SUPPLEMENTATION OF EARLY WEANED CALVES WITH COMBINATIONS OF RUMEN MODIFIERS, COTTONSEED MEAL AND MOLASSES AND TREATMENT WITH AVERMECTIN B1

B.M. Burns[1], J.A. Lindsay, K.J. Hobbs and D. Reid[2]

Queensland Department of Primary Industries, Swan's Lagoon Beef Cattle Research Station, M.S. 54, Millaroo, via Ayr, Q., 4807, Australia

Summary

An investigation was conducted to determine whether the rumen modifiers lasalocid and avoparcin, when included in molasses/urea based supplements, enhanced liveweight performance, in early weaned calves. As part of the study the broad-spectrum parasiticide Avermectin B1 was given to the calves to assess any undesirable side effects on animals of less than four months of age.

There were no significant ($p > 0.05$) liveweight responses to supplementation when the rumen modifiers lasalocid and avoparcin were included in supplement rations. Lasalocid reduced supplement intake, however, it had no adverse effect on liveweight gain. Avoparcin substantially improved growth when cottonseed meal was included in the ration. Weaners treated with Avermectin B1 tended to show a greater liveweight gain than untreated weaners during the experiment ($p < 0.10$) and no adverse side effects were noted.

(Key Words: Lasalocid, Avoparcin, Rumen Modifier, Avermectin B_1)

Introduction

The practice of weaning calves at younger ages has recently been developed in northern cattle herds to reduce breeder mortality due to nutrition and lactation stress (Holroyd, 1985). However, the reduction in weaning age from an average of seven months to three months of age increases post-weaning stress on the calf through the abrupt change in diet from milk to pasture, and increases the risk of dysentery caused by *Eimeria zuernii* coccidiosis (Parker et al., 1986) and debilitation from gastro-intestinal worms. The extent of these stresses depends on the quantity and quality of available pasture but for much of the year it is probable that early-weaned calves would benefit from some form of supplementary feeding. During the dry season, when soil moisture levels fall, native pasture grass growth slows and may cease. The resultant pasture then contains an increasing amount of stem in relation to leaf and the nitrogen content falls (Lindsay, 1984). These factors contribute to a much lower nutrient intake by grazing animals (Minson, 1981). The most economical supplementary nutrients available in northern Australia are molasses fortified with urea and cottonseed meal. Non-protein nitrogen supplements such as urea will slow liveweight loss, however, the inclusion of a protected protein such as cottonseed meal in the supplement will result in liveweight gain (Lindsay et al, 1982; Gulbransen, 1985).

The feed additives lasalocid (LASLD) and avoparcin (AVP) modify rumen fermentation and in some studies with yearling heifers grazing tropical pastures (Horton et al., 1983) and weaner calves fed tropical pasture hay or grazing tropical pastures (Dodemaide et al., 1988) have improved the efficiency of use of supplements. LASLD may also have a role as a coccidiostat and AVP can improve the uptake of protein by the animal. However, no reports are available on the effects of these modifiers on early-weaned calves fed molasses based diets. Avermectin B1 (AVM) which is a broad spectrum parasiticide has been recommended for use in calves older than four

[1]Address reprint requests to Dr. B.M. Burns, Queensland Department of Primary Industries, P.O. Box 10, Richmond, Q., 4822, Australia.

[2]Queensland Department of Primary Industries, Oonoonba Veterinary Laboratory, P.O. Box 1085, Townsville, Q., 4810, Australia.

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months of age. However, it has been used commercially in calves younger than four months of age. Therefore, AVM was evaluated to determine if there were any detrimental effects in this younger class of animal. Further, despite evidence that intestinal parasites can debilitate calves in coastal regions (Turner and Short, 1972; Copeman and Hutchinson, 1979) no attempt seems to have been made to quantify responses to anthelmintic treatment in calves weaned to three months of age.

An experiment was therefore conducted to evaluate the effect of adding LASLD and AVP to dry season supplements of molasses plus six percent urea (M6U) on the liveweight performance of early-weaned calves. The effect of adding CSM to M6U was also measured.

Materials and Methods

Location

The experiment was conducted at "Swan's Lagoon" Beef Cattle Research Station, Millaroo, which is 100 km south of Townsville (latitude 20°05′ south; longitude 147°14′ east in the sub-coastal speargrass region of north Queensland). The climate is warm and sub-humid, having a distinct hot, wet summer period (wet season) and a warm, dry winter period (dry season). The mean annual rainfall is 880mm, the majority of which falls during the summer months of December to February.

Soils and vegetation

The area used for the experiment consisted of soils of poor fertility. Principal pasture species were black spear grass (*Heteropogon contortus*), tropical tall grasses (*Coelorachis rottboellioides*, *Sorghum* spp., *Ophiuros exaltatus*, *Arundinella nepalensis*) and medium grasses (*Alloteropsis semialata*, *Themeda australis*, *Eulalia fulva*, *Panicum* spp., *Dicanthium* spp., *Bothriochloa* spp., and *Chrysopogon fallax*). Principal tree species were poplar gum (*Eucalyptus alba*), with patches of tea-tree (*Melaleuca* spp.) and sandalwood (*Eremophila mitchellii*). Trees formed an open savannah woodland.

