

**THE EFFECT OF SARSAPONIN
WITH AND WITHOUT RUMENSIN
IN HIGH-ENERGY RATIONS
S.R. Goodall and j.K. Matsushima¹**

SUMMARY

Feeding sarsaponin and Rumensin together in a 105-day feeding trial improved feed efficiency more than feeding sarsaponin or Rumensin alone. Also, gains were improved slightly.

INTRODUCTION

Previous research conducted at the Colorado State University Experiment Station has shown that sarsaponin (steroid-saponin) will improve both rate of gain and feed efficiency in feedlot cattle (Goodall and Matsushima, 1978). However, cattle used in the previous study did not receive anabolic steroids or any other feed additives (i.e. Rumensin and/or antibiotics).

OBJECTIVES

Since anabolic agents and Rumensin commonly are used by the U.S. cattle feeding industry, a feedlot study was designed to determine the effects of sarsaponin when used in conjunction with Rumensin and Synovex.

PROCEDURE

One hundred eighty yearling steers purchased through two auction sales with an average weight of 715 pounds were allotted by breed, source and weight to four treatments as follows: control; 40 parts per million sarsaponin²; 30 grams per ton Rumensin; and 40 parts per million sarsaponin plus 30 grams per ton Rumensin. Each treatment included three pen-replications with fifteen head per pen. All cattle were implanted with Synovex-S immediately prior to the start of the experiment, increased to a 90 percent concentrate ration in 28 days, fed for 105 days and slaughtered.

¹Graduate Research Assistant, Department of Animal Sciences, Colorado State University, Fort Collins, Colo.; Professor, Department of Animal Sciences, Colorado State University, Fort Collins, Colo., respectively.

²Expressed on an active ingredient basis.

Live weights were taken at the beginning, during the trial (approximately six weeks on feed), and at the end of the trial. Composition of the average daily ration consumed during the experiment by treatment is given in table 1.

The data were analyzed by standard analysis of variance techniques, and individual treatment means were compared by Duncan's Multiple Range procedures (Duncan, 1955).

RESULTS

Average daily gain, average daily feed consumption, feed efficiency and carcass data are presented by treatments in table 1.

Although there were no significant differences in average daily gain ($P > .05$), the sarsaponin plus Rumensin treatment did have a 5.4 percent greater mean average daily gain than the controls (3.29 versus 3.12 pounds per day) and was 4.3 percent higher than either the sarsaponin or Rumensin treatments alone (3.29 versus 3.15 and 3.15 pounds per day, respectively). Highly significant breed ($P < .01$) and source ($P < .001$) effects accounted for most of the variation and probably obscured statistically significant differences for average daily gain. A treatment x source interaction ($P < .07$) was also observed with average daily gain.

Mean feed consumption for the experiment was not different ($P > .05$) and treatment means were: 22.8, 22.8, 22.0 and 22.1 pounds per head per day for the control, sarsaponin, Rumensin and sarsaponin plus Rumensin treatments, respectively. Animals assigned to both of the Rumensin treatments consumed approximately 3.1 percent less feed than either the controls or the animals fed sarsaponin.

Feed efficiency was improved ($P < .05$) by sarsaponin plus Rumensin when compared to either the control or sarsaponin treatments alone but not when compared to Rumensin alone. The mean feed efficiency ratios expressed as (feed/cwt. gain) were as follows: 731, 723, 697 and 673, respectively, for the control, sarsaponin, Rumensin and sarsaponin plus Rumensin treatments. Feeding sarsaponin plus Rumensin resulted in a savings of 58 pounds of air dry feed over

Table 1. Feedlot Performance and Carcass Data of Sarsaponin-Rumensin Cattle

TREATMENT	Control	Sarsaponin 40 ppm	Rumensin 30 g/ton	Sarsaponin + Rumensin 40 ppm + 30 g/ton
No. Steers	45.00	45.00	45.00	45.00
Initial Weight, lbs.	715.00	716.00	716.00	714.00
Final Weight, lbs.	1033.00	1038.00	1038.00	1049.00
Total Gain, lbs.	318.00	322.00	322.00	335.00
Average Daily Gain, lbs.	3.12 ^a	3.15 ^a	3.15 ^a	3.29 ^a
Avg. Daily Ration, Air Dry Basis, lbs.				
Flaked Corn	16.10	16.10	15.30	15.40
Beet Pulp	2.00	2.00	2.00	2.00
Protein Supplement	0.70	0.70	0.70	0.70
Corn Silage	3.00	3.00	3.00	3.00
Alfalfa Hay	1.00	1.00	1.00	1.00
Total Air Dry Feed	22.80 ^a	22.80 ^a	22.00 ^a	22.10 ^a
Feed/Cwt. Gain, lbs.(Entire feeding period)	731.00 ^a	723.00 ^a	697.00 ^{ab}	673.00 ^b
Dressing % ¹	64.30	64.10 ^b	64.10	63.90 ^b
Liver Abscesses, %	35.60 ^a	24.40 ^b	35.60 ^a	22.20 ^b
Marbling Score	5.90	5.30	5.40	5.80
Fat Thickness, In.	0.51	0.53	0.52	0.52
Ribeye Area, Sq. In.	13.50	13.40	13.50	13.30
USDA Yield Grade	2.20	2.30	2.20	2.30
% Cutability	51.80	51.60	51.80	51.60

a,b Means with different superscripts differ significantly (P<.05).

