Altosid® IGR Mineral Supplement Impacts on Horn Fly Populations in Manitoba

Project Lead:	Manitoba Beef & Forage Initiatives (MBFI)
MBFI Location(s):	Brookdale Farm, Johnson Farm, and First Street Pasture
Collaborating Partners:	Cargill Feed and Nutrition Central Garden & Pet Manitoba Agriculture
Start Date:	2021 Status: Completed

Background

External parasites have negative impact on livestock performance through decreasing milk production, feed efficiency, and overall lower daily weight gain (Byford et al. 1992). External parasites include mites, ticks, lice, and flies. The horn fly (*Haematobia irritans*) is emphasized as having one of the highest impacts on estimated economic losses in beef cattle production (Byford et al. 1992).

Male and female horn flies survive solely by piercing and sucking blood from livestock, typically gathering on the backs and sides of cattle. Decreased weight gains and feed efficiency as well as reduced milk production have been well documented. These blood sucking insects can also carry mastitis bacteria, anaplasmosis and bovine leucosis. The indirect performance on calf weaning weights from mothers with fly treatment has been demonstrated with an increased weight gain of 13 to 36 lbs (Campbell 1976, Cocke et al. 1989, Smythe et al. 2019).

Recently a new product for horn fly control was registered in Canada called Altosid® IGR. Altosid® IGR is an Insect Growth Regulator (IGR) which targets the horn fly larvae development in the manure to break the horn fly life cycle, preventing adults from emerging (hatching) from the manure. The life cycle of horn flies depends on fresh cattle manure pats, with females laying eggs on pats within 2 minutes of deposition before returning to the host (Sanders and Dobson 1969). Altosid® can be purchased in lick tubs or mineral for the cattle to consume. Cargill Animal Nutrition sells this product in their Right Now® Emerald and Onyx with Altosid® IGR pasture mineral.

Objectives

To determine the efficacy of Altosid® IGR in cattle mineral at 0.01% (*S*)-Methoprene for the control of horn flies (*Haematobia irritans*) on cow-calf pairs.

Project Design and Methods

The experimental design consists of a treatment group and an untreated control group, with animals assigned to the groups according to Table 1. The natural populations of horn flies were the challenge in this test system.

Table 1: Experimental design:

Treatment Designation	Treatment	Number of Cow-calf pairs
1 (Brookdale Farm)	Altosid® IGR (S-methoprene) Treatment 55104AL Right Now® Mineral Onyx containing 0.01% (*S*)-Methoprene	50: (25) Planned Rotational Grazing (25) Continuous Grazing
2 (Johnson Farm)	Untreated Control Right Now® Mineral Onyx	85: (85) One grazing group

The animals in treatment group 1 served as the Altosid® IGR treated group for the determination of efficacy against horn flies and effects on calf weight gain due to controlling horn flies using 55104AL Right Now® Mineral Onyx Altosid containing 0.01% (*S*)-Methoprene. The animals in treatment group 2 served as the untreated control group and be offered Right Now® Mineral Onyx. Random sampling and averaging of individual results will be used to limit experimental bias.

All cow-calf pairs were maintained on pasture at separate farm stations for the duration of the study. The treatments were assigned to the two different locations to ensure a minimum of 2 miles separation between treated and untreated livestock.

Due to the operational logistics of herd grazing and breeding management, the treated cows at Brookdale Farm had a higher proportion of first and second calvers. A total of 50 cow-calf pairs were split into two different grazing groups, planned rotational vs. continuous grazing, that both received the same treated mineral. The Johnson Farm untreated control of 85 cow-calf pairs were all mature cows and stayed as one group with summer grazing on the First Street Pasture. The Brookdale Farm, 11 miles North of Johnson Farm, is in the Prairie Pothole Region with clay loam soil and summer pasture paddocks interspersed with numerous wetlands and riparian areas. In contrast, the First Street Pasture has lower agricultural capability with a sandy loam soil and poorer forage productivity.

Treated mineral test substance active ingredients:
(*S*)- Methoprene: Isopropyl (2E, 4E, 7S)-11methoxy-3,7,11-trimethyl-2,4-dodecadienoate
CAS Number: 65733-16-6
Lot number: 0007397484

Starting on April 29, 2021 treated and untreated mineral was freely offered at a rate of 100 g/head/day in flip top mineral feeders at a ratio of 1 feeder per 25 cows. A target of three blue salt blocks per mineral feeder were provided in the same area as mineral feeders. Average mineral consumption per cow was calculated every three days over the duration of the study for each group by weighing out target mineral consumption for three days and reweighing any unconsumed mineral following three days of free choice consumption. Any spilled mineral was collected and re-weighed. The average mineral

consumption was calculated by dividing the difference between the amount offered and the amount remaining by the number of cows in the group by the number of days in the feeding period.

