final report

Project code: B.PRS.0507

Prepared by: Jim and Gaye Kuerschner

2005/S01 Orroroo Bestprac

Date published: 31.12.2007

ISBN: 9781741915013

PUBLISHED BY
Meat & Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Weaner Lambs, Vitamin B12 and Cobalt

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

MEAT & LIVESTOCK AUSTRALIA

PRODUCER **I**NITIATED **R**ESEARCH **D**EVELOPMENT

Group Name
Orroroo Bestprac

Project Code 2005/S01
REPORT NO 1
DATE July 2007

FINAL REPORT

Background

The Orroroo Bestprac group has operated since September 2003 to determine ways to improve returns from sheep flocks through a process of benchmarking performance and implementing projects to improve future performance.

A discussion between group members on the management of weaners led to some comparisons of anecdotal evidence of the benefit of vitamin B12 when added to vaccines for lambs and weaners. Despite this anecdotal observation, there was not a widespread use of vitamin B12 across the district.

Cobalt is essential for the production of vitamin B12. In ruminants vitamin B12 is synthesised from Cobalt by rumen bacteria. Vitamin B12 is essential in the synthesis of proteins and for the metabolism of fats and carbohydrates and on the growth and division of cells. Under deficient conditions, calves and lambs may grow normally for a few months as they draw on stored B12, and then show gradual loss of appetite and failure to grow, followed by anaemia, rapid weight loss and finally death.

The group committed to research the topic further and information was obtained on the distribution of Cobalt deficiency in South Australia. Rohan Beale (Coopers Animal Health) attended a Bestprac meeting in August 2005 and discussed best practice for vaccinating (site, cleanliness, vaccine storage) and presented information on the occurrence of trace element deficiencies in South Australia. The Cobalt map (see figure 1) indicated that for properties within the mapped zone, there was a 10% or less chance of having Cobalt deficiency. He also indicated that animals with adequate Cobalt blood levels could still have a response from B12 injections. B12 injections provide a much higher level of B12 than Cobalt bullets which are seen as a "slow release" system by comparison. This information to some extent supported the possibility of the anecdotal observations of "bloom" for lambs in the district injected with vitamin B12 at weaning.

The group then committed to develop a PIRD application to Meat and Livestock Australia (MLA) to undertake a trial with four properties in the area. The group was successful in their application and began the PIRD in September 2005.

