INFLUENCE OF LOOSE LICK SUPPLEMENT ON THE GROWTH RATE OF LAMBS GRAZING STUBBLES

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Introduction

The opportunity to graze stubbles after harvest plays an important role in mixed farming operations for both the livestock and cropping section of the enterprise. However, the nutritional value and window for maximum benefit is dependent upon a number of factors with weather being a major consideration in management of these stubbles. The role of mineral supplements has previously been shown to provide significant benefit to lambs grazing Lucerne (Long & Duddy, 2015) but what role do they have on the growth rates of lambs grazing stubbles given that these can vary from dry feed with a grain component to stubbles with either actively growing or stressed volunteer plants?

Methods

The 63 lambs used for the initial part of this trial were September drop, White Suffolk lambs averaging 37 Kg that had been raised and weaned on Lucerne at the Temora Agriculture Innovation Centre (TAIC). They were vaccinated and drenched at weaning and 3 weeks later, split into 2 groups and rotated through the available stubbles at TAIC across the summer. Half the lambs were provided with loose lick supplement ad lib (Supplement) and half had no supplement (Control) with the weights of each group monitored before moving to a fresh stubble.

The supplement provided was a commercially available product (Fabstock™ Stubble Mix) with the following analysis as per the label:

- Salt 28%
- Urea 2.5%
- Molasses 2%
- Calcium 12%
- Magnesium 8%
- Sulphur 3.3%
- Phosphorus 3.2 %
- Potassium 0.2%

Contents; Salt, Urea, Magri-lime, Molasses, Vegetable Oil, Causemag, Di-Calcium Phosphate, Bypass Protein Meal, Magnesium Sulphate, Gypsum**. Trace Elements**: Cobalt, Iodine, Selenium, Methionine, Zinc, Manganese, Copper, Biotin, Chelated Zinc. Molybdenum Vitamins: Vitamin A, Vitamin B1, Vitamin D3 and Vitamin E

The cereal stubble treatments (Barley and Wheat) were conducted on identical paddocks with the same paddock history, size and management. The Canola stubbles used in this trial were not identical in size and variety sown but similar in management and paddock history.

Recorded rainfall at Temora over the trial period was 66mm from 9 separate rainfall events with one major storm event making up half the total. This provided a scenario that would be common in a mixed farming enterprise where volunteer plants appear after a rain event only to be ‘burnt off’ by subsequent hot weather. The sequence of events and management of lambs in this trial was kept as close as to what would be typical in a commercial enterprise over the summer months following harvest.

The sequence of grazing rotations was as follows;

1. **Day 0 - 20** - Lambs were provided Barley stubble containing 2010 Kg dry matter/ha (stubble), with 47Kg /ha grain on the ground. There were 73 volunteer barley plants/m^2 in this stubble (2-3 leaf stage).
2. **Day 21- 34** -Canola stubble with volunteer plants under the windrows at an average density of 28.6 plants/m^2, stage 4-5 leaves. These plants were actively growing following a heavy storm prior to the lambs entering the paddock.
3. **Day 35 - 46** – Unharvested Wheat crop that had been slashed with volunteer wheat at 104 plants/m^2 (leaf stage 3-4 leaf) plus some hairy panic growing. Still an amount of grain in the ground; 245kg/ha. Estimated vegetative grazing available was 550 Kg green DM/ha

Following the removal of lambs from the wheat stubble (day46), an additional 92 September drop White Suffolk lambs that had been on Lucerne pasture for 6 weeks were weighed and divided into 4 groups. Two (2) of these were added to the existing treatment groups and placed on Lucerne for three (3) days prior to being allocated to Canola stubbles, one group with supplement, one without. The remainder of the lambs were grazed on either wheat stubble that had been sprayed out or remained on the Lucene pasture, both without supplement. The purpose of this treatment was to further determine the effect supplement was having in relation to the growth rate of lambs when grazing volunteer Canola with different previous grazing history's. The Canola at this stage was severely moisture stressed and around 50% of the plants had flowered, the density of the volunteer plants was as recorded previously. The lambs remained on these treatments for a further 17 days.

Results

Growth Rates on Cereal stubbles

The growth rates of lambs on cereal stubbles provided with supplement exhibited a considerable advantage over those without supplement as shown in Figure 1.

