What Evonik's Data Tells Us?

Taipei, Taiwan
November, 2025

Bean Quality

Regional Differences

Soybean Meal Quality

Supporting The Animal Protein Industry

RUBROS	BASES %	TOLERANCIA DE RECIBO %	REBAJAS	MERMAS
Materias extrañas	1,0	3,0	Para valores superiores al 1,0% y hasta el 3,0% a razón del 1,0% por cada por ciento o fracción proporcional. Para valores superiores al 3,0% a razón del 1,5% por cada por ciento o fracción proporcional.	----
Incluido Tierra	0,5	0,5	Para valores superiores al 0,5% a razón del 1,5% por cada por ciento o fracción proporcional.	
Granos negros	----	1,0	----	----
Granos quebrados y/o partidos	20,0	30,0	Para valores superiores al 20,0% y hasta el 25,0% a razón del 0,25% por cada por ciento o fracción proporcional. Para valores superiores al 25,0% y hasta el 30,0% a razón del 0,5% por cada por ciento o fracción proporcional. Para valores superiores al 30,0% a razón del 0,75% por cada por ciento o fracción proporcional.	
Granos dañados (brotados, fermentados, ardidos, dañados por calor, podridos)	5,0	5,0	Para valores superiores al 5,0% a razón del 1,0% por cada por ciento o fracción proporcional.	
Incluido Granos quemados o "averia"	----	1,0	Para valores superiores al 1,0% a razón del 1,0% por cada por ciento o fracción proporcional.	----
Granos verdes	5,0	10,0	Para valores superiores al 5,0% se rebajará a razón del 0,2% por cada por ciento o fracción proporcional.	
Humedad	----	13,5	----	Para la mercadería recibida que exceda la tolerancia de recibo, se descontarán las mermas correspondientes, de acuerdo a las tablas establecidas.
Chamico	----	5 sem. / kg	----	Para mercadería recibida que exceda la tolerancia de recibo, se practicarán las mermas correspondientes.

Libre de insectos y/o arácnidos vivos

ARBITRAJE: Para los rubros condición "revolcado en tierra", "olores comercialmente objetables" y "granos amohosados", se establece un arbitraje con un descuento sobre el precio de CERO COMA CINCO POR CIENTO (0,5%) a DOS POR CIENTO (2,0%) según intensidad.

SERVICIO NACIONAL DE SANIDAD Y CALIDAD AGROALIMENTARIA.

RUBROS	BASES %	TOLERANCIA DE RECIBO %	
Materias extrañas	1,0	3,0	Para valores superiore cada por ciento o frac 3,0% a razón del 1,5%
Incluido Tierra	0,5	0,5	Para valores supe por ci
Granos negros	----	1,0	
Granos quebrados y/o partidos	20,0	30,0	Para valores superiore por cada por ciento c res al 25,0% y hasta el fracción proporcional 0,75% por cad
Granos dañados (brotados, fermentados, ardidos, dañados por calor, podridos)	5,0	5,0	Para valores superi cier
Incluido Granos quemados o "averia"	----	1,0	Para valores supe por ci
Granos verdes	5,0	10,0	Para valores supe por cada p
Humedad	----	13,5	
Chamico	----	5 sem. / kg	

Libre de insectos y/o arácnidos vivos

ARBITRAJE: Para los rubros condición "revolcado en tierra", "olores comercialmente objeta arbitraje con un descuento sobre el precio de CERO COMA CINCO POR CIENTO (0,5%) a

3. QUALITY / CONDITION: To be final at time and place of shipment per certificate(s) covering and limited to the items below, based on a general representative composite sample taken according to method laid down in FOSFA Standard Contracts method list and issued by a member superintendent of FOSFA. Cost and choice are on Seller's account.

3.1. Laboratory analysis by a FOSFA Analyst Member:

			Method:
• Oil content	: Basis	18.5%	AOCS Ac 3 – 44
Non-reciprocal allowance of 1% discount for each 1% deficiency, fractions in proportion			
• Moisture	: Maximum	14.0%	AOCS Ac 2 - 41

3.2. Grading by a Superintendent or Analyst Member of FOSFA registered at Brazilian Ministry of Agriculture:

- Foreign matter : Basis 1.0%
  Maximum 2.0%
  Non-reciprocal allowance of 1% discount for each 1% deficiency, fractions in proportion
- Damaged beans : Basis 8.0%
  Maximum 8.5%
  Non-reciprocal allowance of 2% discount for each 1% deficiency, fractions in proportion
  Of which:
  - Heat Damaged and Burned : Maximum 4.0%
    of which
    - Burned : Maximum 1.0%
  - Mouldy : Maximum 6.0%
- Broken beans : Maximum 30.0%
- Greenish beans : Maximum 8.0%
- Poisonous seeds/husks : Substantially free
  within tolerances of:
  - 1 particle of treated vegetal seeds with unknown level of toxicity for each 1 kg sample at each lot of 5,000 metric tons loaded or part thereof.
  - 1 particle of toxic natural vegetal seeds for each 1 kg sample at each lot of 5,000 metric tons loaded or part thereof.
- Castor Seed and/or Castor Seed Husks : Maximum 0.005% for general

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Granos negros	----	1,0	
Granos quebrados y/o partidos	20,0	30,0	Para valores superiore por cada por ciento c res al 25,0% y hasta el fracción proporcional 0,75% por cad
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- Oil content ..... : Basis .....
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  Of which:
  - Heat Damaged and Burned ..... : Maximum ..... of which
    - Burned ..... : Maximum .....
  - Mouldy ..... : Maximum .....
- Broken beans : Maximum .....
- Greenish beans : Maximum .....
- Poisonous seeds/husks : Substantially free within tolerances of:
  - 1 particle of treated vegetal seeds with unknown level of toxicity for each 1 metric tons loaded or part thereof.
  - 1 particle of toxic natural vegetal seeds for each 1 kg sample at each lot o part thereof.
- Castor Seed and/or Castor Seed Husks ..... : Maximum .....

TABLE 10.1 – GRADES AND GRADE REQUIREMENTS FOR SOYBEANS

Grade	Maximum Limits of -			
	Damaged Kernels		Foreign Material (percent)	Splits (percent)
	Heat (part of total) (percent)	Total (percent)		
U.S. No. 1	0.2	2.0	1.0	10.0
U.S. No. 2	0.5	3.0	2.0	20.0
U.S. No. 3	1.0	5.0	3.0	30.0
U.S. No. 4	3.0	8.0	5.0	40.0

U.S. Sample Grade is soybeans that:

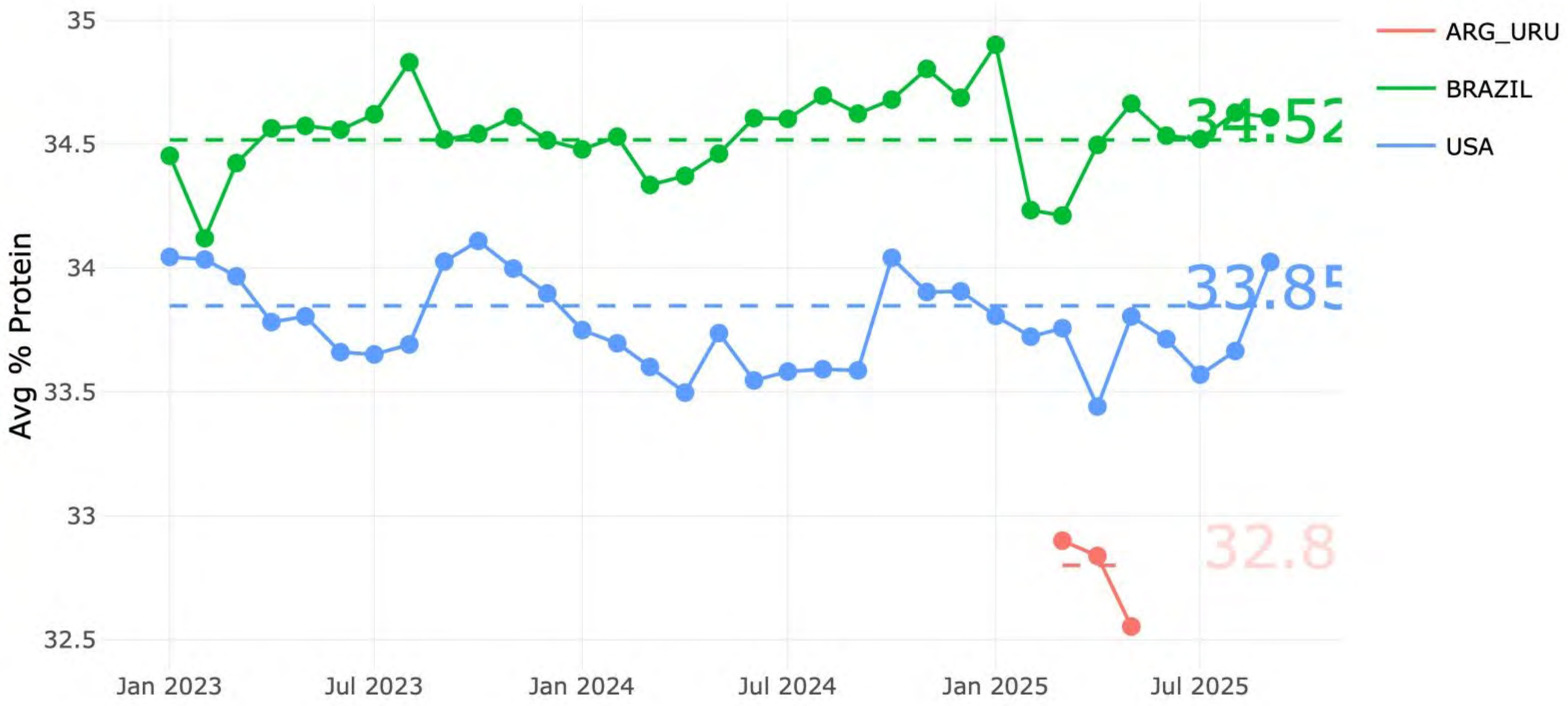
a. Do not meet the requirements for grades U.S. No.1, 2, 3, or 4; or

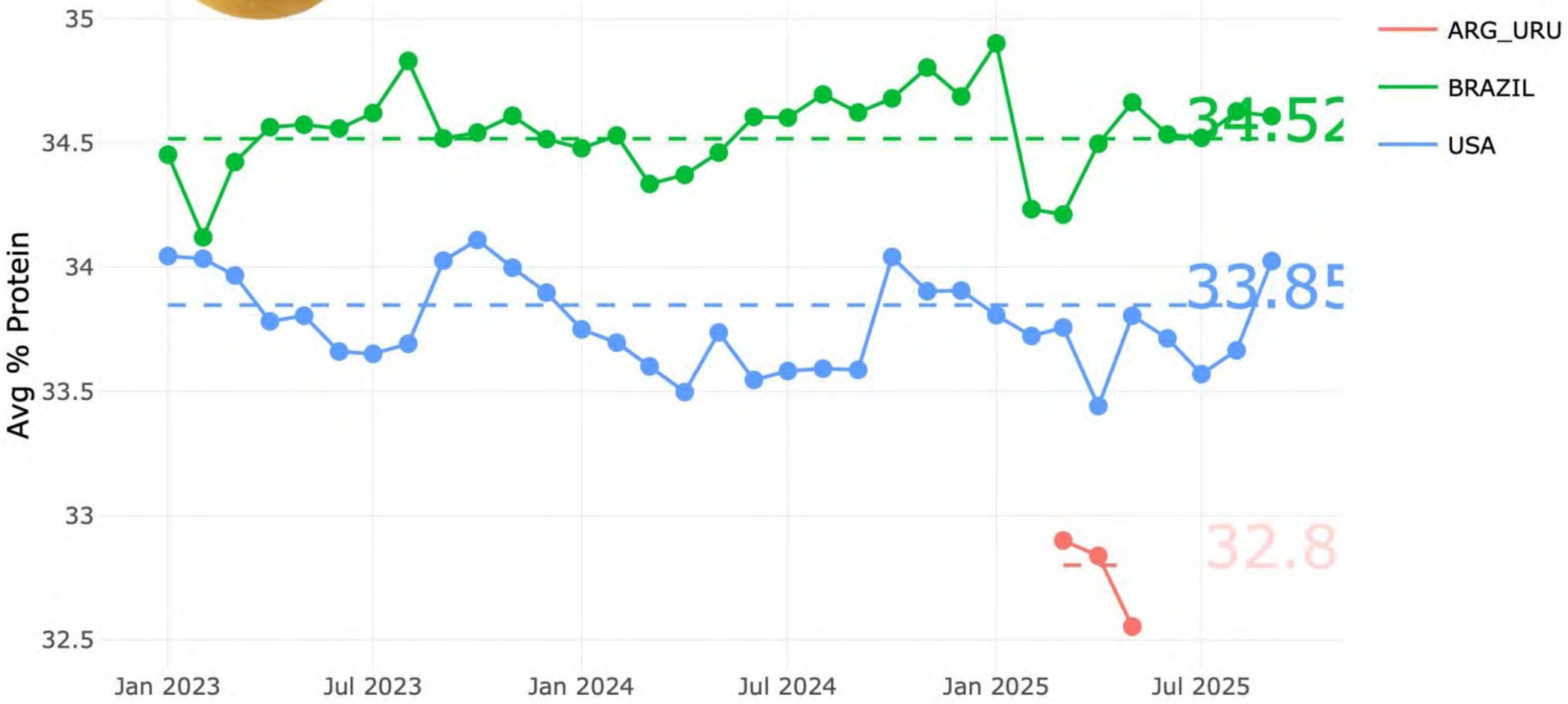
b. Contains 4 or more stones which have an aggregate weight in excess of 0.1 percent of the sample weight, 1 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria* spp.), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 10 or more rodent pellets, bird droppings, or an equivalent quantity of other animal filth in 1,000 grams of soybeans, or

c. Contain 11 or more animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance(s) in any combination, or

d. Have a musty, sour, or commercially objectionable foreign odor (except garlic odor); or

e. Are heating or otherwise of distinctly low quality.


35
34.5
34
33.5
33
32.5
Avg % Protein
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
ARG_URU
BRAZIL
USA
34.52
33.85
32.8


35
34.5
34
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Jan 2023
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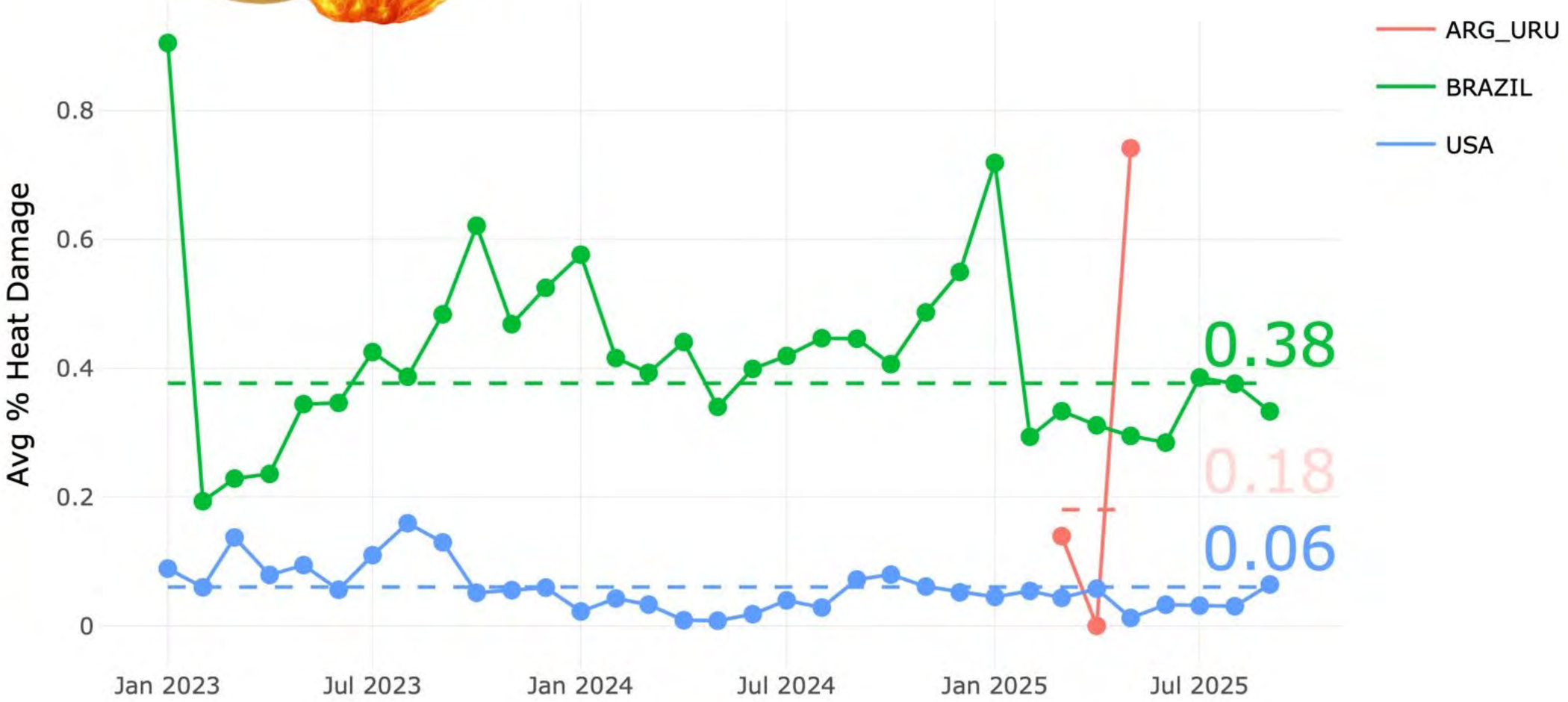
ARG_URU
BRAZIL
USA
Avg % Heat Damage
0.8
0.6
0.4
0.2
0
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
Jul 2025
0.38
0.18
0.06

Section 2. MEAL QUALITY

The standard of quality shall be the soybean meal of fair merchantable quality conforming to standard definitions and standard specifications of the Association, as set forth in these Trading Rules. Analysis shall be made in accordance with methods approved by the American Oil Chemists' Society (AOCS) in effect as of the date of the contract. [See Appendix A, Section 2]

Section 3. MEAL SPECIFICATIONS

All specifications can be modified based on agreements between buyer and seller.

Soybean Meal (as defined above under Rule 2, Section1)

Typical soybean meal product specifications are as follows:

Protein (Range)	44.0 – 49.0 %
Fat	0.5 %
Fiber (Maximum)	3.5 %
Moisture (Maximum)	12.0 %

In accordance with industry practices and as allowed under the 2024 AAFCO Official Publication, soybean meal products may also contain the following:

Flowability Agent (Maximum)	0.5% or 10 lbs per ton by weight of total product
Spent Bleach Clay (Maximum)	0.2% or 4 lbs per ton by weight of total product

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What is protein?

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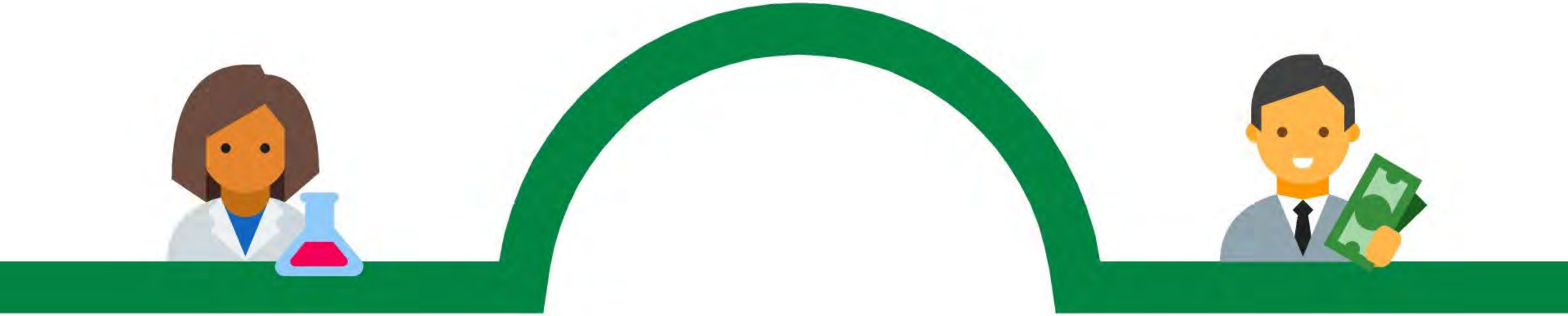
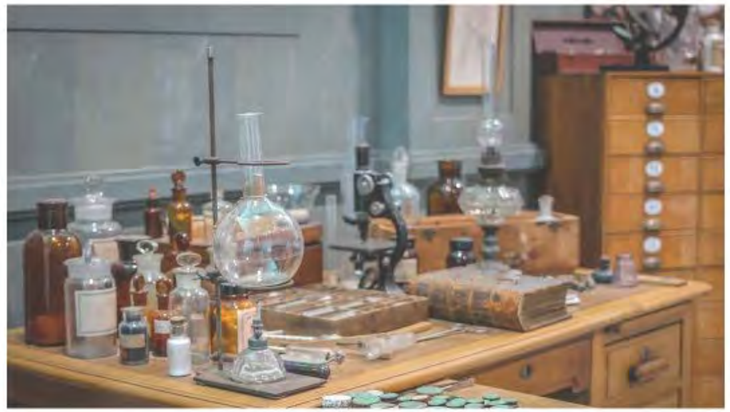
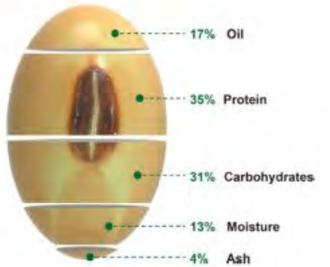
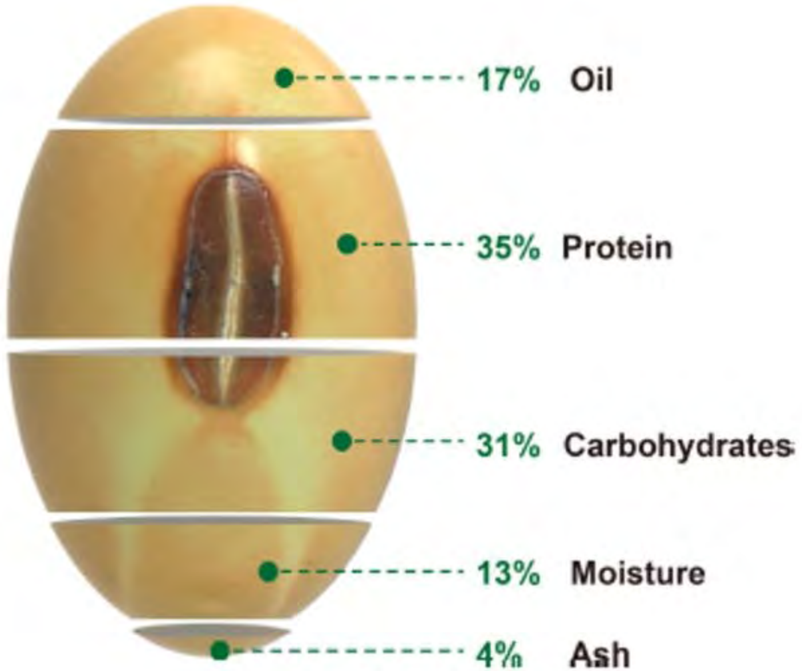


What is protein?