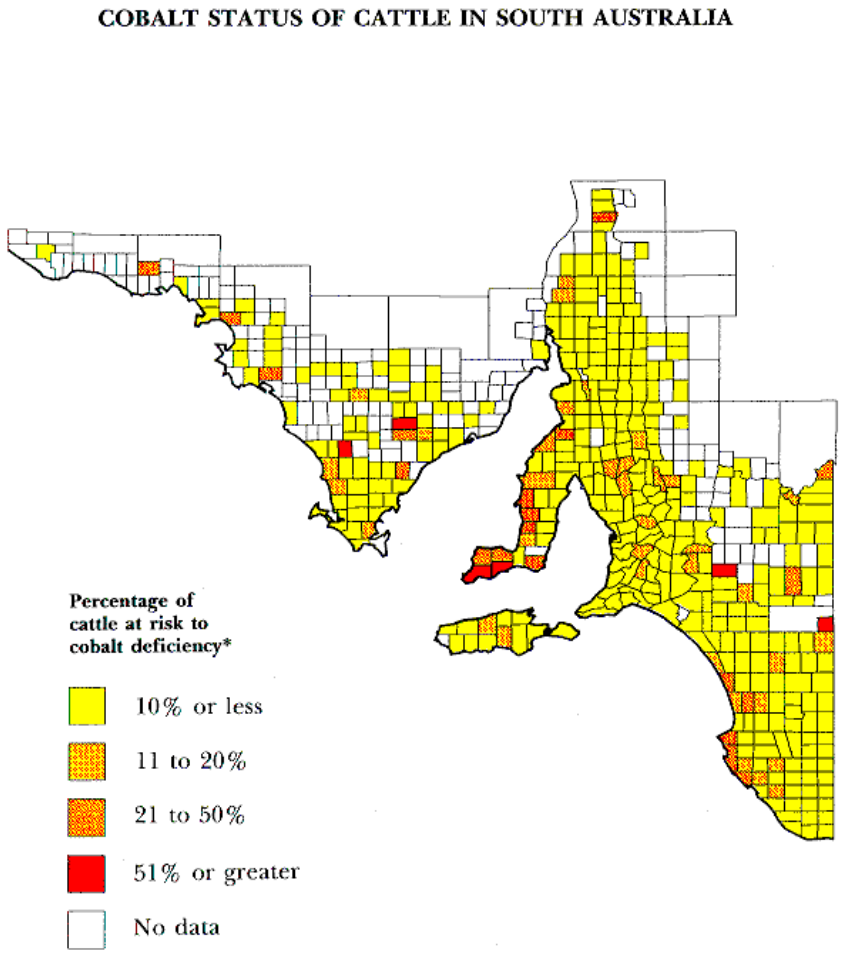
Project Objective

The group's objective in conducting this PIRD was to determine the potential for treatment with vitamin B12 or Cobalt to contribute to improved weaner growth and profitability in livestock enterprises in the Orroroo district of South Australia.

The goals of the project were to:

- Determine the potential of vitamin B12 or Cobalt to improve weaner weights by 10% (from 35 kg to 38.5 kg) over untreated sheep in a four month period.
- Determine the potential of vitamin B12 or Cobalt to improve the weight or condition score of grown treated sheep over untreated sheep in a four month period.

Figure 1: Cobalt status of cattle in South Australia



Methodology

Year One

Four Orroroo Bestprac group members (Kuerschner, Fromm, Ellery, Bowman) agreed to treat a flock of sheep in three different ways (split flock treatment) to assess the benefits of vitamin B12 or Cobalt in improving weight gain or condition scores. The three treatments were:

- Control – Nil treatment.
- B12 – Treat with vitamin B12 injection with a repeat treatment 6 – 8 weeks after the initial treatment.
- Permatrace – Treat with rumen Cobalt bullet and grinder.

Each member ran between 120 and 150 hoggets in the trial (40 – 50 animals per treatment) as one flock under standard conditions to ensure that any differences in weight gain or condition score could be attributed to the B12 or Cobalt treatment.

To provide some background information on Cobalt levels in the district, ten sheep on each property were blood tested (five assigned as control; five assigned to treatment 1 or treatment 2) at on the 26th September 2005. Trent Scholz and Jaimie Frazer (PIRSA Animal Health) conducted the blood tests on property. This was an important learning activity for group members who had not participated in sheep bleeding in the past.

On 13 October 2005 sheep from three properties (Fromm 120 hoggets,. Kuerschner 135 hoggets, Ellery 150 hoggets) and 27 October 2005 sheep from the remaining property (Bowman 156 hoggets) received the following treatments:

- All sheep weighed (no conditions scoring conducted at this stage).
- Faecal egg counts of ten sheep to establish the need for worming. Treatment with anthelmintics is not common practice for all group members in the district and these results would ensure that gains in weight or condition score were not compromised by high worm burdens. The only property that showed a moderate egg count (Fromm) consequently drenched the trial sheep at the start of the trial.
- Treatment 1 - 1/3 of flock B12 injected (1 ml subcutaneous at back of head). Elders Clare provided B12 and an injector for the first injection. Craig Stephenson (Coopers Animal Health) provided technical support for best practice for B12 injection.
- Treatment 2 - 1/3 of flock Cobalt bulleted (+ grinder). Coopers Animal Health provided applicator, bullets and grinders. Craig Stephenson (Coopers Animal Health) provided technical support and training in Cobalt bulleting.
- Control - 1/3 of flock untreated.

Vitamin B12 is mobilised for use and excreted from the body quite quickly so that by 6 – 8 weeks after treatment, residual levels at the vaccination site will be below a useful threshold. The three treatments were run as one flock up until the next treatment time 6 – 8 weeks after the initial treatment, when the vitamin B12 treated sheep received a follow-up injection. The three treatments were then run as one flock again up until the final weighing and condition scoring 6 – 8 weeks after the second vitamin B12 injection.

The vitamin B12 treatment group in each of the trial flocks was re-injected 6 – 8 weeks after the initial treatment by each of the participating landholders.

All of the sheep in the trial flocks were weighed and condition scored on 6th February 2006. It was originally planned to blood test the sheep at this stage but because the B12 blood levels were high, the decision was made that the cost of retesting was not warranted.

Year Two

Based on the inconclusive results for the Fromm, Kuerschner and Ellery properties, these three properties decided not to continue with the trial in the second year.

The Bowman property chose to continue with the trial in the second year and chose to work with some lambs. There were two treatments selected:

- Control – Nil treatment.
- B12 - Treat with vitamin B12 injection with a repeat treatment 6 – 8 weeks after the initial treatment.

The lambs were injected with vitamin B12 and weighed at marking time (24 August 2006). These lambs were then revaccinated 6 weeks after the initial vaccination and reweighed at weaning (25 October 2006).

