EFFECT OF YEAST CULTURE AND AMAFERM® ON RUMINAL CHARACTERISTICS AND NUTRIENT DIGESTIBILITY

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AMAFERM, alone or in combination with yeast culture, improved total tract digestibility of dry matter, crude protein and hemicellulose. The fungal treatments also increased total numbers and percentage of cellulolytic bacteria in the rumen.

SUMMARY

DOSE OF AMAFERM USED
2.63g per head, per day

All combinations of treatments increased the number and percentage of cellulolytic bacteria – although treatments with AMAFERM showed a numerically higher improvement in the percentage cellulolytic bacteria over yeast culture alone. These changes in the rumen microbial population resulted in improved dry matter, crude protein and hemicellulose digestibility when compared with the control. The best treatment for digestibility of nutrients was the AMAFERM + yeast culture treatment. There may be an additive effect of the yeast culture when AMAFERM is added, although the differences over yeast culture or AMAFERM alone were not significant. When cereal grains were fed to increase the energy density of cattle diets, feeding yeast culture and AMAFERM helped minimize the negative associative effects of structural carbohydrates in digestion.

VALUE

Feeding AMAFERM increased total tract digestibility of dry matter, crude protein and hemicellulose. This was accomplished by the increased number and proportion of cellulolytic bacteria in the rumen.

PROTOCOL

Type of Animals/Experimental Units

- Non-pregnant, non-lactating Holstein cows fitted with rumen fistulas

Number of Animals/Experimental Units

- 4 head

Trial Design

- 4 X 4 Latin Square design.
  Each period consisted of a 14-day adaptation period and an 8-day collection period

Treatments

- Control
- Control + 90 g/d yeast culture
- Control + AMAFERM
- Control + AMAFERM + 90 g/d of yeast culture

Diet Information (General)

- A 50% concentrate diet of alfalfa hay, barley, beet pulp with molasses, barely straw, wheat bran, vitamins and minerals (13% CP, 2.4 mcal/kg ME). Diets were identical in nutrient composition except for the addition of AMAFERM and/or yeast extract

Data Collection

- Rumen kinetics and fermentation characteristics, bacterial response and total tract nutrient digestibility

DISCUSSION OF RESULTS

- Ruminal volume, liquid dilution rate, particulate rate of passage and liquid outflow rates were not affected by treatments
- Ruminal pH, VFA, and NH3N were unaffected by treatments (data not shown).
- AMAFERM or the yeast culture tended to increase viable bacteria numbers. Cellulolytic bacteria numbers were increased by nearly 40% ($P < 0.05$), and the percentage of cellulolytic bacteria increased by 27% ($P < 0.05$) (Table 1)
- Digestibility of dry matter (DM) was increased by 4.2% with AMAFERM ($P < 0.05$)
- Digestibility of crude protein (CP) increased ($P < 0.01$) with either the yeast culture or AMAFERM – with the AMAFERM + yeast culture supplement resulting in the largest increase

DISCUSSION OF RESULTS (CONTINUED)

- Hemicellulose (HC) digestibility was increased 6.5% with either the yeast culture or AMAFERM ($P < 0.05$) (Table 2)
- Increased digestibility of structural carbohydrates was concurrent with the increased number and proportion of cellulolytic organisms, as well as a tendency toward reduced particulate and liquid passage rates

Table 1
Effect of treatments on ruminal bacteria.

Bacteria	Basal	Basal + YC	Basal + YC/AO	Basal + AO	SEM
Total Viable, x 10^8/ml	196.2	255.0	257.3	223.5	16.5
Cellulolytic, x 10^8/ml	25.0[a]	39.8[b]	45.6[b]	39.1[b]	3.8
% Cellulolytic	12.9[a]	15.4[ab]	18.0[b]	17.5[b]	0.9

[a, b] Means in the same row with different superscripts differ ($P < 0.05$)

Table 2
Effect of treatments on total tract nutrient digestibility.

Nutrient	Basal	Basal + YC	Basal + YC/AO	Basal + AO	SEM
Dry Matter	77.0[a]	79.1[ab]	81.0[b]	79.8[b]	0.62
Crude Protein	79.5[c]	82.2[de]	84.4[e]	81.6[d]	0.63
Acid Detergent Fiber	69.3	70.0	72.6	71.0	0.89
Hemicellulose	76.3[a]	80.5[b]	83.5[b]	80.8[b]	1.03

[a, b] Means in the same row with different superscripts differ ($P < 0.05$)
[c, d, e] Means in the same row with different superscripts differ ($P < 0.01$)

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