17% Oil
35% Protein
31% Carbohydrates
13% Moisture
4% Ash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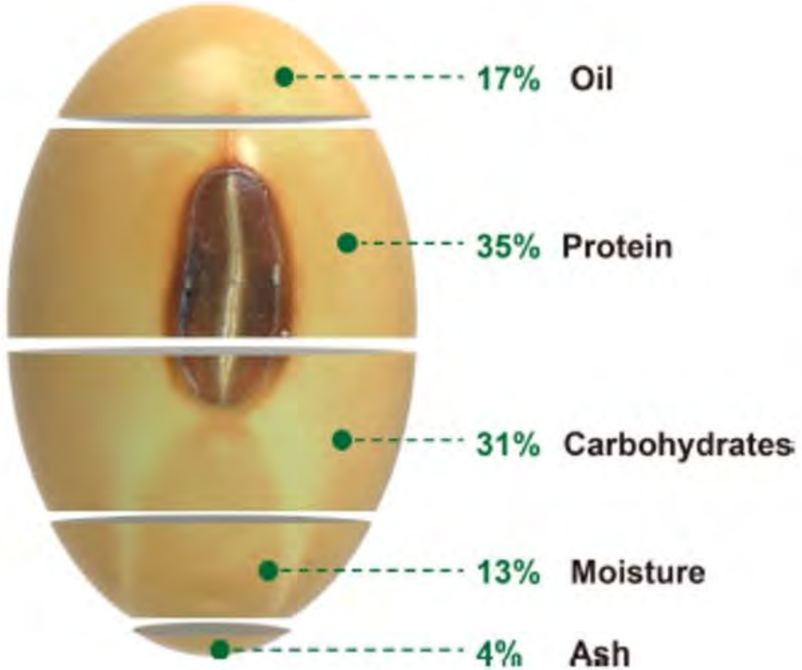
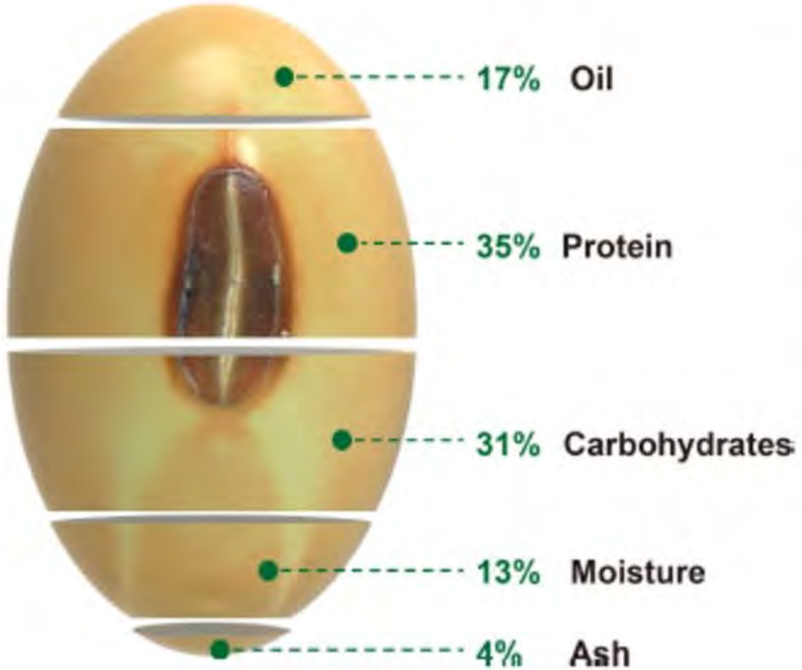


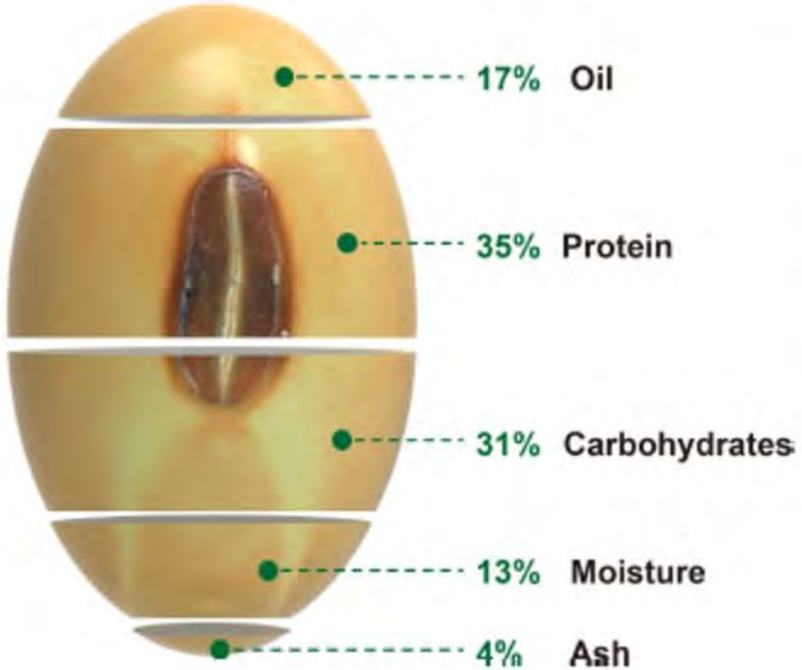
Classification of AA as EAA, NEAA, and CEAA in Animals[a]

Mammals[b]			Poultry			Fish		
EAA	NEAA	CEAA[c]	EAA	NEAA	CEAA[c]	EAA	NEAA	CEAA[c]
Arg	Ala	Gln	Arg	Ala	Gln	Arg	Ala	Gln
Cys	Asn	Glu	Cys	Asn	Glu	Cys	Asn	Glu
His	Asp	Gly	Gly	Asp	Tau	His	Asp	Gly
Ile	Ser	Pro	His	Ser		Ile	Ser	Tau
Leu		Tau	Ile			Leu		
Lys			Leu			Lys		
Met			Lys			Met		
Phe			Met			Phe		
Thr			Phe			Pro		
Trp			Pro			Thr		
Tyr			Thr			Trp		
Val			Trp			Tyr		
			Tyr			Val		
			Val					



Classification of AA as EAA, NEAA, and CEAA in Animals[a]

Mammals[b]			Poultry			Fish		
EAA	NEAA	CEAA[c]	EAA	NEAA	CEAA[c]	EAA	NEAA	CEAA[c]
Arg	Ala	Gln	Arg	Ala	Gln	Arg	Ala	Gln
Cys	Asn	Glu	Cys	Asn	Glu	Cys	Asn	Glu
His	Asp	Gly	Gly	Asp	Tau	His	Asp	Gly
Ile	Ser	Pro	His	Ser		Ile	Ser	Tau
Leu		Tau	Ile			Leu		
Lys			Leu			Lys		
Met			Lys			Met		
Phe			Met			Phe		
Thr			Phe			Pro		
Trp			Pro			Thr		
Tyr			Thr			Trp		
Val			Trp			Tyr		
			Tyr			Val		
			Val					



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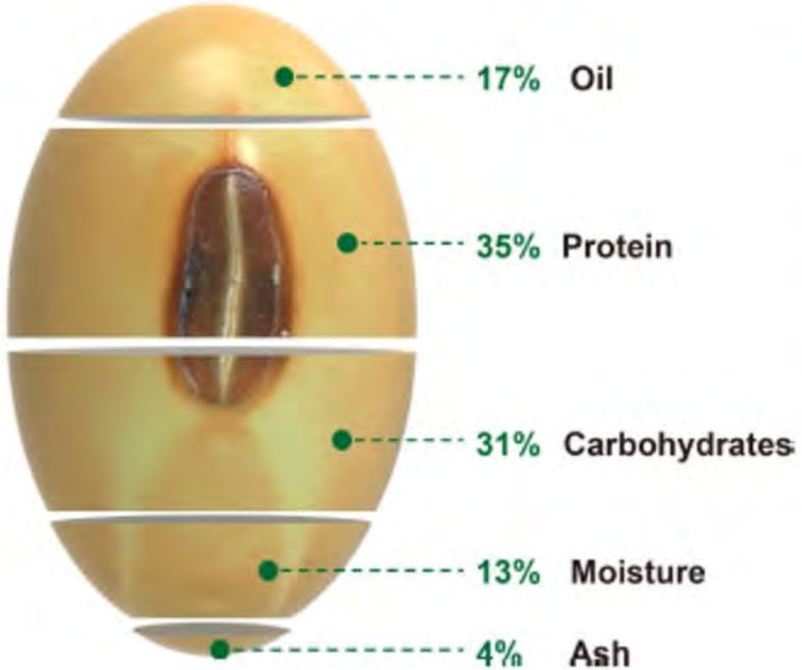
Arg	Ala	Gln	Arg	Ala	Gln	Arg	Ala	Gln
Cys	Asn	Glu	Cys	Asn	Glu	Cys	Asn	Glu
His	Asp	Gly	Gly	Asp	Tau	His	Asp	Gly
Ile	Ser	Pro	His	Ser		Ile	Ser	Tau
Leu		Tau	Ile			Leu		
Lys			Leu			Lys		
Met			Lys			Met		
Phe			Met			Phe		
Thr			Phe			Pro		
Trp			Pro			Thr		
Tyr			Thr			Trp		
Val			Trp			Tyr		
			Tyr			Val		
			Val					



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His	Asp	Gly	Gly	Asp	Tau	His	Asp	Gly
Ile	Ser	Pro	His	Ser		Ile	Ser	Tau
Leu		Tau	Ile			Leu		
Lys			Leu			Lys		
Met			Lys			Met		
Phe			Met			Phe		
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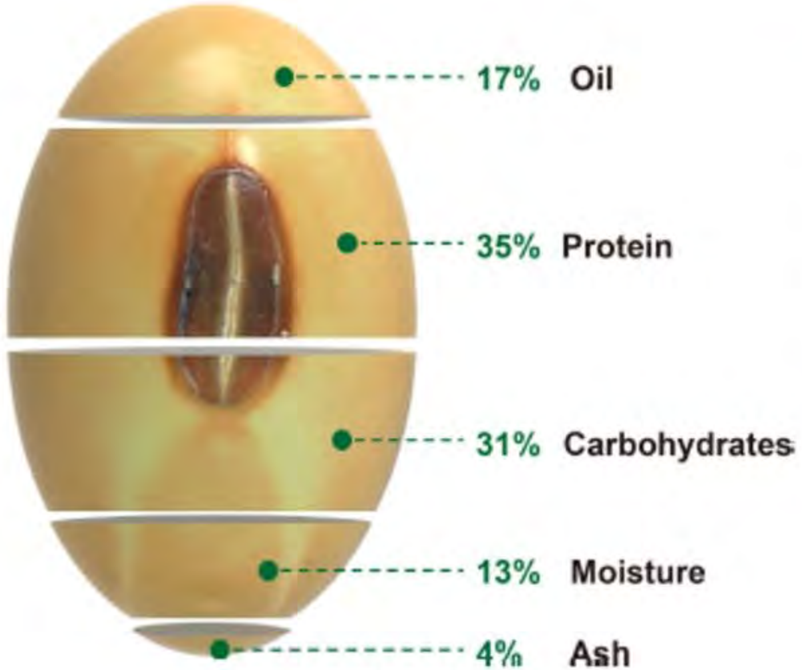
Tyr			Thr			Trp		
Val			Trp			Tyr		
			Tyr			Val		
			Val					



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Val			Trp			Tyr		
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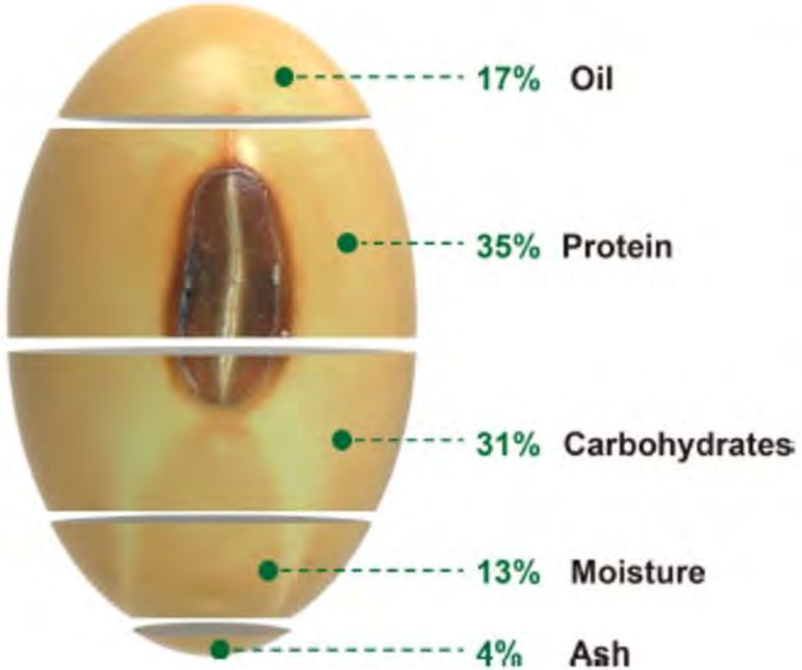
			Val					



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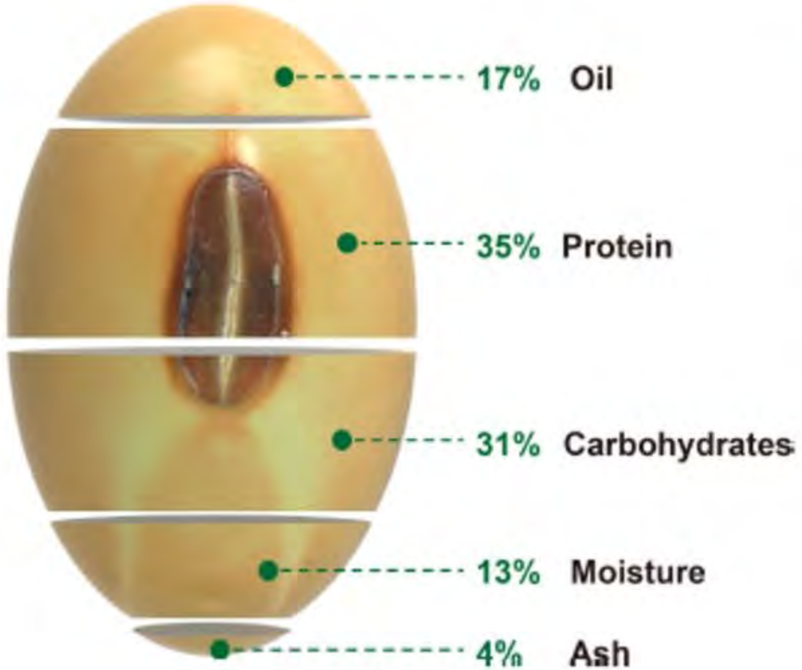
			Tyr			Val		
			Val					



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His	Asp	Gly	Gly	Asp	Tau	His	Asp	Gly
Ile	Ser	Pro	His	Ser		Ile	Ser	Tau
Leu		Tau	Ile			Leu		
Lys			Leu			Lys		
Met			Lys			Met		
Phe			Met			Phe		
Thr			Phe			Pro		
Trp			Pro			Thr		
Tyr			Thr			Trp		
Val			Trp			Tyr		
			Tyr			Val		
			Val					