Over the course of the study, cow-calf pairs were monitored for pink eye and elevated horn fly numbers for review of emergency treatment for control.

Determination of inhibition of adult emergence of the horn fly:

On-animal estimates of adult horn fly numbers were taken once per week beginning on Study Day 0 on April 29, 2021 and continuing for 178 days ending on October 23, 2021. This was done by observation of a minimum of 15 animals in each experimental group to estimate the number of horn flies on one side of the animal. Digital photography was used to take pictures of one side of randomly selected cows from each group. Pictures were taken weekly, where the day of the week varied due to logistical, weather, or labor reasons.

Weekly pictures were taken at approximately the same time of day for each group, targeting early morning before the hottest part of the day that may cause the flies to migrate from the back and side to the animal's bellies. The average number of horn flies from the treated groups was compared with the average number of horn flies in the control group at each data point to determine percent control. Environmental conditions of temperature, relative humidity and precipitation were recorded from the Brookdale Farm weather station and Brandon airport weather station.

Pictures were taken as close as possible without zoom to have the side view of a cow taking the full frame view of the picture with the sun to back of the photographer. The ear tag of each cow was recorded and included in the picture file name. Pictures were taken of cows standing still without tail swishing or throwing their heads and were fairly clean of debris on their sides. The number of adult horn flies per cow was determined by grid counting of analyzed pictures.

Animal performance

The animal Body Condition Scores (BCS) were determined for all cows when weighed. The initial weigh day prior to start of calving was taken at the end of March 2021. The weigh day interval for all cows varied according to the end of calving and start of parallel grazing studies on-project weigh days. At Brookdale Farm calving started March 18 through to May 22, 2021, and at Johnson Farm calving started April 17 through to June 18, 2021. The majority of calves were born from mid-April to late May. Calves were weighed within 24 hours of birth then following the same interval as cows.

Calculations and analysis of data

The following equation will be used to calculate percent control for the treated groups at each weekly count.

$$\% \text{ Control } = \left(\frac{\text{Control Av. Adult Fly Counts - Treated Av. Adult Fly Counts}}{\text{Control Av. Adult Fly Counts}}\right) \times 100$$

Results

Warmer air temperature and higher relative humidity are known factors that influence the speed of the horn fly life cycle progression (Brewer et al 2021). Minimal horn fly numbers were noted from April 29th to June 8th, followed by a steady increase to peak numbers from mid-July to early September (Figure 1). Horn fly numbers dwindled in late September to minimal numbers in October (Figure 1). Figure 2 illustrates the daily maximum temperature, daily average relative humidity, and daily average precipitation over the study period. Observations agree with the typical peak of horn flies to be centered around August.

Figure 1: Average number of horn flies per side of animal calculated from weekly pictures of treated and control herds. Economic threshold shown as 100 horn flies per side of animal for beef cattle production.

