# EFFECTS OF MONENSIN ON INTAKE OF A SELF-LIMITED ENERGY SUPPLEMENT FOR GROWING STEERS GRAZING WINTER WHEAT PASTURE

S.I. Paisley[1] and G.W. Horn[2]

## Story in Brief

A study was conducted to determine the effect of monensin on intake of a self-limited supplement and live weight gain of growing steers grazing winter wheat pasture. Steers were assigned to four winter wheat pastures and stocking density was not altered in the experiment. Steers were given free access to a milo-based self-limited energy supplement that contained 4.0% salt and either 0 or 75 mg monensin/lb (as-fed basis). The addition of monensin decreased daily supplement intake (DM basis) from 5.03 to 1.44 lb/steer. Variation in daily consumption of supplement was also decreased by the addition of monensin, with standard deviations of intake decreasing from 1.28 to .45 lb with the addition of monensin. Daily gains were not affected by supplementation treatment during any of the grazing periods. Monensin limited daily intake of this self-fed energy supplement to levels that approached the targeted 2 to 3 lb/animal. Similar live body weight gains were achieved with much smaller amounts of the monensin-containing supplement as compared with greater amounts of a similar supplement without monensin.

(Key Words: Wheat Pasture, Growing Cattle, Supplementation, Monensin.)

## Introduction

Horn et al. (1990, 1992) and Beck et al. (1993) reported that a self-limited, monensin-containing energy supplement with a targeted level of intake of 2 to 3 lb/head/day increased daily live weight gains of growing cattle on wheat pasture by about .50 lb during each of four wheat pasture years. Profit was increased by $15 to $31/steer depending on feed costs and price structure for the cattle. These increased per-head returns do not include additional profits as a result of decreased death loss due to bloat as a result of feeding the monensin-containing energy supplement. Each 1% decrease in death loss would be worth another $5 to $7/steer depending on cost of the cattle and their time of death. The milo-based supplement used in these trials contained (as-fed basis) 4 to 6% fine mixing salt (usually 4%), 75mg monensin/lb of supplement and 0.75% magnesium oxide. Supplement intake is believed to be limited by

[1]Graduate Assistant [2]Professor

salt, monensin itself, and perhaps magnesium oxide. The objective of this study was to determine the effect of monensin on supplement intake.

## Materials and Methods

***Study Site***. Studies were conducted at the wheat pasture research facility located at Stillwater, OK. The research facility consists of four pastures planted in hard red winter wheat and equipped with automatic waterers and self feeders. Self feeders used in the experiment were designed to measure supplement intakes on an individual animal basis. After comparing actual supplement disappearance with individual visit data obtained from the feeders, it was determined that the individual intake values were inaccurate. Supplement intake data reported in this paper were determined from weekly weigh-back records for each pasture. Cattle were allowed to graze from December 19 until April 12 with large round bales of Bermudagrass hay offered to steers in all four pastures continuously during the initial two months of the trial. Small square bales were hand-fed when snowfall was heavy enough to inhibit grazing. Forage mass available for grazing in each of the four pastures was determined by hand-clipping wheat forage to ground level inside nine 2 $ft^2$ quadrants systematically selected across each pasture (Table 1). Clipping dates were December 19, February 1, March 9, and March 24.

***Cattle***. Forty-four head of spring-born early- and normal-weaned Angus x Hereford crossbred steers were obtained from an OSU beef herd. Steers were initally weighed on December 19 and assigned to one of four pastures resulting in 11 steers per pasture. Steers were reweighed January 17 following an adjustment period to coincide with the beginning of measurement of supplement intake (Table 4). Intermediate weights were recorded March 23, with final weights taken April 14. All weights were recorded after a 14 hour shrink.

***Supplement***. Supplements were milo-based energy supplements containing 4.0% salt (as-fed basis) with or without monensin, fed in meal form (Table 2). The monensin containing supplement was formulated to contain 75 mg of monensin/lb of supplement. Supplements were sampled during sacking as well as each time feed was added to the feeders. Samples were composited across days within each pasture for each batch mix and analyzed for mineral and monensin content.

***Statistics***. Steer weights and daily gains were analyzed as a completely randomized design using the GLM procedure of SAS. Supplement intakes were analyzed as a repeated measures design with week and treatment included

[1]Graduate Assistant [2]Professor

in the model. No week x treatment interactions occurred with intake data. Average treatment intake results are presented across week.