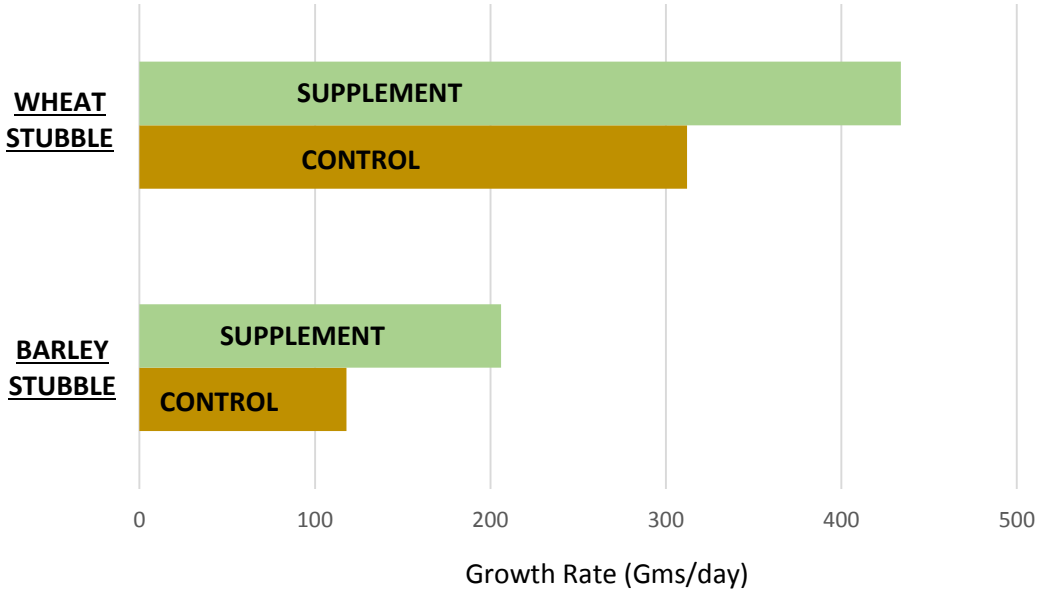

Figure 1. Comparison of growth rates of lambs on cereal stubbles with and without supplement

The lambs on Barley stubble with supplement exhibited growth rates 87gms/head/day greater than those without supplement which was equal to a 74% increase in growth rate above the above the Control group. The visual differences in the paddocks following the removal of the lambs revealed that the lambs on supplement had consumed all the grain and young plants whereas the Control group had not been so efficient. This confirms information provided by Queensland Business and Industry (2013) suggesting an increase in dietary intake by sheep provided supplement and would explain to some degree the increase in growth rates of the lambs on supplement. It was noted that in the days following the introduction of the lambs to their treatments, several of the lambs on supplement scoured in a manner consistent with consumption of grain when not accustomed to it. No noticeable discomfort was observed in the scouring lambs and it corrected itself within a few days. The control lambs at no stage exhibited any signs of scouring.

The amount of feed on offer to the lambs on the slashed wheat crop was substantially greater which was reflected in the higher growth rates achieved by both groups of lambs. The lambs on supplement grew 122.1gms/head/day faster than the control group which was an increase in growth rate of close to 40%. There was a high level of both dry matter and grain available to these lambs with again an apparent difference in level of grain consumption with supplemented lambs consuming slightly more grain. The volunteer plants and weeds present were suffering from a degree of moisture stress during the trial making the grain easier to source for both groups. No scouring was observed in either group.

The consumption of loose mix supplement was similar across the Barley and Wheat treatments at an average of 49.7 gms/head/day, much less than the average consumption of lambs involved in the previous trial on Lucerne (Long and Duddy, 2015)

Growth Rates on Canola stubble

When the lambs were shifted to a Canola stubble with volunteer plants actively growing following a recent rain event, some unexpected results occurred as seen in Figure 2.

