2000/N02

Producer Research Support

Cobalt Deficiency in Cattle

Tenterfield Landcare Group

During 2000-2001 and 2003-2004, 173 head of cattle from eight properties were bled to determine vitamin B_{12} status. Four animals (2.3 percent) presented with B_{12} levels below 100 pmol/l and are therefore likely to be responsive to treatment. If these result are extrapolated across the wider Tenterfield region, vitamin B^{12} deficiency is not a common animal health issue.

This means that treatment for vitamin B^{12} would have been ineffective on 98 percent of cattle, potentially costing an unnecessary $392/100 head of cattle annually.

This project extension highlighted that selenium is deficient in cattle in the Tenterfield region. Treatment for selenium deficiency is not routine among cattle producers. Productive responses to selenium supplementation, in terms of growth, conception and retained placentas are not consistently reported in the literature.

Contact details

Vic Johnston
Gungel
TENTERFIELD NSW 2372
Tel (02) 6736 1155

The project

The original project (2000/N02) was completed during 2002. It concluded that blanket treatment for vitamin B_{12} deficiency was unwarranted and that monitoring of plasma vitamin B_{12} level to determine the likely response to treatment, (ie. intraruminal cobalt or vitamin B_{12} injection) would be useful. Monitoring of plasma vitamin B_{12} was considered because production responses to treatment were not apparent during the period 2000-2002 and treatment was ineffective.

The annual cost of vitamin B_{12} injection is around $3-$5 per head (including labour). The cost of profiling would be around $1 per head, if one in 10 animals per mob were sampled to indicate B_{12} status. Although annual cost savings are $2-$4 per head, the major benefit is greater attention to other management practices.

It is probable that treatment will be required during favourable years. The group has shown that the threshold plasma vitamin B_{12} level of 100 pmol/l applies to their locality and can then be used as a tool to determine the requirement for cobalt/vitamin B_{12} treatment. Levels above this threshold value indicate non-responsiveness to treatment.

As a result of the previous project, group members agreed to move away from preventative treatment of all animals, and monitor plasma vitamin B_{12} to determine the necessity or otherwise for treatment. As individual producers develop a history of their own cattle profiles, they can use the information to determine the probability of vitamin B_{12} deficiency.

This project extension was instigated to allow group members to profile their cattle for plasma vitamin B_{12} status, which will assist them to change from routine vitamin B_{12} users to tactical users.

Objectives

1. improve growth rates in young cattle by identifying the most effective means for overcoming cobalt deficiency;
2. by correcting subclinical and clinical cobalt deficiency, have 95 percent of group member mobs of growing cattle (feeder steers) achieving a sale weight of 400kg at 15-16 months old, compared with an existing 80 percent ready at 17-18 months and the remaining 20 percent not being ready until 24 months;
3. have 10 group members participate in an on-farm trial investigating the relative benefits of cobalt supplements and cobalt fertiliser. Two members of this group will be testing cobalt fertiliser and the remaining eight members will be testing a cobalt supplement;
4. have 12 group members trained in techniques for identifying cobalt deficiency; and
5. have 12 group members trained in assessing feed availability and calculating feed budgets.

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Key points

- As a result of this project, group members have moved away from a blanket preventative use of cobalt/vitamin B_{12} treatments towards monitoring plasma vitamin B_{12} to determine the need – or otherwise - for treatment.
- The deficiency situation with selenium has been highlighted.

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.

Contact Stephen Feighan - MLA Project Manager, Producer Delivery and Adoption.

Tel (02) 9463 9245 or sfeighan@mla.com.au

What was done

Many producers use vitamin B_{12} injections or intraruminal cobalt pills to ensure against cobalt deficiency but few producers know if their cattle have vitamin B_{12} levels likely to be responsive to treatment.

A drought in 2002 led to a modification of the original protocol. Forty head of cattle from five properties were bled on two occasions to determine vitamin B_{12} levels and the need for treatment.

During May 2003, eight cattle (grazing in a single mob) from five properties were bled to determine plasma vitamin B_{12} status. The property numbers were consistent between the original project and this project extension. Treatment was provided to increase vitamin B_{12} levels in those animals that demonstrated a low level of vitamin B_{12}.

