

balchem[®]

Introducing

AminoShure[®]-***XL***

Precision Release Lysine



NEW **AminoShure®-L**
Precision Release Lysine

CONSISTENT
RELIABLE

COST-EFFECTIVE

Now you get all three in a new lysine choice. Through technology advancements, NEW AminoShure-L brings you a reliable source of metabolizable lysine at a lower cost.

New AminoShure-L gives you:

- Cost-competitive replacement for blood meal and other lysine sources
- Consistent, high-quality source of metabolizable lysine
- Flexibility to improve animal performance while potentially lowering ration costs

Always make AminoShure-L available when optimizing diets to take advantage of improved milk production and potential cost savings. Visit Balchem.com/AminoShure or contact your local Balchem Representative to learn more.

Real People. Real Science. Real Results.
800-780-9233 or anh@Balchem.com

BALCHEM
Real People. Real Science. Real Results.

©2011 Balchem Corporation. All trademarks are property of Balchem Corporation.

AminoShure®-L

Precision Release Lysine

- Introduced **October 2008**
- **38%** L-Lysine content
- **64%** Lysine BAV
- **24.32%** Metabolizable Lysine

Confidential

AminoShure[®]-L Study 1: Experimental Design

- 3 Treatments – **0, 30 or 60 grams per day AminoShure[®]-L**
- Replicated 3x3 Latin square with three-week experimental periods with six early to mid-lactation Holstein cows fitted with rumen and duodenal cannulas
- Diets formulated to contain 16.9% CP, 10.0% RDP (dry matter basis) and were iso-caloric and iso-nitrogenous
- Major protein sources in diet were distillers dried grains, soybean meal 47.5% CP, alfalfa hay pellets and corn gluten meal
- All diets contained urea at 0.30% of dry matter to ensure adequate soluble protein
- *All diets contained Smartamine M at 0.02% of DM*
- *CPM estimate of lysine as a % of MP in the control diet was 6.0%*

J. Dairy Sci. 92(Suppl. 1):T294. (Abstr.) – ADSA 2009

AminoShure[®]-L

Precision Release Lysine

Confidential

AminoShure[®]-L Study 1: performance results

	AminoShure [®] -L 0 g/d	AminoShure [®] -L 30 g/d	AminoShure [®] -L 60 g/d
DMI, lbs/day	52.2^a	54.2^b	55.1^b
Milk yield, lbs/day	85.1^a	90.8^b	90.2^b
Milk Fat %	2.91^a	3.10^b	3.15^b
Milk fat yield, grams/day	1112^a	1276^b	1271^b
Milk Protein, %	3.10	3.01	3.06
Milk protein yield, grams/day	1194^a	1239^{ab}	1249^b
Milk nitrogen efficiency	29.9%	30.5%	30.2%

J. Dairy Sci. 92(Suppl. 1):T294. (Abstr.)

AminoShure[®]-L
Precision Release Lysine

Confidential

AminoShure[®]-L Study 2

- Forty-four Holstein cows (mean 102 DIM)
- Cows remained on their respective treatments for 4 weeks.
- Cows were fed corn, corn silage, alfalfa hay, alfalfa silage based TMRs. AminoShure[®]-L, ruminally protected His or both were top dressed twice daily.
- 4 treatments:
 - **Positive Control (PC)** – Diet formulated with blood meal (0.4% of DM), balanced to meet metabolizable Lys and His.
 - **Negative Control (NC)** – diet was similar to PC but blood meal removed, minimum of 80% of metabolizable Lys and His.
 - **NC+His** – NC diet supplemented with rumen-protected His to provide the same level of metabolizable His as PC.
 - **NC+His+Lys** – NC+His diet supplemented with rumen protected Lys to supply the same level of metabolizable Lys as PC.

