EFFECT OF AMAFERM® ON RUMEN AND TOTAL TRACT DIGESTIBILITY

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Cows fed AMAFERM had increased ruminal and total tract digestibility of nutrients, plus efficiency of microbial protein production.

SUMMARY

DOSE OF AMAFERM USED
3g per head, per day

The addition of AMAFERM improved ruminal digestibility of nutrients, especially NDF and ADF. It also had positive responses in total tract digestibility of dry matter and NDF. Trial 1 showed a response in the efficiency of microbial yields. Individual feedstuffs appear to respond differently to AMAFERM – with milo, alfalfa hay and wheat straw all showing increased in vitro digestibility of dry matter. However, the improvement in the forages was much greater than in the milo grain.

VALUE

The addition of AMAFERM improved ruminal digestibility of nutrients, especially NDF and ADF, and the increase in digestibility of in vitro dry matter was much greater in forage than in milo grain.

PROTOCOL

Trial 1

Type of Animals/Experimental Units

- Holstein cows

Number of Animals/Experimental Units

- 4 head

Trial Design

- 2 X 2 factorial in Latin Square

PROTOCOL (CONTINUED)

Treatments

- Low forage, Control
- High forage, Control
- Low forage, AMAFERM
- High forage, AMAFERM

Diet Information

- Concentrate-to-Forage ratios were 2:1 (high) and 1:2 (low)
- Alfalfa hay and cubes, cottonseed hulls, whole cottonseed, cottonseed and soybean meal, milo, molasses, and mineral/vitamin mix
- CP = 16%, NEl = 1.3-1.7 mcal/kg

Trial 2

Type of Animals/Experimental Units

- Holstein cows

Number of Animals/Experimental Units

- 6 head

Trial Design

- Replicated 3 X 3 factorial in Latin Square

Treatments

- Control
- AMAFERM
- Saccharomyces Cerevisiae

Diet Information

- 70:30 Concentrate:Forage

Trial 3

Type of Animals/Experimental Units

- Holstein cows

Number of Animals/Experimental Units

- 4 head

Trial Design

- Crossover

Treatments

- Control
- AMAFERM

PROTOCOL (CONTINUED)

Diet Information

- 61:39 Concentrate:Forage

Data Collection

- Feed intake, total tract digestibility, rumen digestibility, microbial yields, rumen fermentation (Trial 1 only), passage rates and potentially digestible dry matter (Trial 3 only)

DISCUSSION OF RESULTS

Overall

- Dry matter intakes differed greatly both within and between trials
- Total tract digestibility showed only small differences
- Ruminal digestibility showed much variability

Trial 1

- There was a concentrate effect, as ADF and NDF total tract digestibility improved significantly ($P < 0.05$) on the low forage diet (ADF: 13% improvement; NDF: 9% improvement)
- No significant differences in DM, NDF, or ADF digestibility in the rumen were detected, but AMAFERM numerically increased ADF digestibilities by 20%
- There was an increase in the efficiency of microbial yield ($P < 0.05$) for the AMAFERM treatment (Table 2)
- Ruminal contents were not affected by treatment for pH, total VFA, or individual VFA
- Ruminal ammonia was high for all treatments, but variation was too high to detect significant effects (data not shown)

Trial 2

- Saccharomyces Cerevisiae and AMAFERM treatments increased CP, NDF, and ADF digestibilities ($P < 0.05$) despite relatively small differences (Table 1)
- AMAFERM increased NDF digestibility ($P < 0.05$) and numerically increased ADF digestibility

Trial 3

- Cows receiving AMAFERM ate significantly more dry matter than control cows
- NDF and ADF digestibility were significantly improved in cows receiving AMAFERM

DISCUSSION OF RESULTS (CONTINUED)

- There was a 36% advantage in NDF digestibility, and 41% in ADF digestibility with AMAFERM
- No differences were seen for rates of passage in corn or alfalfa in Trial 3 (data not shown)
- Potentially digested dry matter was similar for the control and AMAFERM treatment for milo and wheat straw, but was increased ($P < 0.05$) with AMAFERM for alfalfa hay (data not shown)
- The control had a lower extent of digestion ($P < 0.01$) for milo, alfalfa hay, and wheat straw dry matter, than with treatments where AMAFERM was added to rumen inocula from control cows, or where rumen inocula was taken from cows fed AMAFERM. The response was greater with forages than milo grain (Table 3)

Table 1 Summary of 3 Trials: Effect of AMAFERM on Feed Intake and Total Tract Digestibility of Nutrients.