Analysis of Results

Year One Results

1. **Blood Tests**

Blood tests taken prior to treatment with trace elements provided background results for Cobalt, selenium and copper levels in the tested sheep. Serum reference ranges for the trace elements are:

- Cobalt/B12 (pmol/Litre): < 200 is deficient; 200 – 400 is marginal; > 400 is adequate.
- Copper (µmol/Litre): 8 -30 is normal
- Selenium/GPX (U/g Haemoglobin): < 30 is deficient; 30 – 50 is marginal; > 50 is adequate

	B12	Range	Copper	Range	Selenium/GPX	Range
Bowman	3378	Adequate	20.7	Normal	561	Adequate
	2206	Adequate	13.3	Normal	799	Adequate
	3558	Adequate	12.1	Normal	578	Adequate
	3295	Adequate	12.8	Normal	492	Adequate
	3697	Adequate	13.8	Normal	660	Adequate
	3659	Adequate	13.3	Normal	539	Adequate
	3474	Adequate	11.3	Normal	621	Adequate
	2437	Adequate	17.5	Normal	585	Adequate
	2401	Adequate	21.7	Normal	751	Adequate
	3685	Adequate	14.2	Normal	861	Adequate
Ellery	3739	Adequate	15.3	Normal	Missing No.	Adequate
	3730	Adequate	13.3	Normal	576	Adequate
	3578	Adequate	14.4	Normal	486	Adequate
	3074	Adequate	14.2	Normal	751	Adequate
	3718	Adequate	10.5	Normal	512	Adequate
	3721	Adequate	11.9	Normal	622	Adequate
	3731	Adequate	14.5	Normal	842	Adequate
	3641	Adequate	15.3	Normal	698	Adequate
	3668	Adequate	10.6	Normal	563	Adequate
	3660	Adequate	10.8	Normal	569	Adequate
Fromm	3610	Adequate	11.0	Normal	622	Adequate
	3648	Adequate	13.6	Normal	622	Adequate
	3749	Adequate	11.1	Normal	422	Adequate
	3603	Adequate	10.6	Normal	552	Adequate
	3554	Adequate	11.9	Normal	495	Adequate
	3675	Adequate	16.0	Normal	588	Adequate
	3452	Adequate	10.3	Normal	632	Adequate
	3716	Adequate	14.0	Normal	371	Adequate
	3696	Adequate	14.9	Normal	477	Adequate
	3257	Adequate	10.2	Normal	285	Adequate
Kuerschner	3361	Adequate	13.8	Normal	718	Adequate
	2359	Adequate	18.0	Normal	746	Adequate
	1517	Adequate	14.7	Normal	869	Adequate

	2905	Adequate	11.8	Normal	661	Adequate
	3709	Adequate	18.9	Normal	732	Adequate
	2088	Adequate	15.0	Normal	668	Adequate
	2123	Adequate	19.1	Normal	750	Adequate
	3425	Adequate	17.5	Normal	Missing No.	Adequate
	1734	Adequate	19.7	Normal	684	Adequate
	2605	Adequate	14.9	Normal	756	Adequate

All of the sampled sheep had adequate blood levels of copper, vitamin B12 and selenium. Based on these test results, it was not expected that the treatments would show any significant benefits from the use of supplementary vitamin B12 or Cobalt.

2. **Weights and Condition Scores**

(a) Weights

		Bowman			Kuerschner			Fromm			Ellery		
		W1*	W2	Rank	W1	W2	Rank	W1	W2	Rank	W1	W2	Rank
Control	Av	49.1	51.0		45.2	53.6		43.1	54.0		46.7	56.0	
	Diff	1.9		3	8.4		2	11.0		2	9.3		2
B12	Av	47.2	52.3		45.9	52.6		45.0	53.5		44.6	53.5	
	Diff	5.1		1	6.7		3	8.5		3	8.9		3
Cobalt	Av	49.6	54.4		47.8	57.4		48.3	61.1		48.5	57.9	
	Diff	4.8		2	9.6		1	12.8		1	9.5		1

W1 = 13 October 05; W1* = 27 October 05; W2 = 6 February 06

The above table shows that:

- On the Bowman property there was a trend of nearly 3 kg/head benefit between the B12 and Cobalt treated sheep and the control sheep. These sheep were wether hoggets that had been run hard on some grass ground to knock down spray-topped grasses and under these conditions, the B12 and Cobalt

treatments appeared to show some benefit.