AminoShure[®]-L Study 2: Results

	PC	NC	NC+His	NC+His+Lys
Milk yield, lbs/d	93.7 ^a	89.3 ^b	88.0 ^b	93.9 ^a
Fat, %	3.8	3.8	3.9	3.7
Fat yield, lbs/d	3.57	3.37	3.42	3.48
True Protein, %	2.84	2.90	2.90	2.86
Protein yield, lbs/d	2.65	2.58	2.56	2.67
MUN, mg/dl	16.4 ^a	11.6 ^b	12.0 ^b	11.3 ^b

J. Dairy Sci. 93(Suppl. 1):415. (Abstr.)

AminoShure[®]-L

Precision Release Lysine

Confidential

AminoShure[®]-L v2 launched at the 2011 ADSA Meetings in New Orleans in July



- Introduced **July 2011**
- **52%** L-Lysine content
- **64%** Lysine BAV
- **33.28%** Metabolizable Lysine

- Sold through May 2012

The *AminoShure*[®]-*XL* Journey

Research with Earlier Versions of *AminoShure*[®]-XL

Study 1: University of Delaware – presented at **2016** JAM Meeting

Abstract 1598 - Impact of three rumen protected lysine prototypes on dairy cow performance, milk composition, and milk casein

A. M. Barnard¹, B. A. Barton², C. A. Zimmerman², and T. F. Gressley¹

¹University of Delaware

²Balchem Corporation

- Tested 3 lysine prototypes
- 5 X 5 Latin square
- 10 Multiparous cows
- 15-gram metabolizable lysine deficit by removing some blood meal (negative control diet)
- High quality blood meal source was the positive control diet

Early Version *AminoShure*[®]-*XL*: Results from U. of Delaware 2016 trial – Study 1

	Treatment					SEM	P-values
	-Con	+Con	Lysine prototypes				
			Lys1	Lys2	Lys3		
DMI, lbs/d	60.60	61.00	59.57	58.93	59.19	1.37	0.51
Milk, lbs/d	102.42 ^{B,C}	104.89 ^{A,B}	106.72 ^A	102.22 ^{B,C}	100.44 ^C	1.87	0.02
Fat, %	3.57 ^A	3.41 ^B	3.57 ^A	3.57 ^A	3.52 ^{A,B}	0.06	0.06
Fat, lbs/d	3.64 ^{A,B}	3.53 ^C	3.70 ^A	3.62 ^{A,B,C}	3.55 ^{B,C}	0.04	0.03
Protein, %	2.92	2.90	2.92	2.90	2.95	0.02	0.21
Protein, lbs/d	3.02	2.98	3.00	3.00	3.04	0.02	0.11

Lysine 1 XL version produced 4.3 lbs/day more milk than the negative control

Research with Earlier Versions of *AminoShure*[®]-XL

Study 2: Virginia Tech – presented at **2017** ADSA Meeting. Published in 2019 JDS as Fleming et al.

Abstract 449 - Lactational performance of ruminally protected methionine and lysine prototypes

