



# THE IMPACT OF AMAFERM ON MINERAL BIOAVAILABILITY IN MULTIPAROUS BEEF COWS SUPPLEMENTED WITH VITAFERM CONCEPT-AID

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# INTRODUCTION

- *Aspergillus oryzae* (AO) is an aerobic mold that provides unidentified growth factors to the ruminal microorganisms (Martin and Nisbet, 1990)
- Under certain conditions, AO has proved to have positive effects on ruminal pH, nutrient digestibility and animal performance
- Evidence from ex vivo (Univ. of Kiel) and in vivo (Univ. of Minnesota) studies in pigs suggests a potential effect of Amaferm (*Aspergillus oryzae* extract) on mineral absorption and availability (unpublished data)
- Supplementing minerals pre partum in beef cattle herds is a common practice to enhance mineral status post-partum and thereby support immune and reproductive function
- To the best knowledge of the authors, the effects of Amaferm on mineral nutrition of the ruminant remains unknown

## HYPOTHESIS AND OBJECTIVES

- The hypothesis is that supplementing a mineral package containing Amaferm (Vitaferm Concept-Aid, BioZyme Inc., St. Joseph, MO) from a month prepartum to a month postpartum, may enhance mineral bioavailability in multiparous beef cows.
- The objective of this study is to evaluate the effect of supplementation with Vitaferm Concept-Aid either containing Amaferm or not, on mineral concentrations in blood, liver, colostrum, and milk in multiparous beef cows.

# MATERIALS AND METHODS

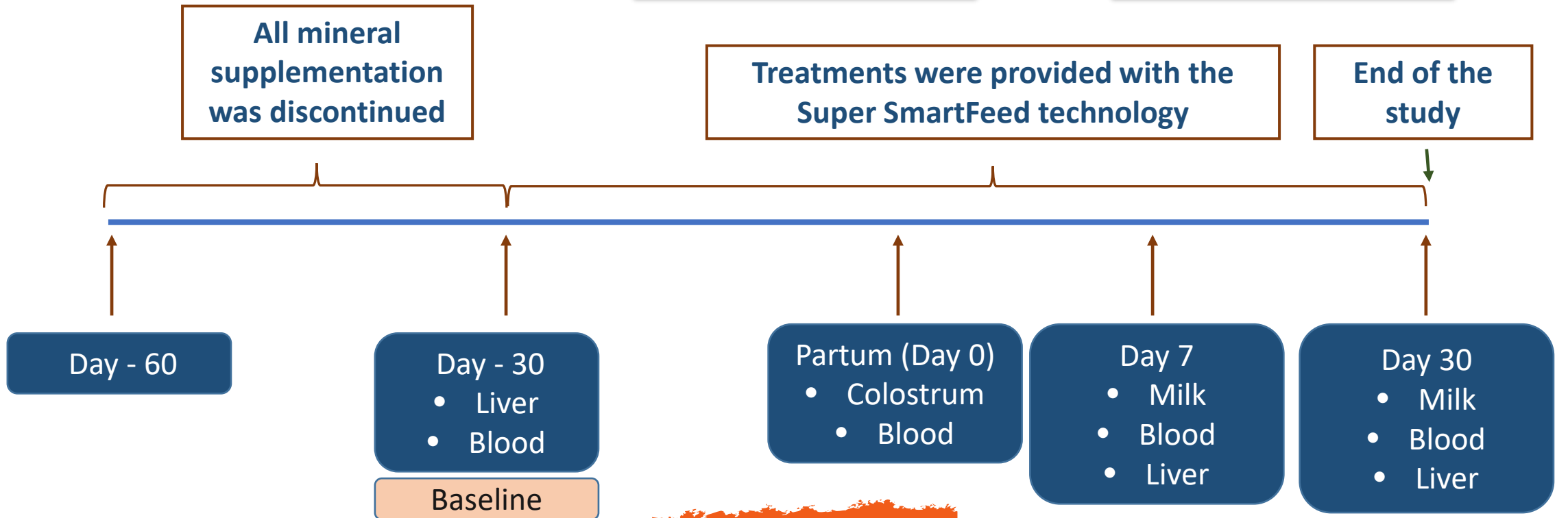
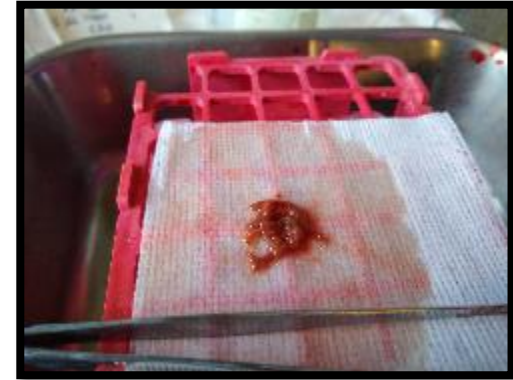
- University of Florida-North Florida Research and Education Center (NFREC) in Marianna, FL
- 30 Angus crossbred multiparous beef cows
- Treatments: Vitaferm Concept-Aid supplement containing (AMA) or not (CTL) Amaferm.