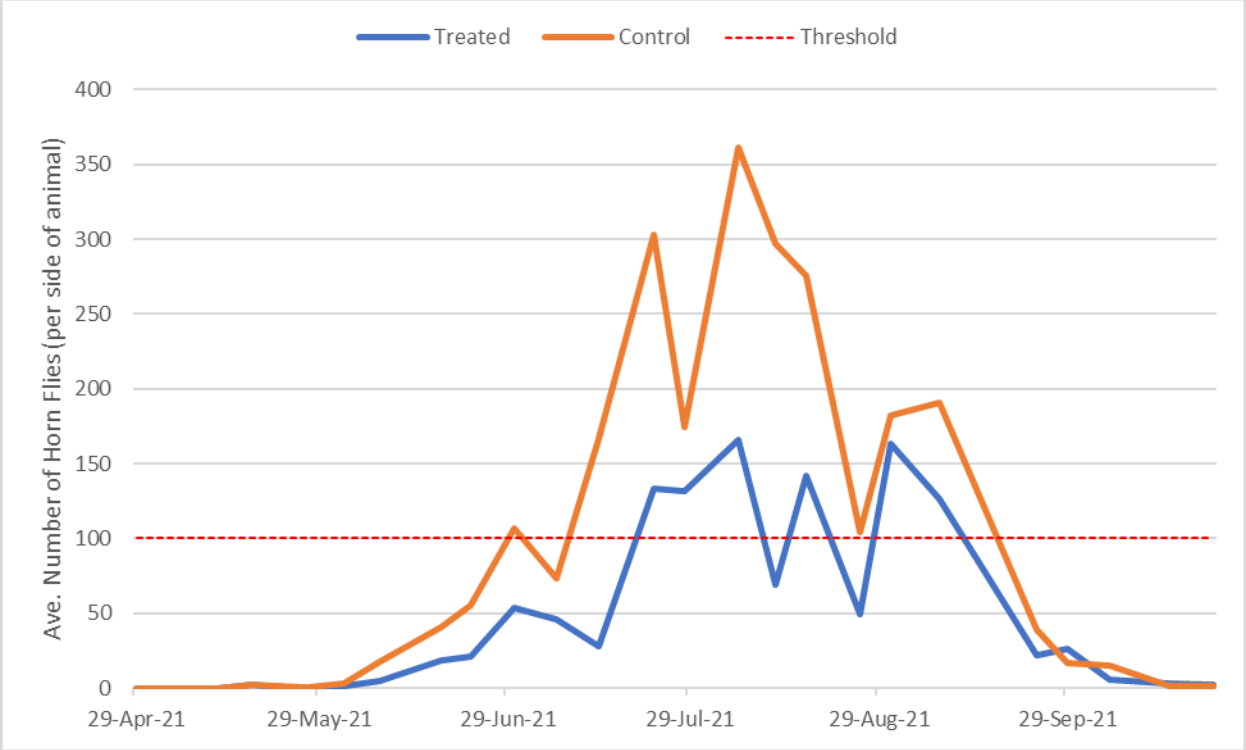
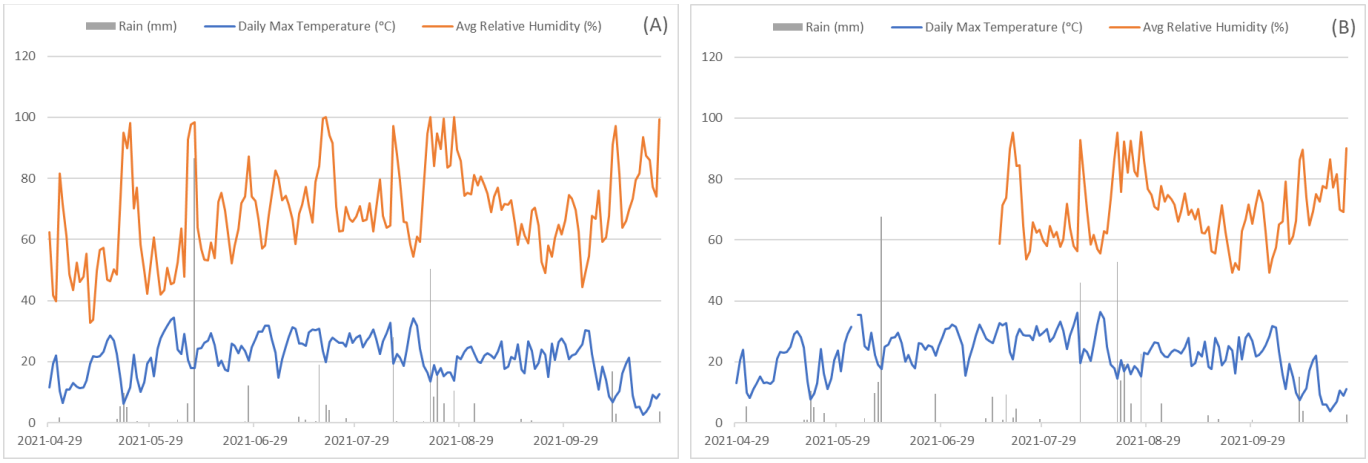