A. Myers¹, K. Estes¹, H. Choi¹, R.R. White², B. Barton³, C.A. Zimmerman³ and M.D. Hanigan¹

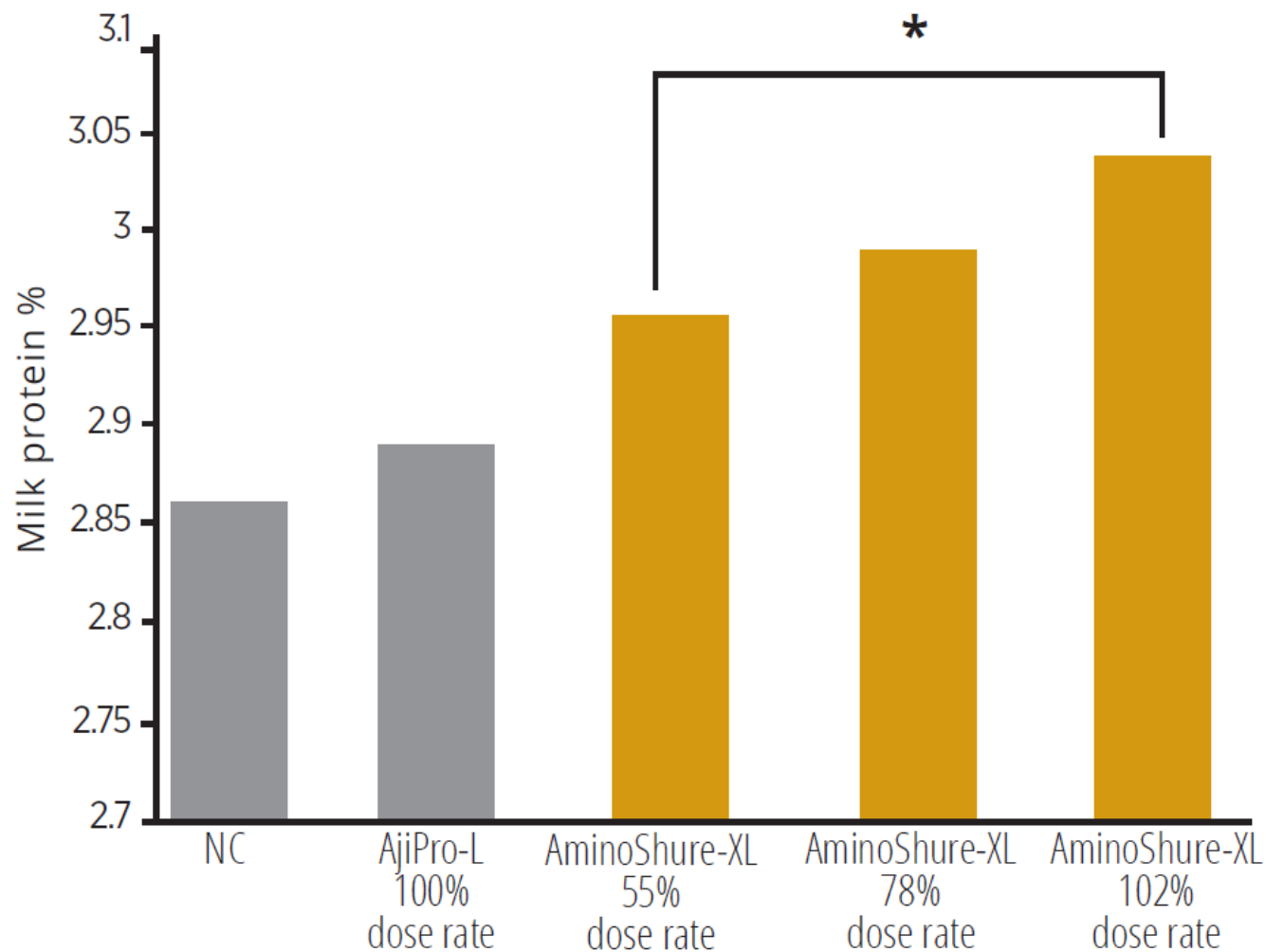
¹Department of Dairy Science, Virginia Tech, Blacksburg

²Department of Animal and Poultry Sciences, Virginia Tech, Blacksburg

³Balchem Corporation, New Hampton, NY

- Tested a lysine prototype at 55, 78 and 102% the L content of AjiPro-L Gen 2
- 5 X 5 Latin square
- 10 Multiparous cows
- 16-gram metabolizable lysine deficit (negative control diet)

Early Version *AminoShure*[®]-XL: Results from Virginia Tech 2017 trial – Study 2



***Linear dose response (P = 0.025)
For every 1g fed = .002% increase**

Fleming et al., JDS 2019

Milk protein % response to all levels of AminoShure-XL and response was linear with dose

Study 3: University of Tennessee

Applied Animal Science 35:482–490
<https://doi.org/10.15232/aas.2019-01885>

© 2019 American Registry of Professional Animal Scientists. All rights reserved.