Multifunctional Molecules

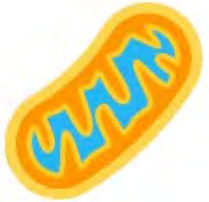
Multifunctional Molecules

Multifunctional Molecules

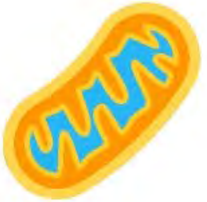
Multifunctional Molecules

Multifunctional Molecules

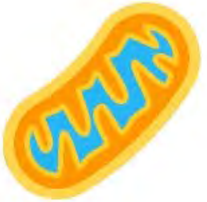
Multifunctional Molecules



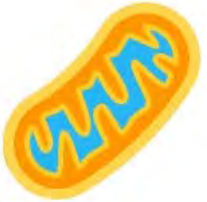
Multifunctional Molecules

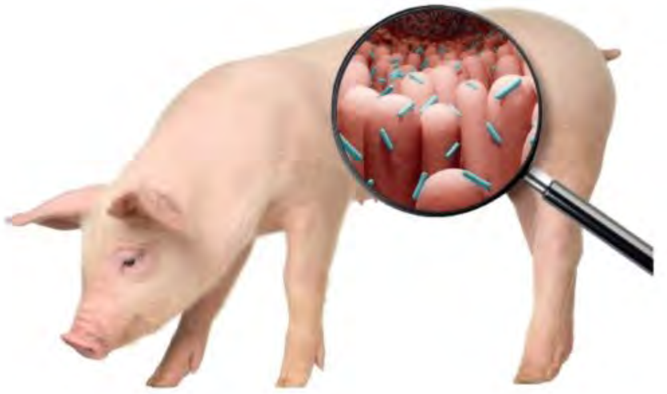


Multifunctional Molecules



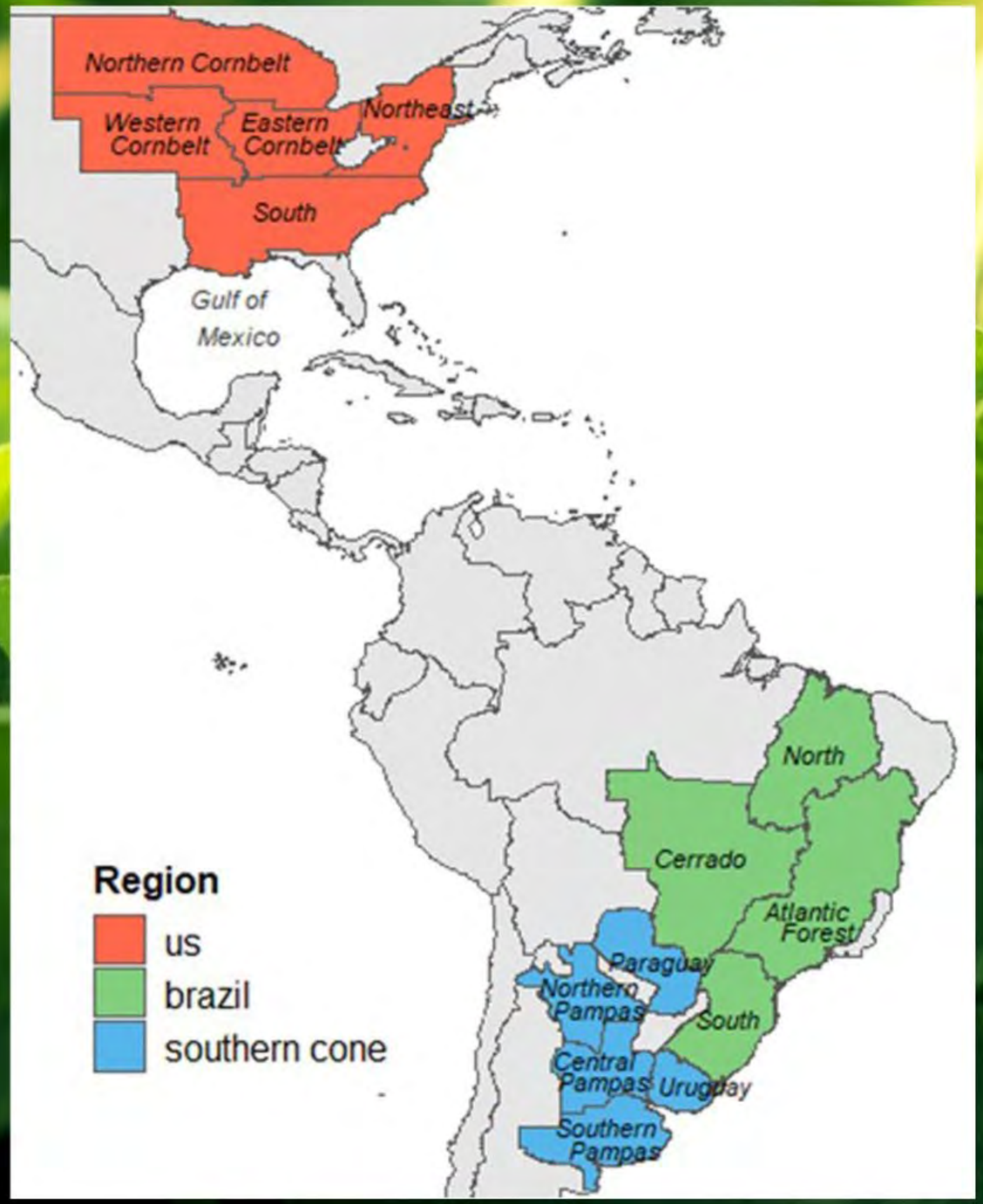
Multifunctional Molecules



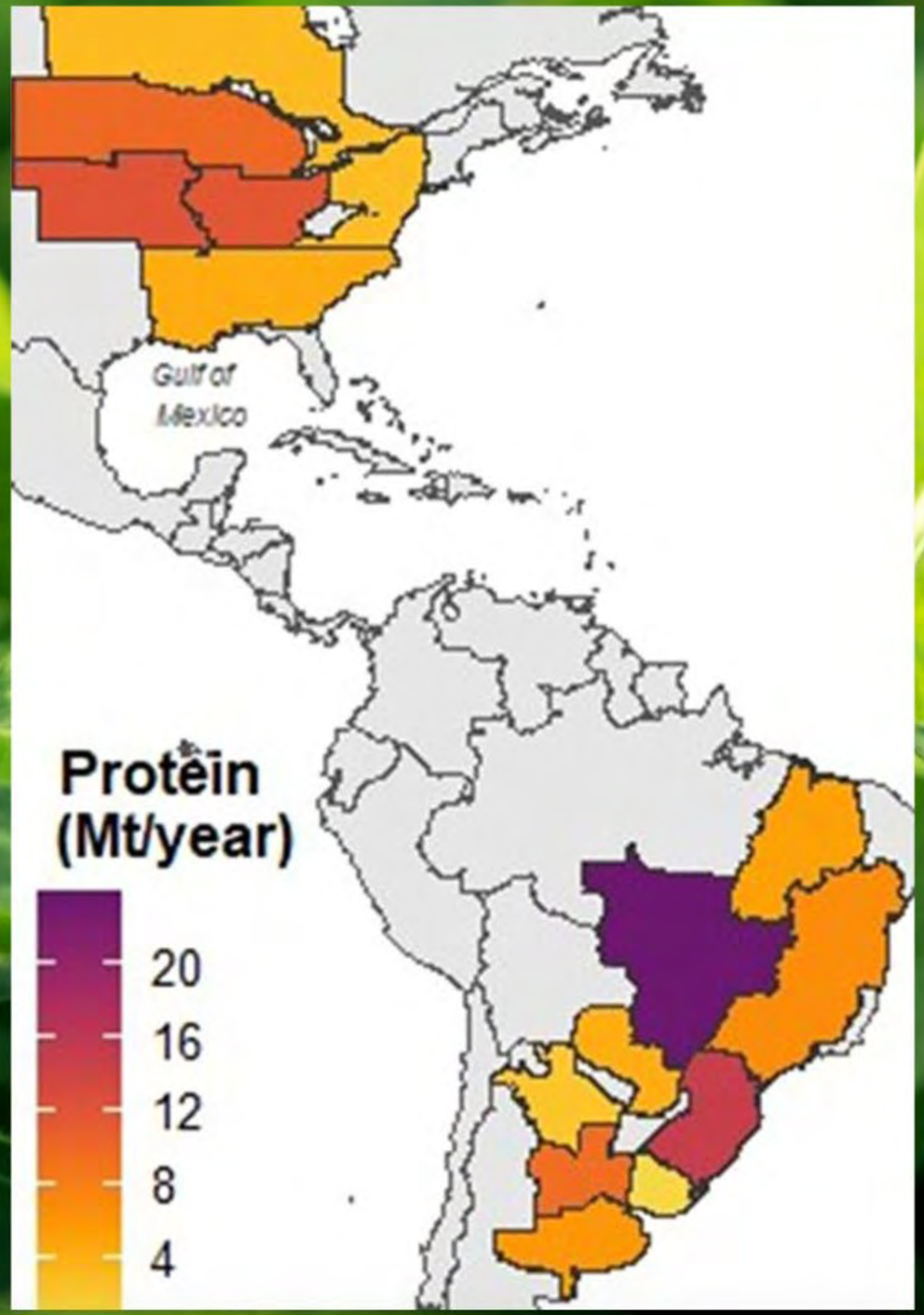


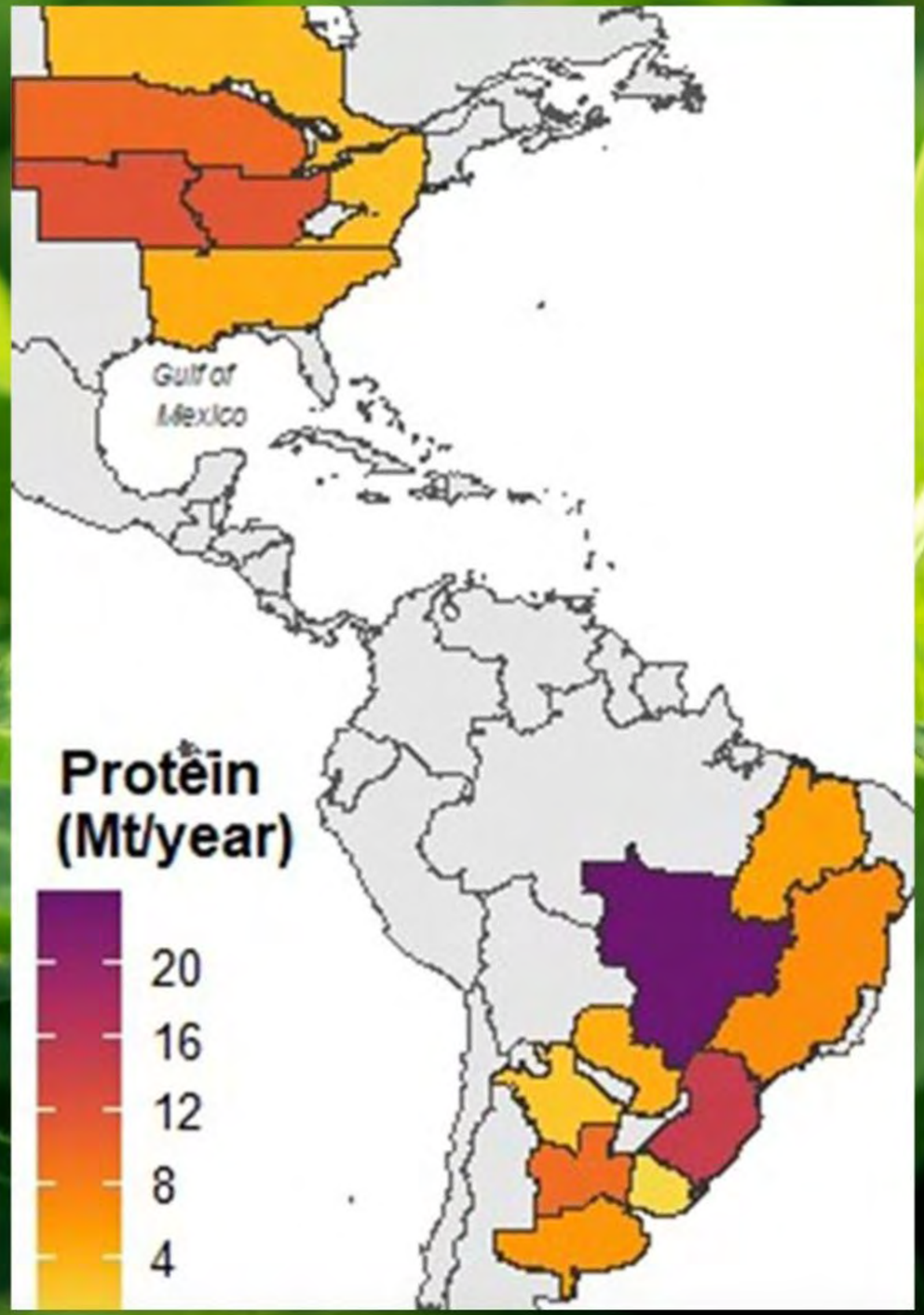
Origins

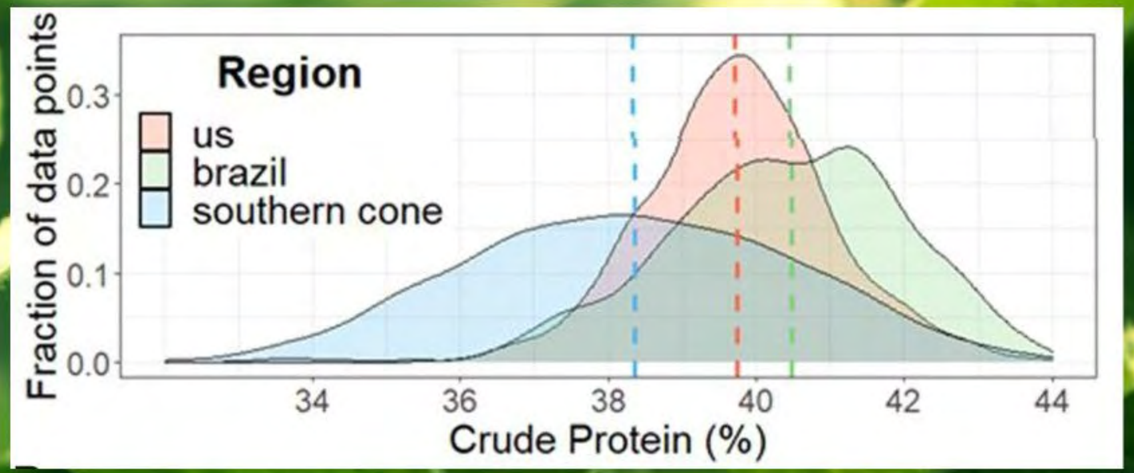
Origins

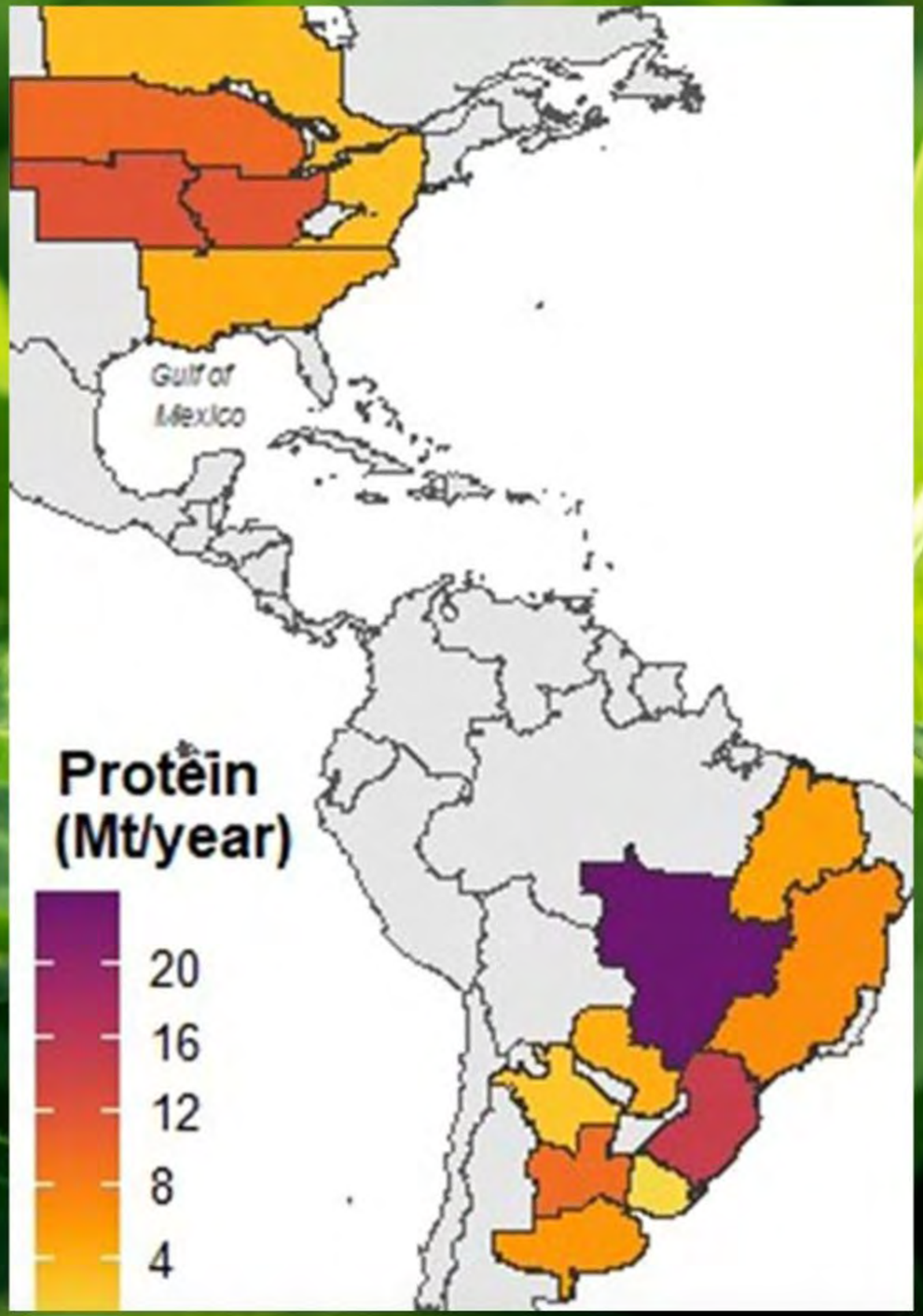

Northern Cornbelt
Western Cornbelt
Eastern Cornbelt
Northeast
South
Gulf of Mexico
North
Cerrado
Atlantic Forest
Paraguay
Northern Pampas
South
Central Pampas
Uruguay
Southern Pampas
Region
us
brazil
southern cone

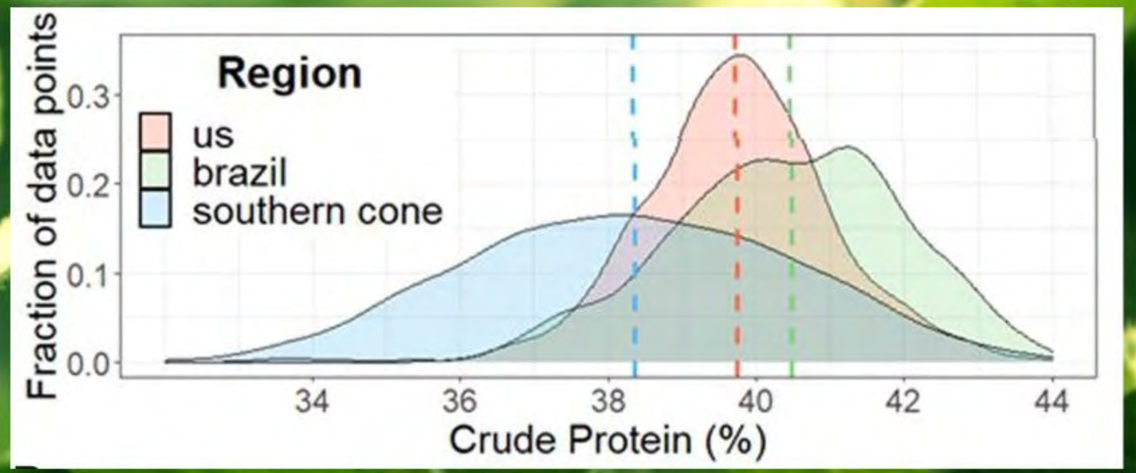
Origins


Gulf of Mexico
Protein (Mt/year)
20
16
12
8
4


Gulf of Mexico
Protein (Mt/year)
20
16
12
8
4


Region
us
brazil
southern cone
Fraction of data points
0.0
0.1
0.2
0.3
34
36
38
40
42
44
Crude Protein (%)


Gulf of Mexico
Protein (Mt/year)
20
16
12
8
4


Region
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brazil
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Fraction of data points
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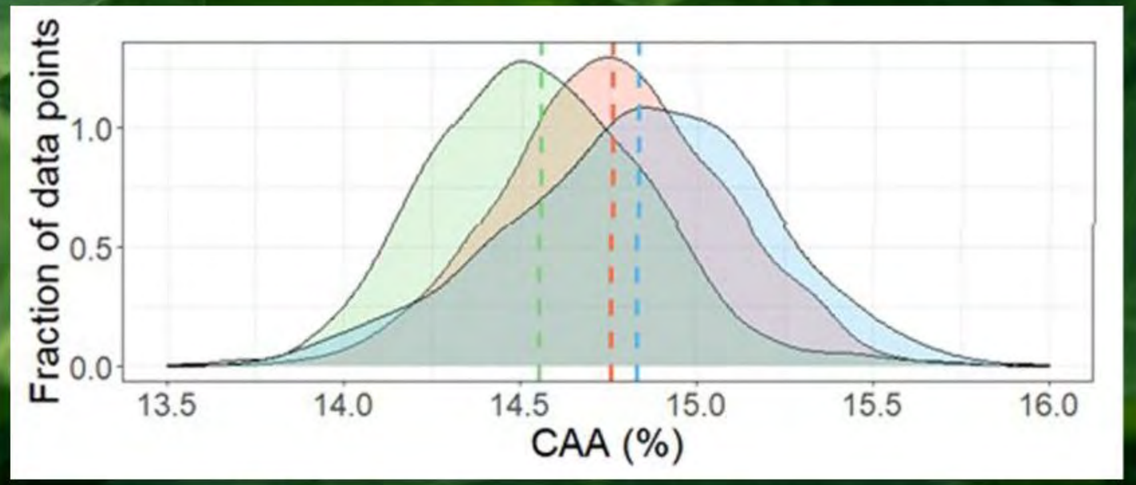
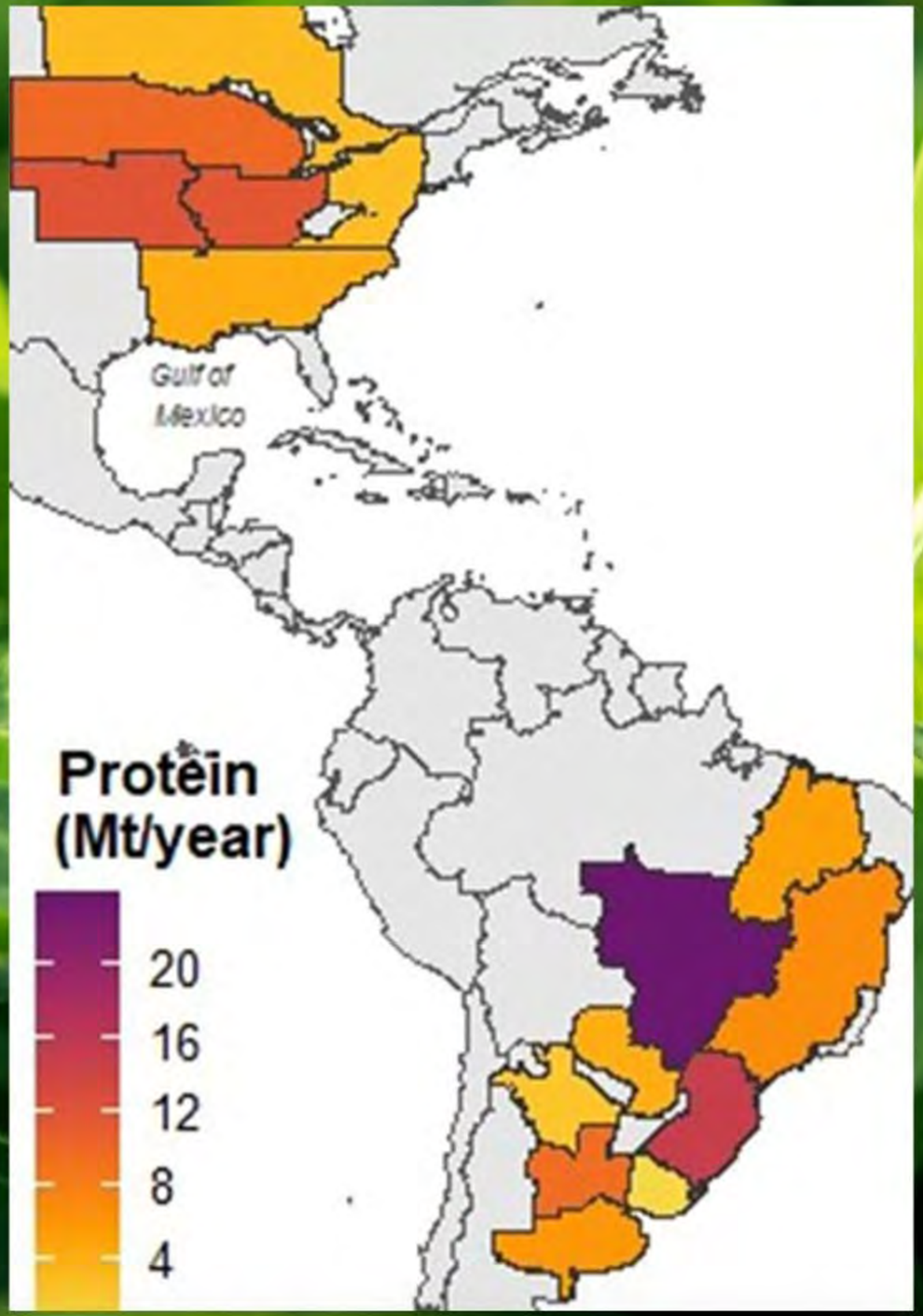
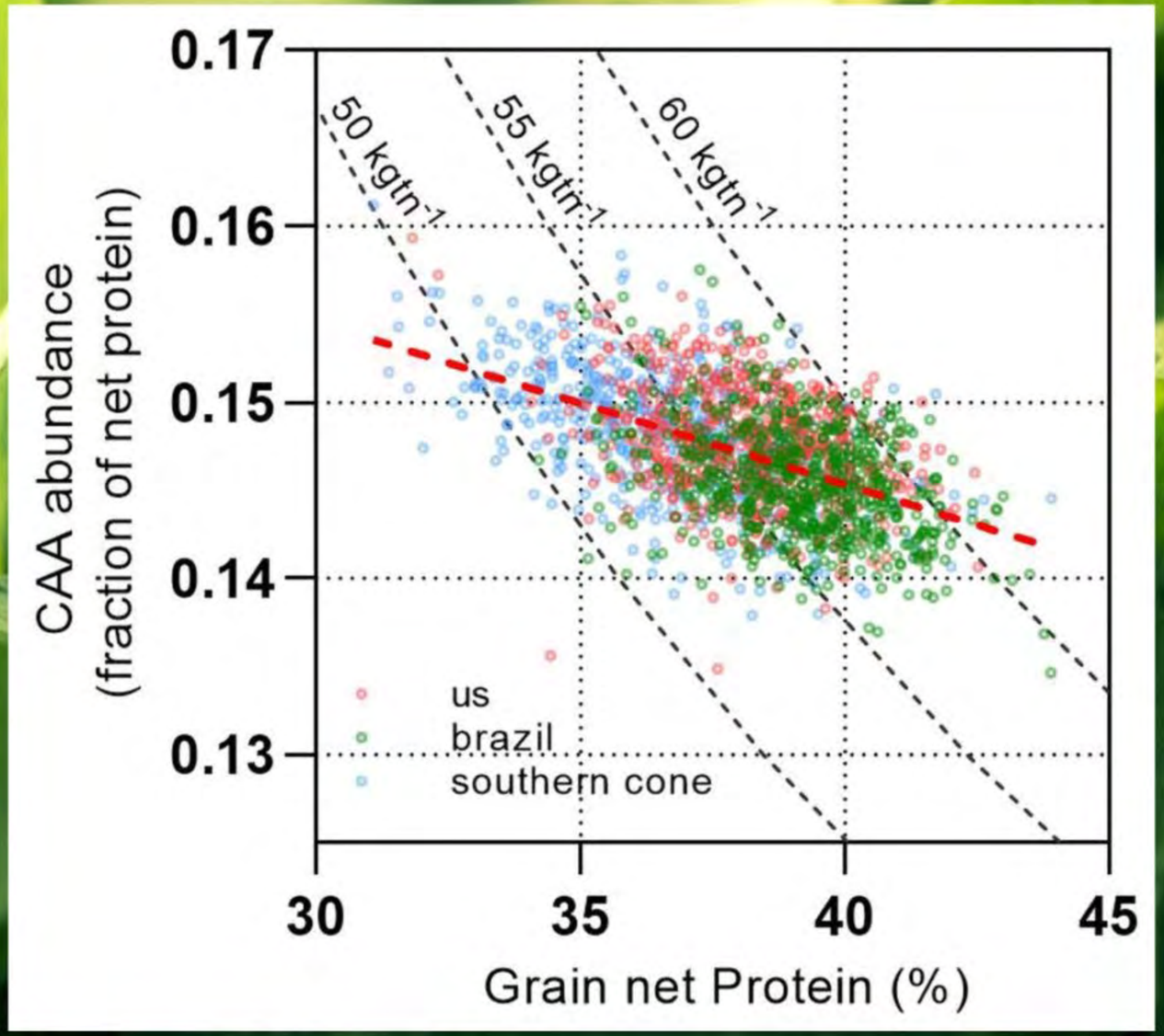
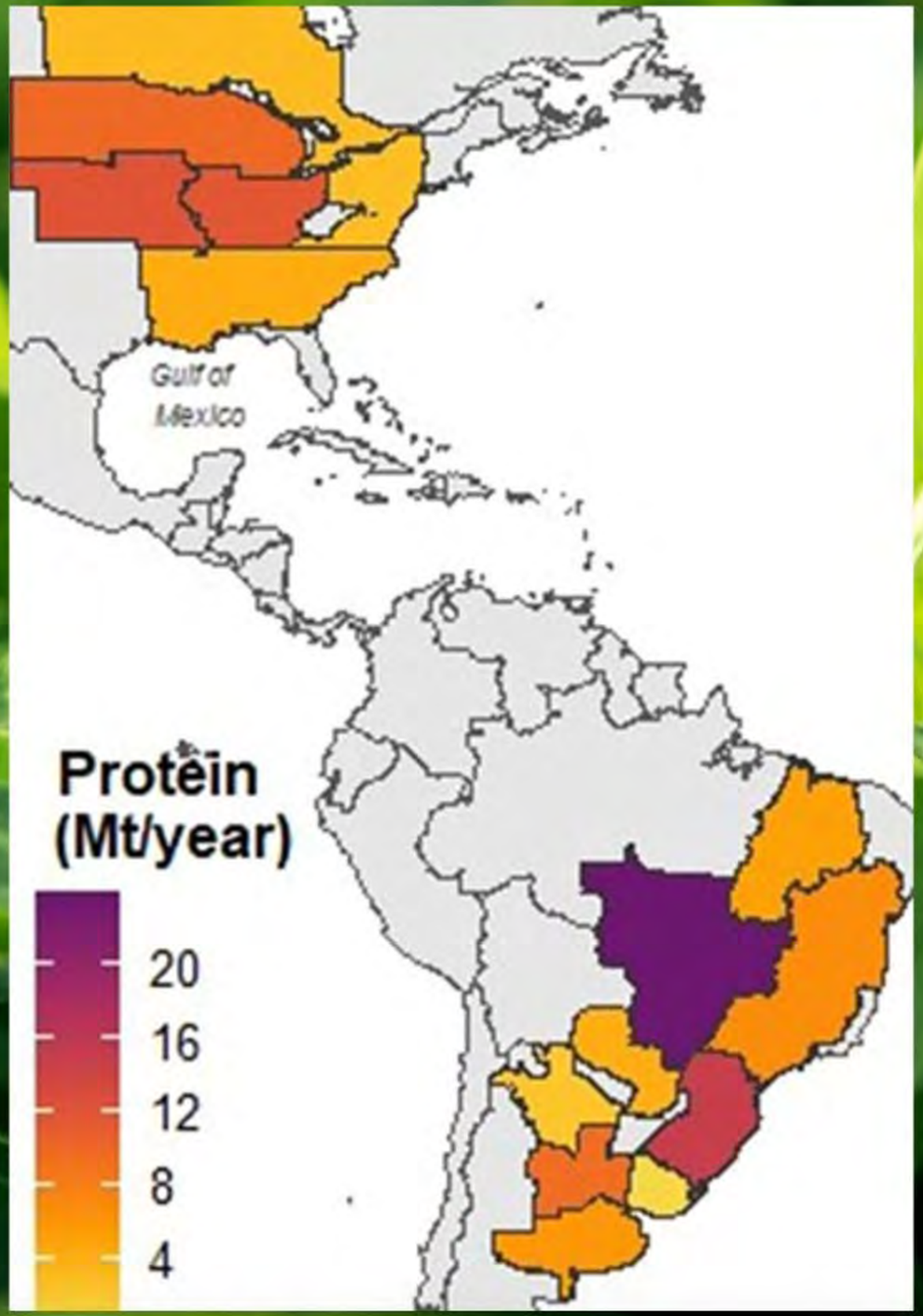
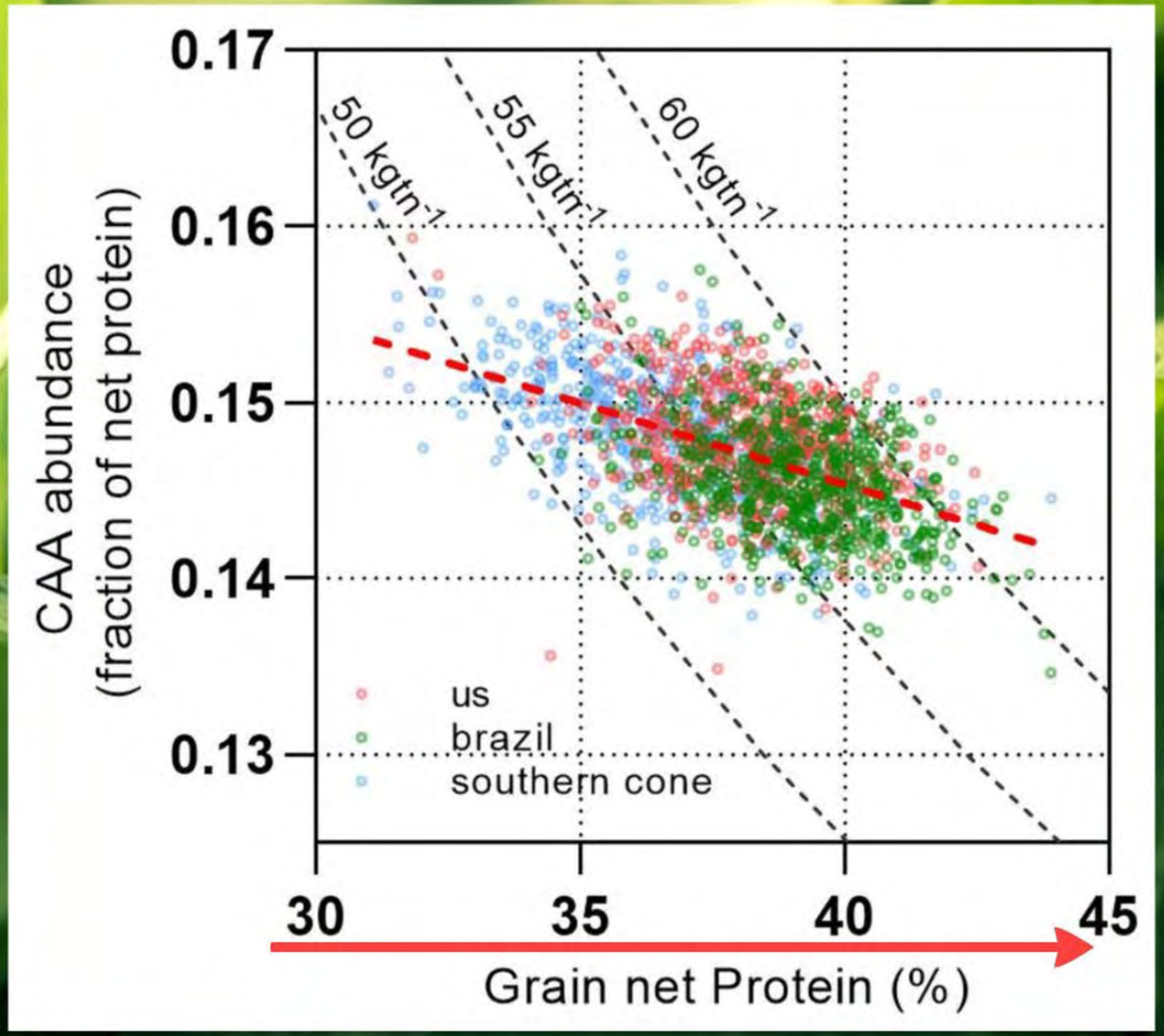
Crude Protein (%)


Fraction of data points
0.0
0.5
1.0
13.5
14.0
14.5
15.0
15.5
16.0
CAA (%)


Gulf of Mexico
Protein (Mt/year)
20
16
12
8
4


0.17
0.16
0.15
0.14
0.13
50 kgtn-1
55 kgtn-1
60 kgtn-1
CAA abundance
(fraction of net protein)
us
brazil
southern cone
30
35
40
45
Grain net Protein (%)


Gulf of Mexico
Protein (Mt/year)
20
16
12
8
4


0.17
0.16
0.15
0.14
0.13
50 kgtn-1
55 kgtn-1
60 kgtn-1
CAA abundance
(fraction of net protein)
us
brazil
southern cone
30
35
40
45
Grain net Protein (%)

United States Soybean Meal Quality Differentiators

Harvest and storage.
Consistency (post-harvest and processing).
Amino acids profile.
Energy content.