## Results and Discussion

The addition of monensin decreased overall supplement intakes (5.03 vs 1.44 lb/steer/d; P<.001). Supplement intakes also differed across weeks during the trial (P<.01). Supplement intakes for each pasture are presented by week (Table 3 and Figure 1). Increases in intake during the first part of March may be associated with cold, wet weather. Overall, monensin decreased variation in supplement consumption, with intake standard deviations of 1.28 lb for control steers vs 0.45 lb for steers offered the monensin containing supplement. Monensin significantly decreased consumption of the salt-limited supplement for cattle grazing wheat pasture, also decreasing variation in daily consumption.

Main effect least square means for supplementation treatment are presented in Table 4. Intermediate and final live weights of steers were not affected (P>.51) by supplementation treatment. Similarly, daily gains were not affected (P>.19) during any of the grazing periods by supplementation treatment.

In this study, monensin served to limit intake of a self-fed energy supplement for growing cattle grazing winter wheat pasture to levels that approached the target of 2 to 3 lb/animal/day for this supplementation strategy. Similar live body weight gains were achieved with much smaller amounts of the monensin-containing supplement as compared with greater amounts of the same supplement without monensin. While physical resources did not allow a group of unsupplemented cattle to be included, one would expect that supplement conversion, expressed as lb of supplement per lb of increased gain, was also greatly improved by inclusion of monensin in this self-limited supplement.

## Literature Cited

Beck, P.A. et al., 1993. Okla.Agr. Exp. Sta. Res. Rep. P-933:256.
Horn, G.W. et al., 1990.Okla Agr. Exp. Sta. Res. Rep. MP-129:209.
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[1]Graduate Assistant [2]Professor

**Table 1. Wheat forage standing crop and allowance during study**

| Pasture | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Treatment | Control | Monensin | Control | Monensin |
| Steers/pasture | 11 | 11 | 11 | 11 |
| Lb forage/acre | | | | |
| 12/19 | 1709 | 1521 | 1481 | 1525 |
| 2/1 | 1821 | 1681 | 1797 | 1737 |
| 3/9 | 2104 | 2507 | 2324 | 2839 |
| 3/24 | 2667 | 2452 | 2456 | 2715 |
| Lb forage/steer | | | | |
| 12/19 | 3433 | 3056 | 2976 | 3064 |
| 2/1 | 3658 | 3377 | 3610 | 3490 |
| 3/9 | 4228 | 5038 | 4669 | 5704 |
| 3/24 | 5359 | 4925 | 4933 | 5455 |

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**Table 2. Feedstuff and nutrient content of energy supplements (DM basis).**

| Ingredient | |
|---|---|
| Milo, ground, % | 62.3 |
| Wheat middlings, % | 21.1 |
| Molasses, sugarcane, % | 4.1 |
| Limestone (38%), % | 4.5 |
| Dicalcium phosphate, % | 2.8 |
| Fine mixing salt, % | 4.4 |
| BayMag (magnesium oxide), % | 0.8 |
| Rumensin 80 Premix | (851 grams/ton)[a] |
| Calculated nutrient content | |
| Dry matter, % | 88.7 |
| NEm, Mcal/cwt | 69.1 |
| NEg, Mcal/cwt | 42.7 |
| Crude protein, % | 10.3 |
| Calcium, % | 2.5 |
| Phosphorus, % | 1.0 |
| Magnesium, % | .7 |

[a] To result in monensin concentration of 75 mg/lb of supplement.

[1]Graduate Assistant [2]Professor

**Table 3. Average supplement DM intake of steers offered a self-limited energy supplement with or without monensin**

| Week | Pasture 1 Control | Pasture 2 Monensin | Pasture 3 Control | Pasture 4 Monensin |
|---|---|---|---|---|
| Jan 17-Jan 25 | 5.09 | 1.69 | 4.28 | 2.59 |
| Jan 25-Feb 1 | 4.65 | 1.46 | 5.85 | 2.40 |
| Feb 1-Feb 8 | 4.59 | 1.20 | 5.44 | 1.62 |
| Feb 8- Feb 15 | 3.83 | 1.24 | 5.34 | 1.06 |
| Feb 15- Feb 23 | 3.15 | 1.20 | 6.32 | 1.50 |
| Feb 23- Mar 1 | 3.35 | .87 | 4.81 | 1.06 |
| Mar 1- Mar 8 | 7.70 | 2.13 | 6.38 | 1.78 |
| Mar 8- Mar 15 | 7.20 | 1.68 | 6.49 | 1.63 |
| Mar 15- Mar 22 | 5.93 | 1.41 | 6.35 | 1.49 |
| Mar 22- Mar 29 | 3.13 | 1.14 | 3.85 | 1.13 |
| Mar 29- Apr 5 | 3.74 | 1.16 | 4.60 | 1.24 |
| Apr 5- Apr 12 | 4.28 | .96 | 4.47 | .94 |
| Avg intake | 4.72 | 1.34 | 5.35 | 1.54 |
| Std dev | 1.52 | .35 | .93 | .52 |