	DM Intake	DM	OM	CP	NDF	ADF
	Kg/d	Digestion Coefficient (%)				
Trial 1[1]						
Low Forage, Control	10.9	72.6	74.6	67.9	50.2	34.1
Low Forage, AMAFERM	12.6	72.4	74.2	69.9	54.8	38.5
High Forage, Control	11.5	67.8	74.7	74.4	66.8	52.1
High Forage, AMAFERM	9.4	71.2	72.9	73.5	67.3	51.9
SEM	3.3	4.3	1.5	5.6	1.3	1.1
Trial 2[2]						
Control	16.1	66.1	67.1	69.5	47.5	18.0
Saccharomyces Cerevisiae (SC)	16.7	66.8	69.5	72.3	51.3	32.2
SEM	17.0	66.7	69.2	71.8	50.2	32.8
AMAFERM	0.7	1.3	0.9	0.8	1.6	5.6
Trial 3						
Control	23.6[a]	63.8[a]	66.0	74.1	39.6[a]	21.3[a]
AMAFERM	26.2[b]	67.9[b]	69.3	76.1	47.0[b]	30.0[b]

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

[1] Concentrate effect significant ($P < 0.01$) for ADF and NDF, also interaction effect significant ($P < 0.05$) for ADF and NDF

[2] Orthogonal contrasts Control vs SC and AMAFERM significant ($P < 0.05$) for CP, NDF, and ADF digestion coefficients, SC vs. AMAFERM did not differ ($P > 0.25$)

Table 2
Summary of 3 Trials: Effect of AMAFERM on Rumen Digestibility of DM, NDF, and ADF; Truly Fermentable Organic Matter (TFOM); and Efficiency of Microbial Yields (Yom, g microbial protein/g TFOM).

	DM	NDF	ADF	TFOM	Yom
	(%)				
Trial 1[1]					
Low Forage, Control	48.5	43.1	30.4	64.3	0.183
Low Forage, AMAFERM	45.1	44.6	36.2	67.8	0.206
High Forage, Control	63.9	66.2	47.5	79.6	0.134
High Forage, AMAFERM	62.5	67.3	45.7	83.4	0.195
SEM	8.1	9.3	9.7	7.8	0.010
Trial 2[2]					
Control	26.1	40.9	16.4	58.0	0.192
Saccharomyces Cerevisiae (SC)	37.7	53.1	29.3	54.7	0.197
AMAFERM	42.8	56.6	30.8	58.9	0.188
SEM	5.7	4.2	11.3	8.9	0.020
Trial 3					
Control	25.2	27.7[a]	19.5[a]	53.0	0.171
AMAFERM	26.9	37.6[b]	27.4[b]	53.7	0.181
SEM	2.1	3.4	1.6	3.5	0.010

[a,b] Means within the same column with different superscripts are different ($P < 0.05$)

[1] For Yom, Control < AMAFERM ($P < 0.05$)

[2] Orthogonal contrasts Control vs SC and AMAFERM significant ($P < 0.05$), SC vs. AMAFERM did not differ ($P > 0.25$)

Table 3
Effect of AMAFERM on in vitro digestibility of dry matter (DM) of different Feedstuffs[1,2]

	Treatment		
	Control	Control + AMAFERM	AMAFERM
	Dry Matter Digestibility		
Milo	84.6	91.1	91.0
Alfalfa hay	50.4	61.8	59.4
Wheat straw	49.6	65.8	66.8

[1] Orthogonal comparison of Control vs. Control + AMAFERM (added inocula) and AMAFERM (fed) was significant ($P < 0.01$), but Control + AMAFERM vs. AMAFERM was not ($P > 0.50$)

[2] Four cows/treatment in Trial 3

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