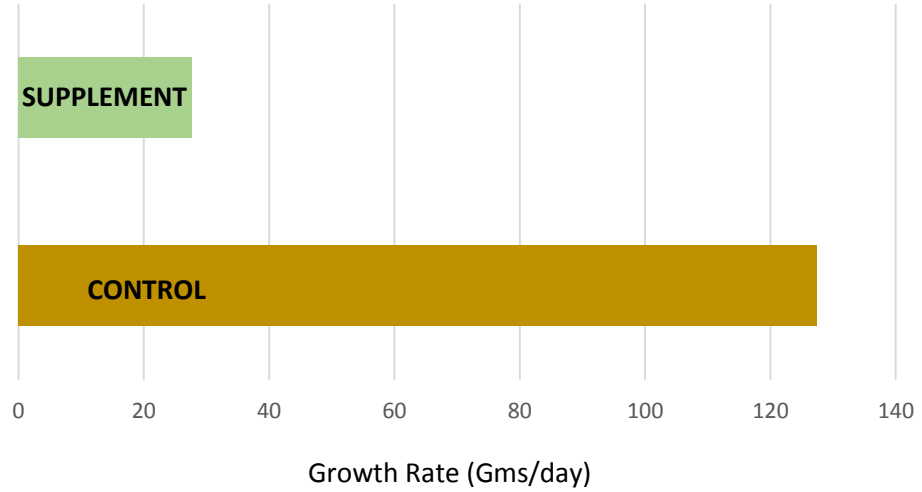

Figure 2. Growth rates of lambs with and without supplement grazing on volunteer Canola

The lambs grazing Canola with supplement seemed more stubborn to shift to the yards for weighing than the Control mob, a characteristic that didn't raise any alarms until the weight data was

analysed. As the level of supplement consumption had decreased to just 21.5gms/head/day and the weight gains between treatments were so different, there was sufficient concerns to re-run the trial after a short period of readjustment for the lambs.

The addition of a fresh group of lambs that had been grazing Lucerne for 6 weeks provided an opportunity to test the suspicion of sub-clinical nitrate poisoning given the recommendation that animals can adapt to high nitrate feeds lowering the risk of nitrate poisoning (Robson, 2007). This would suggest that the lambs from Lucerne would not be at high risk from nitrate poisoning and would respond accordingly. There was a difference in the growth rates of these lambs between the treatments when placed on canola with the lambs from Lucerne with supplement growing at faster rates than those without supplement. Once again there was a slight reduction in growth rates of lambs with supplement compared to those without supplement from the lambs not accustomed to high nitrate feed (original mob). Figure 3 shows the results of lambs from the four grazing treatments with the effect of previous grazing history (adjustment) showing an effect on weight gain when grazing canola.