United States Soybean Meal Quality Differentiators

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United States Soybean Meal Quality Differentiators

Harvest and storage.
Consistency (post-harvest and processing).
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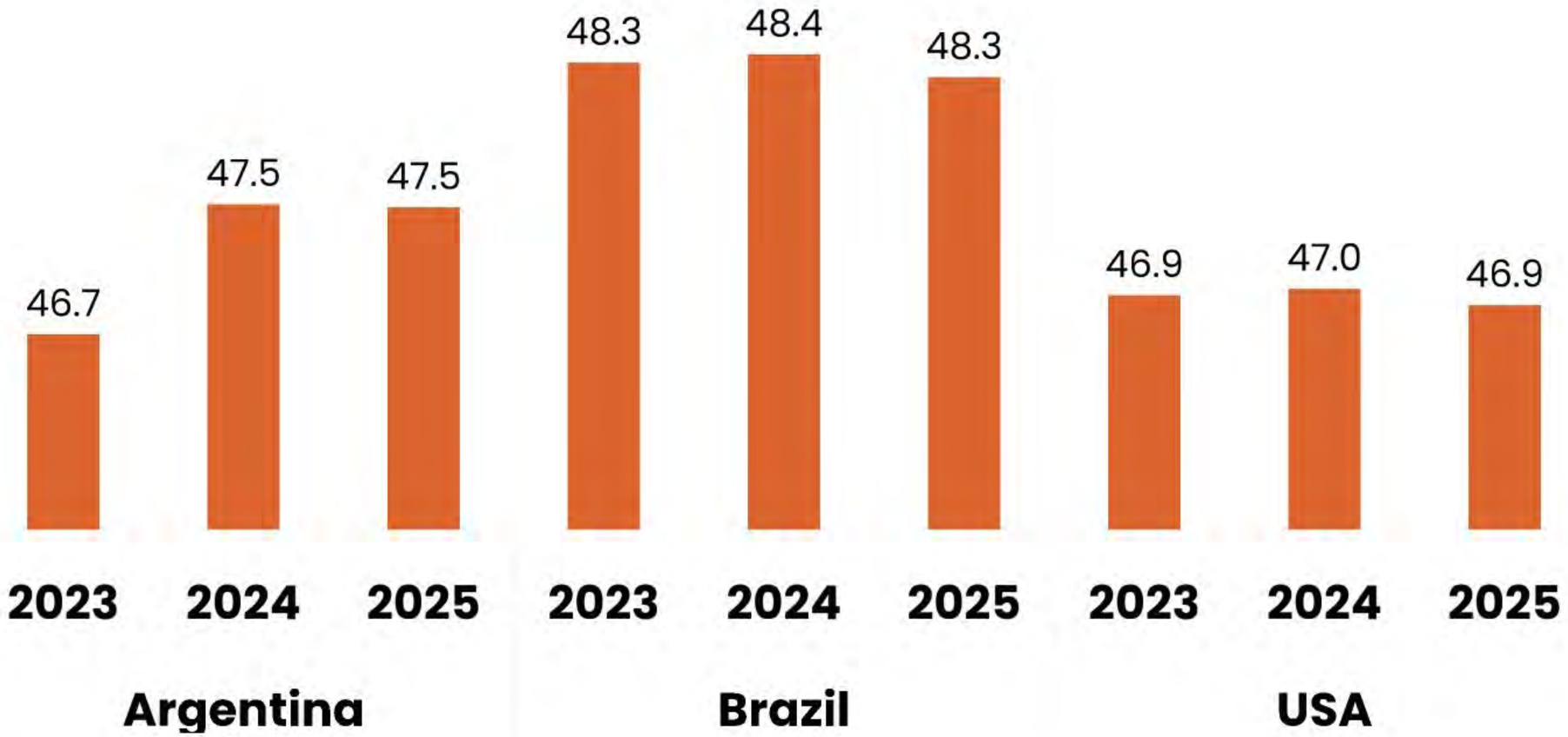
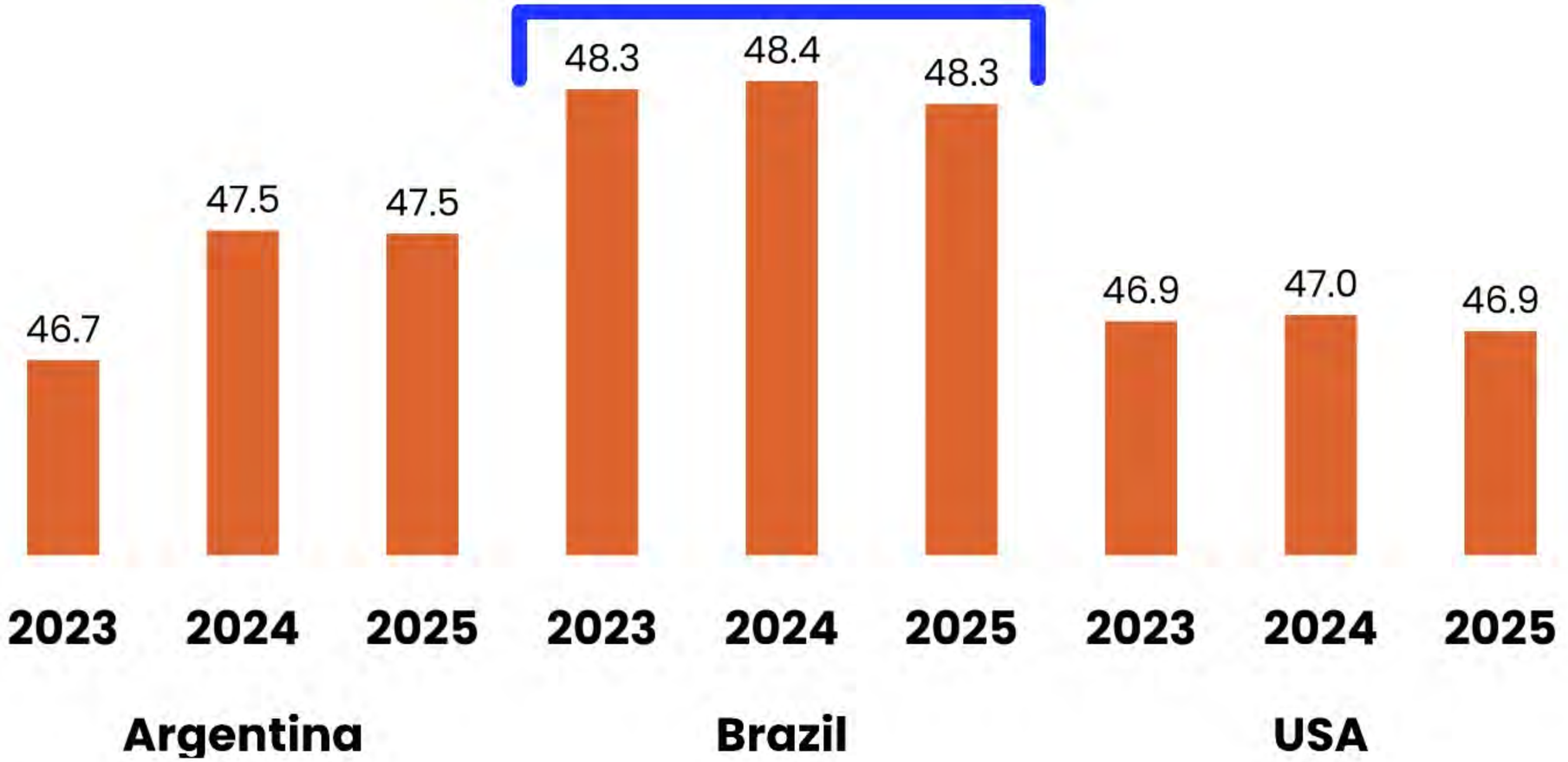
Crude Protein*, %



*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Crude Protein*, %



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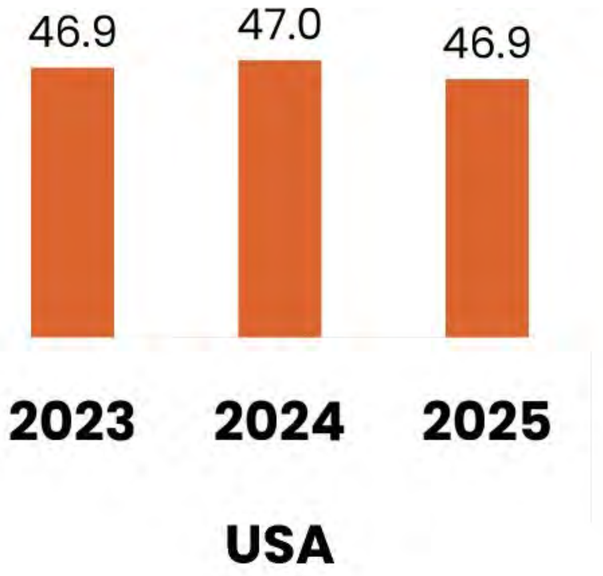
Crude Protein*, %



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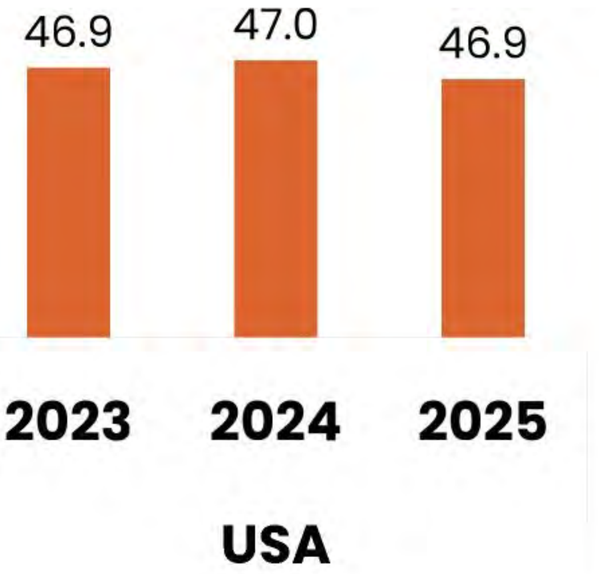
Crude Protein*, %

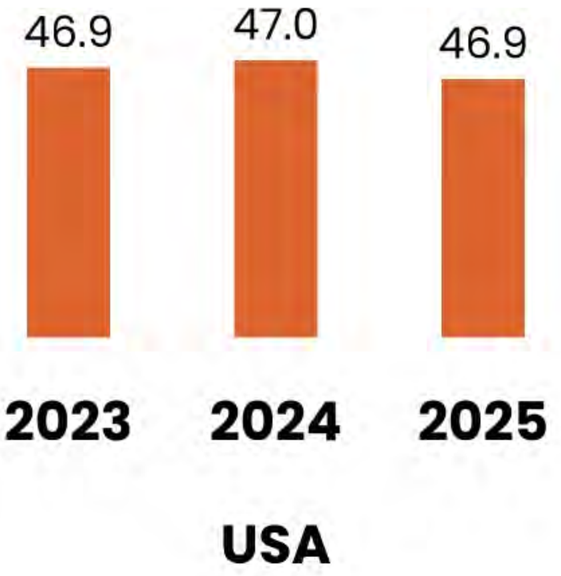


*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Crude Protein*, %

The average protein level of the 2024 crop was 34.0%.

The highest average protein level since 2019, and similar to the average of the previous ten years.



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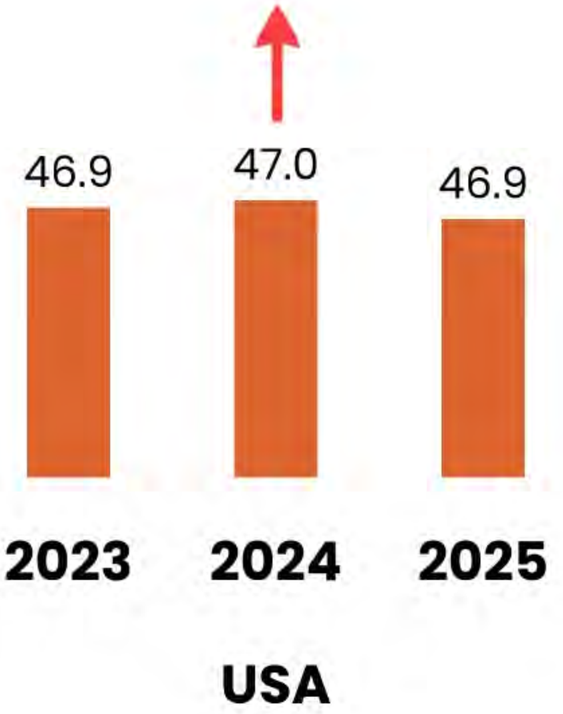
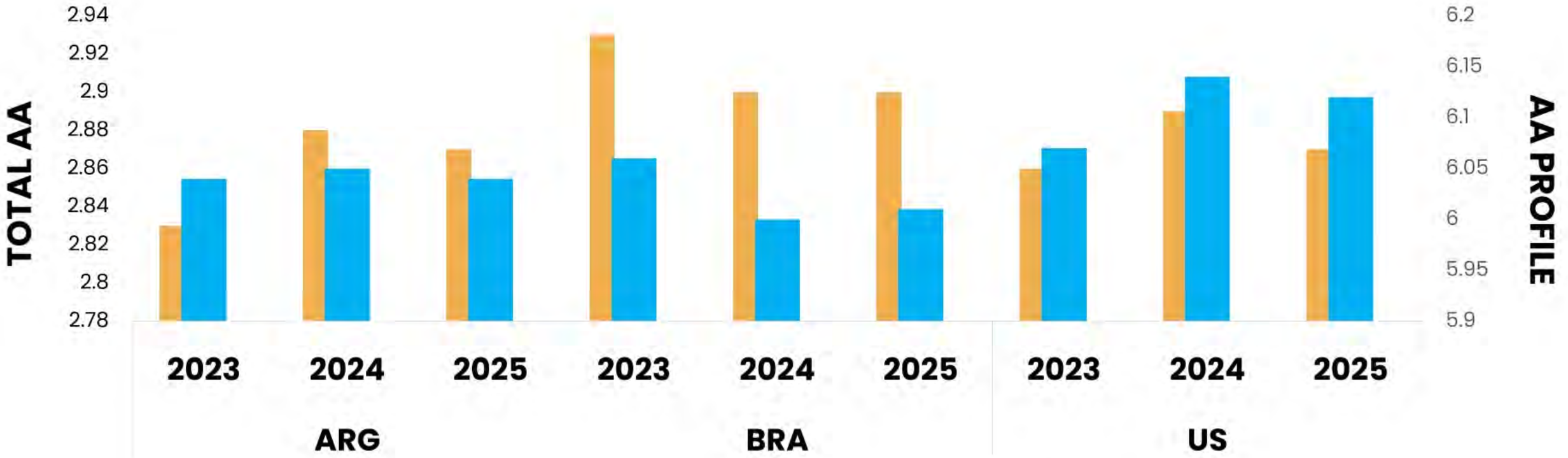


*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Lysine*



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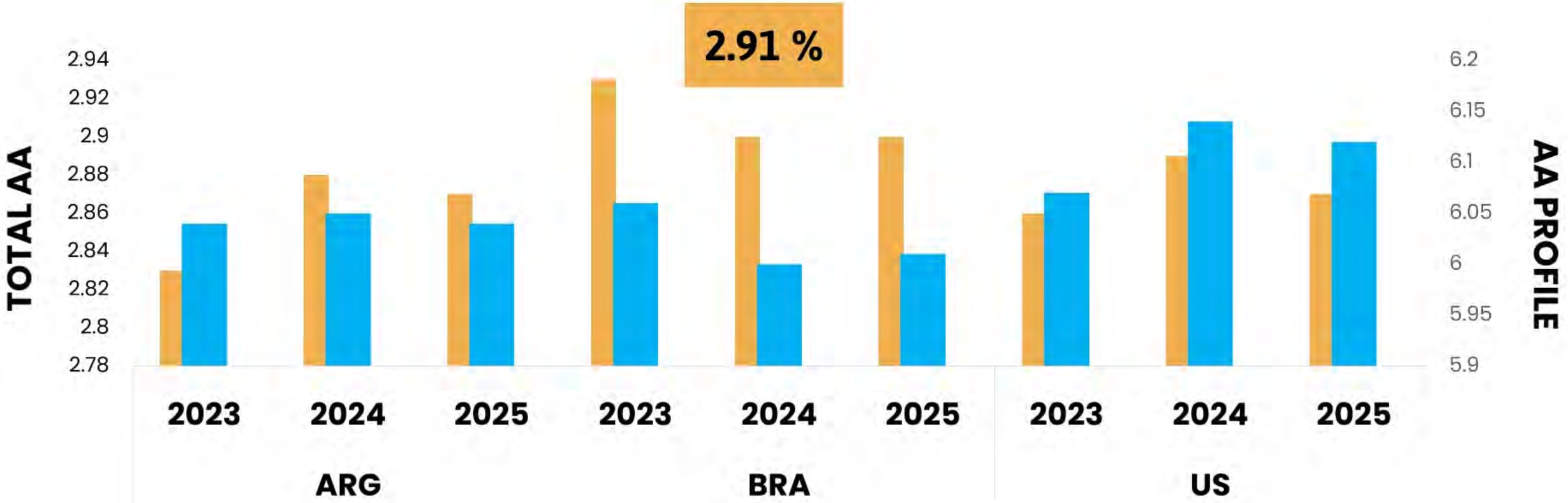
Lysine*



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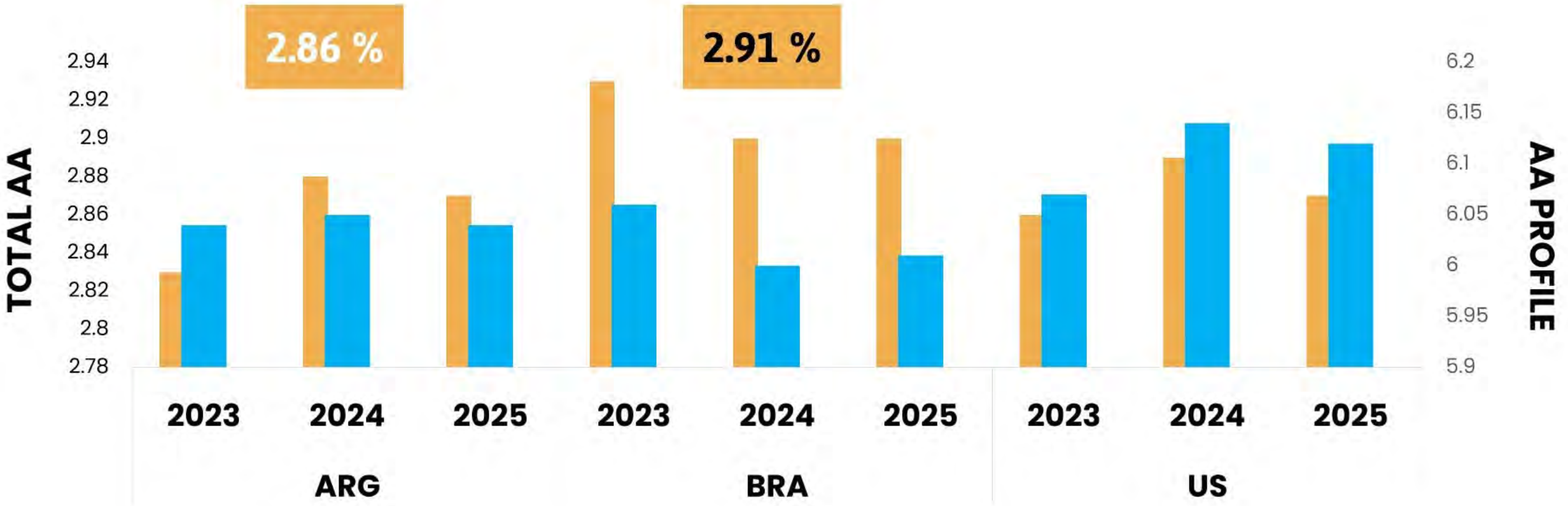
Lysine*



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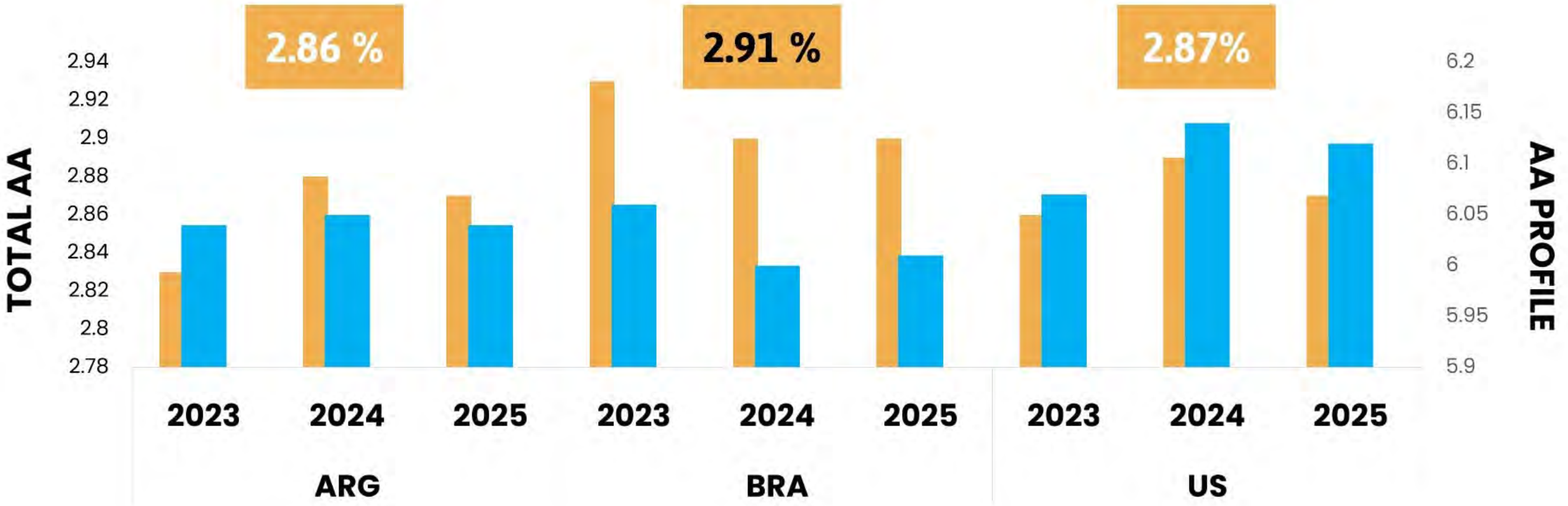
Lysine*