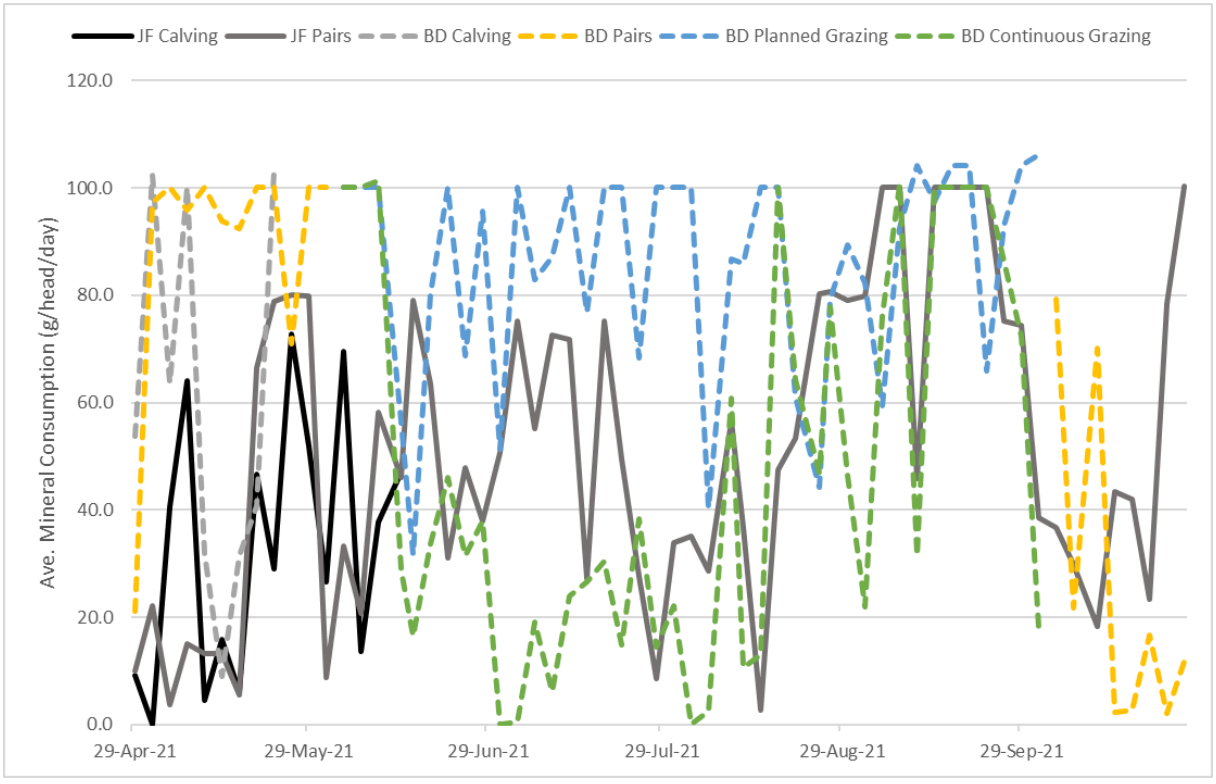
Figure 2: Brookdale Farm (A) and Johnson Farm (B) weather station data April 29th to October 27th, 2021. Daily average rain (mm), maximum temperature (°C), and average relative humidity (%)



Mineral consumption:

Mineral consumption was highly variable across groups and over time from May to October (Figure 3). The most consistent consumption was in the planned grazing group at Brookdale farm with the treated mineral. In cases where lower mineral consumption was observed, salt blocks were switched to loose salt mixed with the mineral to increase overall consumption. Optimal performance of the Altosid® IGR requires consistent consumption of mineral targeting an intake of 100 g / head / day for this product concentration.

Figure 3: Average mineral consumption over three-day intervals. Johnson Farm (JF) control mineral shown in solid lines, and Brookdale Farm (BD) treated mineral shown in dashed lines.



Altosid® IGR control of horn flies

An illustration of horn fly pressure is shown in Figure 4, and examples of cow pictures from the treated and control groups are shown in Figures 5 and 6 respectively. The percent control of the Altosid® IGR treatment ranged from 83% to 10% with an overall average of 53% reduction in horn flies across sampling time points.

The economic threshold of 100 horn flies per side of animal in beef cattle was exceeded on June 30th, and then again on July 14th to September 8th in the control (untreated) Johnson Farm group for 10 weeks (Figure 1, A1). The Altosid® IGR treated group average number of horn flies, while substantially lower than the untreated control, did exceed the economic threshold in six time points over the duration of the study (Figure 1, A1). The reduced and inconsistent mineral consumption of the continuous grazing herd (Figure 3) within the treated group may be a contributing factor to the observed horn fly.

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Figure 4: Illustration of horn fly pressure on cattle, with economic threshold identified at 200 flies per animal for beef cattle production (100 flies per animal for lactating dairy cow) (https://www.altosidigr.com/blog/economic-threshold).