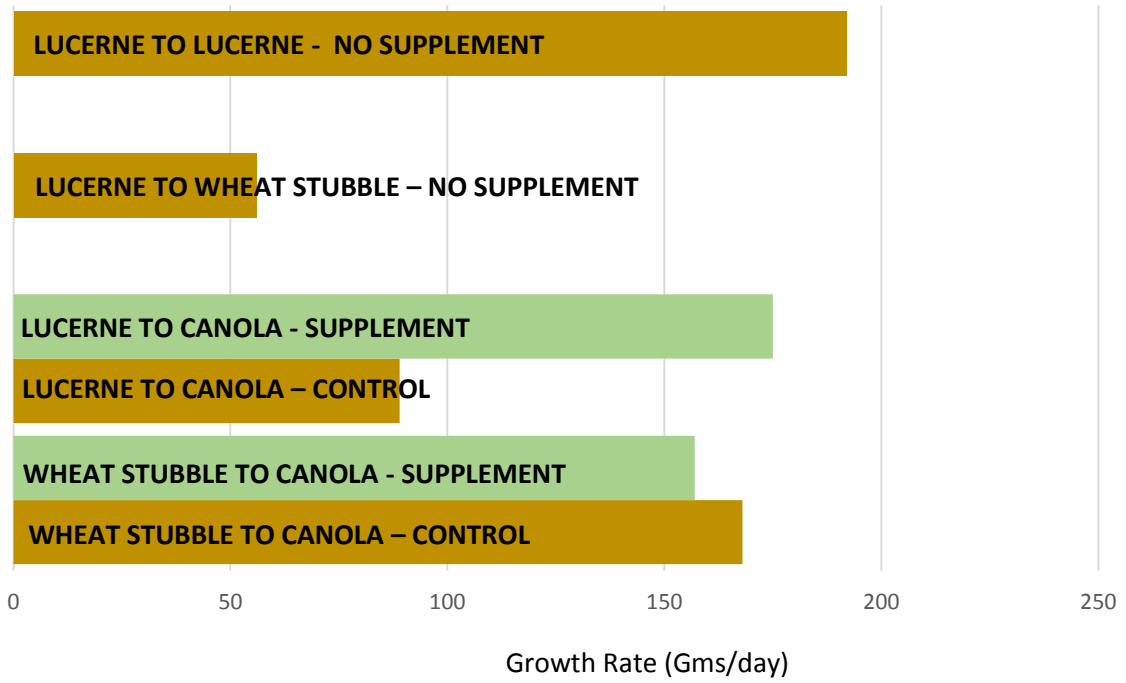

Figure 3 Effect of pre grazing treatment on response to supplement when grazing Canola

The value of all stubbles at this stage was beginning to diminish as the Canola was drying off and the wheat stubble had very little to offer store lambs. The Lucerne pasture was also showing signs of moisture stress. The growth rates of lambs left on Lucerne exceeded lambs on all other treatments whereas those on depleted wheat stubble struggled to maintain acceptable growth rates.

Discussion

The growth rate response to supplements on cereal stubbles is clear and decisive. Lambs grazing on cereal stubbles achieve higher growth rates when given access to loose lick supplements than those grazing on stubbles without supplement. This more than likely occurs for a number of reasons. Firstly, the loose lick provides supplementation of essential minerals missing in the available feed within the stubbles such as Calcium and Sodium and as most stubbles are low in crude protein (2-4%) (Agriculture Victoria, 2016), supplements provide some additional benefit through additional protein in the form of protein meal and urea. The second area where supplements assist is by increasing appetite and dietary intake (Queensland Business & Industry, 2013) therefore increasing potential for increased growth rates.
Lambs on barley stubble with supplement achieved growth rates 74% higher than those without supplement and the difference in the amount of both grain and volunteer plants consumed was clearly evident. No grain or barley plants remained in the stubble running the supplemented lambs whereas the control lambs still had an estimated 27Kg/ha of grain and 19.7 plants/m^2 not consumed in the paddock. The lower consumption in lambs not offered supplement would account for a proportion of the weight large gain differences as it has long been recommended that increased appetite is one of the benefits of mineral supplements as well as providing additional protein and minerals. The initial, short term scouring of the lambs on supplement could have been due to the increased consumption of spilt grain within the stubble due to the effect of the supplement plus the concentration of components within the loose lick.

With the relative low value of feed on offer in the barley stubble, the inclusion of loose lick supplements was critical in achieving growth rates of just over 200gms/head/day, however once the grain and volunteer plants were consumed, this growth rate would not be sustained had the lambs remained on this stubble and supplementation of their diet with cereal grain and/or lupins would have been required to maintain weight gain.

The wheat stubble provided a different situation with high levels of grain and dry matter available to the lambs. This provided a much higher daily growth rate (434 and 312 gms/day) across both the supplemented and control lambs respectively. Even with higher nutritive value within the stubbles, the inclusion of a loose lick supplement still provided a daily growth advantage of close to 40% when compared to the control treatment. The level of volunteer wheat and some weed species, coupled with grain on the ground provided an ideal finishing opportunity for lambs with growth rates from both groups more than acceptable. However, the provision of supplement was still a favourable economic decision with an additional $3.35 carcase value for a cost of supplement around $0.60/lamb for the short period of the trial. This figure approaches the financial returns (600%) gained from using supplement on high value Lucerne pasture by Long & Duddy (2015).

The effect of supplement on the growth rates of lambs grazing volunteer canola was totally different and provided some interesting results. The advantages that loose licks provide to lambs grazing cereals such as mineral supplementation and protein addition to the diet, do not apply to canola stubbles with volunteer plants. Canola stubbles with volunteer plants do not have the same requirement for mineral supplements due to a much higher sodium (Dove, 2014) and magnesium content (Frischke & McMillan, 2012) and the average value of 12-14% crude protein (Schroder 2008) present in canola plants. The effect of creating greater appetite may not be a factor but if it is, only serves to amplify the warnings that go with grazing canola. These include potential problems due to high levels of nitrate up to 4000ppm (Frischke & McMillan, 2012) and high levels of Sulphur (0.5 – 1.3%) (Schroeder, 2008) and the fact that these issues become more critical just after rainfall or as plants become moisture stressed. The reasons that supplements work in cereals are identical to the

