

# Effects of Supplemental Methionine or Choline on Health and Growth Performance in High-Risk Receiving Beef Heifers

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## Introduction

- Methionine is the most widely utilized methyl donor in the body and is an often-limiting amino acid for growth in cattle.
- Choline is a methyl group source and interacts with methionine in the body.
- Methionine and choline supplementation improves immune function and reduce inflammation in transition dairy cows.
- High-risk receiving cattle face stressors such as transportation, disease exposure, and low feed intake.
- Methionine or choline supplementation may provide benefits to receiving cattle health and immune function.

## Objective

- Determine if supplementally ruminally protected methionine or choline can improve health and growth performance in high-risk beef heifers.

## Experimental Procedures

- 1440 crossbred heifers (384 per year; 493 ± 9.8 lb); Tennessee origin
- Transported 675 miles to the KSU Beef Stocker Unit over a 3-year period
  - Year 1: 10/6/20 – 10/15/20; Year 2: 10/6/21 – 10/14/21; Year 3: 10/5/22 – 10/14/22
- Heifers blocked by load (15) and stratified by arrival body weight to 1 of 8 pens containing 12 heifers each
- Pens assigned to 1 of 5 treatments
  - Control (nothing)
  - 5 g/d Methionine – provided as 8.33 g/d Smartamine M; Adisseo USA Inc.
  - 15 g/d Methionine – provided as 25 g/d Smartamine M; Adisseo USA Inc.
  - 1.17 g/d Choline – provided as 26 g/d ReaShure; Balchem Corp.
  - 3.5 g/d Choline – provided as 78 g/d ReaShure; Balchem Corp.
- Limit-fed 2.2% of body weight (dry matter basis) at 0700 h daily for 60 d
  - Treatments were top dressed once daily at feeding
- Pen weights measured weekly to adjust feed offered the following week
- Heifers observed twice daily for clinical signs of respiratory illness
  - 1<sup>st</sup> treatment: florfenicol; 2<sup>nd</sup> treatment: enrofloxacin; 3<sup>rd</sup> treatment: oxytetracycline
- Performance data analyzed in PROC MIXED of SAS
  - Fixed effects: Treatment and Year; Random effect: Block(Year)
- Health data analyzed in PROC GLIMMIX of SAS as binomial proportions
  - Fixed effects: Treatment and Year; Random effect: Block(Year)

## Experimental Diet

Ingredient	% of Dry Matter
Corn, dry-rolled	39.5
Wet corn gluten feed <sup>1</sup>	40.0
Prairie hay, chopped	13.0
Supplement <sup>2</sup>	7.5

<sup>1</sup>Cargill Corn Milling (Blair, NE)

<sup>2</sup>Supplement pellet formulated to contain (dry matter basis) 8.5% calcium, 0.64% phosphorus, 0.76% potassium, 5.0% salt, and 307 g/ton monensin (Rumensin; Elanco, Greenfield, IN)

## Growth Performance

Item	Control	Treatment		SEM	P-value Treatment		
		Methionine, g/d	Choline, g/d				
		5	15	1.17	3.5		
Number of pens	24	24	24	24	24	-	-
Number of heifers <sup>1</sup>	279	278	278	282	280	-	-
Body weight, lb							
Day 0	492	492	494	494	494	2.0	0.26
Day 60	642 <sup>ab</sup>	639 <sup>b</sup>	646 <sup>a</sup>	639 <sup>b</sup>	637 <sup>b</sup>	4.6	0.09
Average daily gain, lb/d							
Days 0 to 60	2.51 <sup>ab</sup>	2.45 <sup>ab</sup>	2.56 <sup>a</sup>	2.43 <sup>b</sup>	2.40 <sup>b</sup>	0.075	0.09
Dry matter intake, lb/d							
Days 0 to 60	12.1	12.0	12.1	12.1	12.0	0.07	0.48
Gain:Feed, lb/lb							
Days 0 to 60	0.208 <sup>ab</sup>	0.204 <sup>ab</sup>	0.212 <sup>a</sup>	0.201 <sup>b</sup>	0.201 <sup>b</sup>	0.0058	0.10

<sup>1</sup> Performance data from dead and chronic heifers were removed from analysis.

<sup>a,b</sup> Within row, means without a common superscript differ  $P \leq 0.05$ .

## Health

Item	Control	Treatment		SEM	P-value Treatment		
		Methionine, g/d	Choline, g/d				
		5	15	1.17	3.5		
Number of pens	24	24	24	24	24	-	-
Morbidity, %							
Treated once	23.8	24.1	22.6	23.1	27.6	0.04	0.71
Treated twice	4.9	6.7	4.4	4.9	7.2	0.02	0.30
Treated thrice	1.2	1.3	1.4	0.5	0.8	0.65	0.52
Mortality, %	0.6	0.6	0.6	0.9	0.9	0.54	0.97
Morbidity, head							
Treated once	82	81	83	79	93	-	-
Treated twice	24	32	23	24	35	-	-
Treated thrice	7	8	8	3	5	-	-
Mortality, head	2	2	2	3	3	-	-
Days to							
First treatment	19	18	17	21	17	-	-
Second treatment	21	24	18	25	20	-	-
Third treatment	18	33	28	42	26	-	-
Mortality	17	7	9	25	32	-	-

## Conclusions

- Supplemental methionine or choline did not affect growth performance or feed efficiency relative to control.
- Supplemental methionine or choline did not affect incidence of respiratory morbidity or mortality.

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