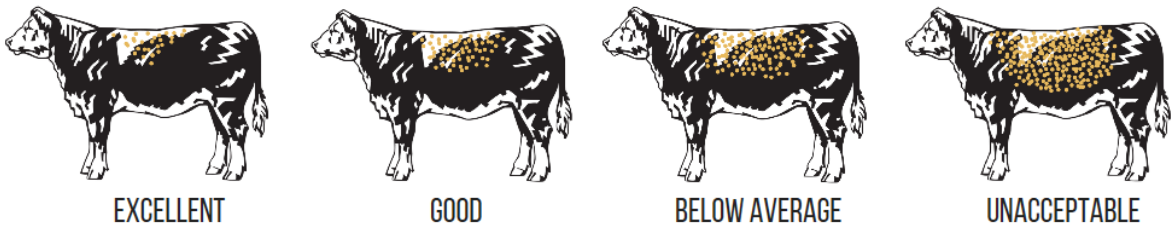

Figure 5: Example picture of cow from weekly sampling of Brookdale Farm Altosid® IGR treated study group.

Figure 6: Example picture of cow from weekly sampling of Johnson Farm control study group.

Animal performance

In both treatment groups the cows gained an average of 0.4 units of body condition, on a scale of 1 to 5, over the grazing season. A direct increase in weaning weight was not observed in the Altosid® IGR treated calves. However, the Altosid® IGR group demonstrated average weaning weight 48% of dam weight vs 40% in the control group (Table 2).

Taking the percentage of dam weight is a phenotypic indicator of production efficiency. The increased productivity may, in part, be due to the Altosid® IGR treatment. However, additional variables outside the scope of this study, including differing forage quantity and quality, confound any direct relationships to be confirmed.

Table 2: Summary of May – November cow-calf production

Treatment	Farm - Livestock	Ave. Starting Weight (lbs)	Ave. End Weight (lbs)	Ave. BCS Change	Weaning Weight % of Dam Weight
Altosid® IGR	Brookdale Farm: 50 Cow-calf	1084	1132	+ 0.4	NA
	Calves	80.3	541	NA	48%
Control	Johnson Farm: 85 Cow-calf	1356	1396	+ 0.4	NA
	Calves	85.2	563	NA	40%

Project Findings

We observed the Altosid® IGR treatment to provide overall beneficial horn fly control under the more challenging environment at Brookdale Farm (e.g., increased standing water) compared to the control at Johnson Farm. Variability in the % control of treatment group may have been due to periods of lower mineral consumption in the continuous grazing treatment group. The constant closer proximity of the mineral feeder in the planned rotational system may have contributed to the more consistent consumption. MBFI will continue to work to tailor the mineral program to reach target free choice intake.

MBFI farm operations has previously used pour on insecticides for general fly control in previous grazing seasons, rotating chemistries for winter lice control. In-season control applications requires additional gathering of the herd and processing through livestock handling facilities. In comparison, Altosid® IGR has no additional labour or logistics in treating livestock due to fly control to be delivered through mineral feed already in use. Depending on the selected pour-over insecticide, the cost per head per application may range between $1.15 to $7.5, where multiple applications may be required during peak horn fly pressure. Assuming a target consumption of 100mg per head per day, the additional cost (2021) of Altosid® IGR Right Now® Mineral Onyx compared to the untreated control Right Now® Mineral Onyx was approximately $8 per head over the grazing season (April to October).

It is important to note that no single method of fly control will result in complete eradication. An effective program keeps horn fly levels to less than 200 flies per animal. There are no restrictions on using other fly control measures in conjunction with Altosid® IGR in cases of extreme fly pressure. Altosid® IGR is a great base for your fly control program and can help reduce fly induced stress on your cattle allowing them a better opportunity to reach their full genetic potential.

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Appendix

A1: Weekly average number of horn flies per animal in treated and control groups (red text indicates exceeded economic threshold of 100 horn flies per side of animal), and % percent control

Date	Treated	Control	% Control
29-Apr-21	0	0	0
5-May-21	0	0	0
12-May-21	0	0	0
18-May-21	3	2	0
27-May-21	0	1	82%
2-Jun-21	1	3	51%
8-Jun-21	5	18	73%
18-Jun-21	18	41	54%
23-Jun-21	21	55	62%
30-Jun-21	53	107	50%
7-Jul-21	46	74	37%
14-Jul-21	28	166	83%
23-Jul-21	133	303	56%
28-Jul-21	132	174	24%
6-Aug-21	166	361	54%
12-Aug-21	69	297	77%
17-Aug-21	142	275	48%
26-Aug-21	50	104	53%
31-Aug-21	164	182	10%
8-Sep-21	127	191	33%
24-Sep-21	22	39	43%
29-Sep-21	26	17	0
6-Oct-21	6	15	61%
16-Oct-21	3	1	0
23-Oct-21	2	1	0