ones that potentially cause problems when grazing canola stubbles where volunteer plants are actively growing. When nitrate levels approach 4000ppm, nitrate poisoning becomes a real consideration. Sulphur consumption should not exceed 0.4% on a dry matter basis (Schroeder,2008), and the fact that the supplement contained around 3.3% Sulphur and levels of nitrates through the use of urea and canola meal, potentially creates issues when both the plants and supplement are consumed. However generally Sulphur is essential in maintaining rumen efficiency and a ratio of 10:1, Nitrogen:Sulphur is considered the right level to achieve maximum utilisation of feed and production (Breytenbach, 1999, Merck Vet. Manual, 2014), especially in Merinos.

The first trial where the lambs on canola with supplement showed a large reduction in growth rate when compared to the lambs without supplement was potentially a subclinical case of nitrate poisoning. Actively growing canola plants, higher susceptibility of young animals (Undersander et.al, Crowley (1985)) and lack of alternative grazing plants all point to a high risk of nitrate poisoning. The addition of a loose lick may have contributed to this condition although no lambs showed the advanced signs of poisoning and lethargic behaviour was the only sign apart from markedly lower weight gains.

The subsequent trial using canola stubble attempted to explain some of the differences in the initial trial. There are many references to conditioning animals to high levels of nitrates in feed and with Lucerne typically containing moderate to high levels of nitrate between 1760 – 4000ppm, (Undersander et.al, Healthy Soils Inc (2012)), lambs coming off Lucerne pasture should have some level of adjustment to potentially higher nitrate levels in canola plants. The lambs that had been on Lucerne pasture for 6 weeks did show the typical response to supplement that had been witnessed in the previous trials on cereal stubble and Lucerne (Long & Duddy, 2015) with the supplemented lambs increasing growth rate by 86gms/head/day above the control; almost double the growth rate. As in the initial trial on canola stubble, supplemented lambs coming off cereal stubble onto canola stubble exhibited lower growth rates than the control but not to the same extend as in the initial trial; 157 compared to 168gms/head/day respectively. Interestingly the growth rates of all the groups except the Lucerne to canola control lambs were similar (175, 157 & 168gms/head/day) raising a further question as to why the large drop in growth rate attributable to lambs coming from Lucerne to canola when no supplement was available or conversely, why didn't we get a similar response on those lambs that had been on wheat stubble. It also raises the suspicions that even the control lambs in the first trial were suffering some small degree of nitrate poisoning as the growth rates of these lambs averaged 128gms/head/day, much lower than the growth rates of the same lambs (168gms/head/day) in the second trial, despite having access to canola plants that were more actively growing and more palatable in the first trial.

Part of the answer to the results in the second part of the trial may lie in the fact that the canola plants within the stubble were severely stressed and at a much later maturity stage than the initial trial. Not only would the nutritive value have been much less, but the potential for any degree of nitrate poisoning would have been considerably diminished. This is confirmed with the growth rates of the lambs remaining on Lucerne averaging 30-40gms/head/day above those on canola with supplement. It is the altered responses of the two groups of lambs from different pre-treatment grazing history's (cereal v's lucerne) that creates questions as to what factors are causing this result. Future trials using actively growing canola need to be conducted to validate the initial trial results and also clarify the effect that changing feed types may have on potential growth rates in lambs. The adjustment of gut microflora to different feed types and the effect it has on growth rate is one area that needs further investigation. In the time frame of these trials, the gut microflora would not have had sufficient time to fully adjust.

Nonetheless, the decision to use supplements on canola stubbles is not as straight forward as the decisions on cereal stubble or Lucerne pasture.

When grazing lambs on cereal stubbles the use of loose lick supplements provides clear benefits in increasing lamb growth rates. The financial returns provided by supplements are evident as well as better utilisation of stubbles through increased dietary intake. When faced with the opportunity to use canola stubbles, consideration to the potential risk of nitrate poisoning must be given regardless of whether you are considering the addition of a supplement or not. The use of a supplement may actually compound the potential risks across a number of areas especially by increasing nitrate and sulphur intake.

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