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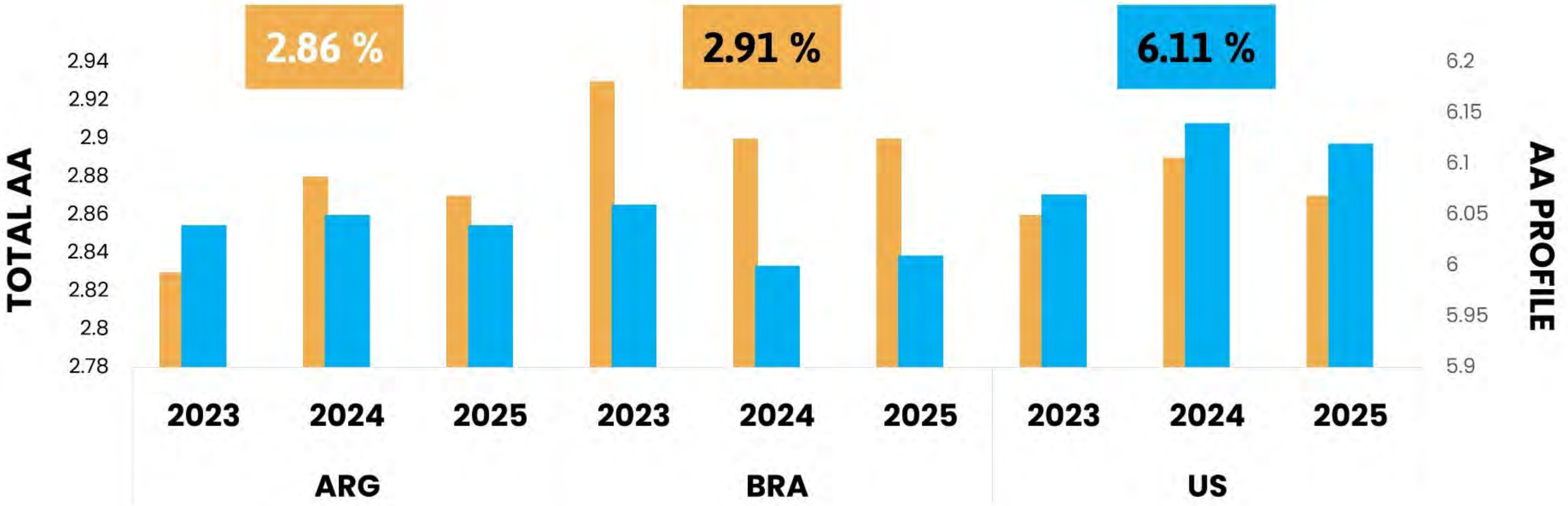
Lysine*



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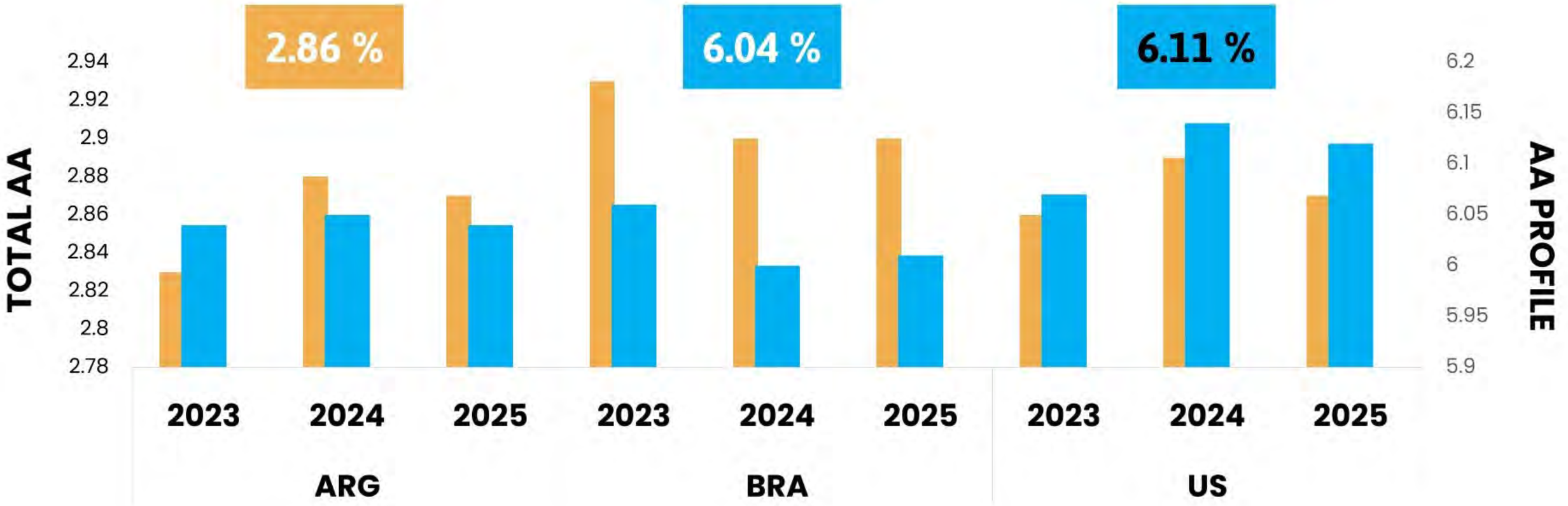
Lysine*



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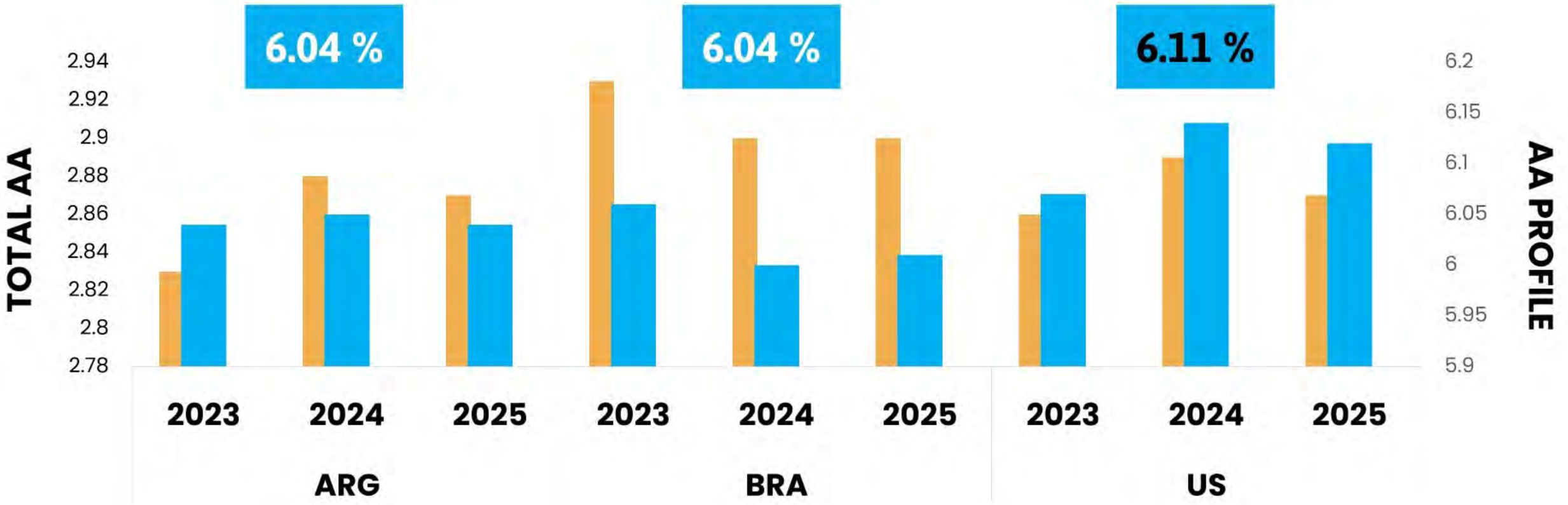
Lysine*



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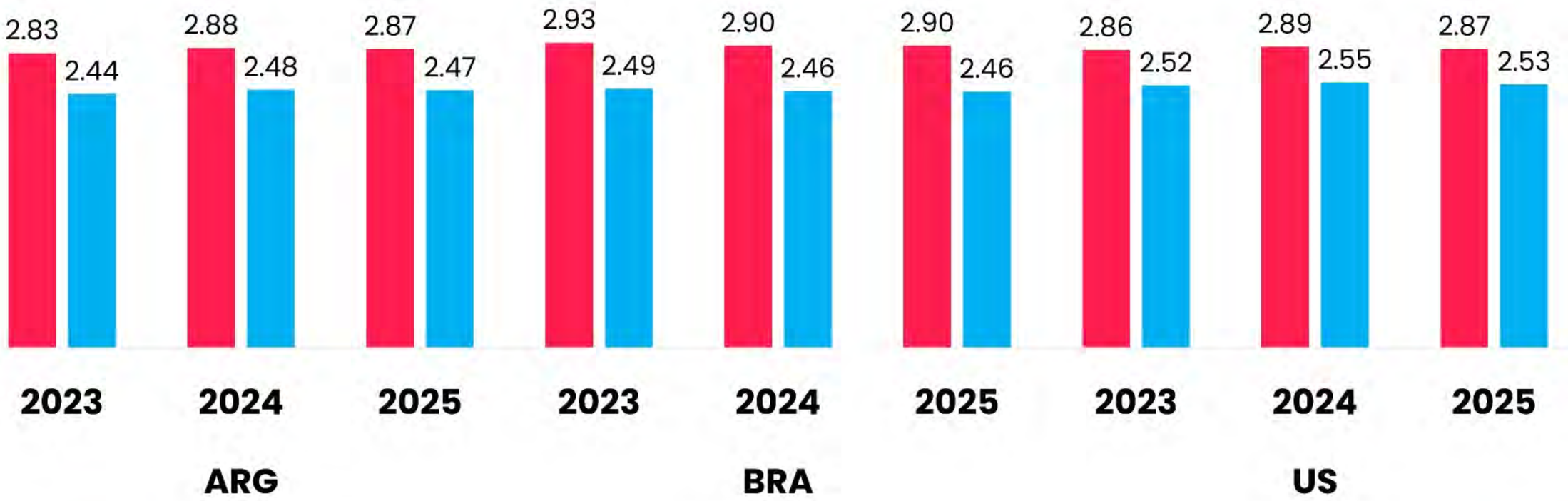
Total AA* vs. Digestible AA



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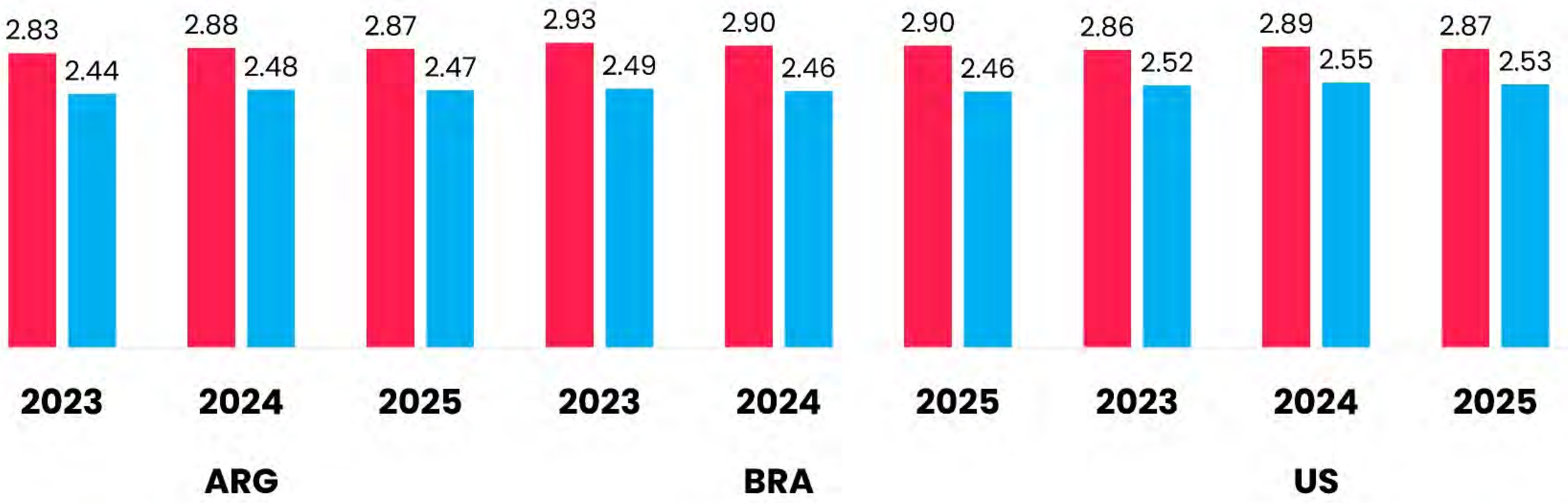
Lys

Total AA* vs. Digestible AA



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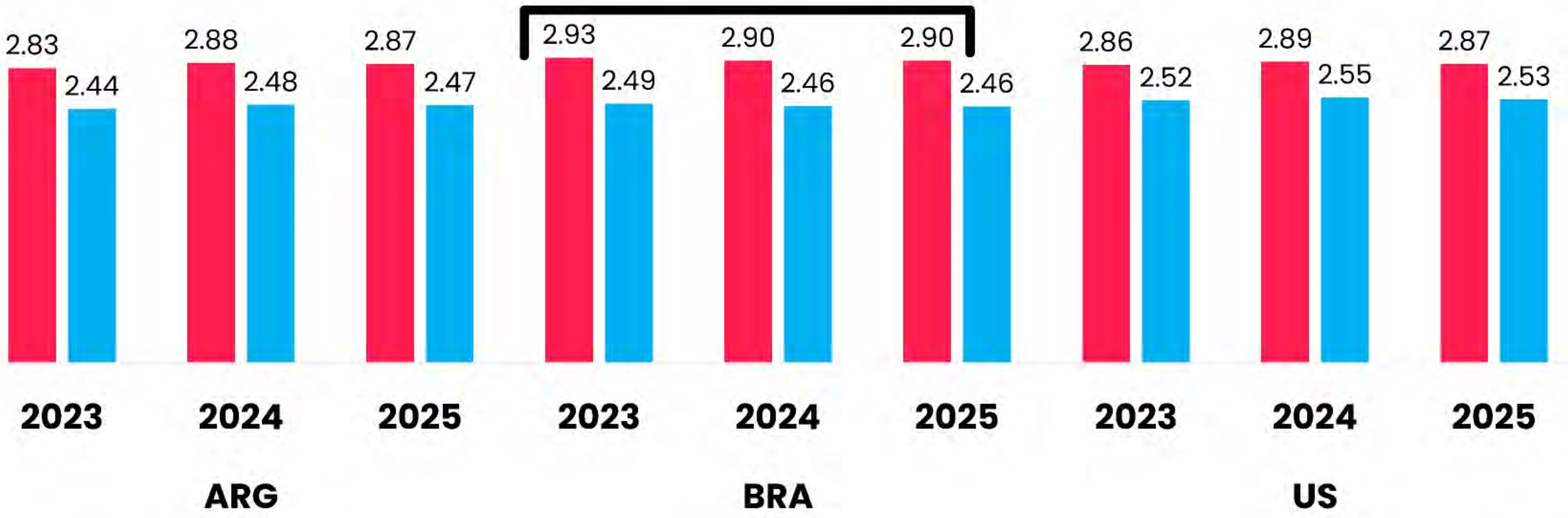
Lys

Total AA* vs. Digestible AA



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Lys

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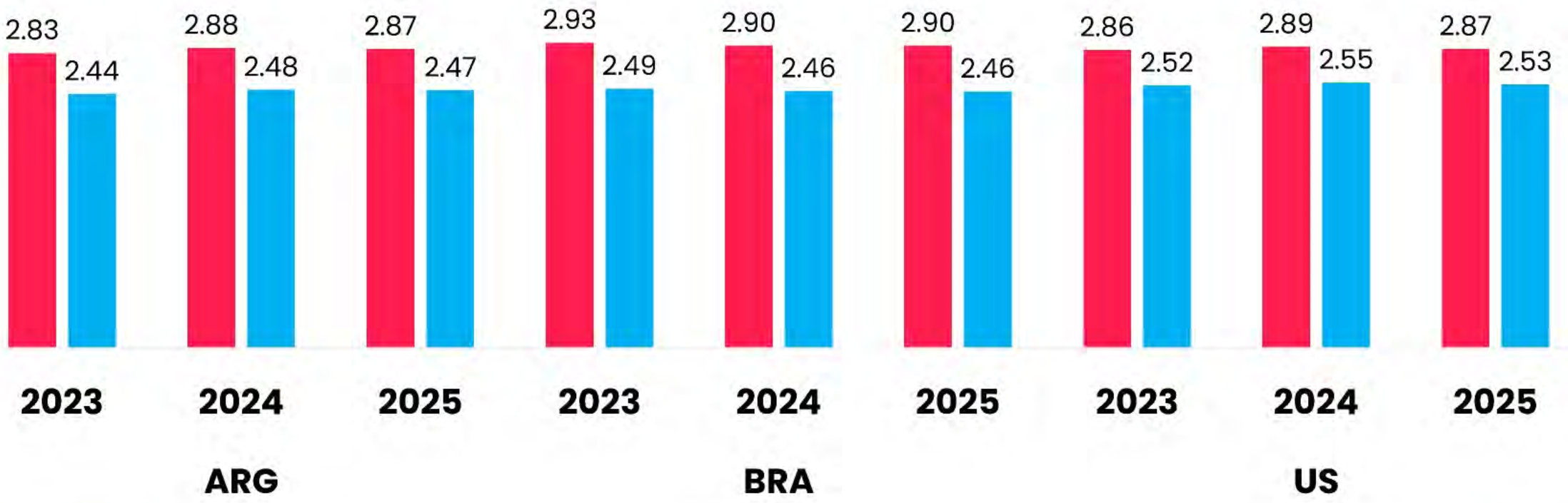

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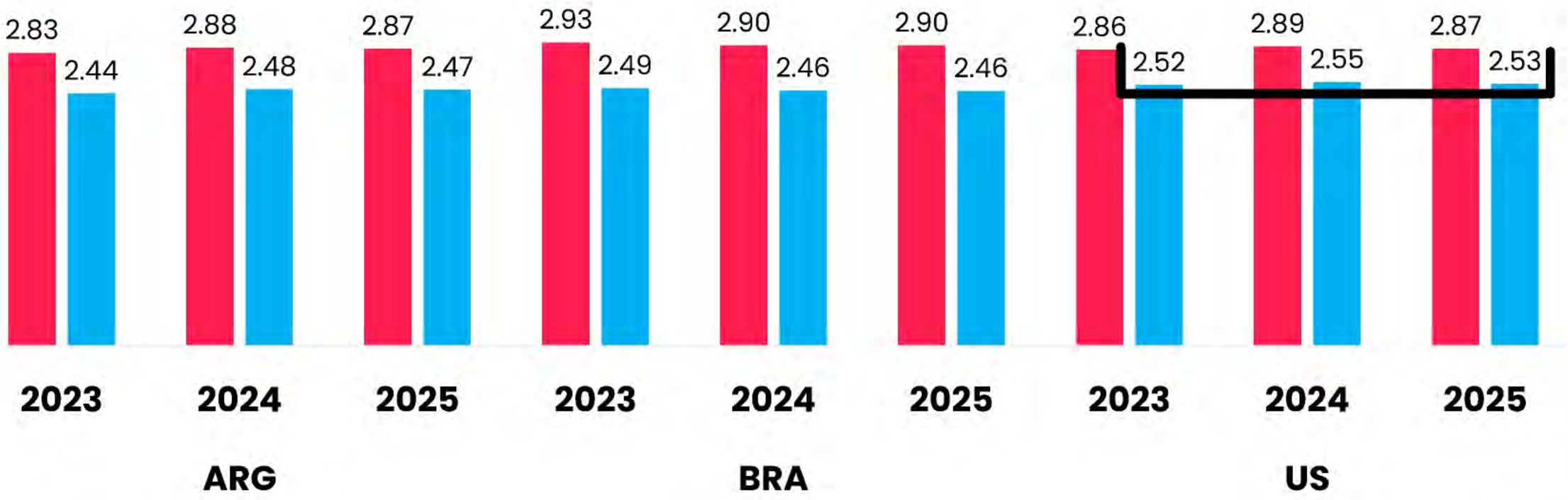
Lys

Total AA* vs. Digestible AA



*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Total AA* vs. Digestible AA

*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

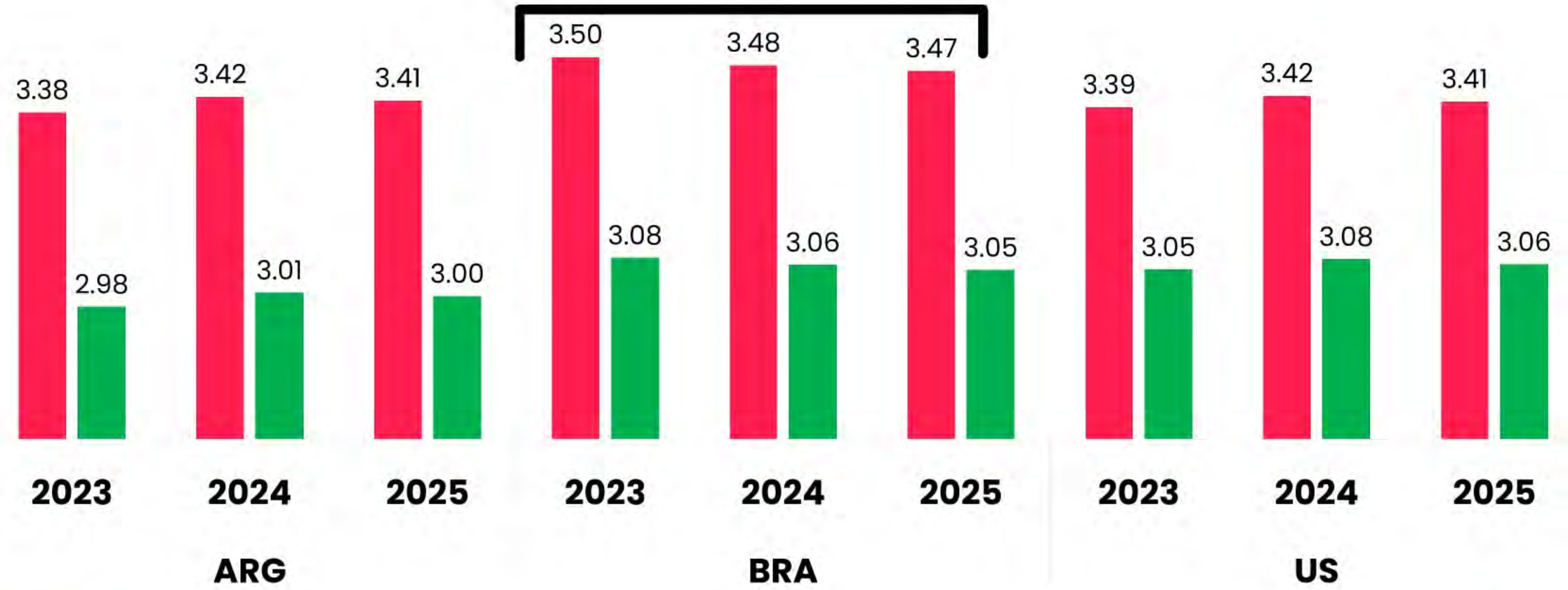
Arg

Total AA* vs. Digestible AA

*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Arg

Total AA* vs. Digestible AA



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Arg

Total AA* vs. Digestible AA

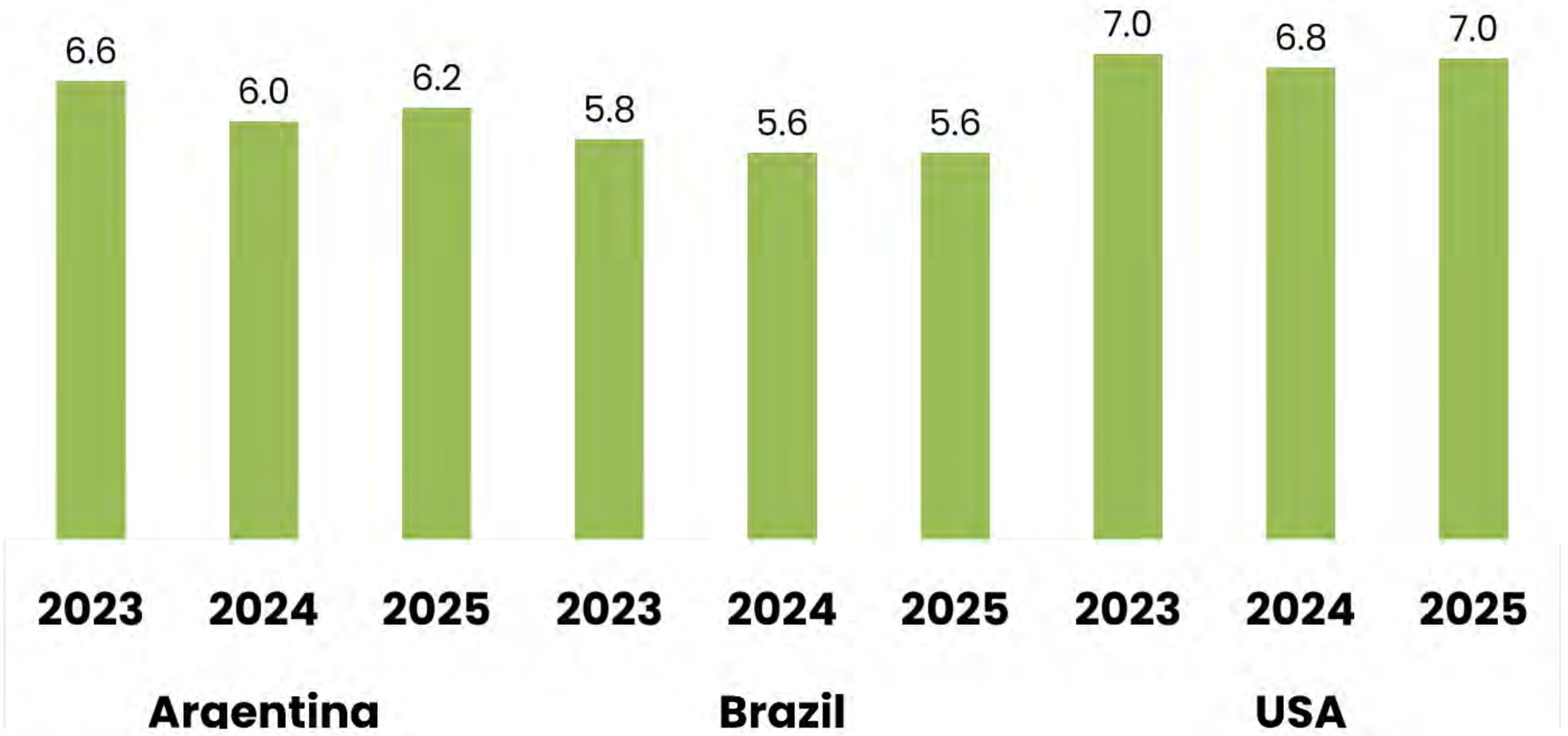
*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Arg