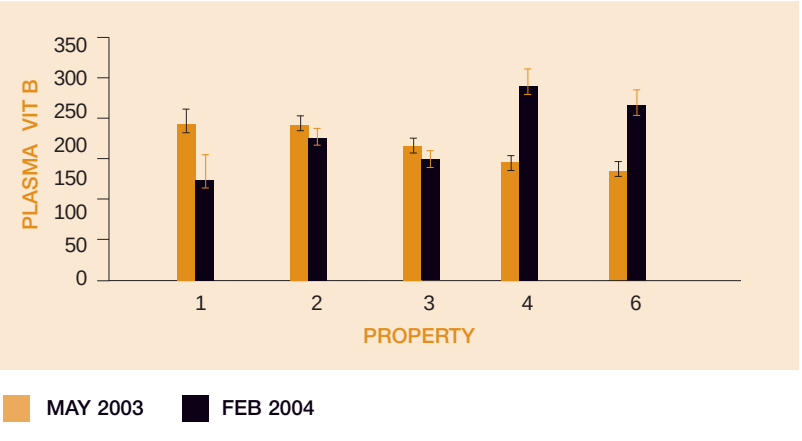
The procedure was repeated in February 2004. This time, blood was also analysed for glutathione peroxidase activity to determine the selenium status.

Two site visits by local veterinarians were made to sample animals. Blood sample reports were sent to collaborators after each sampling. A final workshop, attended by around 20 cattle producers, was held in May 2004 at Tenterfield. Project results and results of cattle selenium status were presented at a workshop. Workshop outcomes were also published in local newspapers and newsletters.

What happened?

Samples of blood were taken during May 2003 and February 2004. At the times when the blood samples were taken, pastoral conditions were highly favourable resulting in ample herbage mass of moderate quality. Plasma concentrations of vitamin B_{12} are shown in *Figure 1*. Plasma B_{12} levels on average exceeded the threshold value for production responses to cobalt or vitamin B_{12} treatment (ie. 100 pmol/l). There was one animal at each sampling with a B_{12} level below 100 pmol/l. This represents 2.5% of sampled animals.

Figure 1. Mean (±se) plasma concentration of vitamin B12 during May 2003 and February 2004.



Plasma concentrations of glutathione peroxidase activity (GSHPx) are detailed in *Figure 2.* Forty five percent of cattle sampled were deficient in selenium, with no single animal having adequate selenium. GSHPx levels indicated marginal or deficient selenium.

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MLA also recommends

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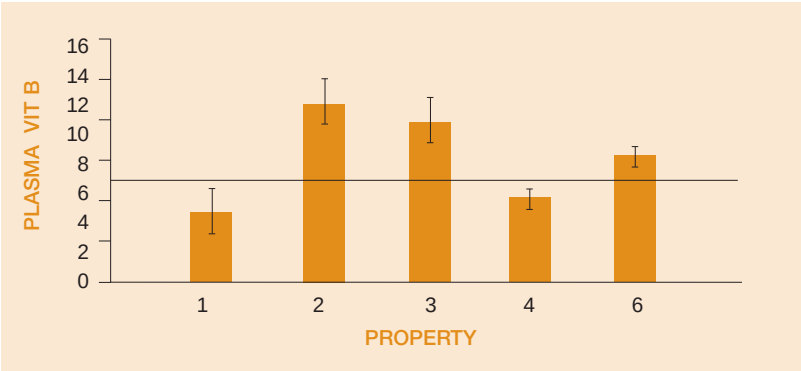
Figure 2. Mean (±se) plasma concentration of glutathione peroxidase activity (indicator of selenium status) during February 2004.



Levels below the line (less than 7 units/g Hb) indicate deficiency in selenium. Values from 8-30 units/g Hb indicate marginal selenium status. Adequate levels considered > 60 units/g Hb.

Discussion

The general deficiency in selenium surprised many of the cattle producers. A motion was carried at the workshop to explore the potential for a further Producer Research Support application in 2005 to examine the productive/reproductive responses to selenium treatment in cattle.

This project has resulted in a change in practice for group members, away from a blanket preventative use of B_{12} treatments towards a monitoring of plasma B_{12} to determine the need for treatment. The deficiency situation with selenium has been highlighted.