Experimental design and animal management

One hundred and twenty Zebu crossbred calves (98 to 172 kg liveweight and three to six months of age, respectively), were weaned in late April. After a 10 day period of feeding and education in the yards, the weaners were randomly allocated on the basis of sex and fasted liveweight to six treatments to give 20 animals in two paddocks per treatment of 10 animals. One half of the animals

TABLE 1. SUPPLEMENTS FED DURING EXPERIMENT (27 DAYS)

Abbreviation	Contents	Intake of additive (mg/hd/day)	
		Lasalocid	Avoparcin
M6U	Molasses + 6% urea ad libitum	0	0
M6U+LASLD	M6U + lasalocid	400	0
M6U+LASLD+AVP	M6U + lasalocid + avoparcin	400	200
M6U+CSM	M6U + 300 g/day cottonseed meal	0	0
M6U+CSM+LASLD	M6U + cottonseed meal + lasalocid	400	0
M6U+CSM+LASLD+AVP	M6U + cottonseed meal + lasalocid + avoparcin	400	200

from each treatment were randomly allocated to an AVM treatment group and received one dose of AVM, proportional to liveweight, at the start of the experiment. The animals grazed one of 12 native pasture paddocks at a rate of 0.3 animals per hectare. Groups of weaners within replicates were rotated between paddocks in a set sequence after initial randomization. The animals were supplemented twice weekly at three and four day intervals and were weighed at fortnightly intervals.

The feeding regime used during the experiment (27 days) was a mixture of M6U which was used as the carrier for LASLD and AVP.

Supplements (table 1) were arranged in a 2x3 factorial design with two levels of M6U (M6U and M6U + CSM) and three levels of LASLD (No LASLD, LASLD and LASLD + AVP).

Liveweight gain was measured and the data were analysed using a standard analysis of variance.

Results

From the intakes of supplements it appeared that, at the levels used, LASLD when combined with M6U depressed molasses intake. The control group receiving supplementary M6U gained an average 4.4 kg or 161 g/d, whereas the provision

TABLE 2. SUPPLEMENT INTAKES, METABOLIZABLE ENERGY OF SUPPLEMENTS AND DAILY LIVEWEIGHT GAINS OVER 27 DAYS OF CALVES FED NATIVE PASTURE SUPPLEMENTED WITH MOLASSES + 6% UREA (M6U) OR M6U + COTTONSEED MEAL (M6U+CSM).

TREATMENTS	M6U	M6U ± CSM	MEAN
No LASLD			
Supplement Intake (kg/d)			
Molasses	0.35	0.36	
CSM		0.31	
Metabolizable Energy (MJ/day DM)	2.9	6.3	
Liveweight Gain ± s.e. (kg/d)	0.16 ± 0.09	0.24 ± 0.09	0.20 ± 0.06
LASLD			
Supplement Intake (kg/d)			
Molasses	0.16	0.13	
CSM		0.16	
Metabolizable Energy (MJ/day DM)	1.3	2.8	
Liveweight Gain ± s.e.	0.25 ± 0.09	0.27 ± 0.09	0.26 ± 0.06
LASLD+AVP			
Supplement Intake (kg/d)			
Molasses	0.05	0.07	
CSM		0.19	
Metabolizable Energy (MJ/day DM)	0.4	2.7	
Liveweight Gain ± s.e. (kg/d)	0.24 ± 0.09	0.39 ± 0.09	0.32 ± 0.06
Mean Daily Liveweight Gain ± s.e.	0.22 ± 0.05	0.30 ± 0.05	

of CSM increased this growth rate by approximately 50%; however, this difference was not significant ($p > 0.05$) (table 2). The addition of LASLD appeared to have a similar effect as CSM on calves on the M6U diet but no further effect on those receiving M6U-CSM. AVP produced no further growth responses above LASLD on M6U but did appear to improve growth when the protein content had been increased by inclusion of CSM (0.24 kg/d versus 0.39 kg/d; $p > 0.05$) (table 2).

Weaners treated with AVM tended to have greater liveweight gains than untreated weaners during the experiment (0.28 kg/d and 0.23 kg/d) for treated and untreated weaners, respectively ($p < 0.10$). No adverse side effects were observed with this treatment.

Discussion

The lack of significant responses to supplementation with the rumen modifiers AVP and LASLD may be explained by the availability of green feed at the commencement of the experiment and the hayed off pastures towards the completion of the experimental period. A significant response to the rumen modifiers may have occured with poorer quality pastures, as was found by Mudd and Smith (1982).

The lower feed intakes of supplements observed in this experiment, due to the inclusion of LASLD is confirmed by other research when growing beef cattle were fed high grain diets (Berger and Ricke, 1980; Kuhl et al., 1980). While LASLD reduced feed intake it had no adverse effect on liveweight gain i.e. a similar liveweight gain can be achieved by feeding less supplement with LASLD included. This is an important economic consideration when supplementary feeding.

The substantially improved growth rate recorded when AVP was added to M6U + CSM + LASLD is in agreement with earlier work (Macgregor, 1983), and can be explained by the action of AVP in the small intestine which results in an increased net uptake of amino acids from this part of the gastro-intestinal tract.

Finally, the improved growth performance observed in this experiment when CSM is added to M6U is supported by previous studies (Lindsay et al., 1982; Gulbransen, 1985). Such protected proteins are an essential part of any supplement fed to young weaners to ensure liveweight gain.

There were no detrimental side effects to the AVM treatment in these early weaned calves.

This study has once again highlighted the improved performance that can be achieved when a protected protein such as CSM is added to a molasses/urea based supplement and fed to early-weaned calves grazing native pasture. Increased protein uptake by the small intestine can be enhanced with the use of the rumen modifier AVP, and supplementation costs can be reduced by incorporating LASLD into a ration. Therefore, these two rumen modifiers should be considered when implementing a supplementary feeding programme.

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