Total AA* vs. Digestible AA

*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Sucrose*, %



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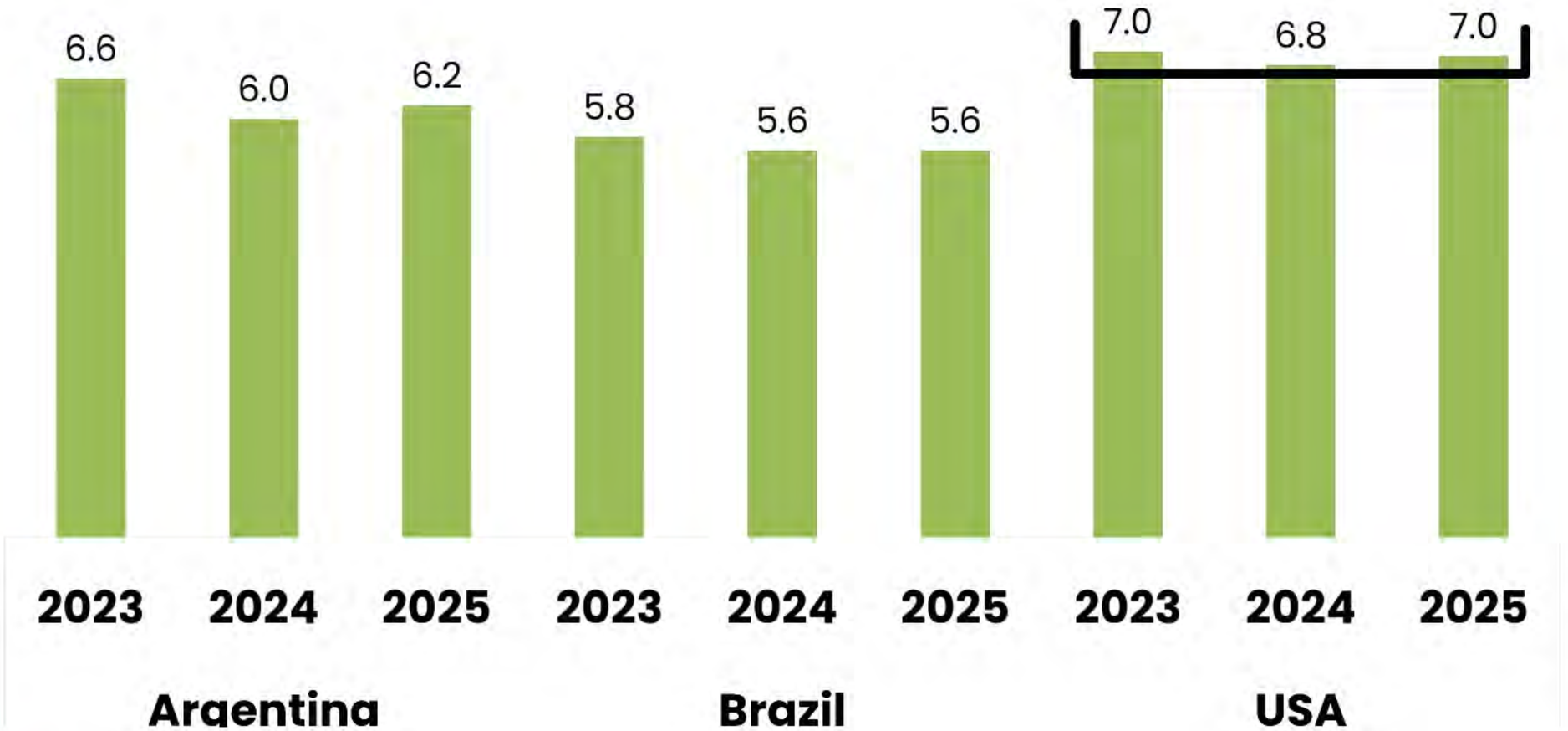
Sucrose*, %



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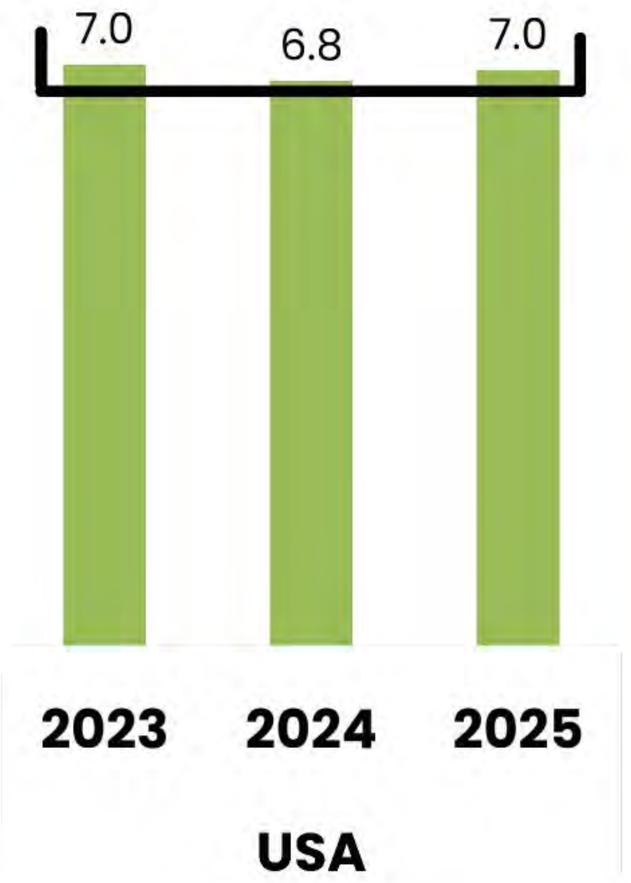
Sucrose*, %



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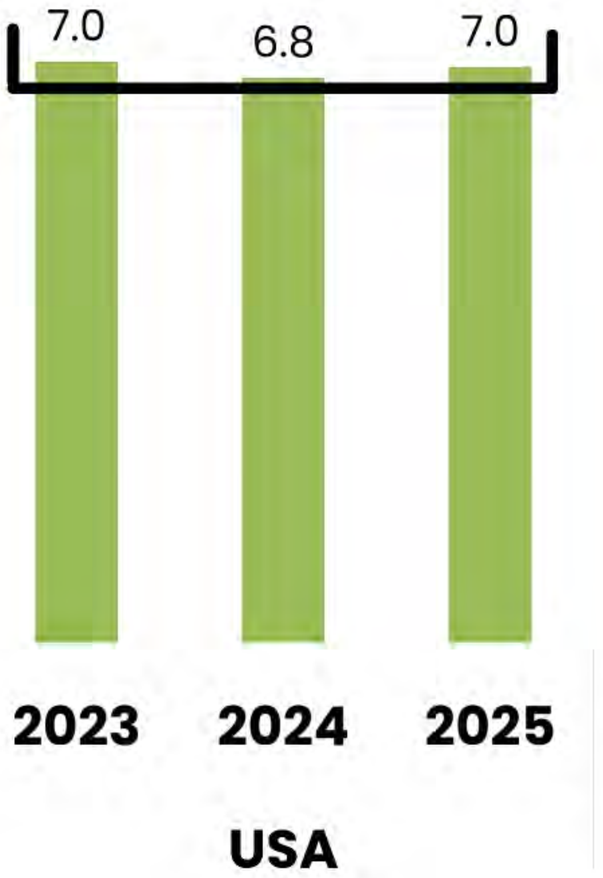
Sucrose*, %

It contributes ≈3.9 kcal/g of energy (Stein et al., 2008).



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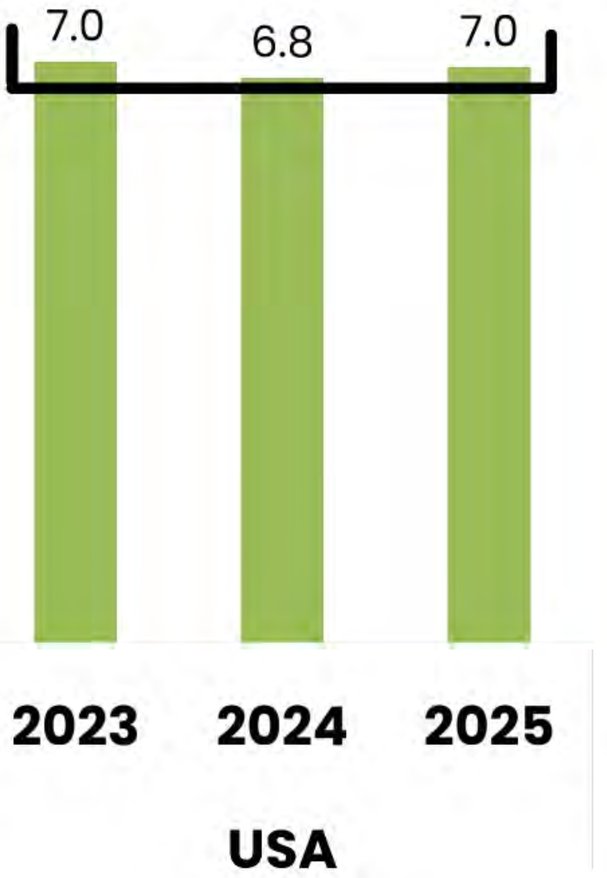

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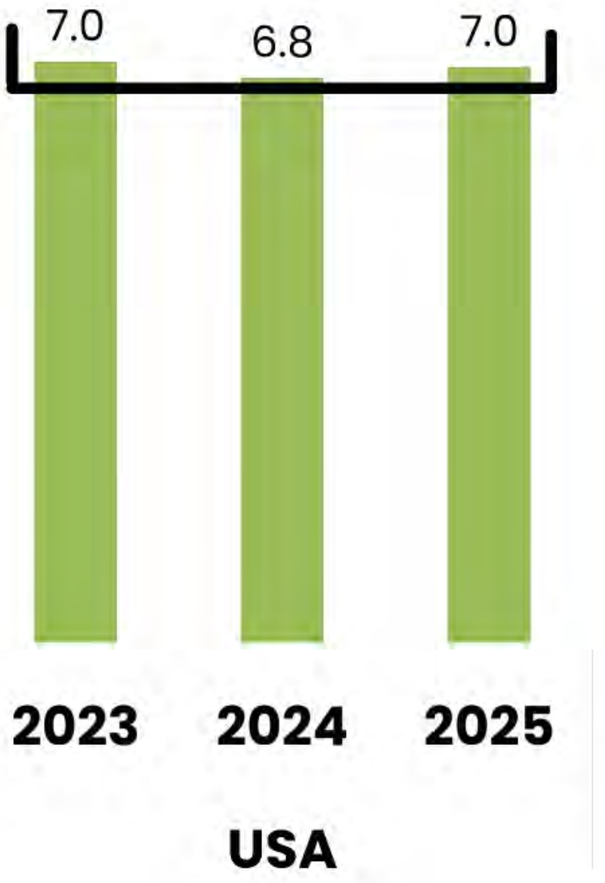
It shows some trade-offs with protein, expressing higher concentrations where protein is lower.



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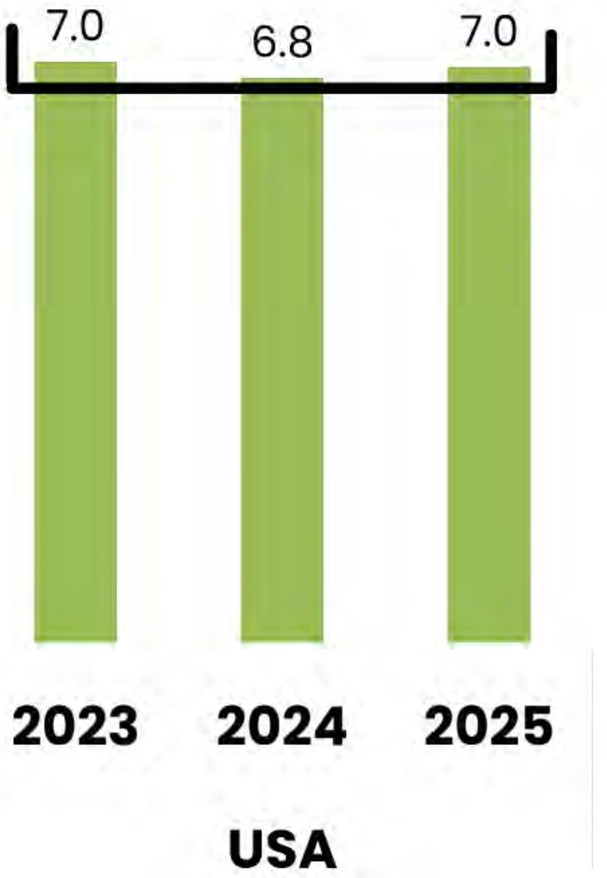
It contributes ≈3.9 kcal/g of energy (Stein et al., 2008).

It shows some trade-offs with protein, expressing higher concentrations where protein is lower.

Average U.S. sucrose levels, at 4.3% in 2024 were lower than those in 2023 (5.4%)



*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Energy Values*, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
NEg	2,146	2,182	2,154	2,156	2,165	2,150	2,187	2,181	2,198

*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Energy Values*, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
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Energy Values*, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
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	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
AMEn	2,345	2,355	2,353	2,382	2,380	2,370	2,377	2,349	2,367

*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

Energy Values*, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
NEg	2,146	2,182	2,154	2,156	2,165	2,150	2,187	2,181	2,198

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
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Energy Values*, kcal/kg

	ARG			BRA			US		
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Energy Values*, kcal/kg

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Productive Energy

Developed by the University of Arkansas since 2015.

Respiratory chambers

Dual energy x-ray absorptiometry

USSEC U.S. SOYBEAN EXPORT COUNCIL | USSOY

Energy Values, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
AMEn	2,345	2,355	2,353	2,382	2,380	2,370	2,377	2,349	2,367
PE	3,108	3,155	3,148	3,250	3,248	3,235	3,254	3,252	3,252

Energy Values, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
AMEn	2,345	2,355	2,353	2,382	2,380	2,370	2,377	2,349	2,367
PE	3,108	3,155	3,148	3,250	3,248	3,235	3,254	3,252	3,252

Energy Values, kcal/kg

	ARG			BRA			US		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
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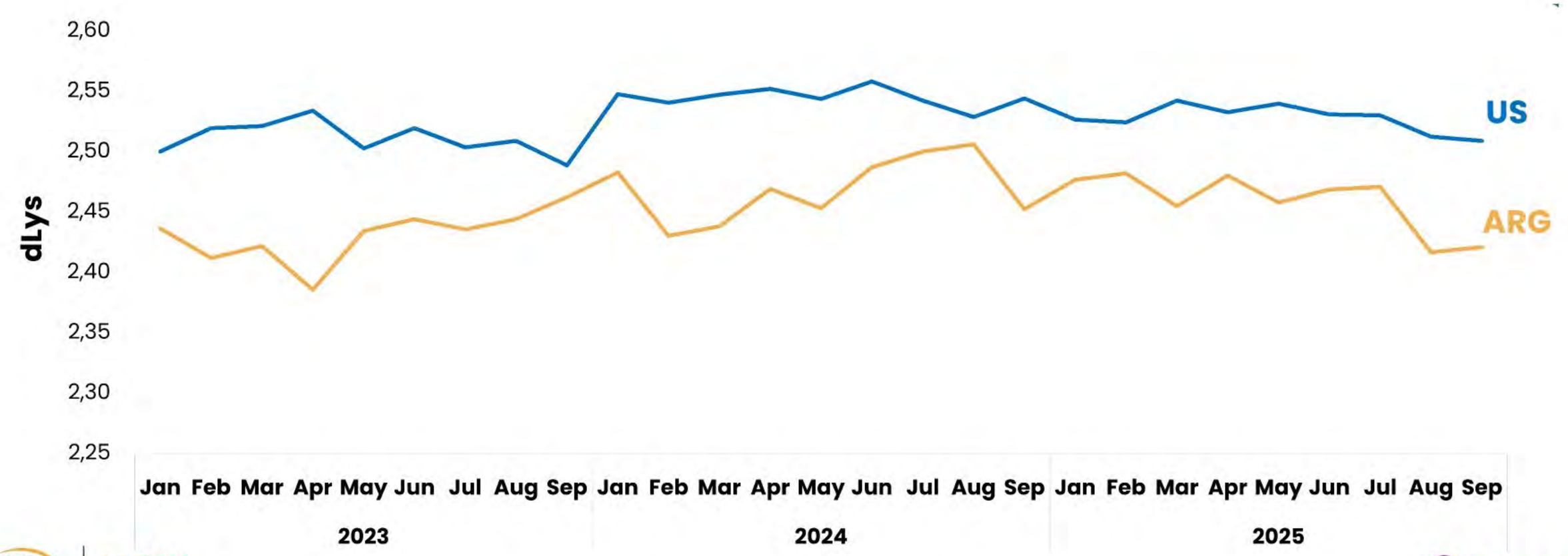
Crude Protein Quality*



*Data extracted from Evonik's Global Database (Sep 2025), crude protein and fiber ranges were adjusted according to export specifications.

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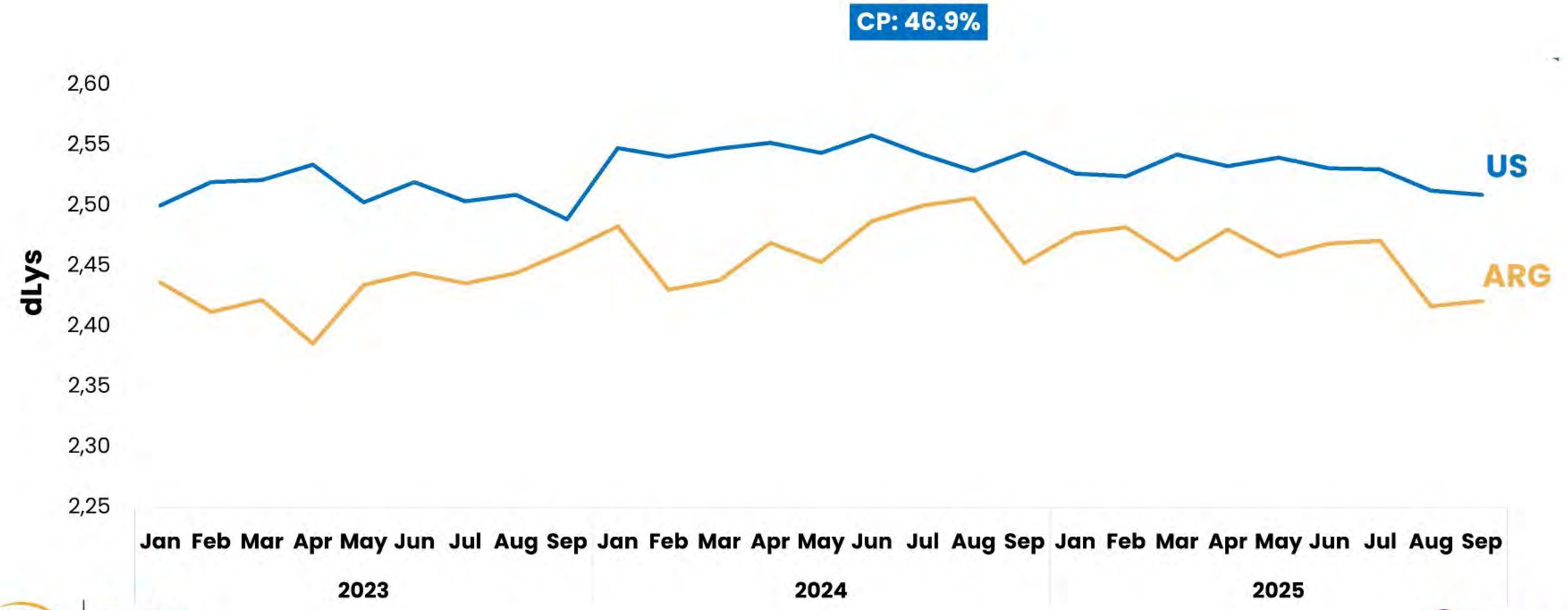

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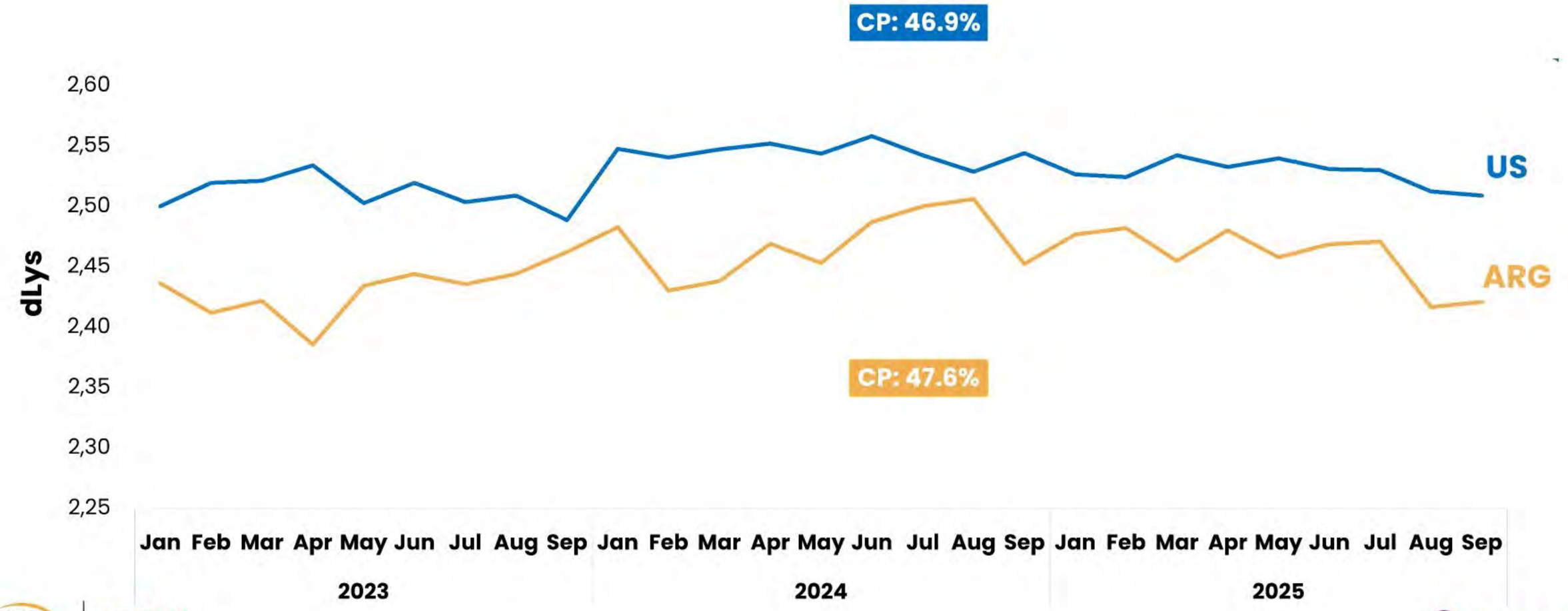