- On the Kuerschner, Fromm and Ellery properties, the differences between treatments resulted in the B12 treatment being ranked lowest for weight gain for all three properties. The Cobalt treatment was the highest ranked treatment but with an average weight difference of 1.2, 1.8 and 0.1 kg respectively, the group did not feel that this was a significant gain. The unexplained result of the B12 treated sheep showing the lowest weight gains lead the group to conclude that some of the result may have been due to trial error. When the results were loaded into a statistics program, the high level of variability was confirmed.

(b) Condition Scores

Property	Range	Condition Scores		
		Control	B12	Cobalt
Ellery	Low	3	3	3
	Average	3.7	3.8	3.7
	High	4	4.5	4.5
Fromm	Low	3	3.5	3
	Average	3.7	3.9	3.8
	High	4.5	4.5	4.5
Bowman	Low	2.5	2.5	2.5
	Average	3.1	3.2	3.3
	High	4	4	4
Kuerschner	Low	2.5	3	2.5
	Average	3.8	3.8	3.6
	High	5	4.5	4.5

There was a slight trend towards a higher condition score for the B12 and Cobalt treated sheep on Bowman and Fromm properties. There was a slight trend towards a lower condition score for Cobalt treated sheep on the Kuerschner property. These results are consistent with the weight gain differences for the Bowman property but were inconsistent with the results for the Fromm and Kuerschner properties.

Year Two Results

(c) Weights (Bowman Property)

Sheep Type	Range	Weights			
		Control		B12	
		W1	W2	W1	W2
Ewe	Low	6.0	19.5	9.0	19.7
	Average	15.4	26.7	15.8	26.1
	High	22.0	35.5	22.0	34.8
	Difference on Average Wt	11.3		10.3	
Wether	Low	9.0	19.5	8.0	14.5
	Average	16.1	28.2	16.0	26.7
	High	26.0	39.8	28.5	33.7
	Difference on Average Wt	12.1		10.7	

W1 = 24 August 2006; W2 = 25 October 2006

The results indicated:

- A slightly lower average weight gain (1.0 kg difference) for the vitamin B12 treated ewes when compared to the control ewes. This level of weight difference is probably not significant.
- A slightly lower average weight gain (1.4 kg) for the vitamin B12 treated wethers when compared to the control wethers. This level of weight difference is also probably not significant.

What Did the Group Learn?

The group learnt a number of things in doing the trial:

1. They now have a sound knowledge of the process for testing blood levels of trace elements in sheep.
2. They know that the levels of copper, selenium and Cobalt/B12 in the blood of sheep in the Orroroo area are adequate.
3. There is an improved knowledge of best practice for vaccination of livestock.
4. They have knowledge and skills in administering Cobalt bullets and grinders into a sheep's rumen.
5. They have participated in a split flock trial and understand the relative benefits of this method compared to paired flocks run in separate paddocks. The biggest benefit for the group was the ease of managing one trial flock.

6. The groups determined that vitamin B12 could be worthwhile for weaners or sheep running under hard conditions. However, it will only be used if the injection fits in with normal mustering requirements and if the marginal cost of adding vitamin B12 to a normal vaccine is low. It is unlikely that it would be economic to undertake a separate mustering just to revaccinate with vitamin B12 as the weight gain benefits are usually variable and low.
7. As a result of the trial, three members who were going to use vitamin B12 have decided not to, as the benefits are inconsistent and do not warrant any additional costs of labour and vitamin B12. One member was not using vitamin B12 but may have had the results been conclusively positive. Two members of the group still use vitamin B12 at marking as a single injection with no follow-up. For the properties who choose not to use vitamin B12, the savings at 7 cents/dose over 1,000 lambs x 2 doses would be $140/year plus any associated mustering and labour costs. For the four properties, this will lead to a combined savings of $560/year.

How Could the Trial Have Been Improved?

The trial could have been improved in the following ways:

1. Larger numbers of sheep in each flock (a larger sample size) would have reduced some of the error factors and the results might have been more conclusive.
2. One of the producers noted that we should have used standard times in the yards for all properties to allow better comparison of results between properties. Some of the low or high weight gains could be in part due to different yard intervals.
3. It would have been ideal if the whole group had participated for the full two years.
4. The results could have been more widely promoted. It was difficult to run a field day as there was little that people could see between the different treatments.

Promotion Of Results

- ► A field day was run when the sheep were bled and treated with Cobalt bullets so that all group members had a chance to participate.
- ► The results of this PIRD were promoted to other Bestprac groups in the area, especially when discussing best practice options for weaner management.
- ► The results also received wider promotion to other properties through the PIRSA veterinarians involved in the blood testing.
- ► The results will be promoted in Rural Directions Pty Ltd client newsletter *In Touch*.