspect animals were reactive in the first test and subsequently suspect indicating a loss in sensitivity of the test after vaccination. The other three (two non-reactive and one positive) were reactive after the second vaccination. These results indicated that 4.5 percent of the cattle sample may have benefited from a second vaccination.

Anaplasma

In the CAT and after initial vaccination, only one animal remained non-reactive. This animal was also non-reactive in the *B. bovis* ELISA. On revaccination this animal seroconverted, therefore benefiting from the second vaccination.

Of the 34 animals that were not presented for the second test, six were seronegative to *B. bovis* and *Anaplasma* on the first test results.

Discussion

The reduction in eligible animals for the study means the data collected is not robust enough to be statistically significant, but initial observations support revaccination of valuable animals such as stud bulls and replacement dairy heifers.

Given the high level of natural exposure in the study herds, the possibility of natural infection interfering with the study results cannot be excluded. Further investigation would require the use of weaners in cattle tick free areas, to eliminate natural exposure.

Two producers from the project group are considering using a two shot vaccination regime to protect cattle against tick fever in the future.

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MLA also recommends BeefPlan

BeefPlan is a non-traditional approach to learning. Groups of like-minded beef producers, work together as a management team to focus on property management. Importantly the learning agenda is set and controlled by the group.

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Next Steps

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References

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