NUTRITION: *Original Research*

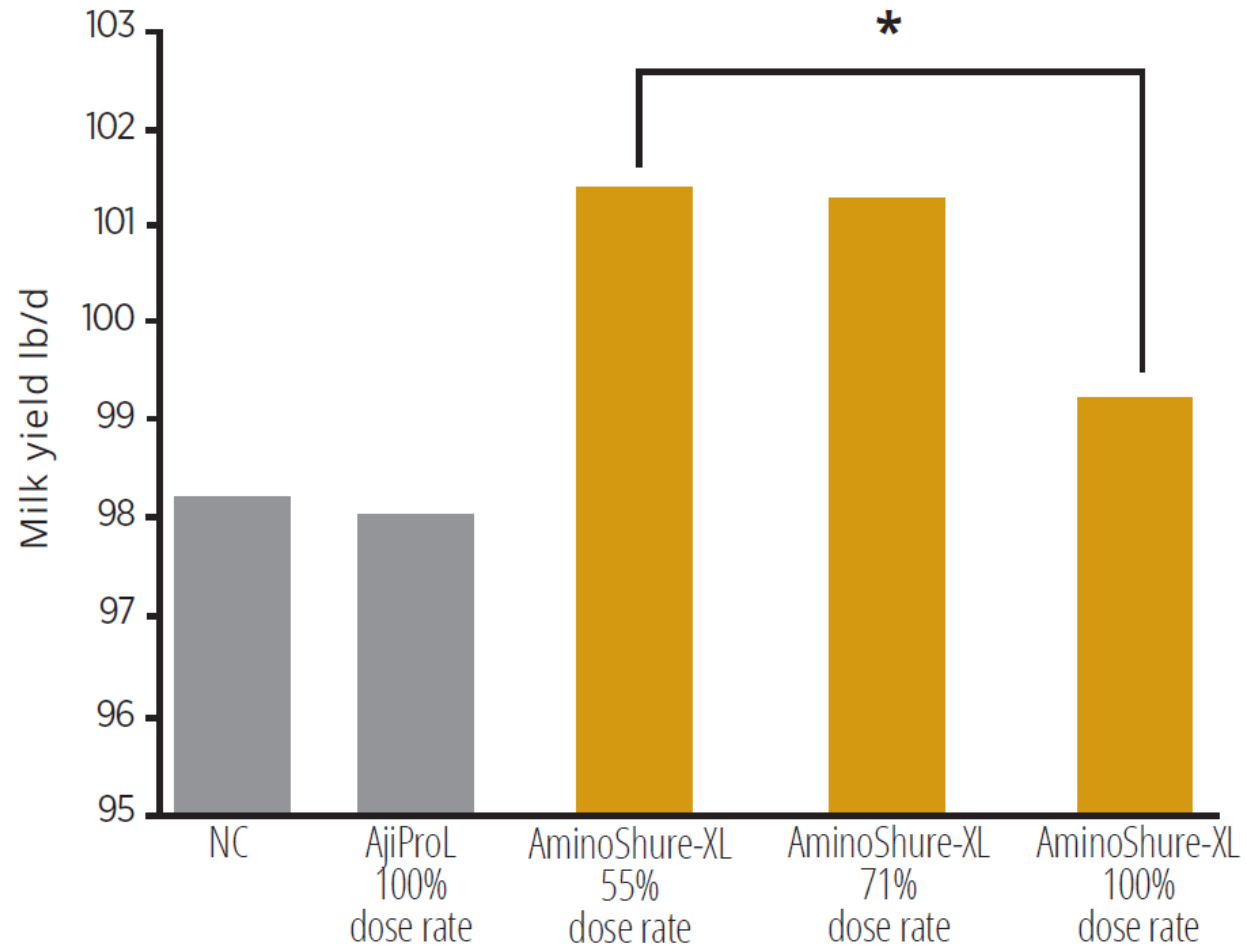
Rumen-protected lysine supplementation increased milk production in dairy cows fed a lysine-deficient diet

H. R. Bailey,¹ PAS, J. D. Kaufman,¹ PAS, K. A. Estes,² C. A. Zimmerman,² PAS, B. A. Barton,² PAS, and A. G. Rius^{1*}

¹Department of Animal Science, University of Tennessee, Knoxville 37966; and ²Balchem Corporation, New Hampton, NY 10958

- Tested a lysine prototype at 55, 71 and 100% the Lysine content of AjiPro-L Gen 2
- 5 X 5 Latin square
- 10 Multiparous cows (94 DIM)
- 15-gram metabolizable lysine deficit (negative control diet)