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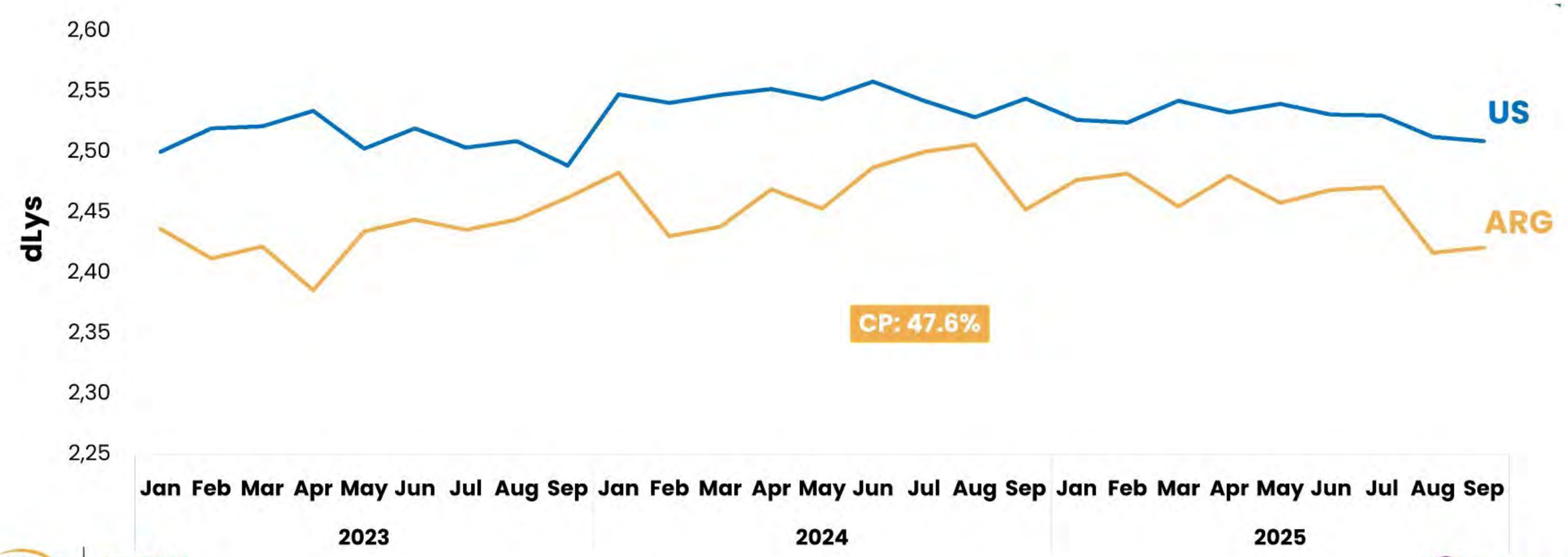

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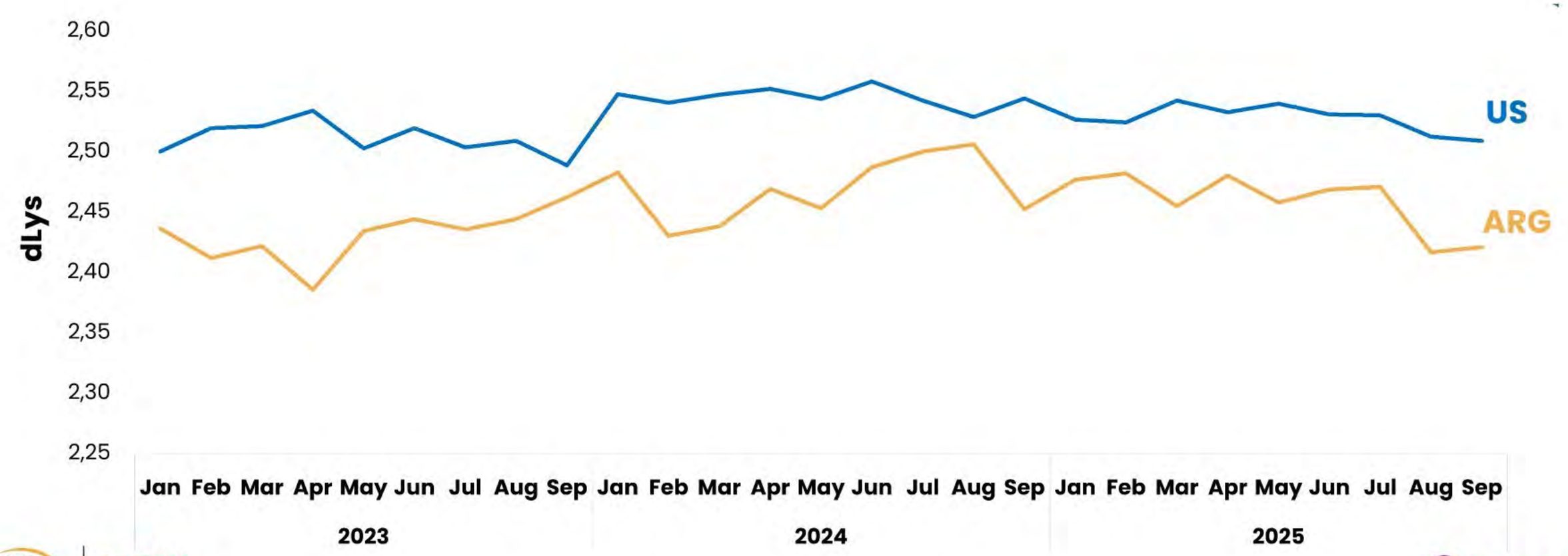

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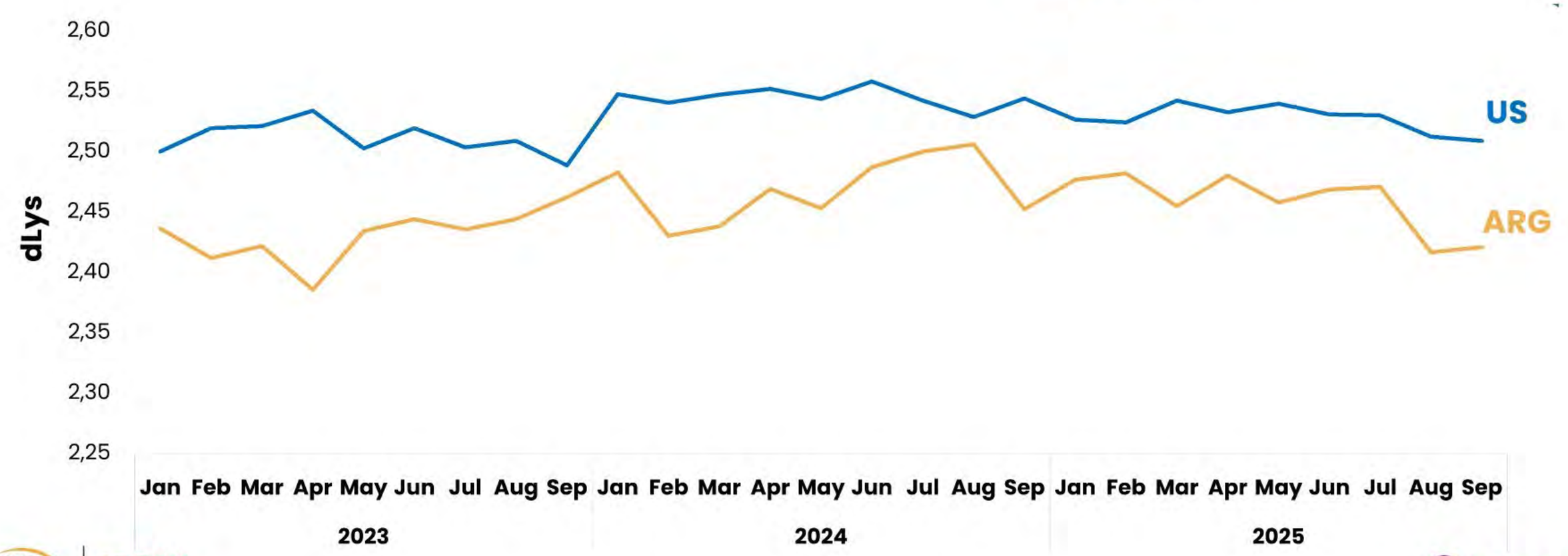
Crude Protein Quality*

KOH: 79.7 %

TIA: 2.8 mg/g



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EVONIK Leading Beyond Chemistry

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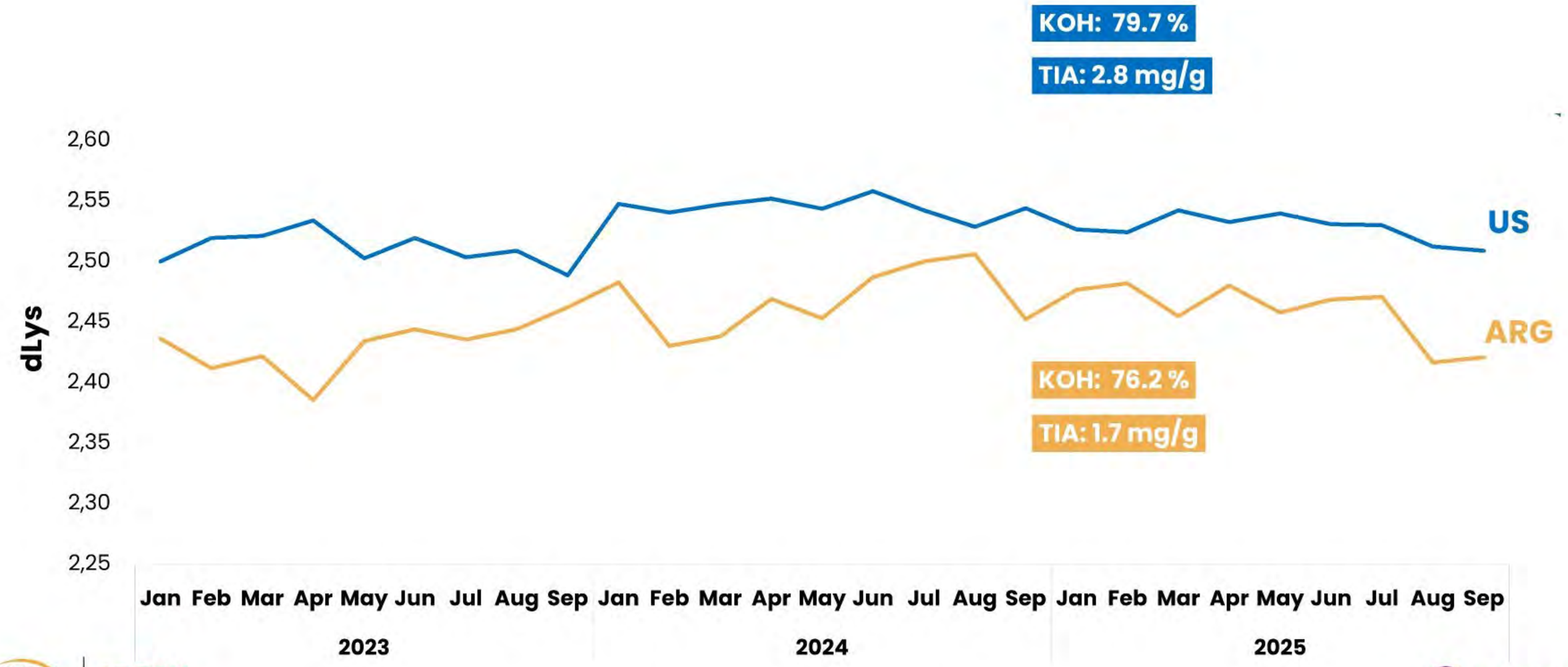

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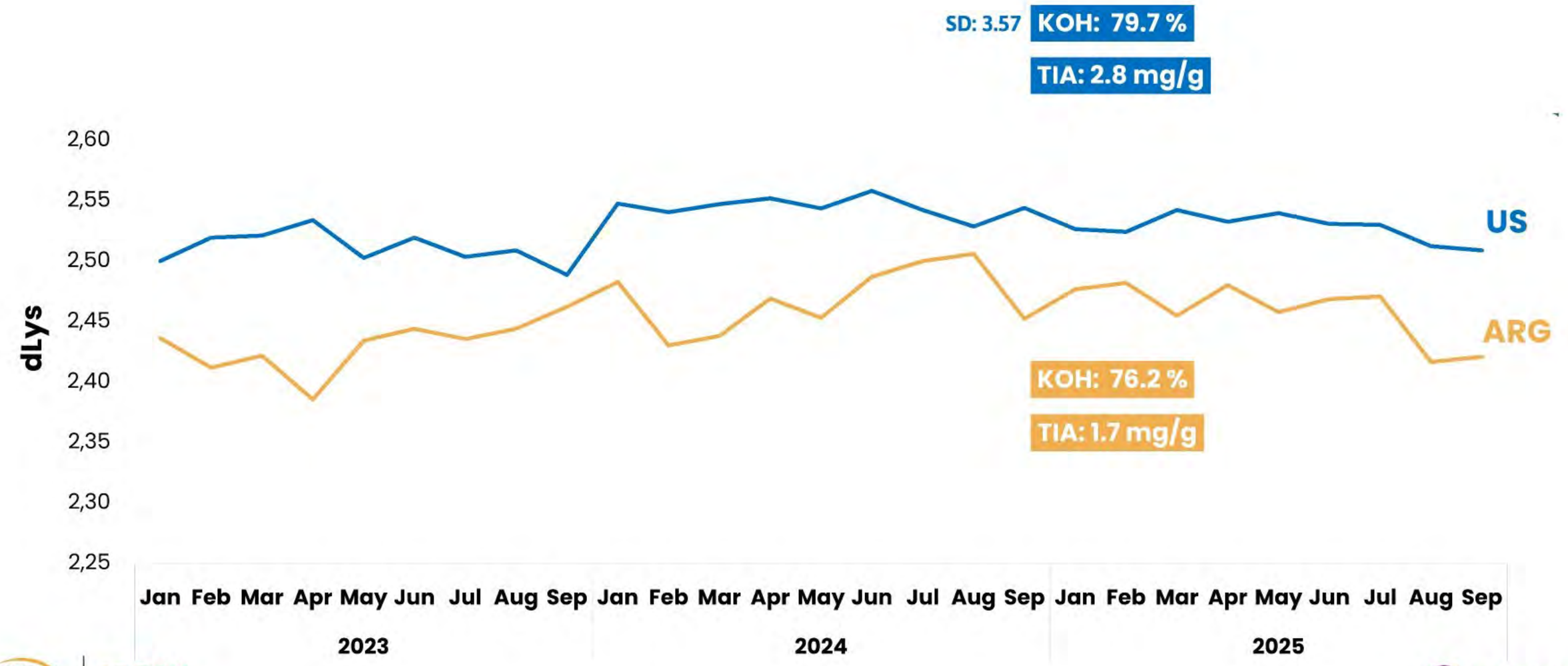

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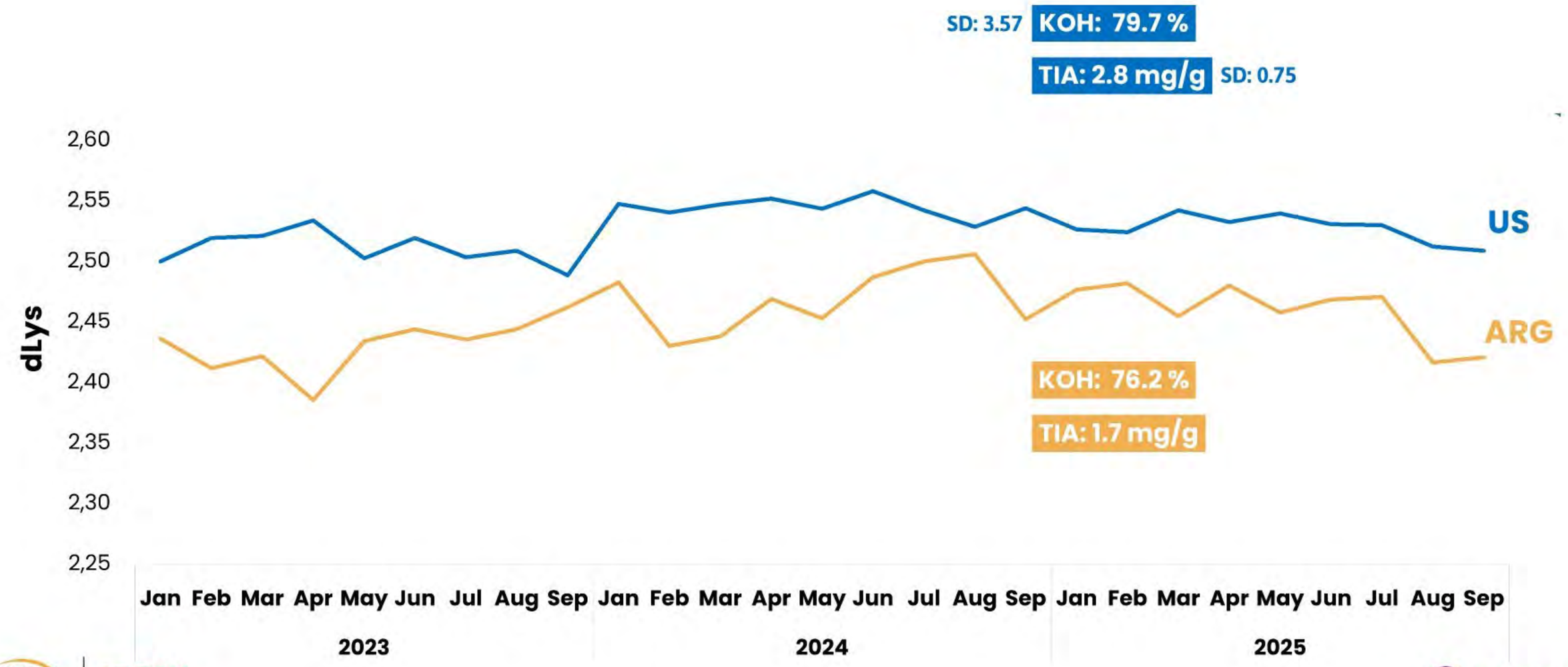

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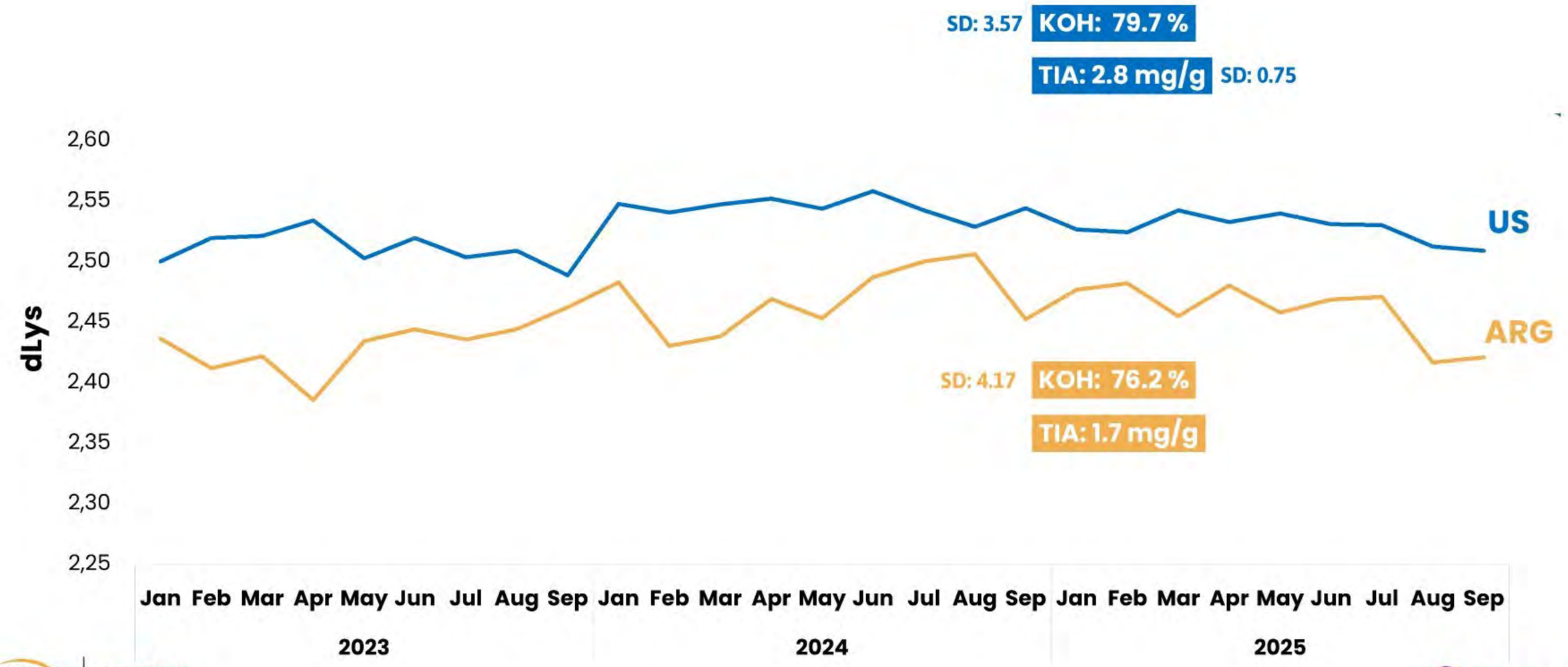

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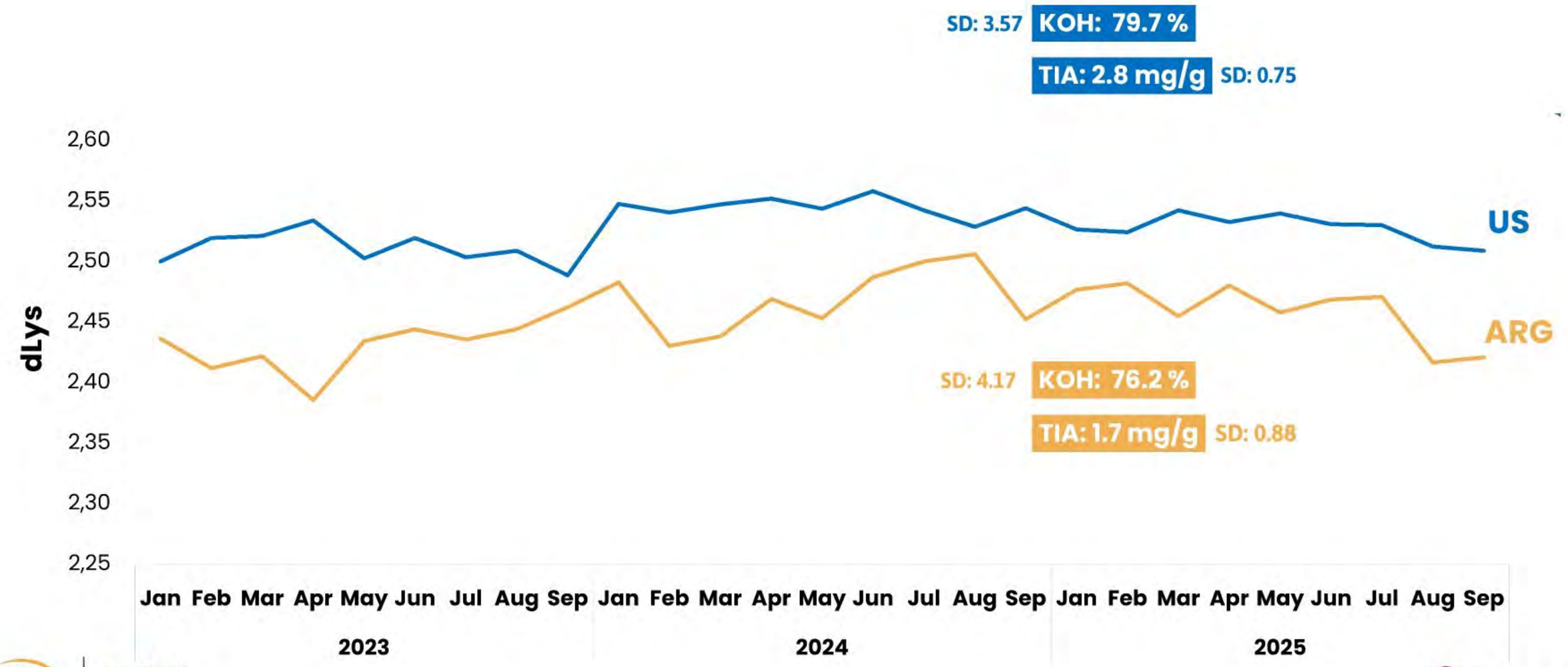

