

EFFECT OF SARSAPONIN ON IN SITU DIGESTION OF A COMPLETE DAIRY RATION

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Story in Brief

Disappearance of nitrogen (N), organic matter (OM) and acid detergent fiber (ADF) of a grain supplement (Gr), hay, soybean meal (SBM), and a complete dairy ration with sarsaponin (S) and without sarsaponin (NS) was measured *in situ*. Two rumen cannulated animals, in a cross-over design, were fed a complete ration of concentrate:silage (55:45) three times a day. The total ration had 15.5% crude protein and sarsaponin was added at a level of 70 g/ton of air-dry feed. Disappearance of OM, N, and ADF was greater for SBM than for all other substrates. ADF disappearance from grain was greater than from S and NS and disappearance from S tended to be lower than from the NS ration. N disappearance was not significantly different for Gr, hay, S and NS. OM disappearance from S was less than from NS and hay.

[Key Words: In situ digestion, Sarsaponin, Dry matter disappearance, Rumen.]

Introduction

Goodall (1980) reported that sarsaponin caused a reduction of passage of liquids and solids from the rumen and the total digestive tract. Zinn and Owens (1980) reported that 10 to 20 % of the starch of high grain feedlot diets were excreted in the feces. The reduction of this nutrient loss, by slowing the rate of passage, could result in an improvement in animal performance when using mixed diets by improving both starch and fiber digestion.

Peekstok (1979) observed a stimulating effect of sarsaponin on anaerobic fermentation in biological waste treatment systems. The enhancement of anaerobic fermentation in ruminal digestion of starch and fiber could have an effect on fermentation patterns. Goodall (1980) observed that total digestive tract nutrient digestibility tended to be roughly 6 % higher as a result of supplementing rations with 100 ppm of sarsaponin. Particulate and liquid flow rates to the abomasum averaged 15.6 and 17.0 % lower for diets containing 100 ppm of sarsaponin.

The objective of this study was to evaluate the *in situ* rate of disappearance of different components of a protein supplement, roughage, grain, and a complete ration with and without sarsaponin.

Materials and Methods

Two rumen-cannulated animals, one large framed Angus steer and a Hereford heifer, were fed a complete ration suitable for lactating dairy cows. It contained 15.5% crude protein (CP), and consisted of concentrate:silage (55:45, dry basis) fed three times a day (1100, 1900

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and 0300 hours). A cross-over design that involved two 12-day periods was used. Ration treatments were: (1) 70 g of sarsaponin/ton of air-dry feed and (2) no sarsaponin (control). The initial eight days of each period were used for adjustment, and during the following 72 hr different substrates were incubated in situ in dacron bags (5 x 10 cm) with a pore size of 55 microns. Substrates were a complete ration with 70 g sarsaponin/ton of air-dry feed (S) and the same ration with no sarsaponin (NS), a roughage source (hay), SBM and a basal grain. The latter three were the ingredients of the complete ration. These were attached to a 50 cm string with a weight at the end so that they would stay submerged in the ventral part of the rumen in order to have a complete and uniform exposure to microbial action. Measurements of rate of digestion were made for different incubation times (4, 8, 12, and 72 hr) during each period. After incubation, the bags were washed, dried for 72 hr at 55 °C and later analyzed for dry matter (DM), organic matter, nitrogen, and acid detergent fiber.

Results and Discussion

Whether the animals were fed the ration with sarsaponin or the one without sarsaponin had no significant effect on the rate of disappearance of the substrates from dacron bags during incubation. Therefore, values for each treatment obtained from the two animals were averaged without regard to the ration fed.

Rate of disappearance of ADF, N and OM were greater for SBM than for all other substrates (Table 1). ADF disappearance for S tended to be lower than from NS, whereas ADF disappearance from the grain supplement was higher than from S and NS substrates. This is in contrast to results of Goetsch and Owens (1984) who observed greater ADF digestibilities for rations supplemented with 60 g sarsaponin/ton of ration. Also, Zinn et al. (1983) reported small increases in ADF digestion due to sarsaponin supplementation.

Rate of disappearance of N tended to be greater for the substrate without sarsaponin as compared to grain, hay and S. In contrast, Goetsch and Owens (1984) reported that ruminal N digestion tended to be greater for cows fed 60 g/ton of sarsaponin. On the other hand, Zinn et al. (1983) observed that duodenal flow of feed N increased when sarsa-

Table 1. Rate of disappearance for nitrogen, organic matter and acid detergent fiber.

Substrates	N	OM	ADF
Soybean meal	2.53 ^a	2.60 ^a	2.44 ^a
Hay	0.40 ^b	0.50 ^d	0.45 ^c
No Sarsaponin	1.00 ^b	0.80 ^c	0.34 ^c
Sarsaponin (S)	0.54 ^b	0.60 ^d	0.12 ^c
Grain	0.75 ^b	1.20 ^b	0.72 ^b

abcd. Means in a column with different superscripts are different (P<.05).

ponin was supplemented to high concentrate, high protein diets. Organic matter disappearance from S and hay was lower than from NS and grain ($P < .05$). Less nitrogen and organic matter of rations supplemented with 60 g/ton of sarsaponin may be degraded in the rumen and by-passed to the small intestine. More research is required to explain the conflicting results from this and other trials.

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