¹Hot carcass weight divided by final live weight.

25=small degree marbling; 6=modest degree.

the controls for each 100 pounds of live weight gained and a 24 pound savings over Rumensin alone.

Feedlot performance data for the first six and the last nine weeks of the trial are given in table 2. Animal performance for the first six weeks indicates a general lack of positive response to any of the treatments imposed when compared to controls, except for feed consumption, which was highest ($P < .05$) for the sarsaponin cattle (22.0 pounds per day) versus 21.37, 21.83 and 20.63 pounds per day for the control, Rumensin and sarsaponin plus Rumensin cattle, respectively.

By contrast, feedlot performance data for the last nine weeks indicates a significant improvement in both average daily gain and feed efficiency for all treatments versus controls; the combination of sarsaponin plus Rumensin was the best. Feed consumption was highest for the control cattle ($P < .05$), intermediate for the two sarsaponin treatments and lowest for the Rumensin ($P < .05$) fed cattle.

Carcass measurements were similar for dressing percentage, marbling score, fat thickness, ribeye area and percent cutability for all of the treatments. However, significant decrease occurred in the incidence of liver abscesses for both the sarsaponin and sarsaponin plus Rumensin treatments versus the control and Rumensin treatments (24.4 and 22.2 percent versus 35.6 and 35.6 percent, respectively). This response was obtained in the absence of supplementary antibiotics.

RESULTS AND DISCUSSION

Feeding sarsaponin plus Rumensin together resulted in the best overall performance in this feedlot test better than the predicted additive effects of sarsaponin or Rumensin. This suggests the possibility of a synergism existing between these two feed additives.

Considerable animal variation arising from breed and source effects may have obscured any statistical differences in performance or carcass data. A general lack of response to any of the treatments imposed when compared to controls during the first six weeks suggests that this period perhaps was

Table 2. Feedlot Performance of Sarsaponin-Rumensin Cattle (First 6 Weeks Versus Last 9 Weeks).

TREATMENT	Control	Sarsaponin 40 ppm	Rumensin 30 g/ton	Sarsaponin + Rumensin 40 ppm + 30 g/ton
No. Steers	45.00	45.00	45.00	45.00
First Six Weeks: ADG, lbs.	3.52 ^a	3.33 ^a	3.32 ^a	3.46 ^a
Total Air Dry Consumption, lbs. (head/day)	21.37 ^a	22.00 ^b	21.83 ^{abc}	20.63 ^c
Feed/Cwt. Gain	607.00 ^a	660.00 ^a	658.00 ^a	596.00 ^a
Last Nine Weeks: ADG, lbs.	2.83 ^a	3.04 ^b	3.04 ^b	3.17 ^c
Total Air Dry Consumption, lbs. (head/day)	23.78 ^a	23.37 ^{ac}	21.90 ^b	23.00 ^c
Feed/Cwt. Gain	840.00 ^a	769.00 ^b	721.00 ^{bc}	725.00 ^c

a, b, c Means with different superscripts differ significantly (P<.05).

necessary to equalize previous nutritional, environment and compositional effects in the cattle used in this experiment.

During the last nine weeks favorable responses to the Rumensin and sarsaponin treatments were obtained, but due to the shortness of the entire feeding period (105 days), this perhaps was not long enough to offset the unfavorable responses during the first six weeks on feed.

Even so, the following significant results were obtained in this experiment:

- (1) Sarsaponin plus Rumensin improved feed efficiency ($P < .05$) to a greater extent than either sarsaponin or Rumensin alone;
- (2) Sarsaponin fed cattle consumed more feed ($P < .05$) during the first six weeks of the trial than any other treatment, while the sarsaponin plus Rumensin cattle consumed the least ($P < .05$);
- (3) During the last nine weeks of the trial there were significant improvements in average daily gain and feed efficiency for all treatments compared to controls;
- (4) Liver abscess incidence was lower ($P < .05$) for both sarsaponin treatments.

LIST OF REFERENCES

- Duncan, D. B. 1955. Multiple Range and Multiple Biometrics II:1-42.
- Goodall, S. R. and J. K. Matsushima. 1978. Sarsaponin in Beef Cattle Rations. Beef Nutrition Research. General Series 979, Colorado State University Experiment Station. pp. 9-10.