Early Version *AminoShure*[®]-XL: Results from U. of Tennessee trial – Study 3



Bailey et al., Appl. Anim. Sci. 2019

* Linear XL dose response at P = 0.03

Average milk response to XL vs. Neg Control was 3.3 lbs/day

AminoShure[®]-XL

Precision Release Lysine

Bioavailability

Stable Isotope Technique – Virginia Tech

- *In vivo* method – **for any AA**
- Products are fed
- Utilizes a jugular infusion of isotopically labeled AA that act as tracers
- Plasma samples are analyzed for isotopic enrichment
- Published procedure:
 1. Borucki Castro, S., H. Lapierre, L. Phillip, P. Jardon, and R. Berthiaume. 2008. Towards non-invasive methods to determine the effect of treatment of soya-bean meal on lysine availability in dairy cows. *Animal* 2:224-234.
 2. Maxin, G., D.R. Ouellet, and H. Lapierre. 2013. Effect of substitution of soybean meal by canola meal or distillers grains in dairy rations on amino acid and glucose availability. *J. Dairy Sci.* 96:7806-7817.
 3. Estes, K. A., R. R. White, P. S. Yoder, T. Pilonero, H. Schramm, H. Lapierre, and M. D. Hanigan. 2018. An *in vivo* stable isotope-based approach for assessment of absorbed amino acids from individual feed ingredients within complete diets. *J. Dairy Sci.* 101(8):7040-7060.
 4. Huang, X., K.A. Estes, P.S. Yoder, C. Wang, N. Jiang, T. Pilonero, and M.D. Hanigan. 2019. Assessing availability of amino acids from various feedstuffs in dairy cattle using a stable isotope-based approach. *J. Dairy Sci.* 102:10983-10996.

AminoShure-XL Stable Isotope Bioavailability Trial Results

Treatment	Lysine Bioavailability (%)
AminoShure-XL	64.0

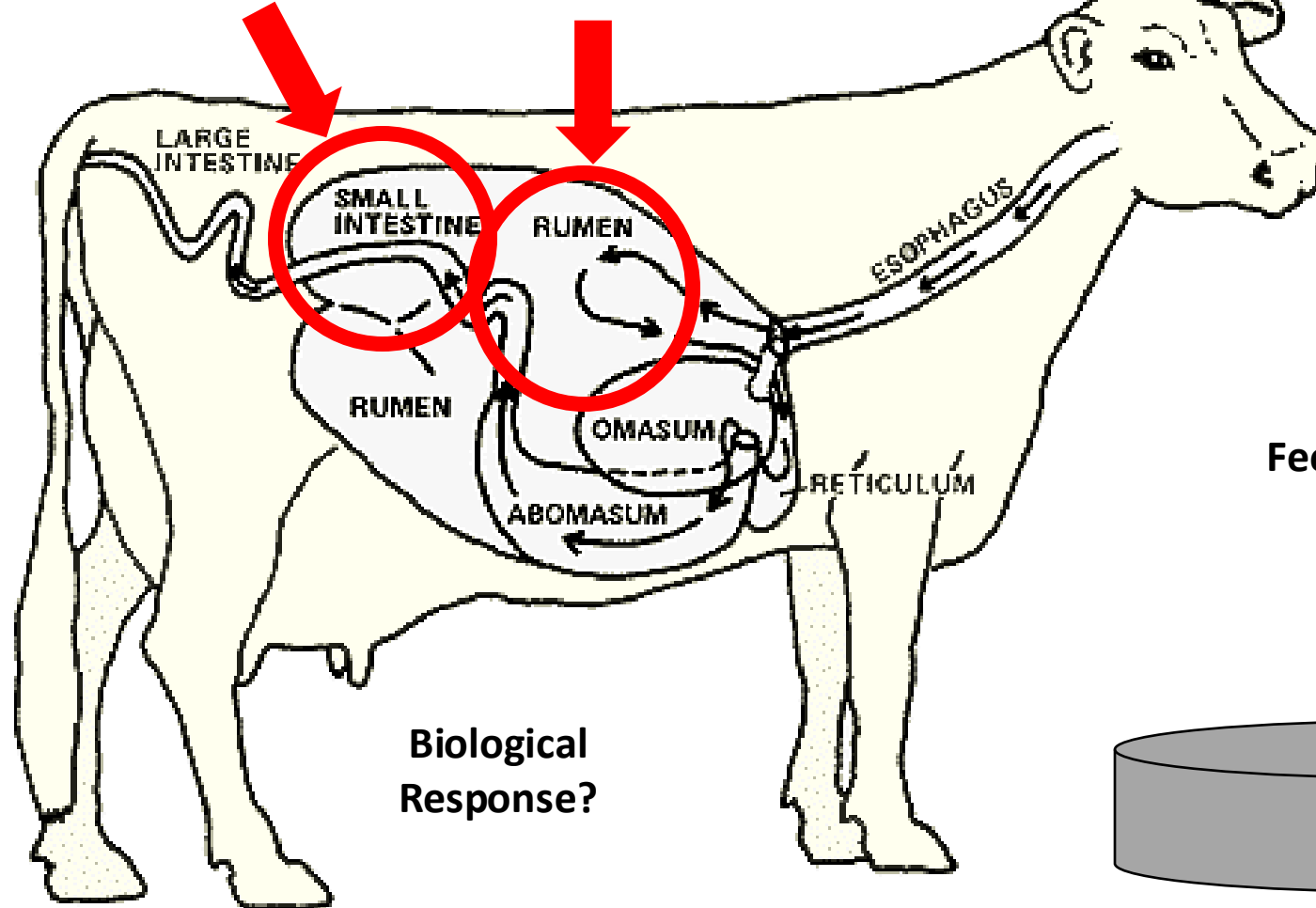
Was presented at the 2024 ADSA Meetings last month