- Complete randomized design
- 30 multiparous Angus cross cows, BW  $653.41 \pm 62.25$  kg, confirmed pregnant, randomly assigned to one of 2 treatments (15 cows per treatment)
- Collectively maintained in a 1.2 ha pen
- *Ad libitum* bermudagrass hay + 0.453 kg/d of a DDGS-based supplement containing 25% of Vitaferm Concept-Aid
- For a minimum of 60 days prior to the expected calving date, all mineral supplementation was discontinued in cows



# EXPERIMENTAL PERIOD



## SAMPLE ANALYSIS

All samples were analyzed to determine mineral concentration of Mg, P, Ca, Mn, Fe, Co, Cu, Zn, Se, Mo using ICP-MS (Animal Health Diagnostic Laboratory, Lansing, MI)

- Data analyzed as a completely randomized design with repeated measures, using the MIXED procedure of SAS (version 9.3)
- Experimental unit : Cow
- Fixed effects: Treatment (Amaferm vs. Control)
- Covariates:
  - a) Concentration of mineral on d-30 (used when significant)
  - b) amount of Vitaferm Concept-Aid consumed prior to the analysis
- Significance  $P \leq 0.05$ , and tendencies if  $P > 0.05$  and  $\leq 0.10$

## STATISTICAL ANALYSIS

# RESULTS

## Mineral concentrations in SERUM

Item	Amaferm			Control			SEM <sup>2</sup>	P-value				
	Sampling day			Sampling day				Trt	Day	Trt × Day	Prepartum	Intake
	0	7	30	0	7	30						
Mg, ppm	22.4	16.0	18.4	21.8	18.6	18.5	1.05	0.556	<0.001	0.150	0.097	0.029
<b>P, ppm</b>	<b>90.2</b>	<b>81.8</b>	<b>116.8</b>	<b>97.4</b>	<b>103.2</b>	<b>122.4</b>	<b>5.52</b>	<b>0.042</b>	<b>&lt;0.001</b>	<b>0.148</b>	<b>0.006</b>	<b>0.145</b>
Ca, ppm	82.0	79.5	87.9	86.3	90.9	92.6	4.20	0.098	0.2116	0.537	0.354	0.664
Mn, ng/mL	1.76	1.13	1.26	1.81	1.04	1.12	0.240	0.815	0.001	0.855	0.237	0.704
Fe, µg/mL	106.2	110.5	108.9	93.6	104.8	106.9	12.28	0.556	0.722	0.890	0.228	0.987
Co, ng/mL	0.21	0.19	0.24	0.22	0.18	0.30	0.026	0.429	0.006	0.186	0.243	<0.001
Cu, µg/mL	0.501	0.415	0.473	0.518	0.484	0.512	0.0299	0.206	0.126	0.523	0.004	0.734
Zn, µg/mL	0.637	0.582	0.663	0.649	0.712	0.726	0.0510	0.103	0.522	0.494	0.625	0.536
<b>Se, ng/mL</b>	<b>40.84</b>	<b>45.87</b>	<b>57.00</b>	<b>45.19</b>	<b>52.39</b>	<b>68.48</b>	<b>2.892</b>	<b>0.014</b>	<b>&lt;0.001</b>	<b>0.329</b>	<b>0.012</b>	<b>0.003</b>
Mo, ng/mL	1.56	1.85	0.79	1.76	1.98	1.08	0.245	0.322	0.002	0.942	0.006	0.562
Intake <sup>4</sup> , g	2373	376	1914	1463	359	1893	271.8	0.184	<0.001	0.171	-	-