[1]Graduate Assistant [2]Professor

**Table 4. Performance of steers fed a self-limited energy supplement with or without monensin.**

| Item | Control | Monensin | SE[a] | P<[b] |
|---|---|---|---|---|
| No. of steers | 22 | 22 | | |
| Steer wt, lb | | | | |
| Initial wt | 608 | 599 | 9.5 | .51 |
| Wt. 3/23 | 787 | 783 | 11.1 | .80 |
| Final wt (lb) | 868 | 869 | 11.7 | .96 |
| Daily gains, lb/steer | | | | |
| 1st period | 2.76 | 2.84 | .067 | .43 |
| 2nd period | 3.68 | 3.90 | .118 | .19 |
| Overall | 2.99 | 3.10 | .066 | .24 |

[a] Standard error of least square means.
[b] Overall level of significance.

[1]Graduate Assistant [2]Professor

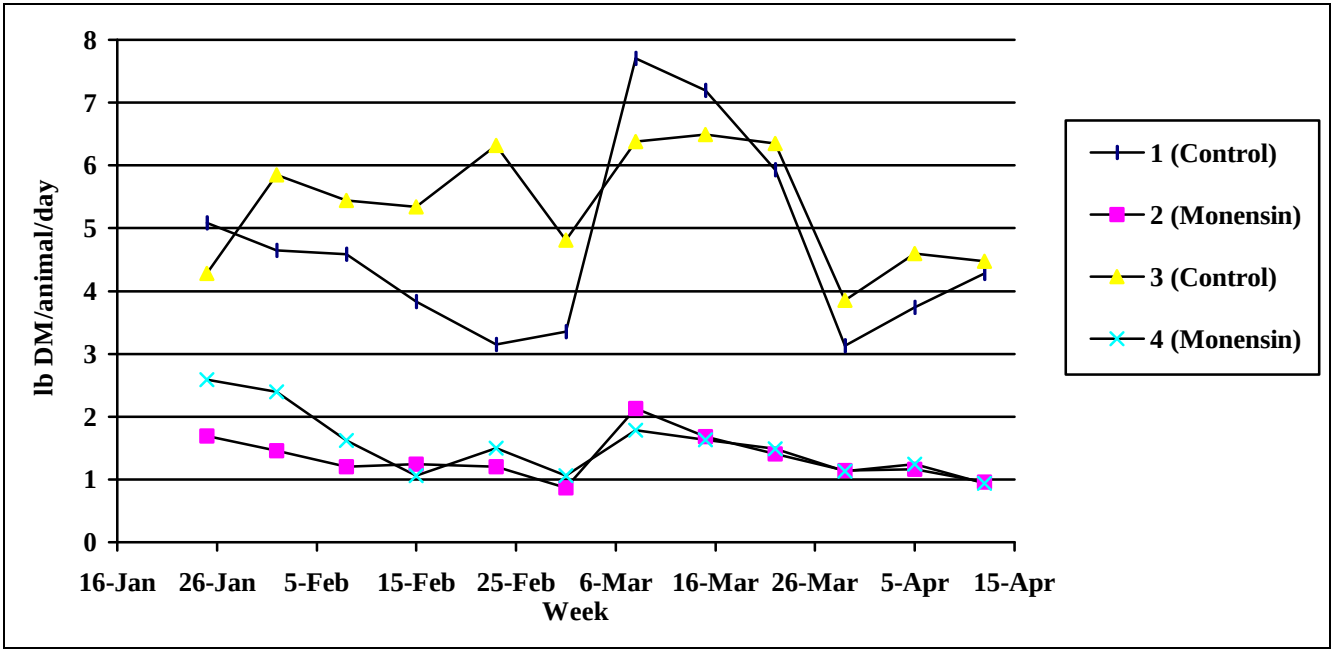


**Figure 1. Weekly supplement DM intakes of steers offered a self-limited energy supplement with or without monensin while grazing wheat pasture.**