1411 Bioavailability of multiple rumen-protected amino acids by a stable-isotope technique in dairy cattle. T. Fernandes*¹, M. H. De Oliveira^{1,2}, A. Hruby-Weston¹, M. Morozuk¹, B. Thelen¹, and M. D. Hanigan¹, ¹Virginia Tech, Blacksburg, VA, ²State University of São Paulo, Botucatu, SP, Brazil.

Presented at the 2024 ADSA Meeting

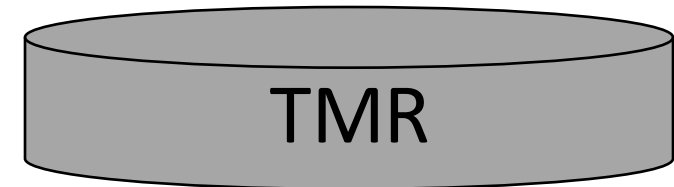
Rumen-Protected Product Characteristics

Intestinal Release? Rumen Stability?



Biological Response?

Feed and Mixing Stability?



TMR Stability – Estes et al., 2024

Objective: Evaluate the TMR stability of six rumen protected lysine products using the methods developed by Ji et al (2016) and Ishimaru et al (2019) using unprotected Lys-HCl as a control.

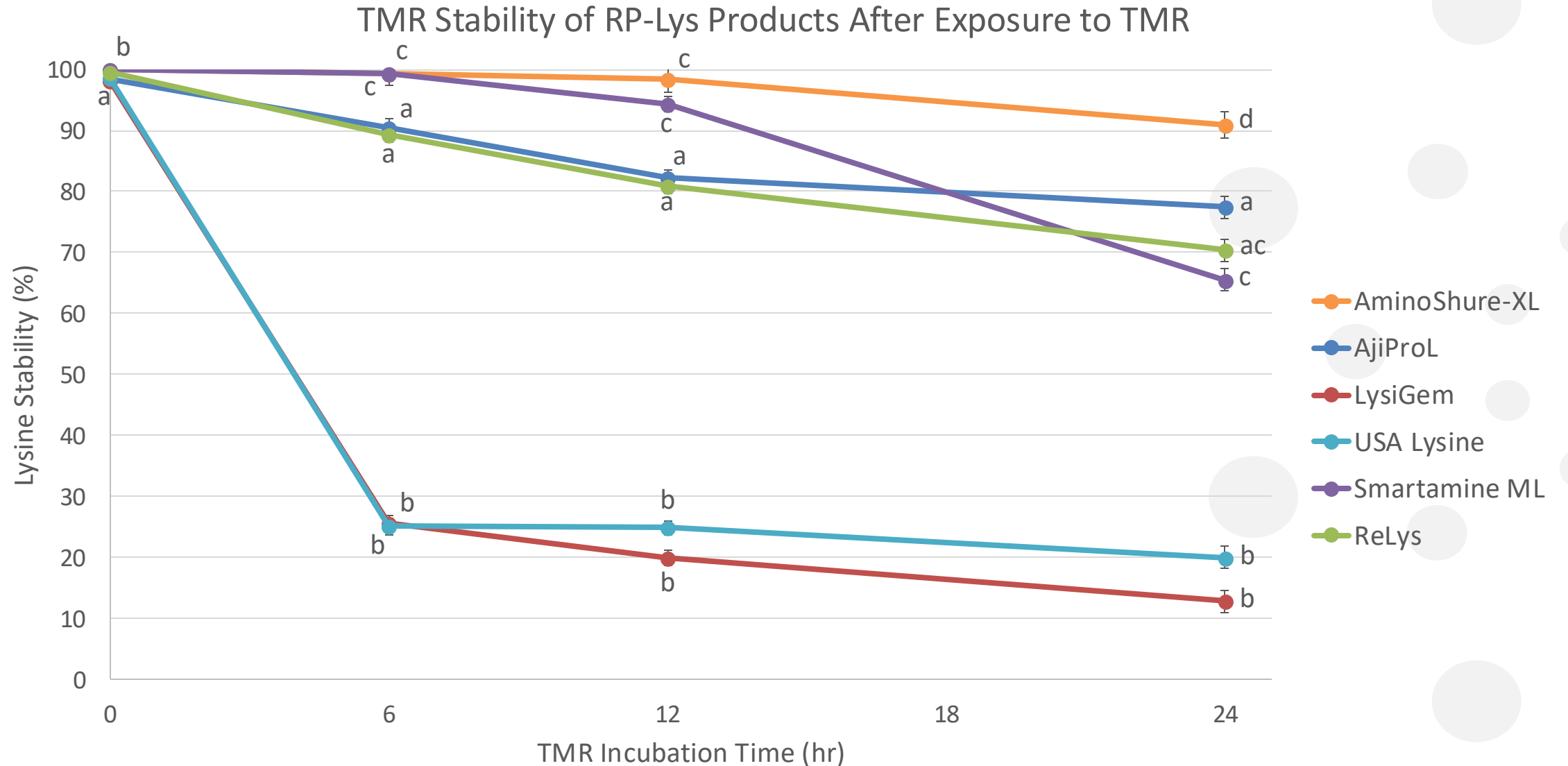
TMR Incubation Times: 0, 6, 12 and 24 hrs

Treatments:

- Negative control – no RP-Lys/unprotected Lys-HCl
- Positive control – unprotected Lys-HCl
- USA Lysine
- LysiGem
- AjiPro-L
- AminoShure-XL
- Smartamine ML
- ReLys



Results



abcd Values with differing superscripts within a timepoint are considered statistically different ($P < 0.05$).

- Encapsulated Lysine for Dairy Cows
- **Feeding rate:** 20 - 100 g/day (dependent upon user goals and base dietary ingredients)
- **Function:**
 - Consistent and concentrated form of L-lysine, one of the most limiting amino acids in diets.
 - Use can result in increased milk production and/or increase the value of the milk by increasing the fat and/or protein content.
 - Can also be used as an ingredient to reduce feed costs and lower the crude protein content of diets while maintaining animal performance.



