THE EFFECT OF MONENSIN ON PRODUCTION AND REPRODUCTIVE FUNCTION IN AUTUMN CALVING HERDS

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SUMMARY
Autumn calving cows (n = 201) in 3 herds were allocated to 2 treatment groups. One group received 300 mg of monensin daily (via 1 anti-bloat capsule inserted within 4 weeks of calving). The other group was a control which did not receive any monensin.

There were no significant effects of monensin on milk, fat and protein production over the 100-day treatment period following calving.

The reproductive function of the 2 treatment groups (as assessed by 24 day submission, non-return rates and the interval from calving to first observed oestrus) did not differ significantly.

Keywords: monensin, milk production, reproduction, cows, autumn calving.

INTRODUCTION
Autumn calving herds provide fresh out-of-season milk for urban areas, enable increased processor efficiencies by maintaining year round factory throughput and provide fresh milk during winter for short shelf-life cheese production. However, compared with spring calving herds, autumn calving herds in Tasmania suffer a 14.5% reduction in productivity which includes an increase of 66% in the number of empty cows (Fulkerson, et al. 1987). Much of this productivity loss is reflected in a protracted period (over 20 weeks) post-calving during which there is no gain in liveweight.

Monensin has long been recognised as an energy metabolism enhancer for ruminants (Bergen and Bates 1984). Research assessing the value of monensin as an anti-bloat treatment for lactating cows indicated that there were productivity benefits beyond those expected from the alleviation of bloat (Dobos et al. 1989; Moate et al. 1990; Lowe et al. 1991).

A review of the effects of ionophores, which include monensin, on cow reproduction (Sprott et al. 1988) suggests that some aspects of reproductive function could be enhanced depending on the quality of the diet and stock body condition.

It is therefore suggested that the winter milking herd, dependent on pasture for a large proportion of their diet, could be especially responsive to the energy efficiency benefits of monensin. This experiment was designed to determine if the treatment of autumn calving cows with monensin, during winter, would result in improved production and reproductive function.

MATERIALS AND METHODS
Autumn calving cows in 3 herds (2 Friesian and 1 Jersey) were serially allocated to 2 treatment groups [PM, plus monensin, (100 cows); NM, no monensin (101 cows)] according to their previous year’s production (if available), age and expected calving date. Calving in all herds commenced in April.

The herds were located at the Elliott Research Station and Ridgley in the north west and at Scottsdale in the north east of Tasmania.

Cows allocated to the PM group had an anti-bloat capsule (Elanco Animal Health, Sydney, N.S.W.) administered within 4 weeks of calving. The capsules delivered 300 mg active monensin per day for approximately 100 days.

All cows were fed a daily ration of approximately 5 kg DM pasture, 6 kg DM pasture silage and 4 kg DM hammermilled wheat or dairy pellets. This is typical of the winter ration of the majority of Tasmanian autumn calving herds.

All cows were tested fortnightly for milk yield and, fat and protein contents on an alternate morning/afternoon basis from calving through to September when tests were on a monthly basis. Estimated daily production, from 1 month following calving until estimated capsule expenditure, was tested for treatment effects by analysis of variance with calving date as a covariate.

Reproductive function was assessed by Chi-square analysis of (i) submission rate defined as the number of cows submitted for the first time within the first 24 days of mating as a proportion of the total number of cows available for submission, and (ii) non-return-rate defined as the number of cows
that did not return for submission in the 24 days following their first submission as a proportion of those cows submitted in (i) above. Planned starting dates for mating of the 3 herds were 2, 3 and 27 July. Additionally, the treatment effect on the interval between calving and first oestrus was determined by analysis of variance for the 2 herds that recorded pre-mating heats.

RESULTS
Covariate corrected mean and standard error for daily yields of milk, fat and protein over the entire test period for the 2 treatments are shown in Table 1. Although there was a trend for the monensin treatment to cause increased milk, fat and protein production, compared with the control group, the differences were not significant \( (P > 0.05) \) at any of the tests either within or across herds. There was no significant herd \( \times \) treatment interaction for any of the 3 production parameters assessed.

Table 1. Covariate adjusted mean (+ s.e.) daily yield of milk, fat and protein for treatment and control groups over the 100-day test period

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Monensin (L)</th>
<th>Control (L)</th>
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<tbody>
<tr>
<td>Milk</td>
<td>15.4 (0.05)</td>
<td>14.9 (0.05)</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>683 (7.9)</td>
<td>663 (7.8)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>467 (1.6)</td>
<td>454 (1.4)</td>
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The submission rate over all herds was 61%. The submission rate for the PM treatment was 56% and was not significantly different from the NM group with 66%.

The non-return to service rate overall was 77%. The monensin treatment group non-return rate (82%) was not significantly different to the control group (73%).

Both groups had intervals from calving to first observed oestrus that were not significantly different (PM 67 days; NM 59 days).

DISCUSSION
The lack of significant increases in production due to the monensin treatment in this experiment differs from the observations of Dobos et al. (1989), Moate et al. (1990) and Lowe et al. (1991) where significant increases in milk production were observed. As they studied treatments on spring calving cows it is suggested that the alleviation of bloat by monensin was a significant contributor to the increases observed in productivity. As this experiment avoided the confounding effects of bloat it has been able to assess more precisely the proposed energy efficiency effects of the monensin treatment.

The energy metabolism benefits of monensin are thought to be primarily due to the elevation of the proportion of propionate in the rumen fluid (Bergen and Bates 1984). As the diets in all 3 herds in this experiment were supplemented with cereal grains, which also elevate propionate proportions, this may partially explain the lack of response to the monensin treatment. However Kube et al. (1988) recorded increased milk production with the treatment of cows at peak lactation, with monensin administered at 200 mg per day, on a diet with a high grain content. Sprott et al. (1988) also recorded significant beef cattle liveweight gains when treated with monensin and fed high grain diets.

In their review of the effect of ionophores on cow production Sprott et al. (1988) noted that monensin and lasalocid treatments of 150–200mg had no adverse effects (and by inference no positive effect) on first service and pregnancy rates in lactating cows in 16 reviewed trials. The lack of a significant response to the monensin treatment on the reproductive parameters assessed in this trial is therefore not surprising.

This experiment suggests that the use of monensin as a feed supplement, at 300 mg/day, is unlikely to be beneficial for autumn calving herds fed rations similar to those described.

In other studies, where bloat has occurred, the increased milk yield response to feeding monensin may have been a combined result from both the control of bloat and a nutritional benefit gained from the monensin treatment.

ACKNOWLEDGMENTS
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REFERENCES