# RESULTS

## Mineral concentrations in LIVER

<i>Item</i>	<u>Amaferm</u>		<u>Control</u>		SEM	<u>P-value</u>				
	<u>Sampling day</u>		<u>Sampling day</u>			Trt	Day	Trt × Day	Prepartum	Intake
	7	30	7	30						
Mg, ppm	553.4	579.5	558.9	591.6	28.64	0.778	0.301	0.905	0.751	0.044
P, ppm	10317	11014	10242	11208	543.6	0.917	0.146	0.807	0.758	0.062
Ca, ppm	248.4	274.6	281.1	233.4	35.65	0.912	0.765	0.307	0.342	0.259
Mn, mg/kg DM	11.24	12.79	11.63	13.26	0.722	0.588	0.039	0.952	0.227	0.002
Fe, mg/kg DM	416.8	483.8	432.6	420.4	44.23	0.632	0.535	0.369	0.972	0.405
Co, mg/kg DM	0.22	0.27	0.22	0.28	0.015	0.746	0.002	0.958	0.005	0.007
Cu, mg/kg DM	208.6	297.8	202.2	276.4	22.98	0.628	<0.001	0.664	<0.001	0.032
Zn, mg/kg DM	115.1	127.1	132.0	132.7	8.98	0.248	0.487	0.536	0.239	0.004
Se, mg/kg DM	0.83	1.21	0.82	1.21	0.068	0.999	<0.001	0.902	0.348	0.006
Mo, mg/kg DM	2.80	2.87	2.81	2.89	0.221	0.963	0.745	0.997	0.036	0.664
Intake, g	2749	1914	1822	1893	324.4	0.184	0.223	0.152	-	-

# RESULTS

## Mineral concentrations in MILK

Item	Amaferm		Control		SEM <sup>2</sup>	P-value			
	Sampling day		Sampling day			Trt	Day	Trt × Day	Intake
	7	30	7	30					
Mg, ppm	127.9	124.6	127.7	125.5	4.23	0.942	0.415	0.879	0.039
P, ppm	1280.5	1098.1	1265.0	1087.2	51.32	0.846	<0.001	0.936	0.621
Ca, ppm	1582.0	1492.2	1538.3	1463.9	42.81	0.463	0.040	0.841	0.125
Mn, ng/mL	32.0	52.6	24.0	38.9	4.64	0.055	<0.001	0.477	0.769
Fe, µg/mL	0.204	0.193	0.221	0.145	0.0319	0.680	0.109	0.224	0.957
Co, ng/mL	0.623	0.665	0.609	0.600	0.0411	0.374	0.679	0.527	0.193
Cu, µg/mL	0.108 <sup>a</sup>	0.027 <sup>c</sup>	0.062 <sup>b</sup>	0.026 <sup>c</sup>	0.0110	0.065	<0.001	0.033	0.012
Zn, µg/mL	5.90	4.27	5.76	4.62	0.321	0.794	<0.001	0.324	0.411
Se, ng/mL	14.86	13.31	14.14	13.09	0.606	0.521	0.014	0.605	0.403
Mo, ng/mL	13.75	11.16	16.37	11.23	1.961	0.564	0.024	0.432	0.039
Intake, g	2748.5	1914.2	1822.2	1892.5	324.46	0.184	0.223	0.152	-

a, b, c Different superscript,  $P < 0.05$

# RESULTS

## Mineral concentrations in COLOSTRUM

<i>Item</i>	Amaferm	Control	SEM <sup>2</sup>	<i>P-value</i>	
				Trt	Intake
Mg, ppm	220.1	276.4	30.87	0.224	0.810
P, ppm	1480.6	1670.4	70.28	0.078	0.410
Ca, ppm	1683.7	1904.8	85.31	0.090	0.645
Mn, ppm	0.496	0.495	0.0022	0.718	0.771
Fe, ppm	1.079	1.299	0.2924	0.610	0.869
Co, ppm	0.0013	0.0015	0.00014	0.449	0.003
Cu, ppm	0.160	0.145	0.0281	0.707	0.736
Zn, ppm	11.07	15.95	2.123	0.129	0.691
Se, ppm	0.035	0.042	0.0054	0.356	0.847
Mo, ppm	0.046	0.048	0.0082	0.826	0.518
Intake, g	2372.8	1463.2	441.64	<0.001	-

# CONCLUSION

- In serum, concentrations of phosphorus and selenium were decreased by the feeding of Amaferm, suggesting changes in the homeostasis of these minerals.
- In contrast, the concentration of manganese in milk on days 7 and 30 was increased on average by 34% by the addition of Amaferm into the mineral supplement.
- Cows fed Amaferm produced milk on day 7 with about 74% more copper than control cows.
- Treatments did not affect the concentration of minerals in liver and colostrum.

**As an overall conclusion, it appears that Amaferm has an impact on mineral nutrition in ruminant animals**

## FOLLOW UP STUDIES

- Mineral digestibility and balance
- Use of non-lactating animals in order to reduce the variation caused by parturition and the output of minerals in colostrum and milk
- Characterization of ruminal fermentation, including quantification of microbial protein synthesis and ruminal balance of minerals

Questions?

## ACKNOWLEDGEMENTS



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