Parameter	
Lysine, %	54.0
Rumen bypass, %	75.0
Intestinal Availability, %	80.0
Lysine Bioavailability, %	60.0
Metabolizable Lysine, %	32.4

Consistent, Cost-Effective and Reliable

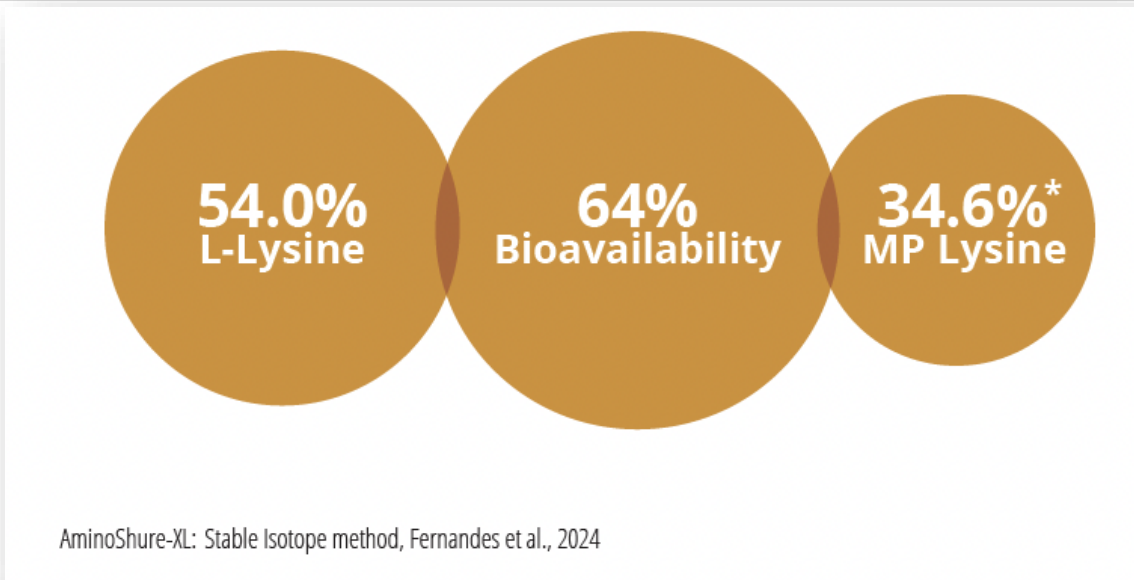


Table 2 Cost of replacing 0.25 lb of high-quality blood meal with AminoShure-XL

	Manufacturers Suggested Retail Price (\$/ton)	Feeding Rate (gms)	Lysine % of DM	MP Lysine (%)	MP Lysine (gms)	\$/head/day
Blood Meal	\$1,200	114	8.4%	5.5% ¹	6.2	0.15
	\$1,000	114	8.4%	5.5% ¹	6.2	0.13
	\$800	114	8.4%	5.5% ¹	6.2	0.10
AminoShure-XL	\$5,000	19	54.0%	32.4%	6.2	0.11

¹Assumes high-quality blood meal

Table 1 Blood meal MP lysine quality comparison

Blood Meal Quality	DM (%)	CP (%)	RUP (%)	Intestinal Digestibility	Lysine % of CP	MP-Lys %
Poor	90.0%	93.0%	81.0%	40.0%	9.0%	2.4%
Average	90.0%	93.0%	81.0%	65.0%	9.0%	4.0%
High	90.0%	93.0%	81.0%	90.0%	9.0%	5.5%

Why Choose AminoShure-XL?



AminoShure-XL		AjiPro-L
54.0% L-Lysine		40.0% L-Lysine
64%	BIOAVAILABILITY	64%
34.6%* MP Lysine	35% MORE MP LYSINE	25.6% MP Lysine
98%	TMR STABILITY @ 12HRS	82%
33%* AVAILABLE MP Lysine	60% MORE AVAILABLE MP LYSINE	21% AVAILABLE MP Lysine

*Stable Isotope method, Fernandes et al., 2024
The bioavailability parameters are based on each manufacturer's bioavailability claims and content declarations.

Learn More at Balchem.com/XL

AminoShure®-XL

Precision Release Lysine

AminoShure®-XM

Precision Release Methionine

