THE EFFECT OF A-MAX CONCENTRATE LEVEL ON MICROBIAL METABOLISM IN CONTINUOUS CULTURE OF RUMEN CONTENTS.

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Introduction: A-MAX™ Concentrate has shown to be efficacious in enhancing rumen metabolism and milk production in lactating-cow studies. It can provide maximum benefit to the animal if fed at the optimal dose.

Objective: To do a dose response of A-MAX Concentrate on nutrient digestion and microbial metabolism of rumen microbes in continuous culture.

Materials and Methods: A lactating-cow ration is formulated to support 90 lbs. of milk and fed to a continuous culture with the following conditions: liquid dilution rate: 12%, solids retention time: 22 h, feed intake: 100 g DM/d, feeding frequency: twice daily and fermentation time: 39°C. The treatments were control ration alone and the control ration with the equivalent of A-MAX Concentrate fed at 2, 4, 8, and 16 oz/h/d. The data were subjected to Duncan's multiple range test to evaluate treatment effects.

Results: There were no significant linear or cubic effects associated with dose responding A-MAX. However, there were quadratic effects for NDF and ADF digestibility maximizing at 4 oz/h/d. Volatile fatty acid concentration also showed no linear or cubic effects; however, acetic was maximized at the 4 oz/h/d level and minimized at the 16 oz level. AP ratio tended to be highest at the 4 oz and acetic (mmoles/d) at the 8 oz level of supplementation. Mean pH was not influenced by supplementation; however, pH at 4 and 6 h post-feeding was influenced qua-dratically by dose. There was a significant quadratic effect for non-ammonia-N, maximizing at 2 oz/h/d and the tendency for ammonia N to maximize at 8 oz/h/d. There was a numerical ten-dency for microbial nitrogen to be highest at the 4 oz/h/d feeding rate. However, it was clearly shown that the 8 oz and 16 oz levels reduced microbial nitrogen yield/d. Microbial efficiencies also decreased with increased levels beyond 8 oz/d; however, there was a tendency for 2 oz for the highest efficiency of microbial nitrogen/kg DM.

Conclusion: These data would suggest that the 2 to 4 oz/cow/d level of A-MAX Concentrate supplementation is optimal for many microbial metabolism responses in continuous culture. Levels above 4 oz/cow/day, in most cases, were not beneficial and may not be warranted in regard to enhancing microbial metabolism in the rumen.

Results Tables:

Table 1. Effects of Treatments on Nutrient Digestion Coefficients.						
	Diets					Yeast Effects
	Yeast Level/h/d					*P*
Item	Cont.	2 oz	4 oz	8 oz	16 oz	Quad
Digestion, %						
DM	71.9	67.3	74.4	70.2	71.0	NS
OM	50.1	50.9	50.9	50.4	49.9	NS
NDF	40.1	42.9	47.0	45.1	40.0	.07
ADF	43.6	42.6	50.3	46.5	40.0	(.15) NS
NSC[1]	80.8	81.6	79.9	80.8	80.4	NS
CHOD[2]	40.2	40.8	41.8	41.8	40.2	(.22) NS

[1] Nonstructural carbohydrate (sugars + starch)
[2] Total carbohydrate digested (NDF + NSC), g/day

Table 2. Volatile Fatty Acid (VFA) Production, Molar Ratios, and Average Daily Fermenter pH.						
	Diets					Yeast Effects
	Yeast Level/h/d					*P*
Item	Cont.	2 oz	4 oz	8 oz	16 oz	Quad
Total VFA, mmoles/d	411	404	399	408	415	NS
Molar Percentages:						
Acetic	55.3	59.0	60.1	59.6	56.8	.02
Propionic	23.9	23.7	20.8	20.6	22.2	(.20) NS
A-P Ratio	2.34	2.55	2.95	2.91	2.63	(.15) NS
Mmoles/day:						
Acetic	227	238	240	243	235	.10
Propionic	98	96	84	84	93	NS
Rumen pH						
Hours 2	6.26	6.27	6.32	6.30	6.35	NS
4	5.92	6.04	6.06	6.05	6.06	.09
6	5.96	6.04	6.07	6.09	6.05	.08
Average pH	6.22	6.26	6.27	6.27	6.27	NS

Results Tables:

Table 3. Nitrogen Partitioning, Microbial Growth, and Microbial Efficiency.							
	Diets					Yeast Effects	
	Yeast Level/h/d					*P*	
Item	**Cont.**	**2 oz**	**4 oz**	**8 oz**	**16 oz**	**Linear**	**Quad**
Non-ammonia N, g/d	3.02	3.11	3.04	3.10	2.99	NS	.03
Ammonia N, mg/dl	5.60	5.58	6.28	7.74	6.85	NS	(.17) NS
By-Pass N, g/d	1.31	1.42	1.28	1.44	1.40	NS	NS
Microbial N, g/d	1.72	1.69	1.77	1.66	1.59	.06	NS
Efficiencies:							
Mic. N/kg DMD[1]	23.9	25.1	23.8	23.6	22.4	.07	NS
Mic. N/kg CHOD[2]	42.8	41.5	42.4	39.8	39.7	NS	NS

[1] Microbial N produced per kg dry matter digested.
[2] Microbial N produced per kg total carbohydrate digested.