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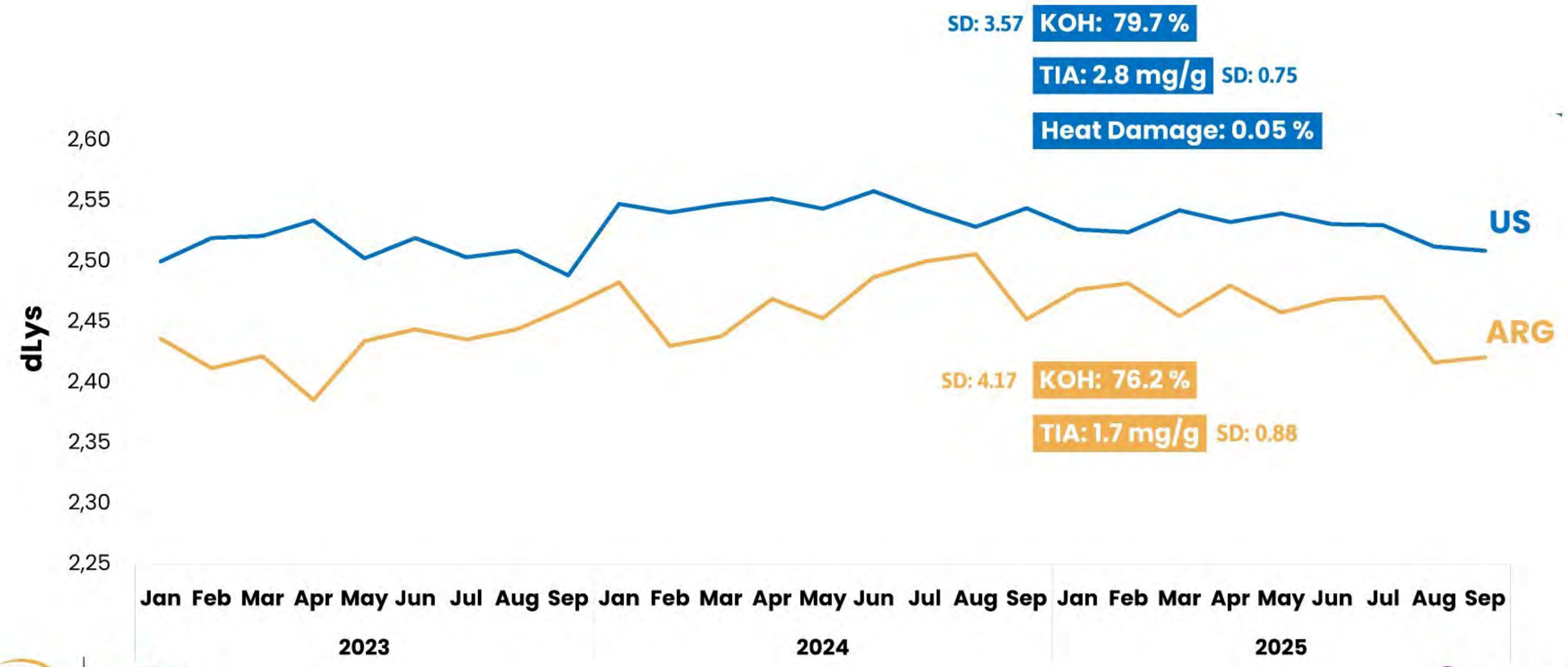

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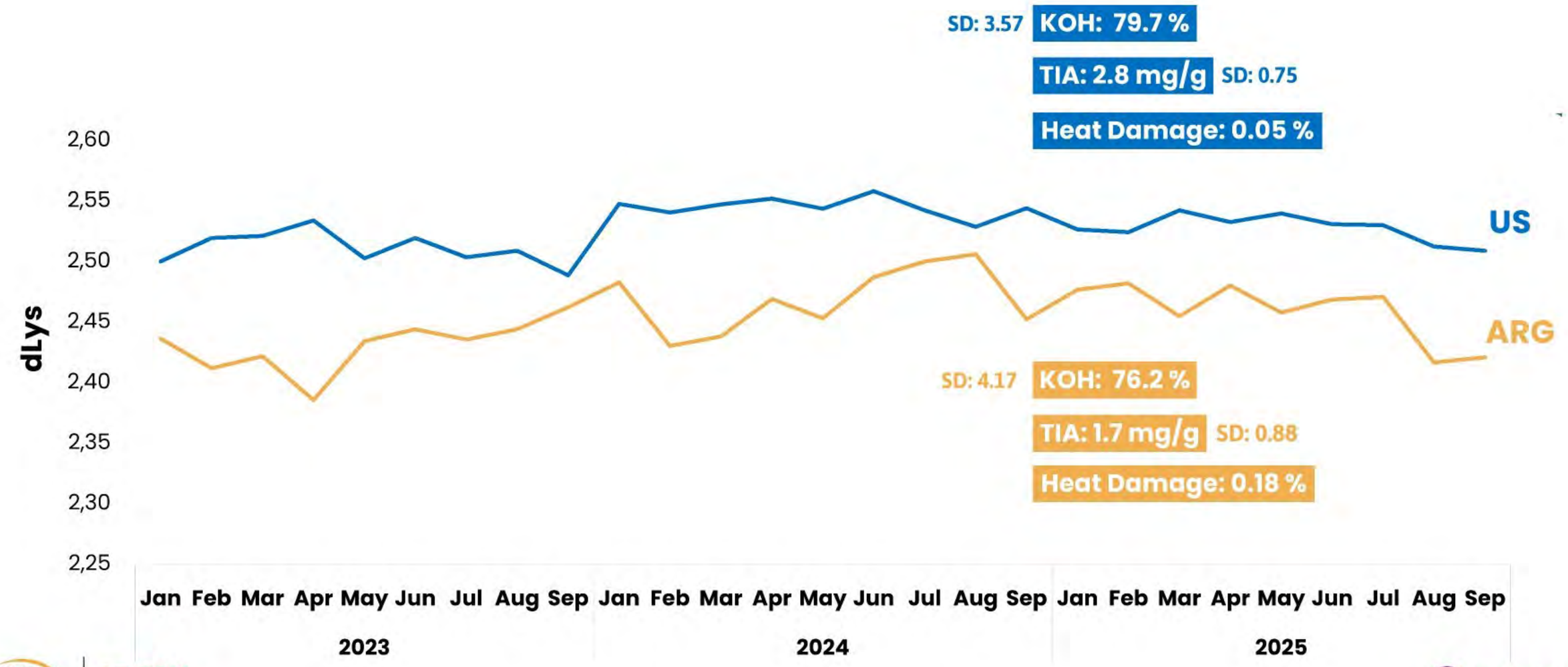

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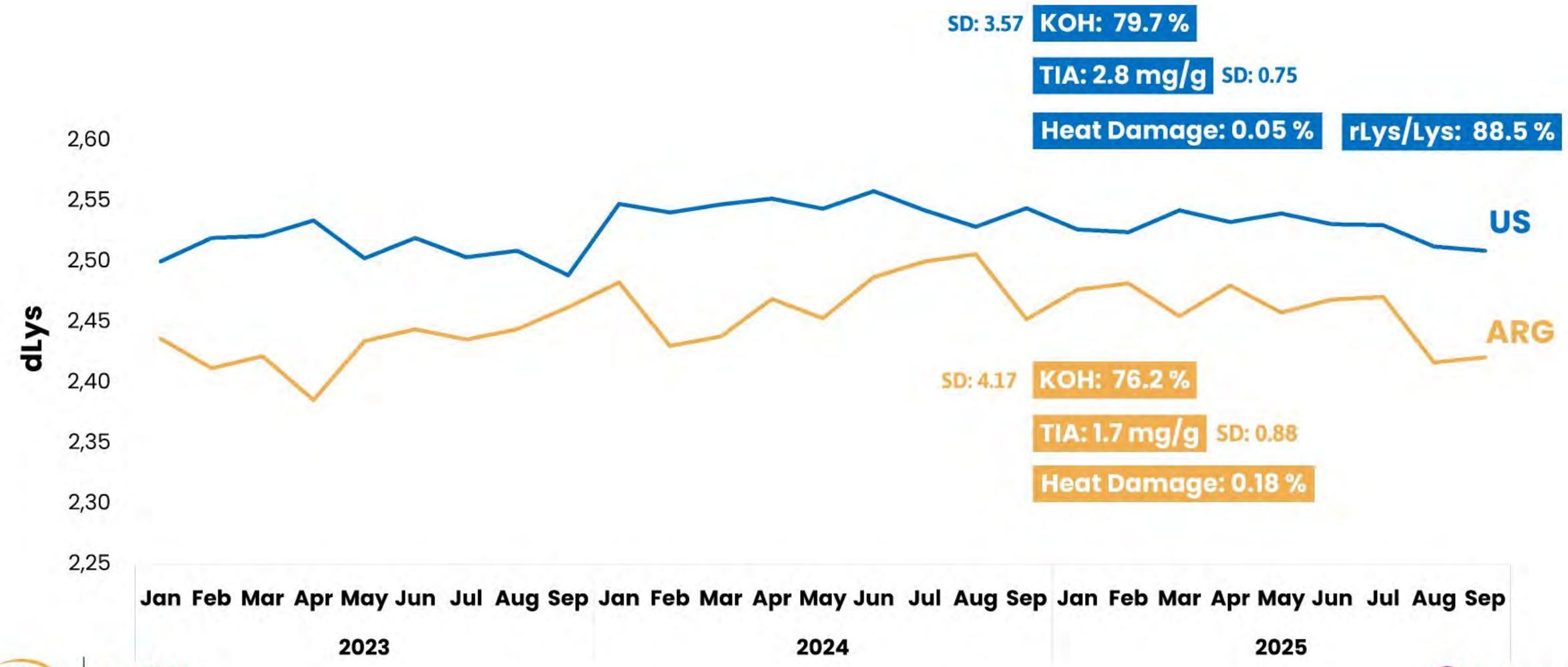

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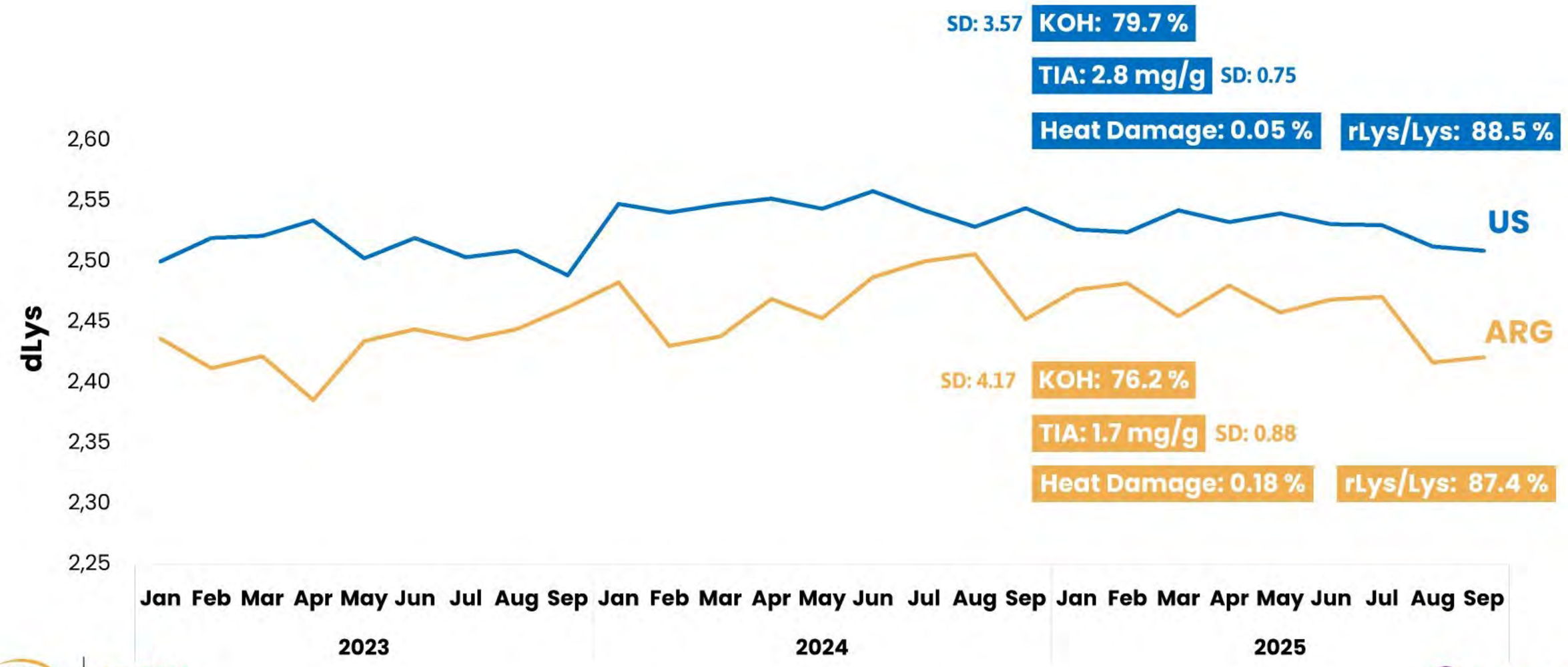

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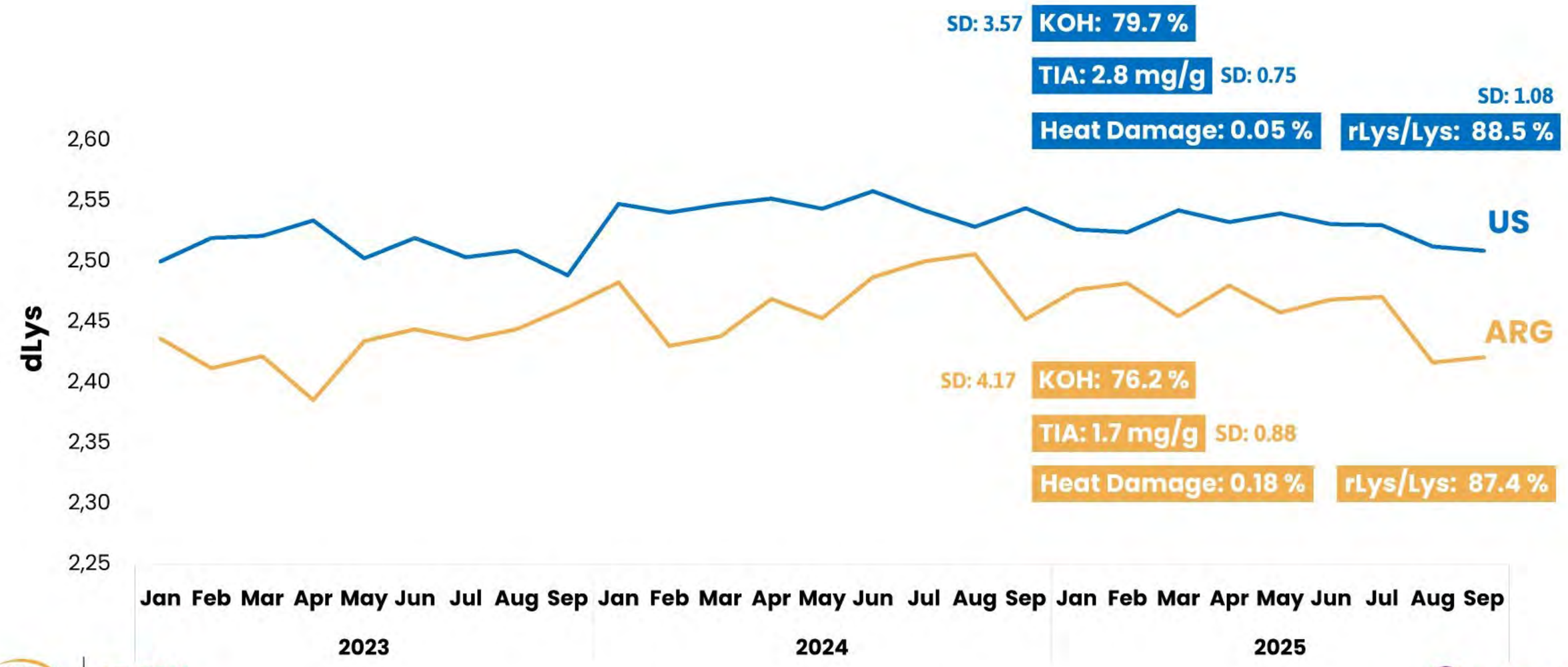

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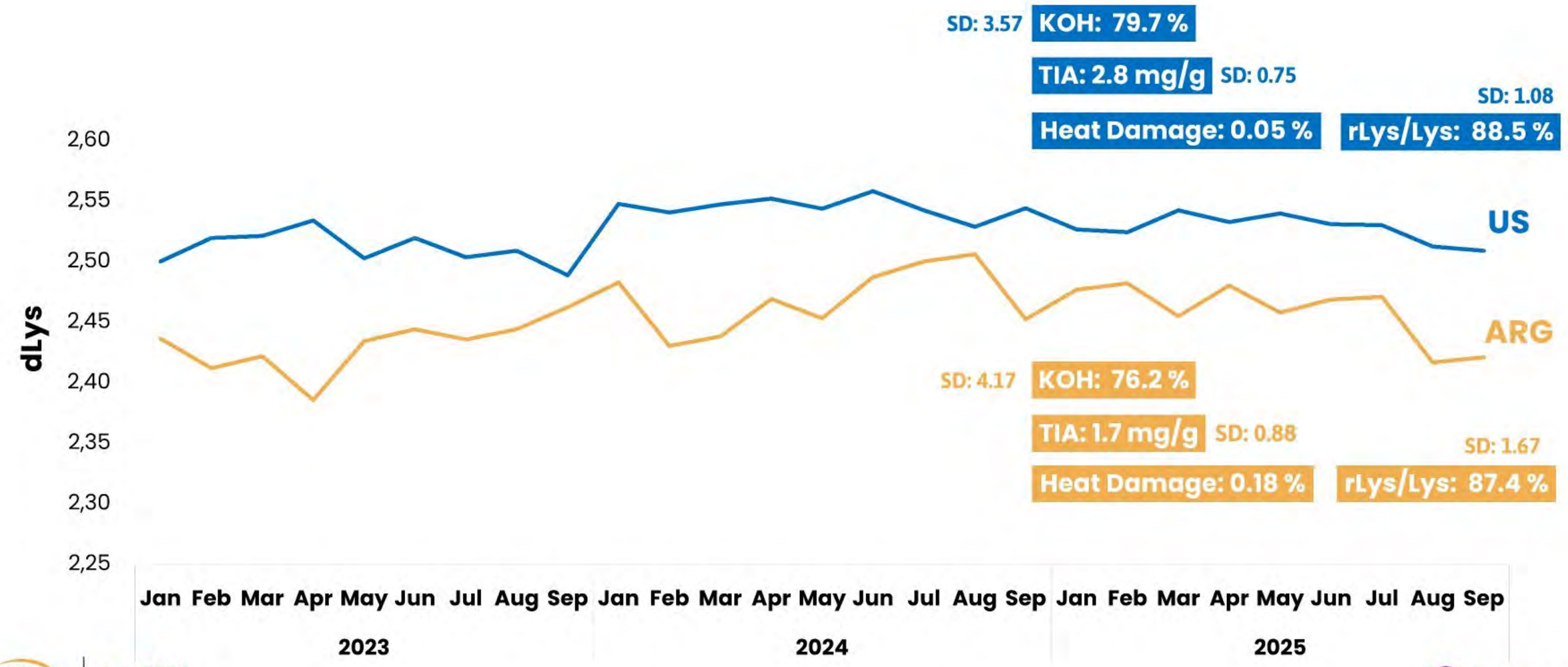

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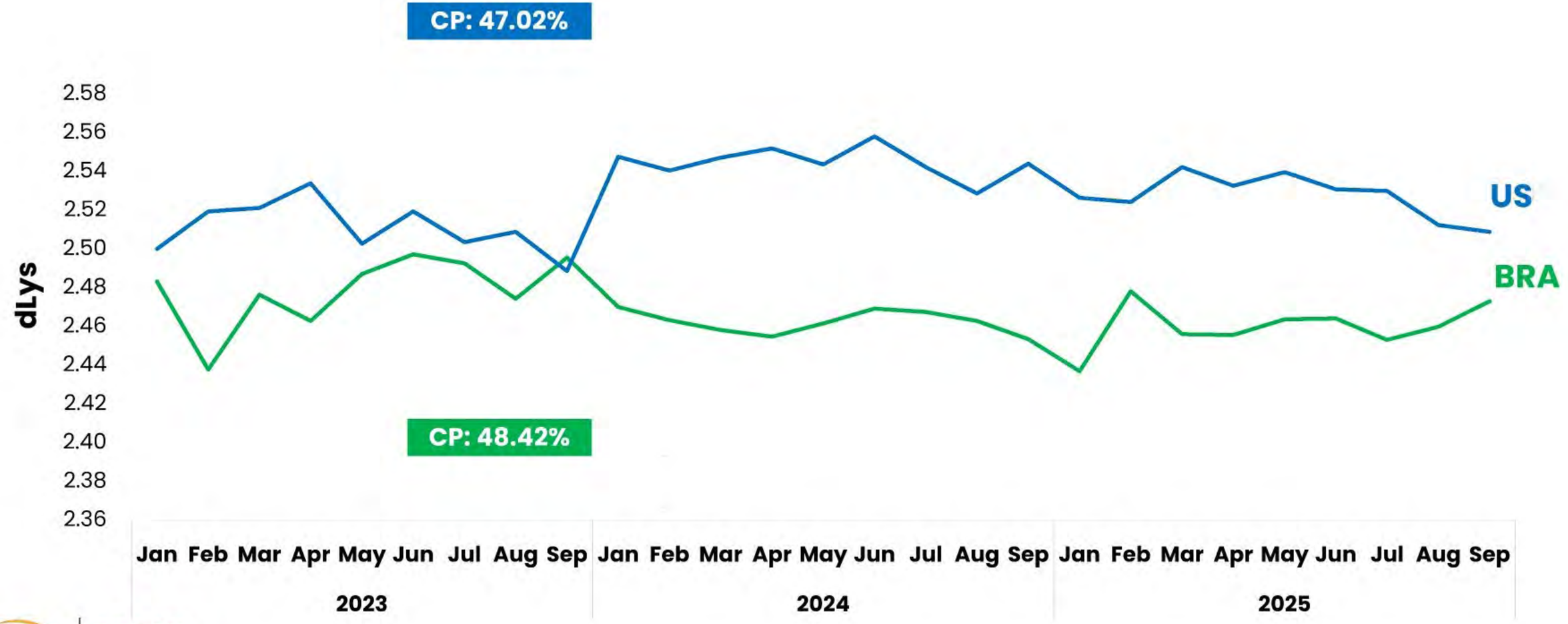

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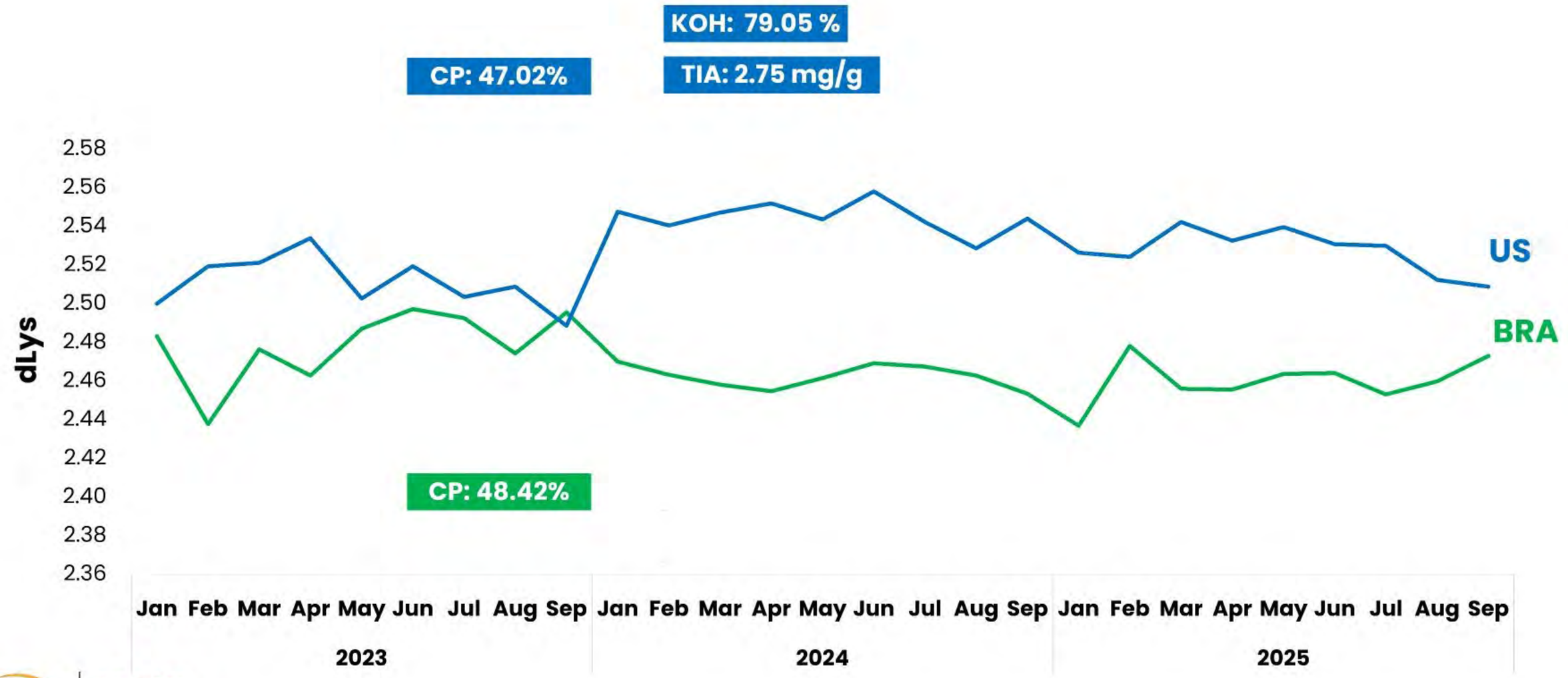

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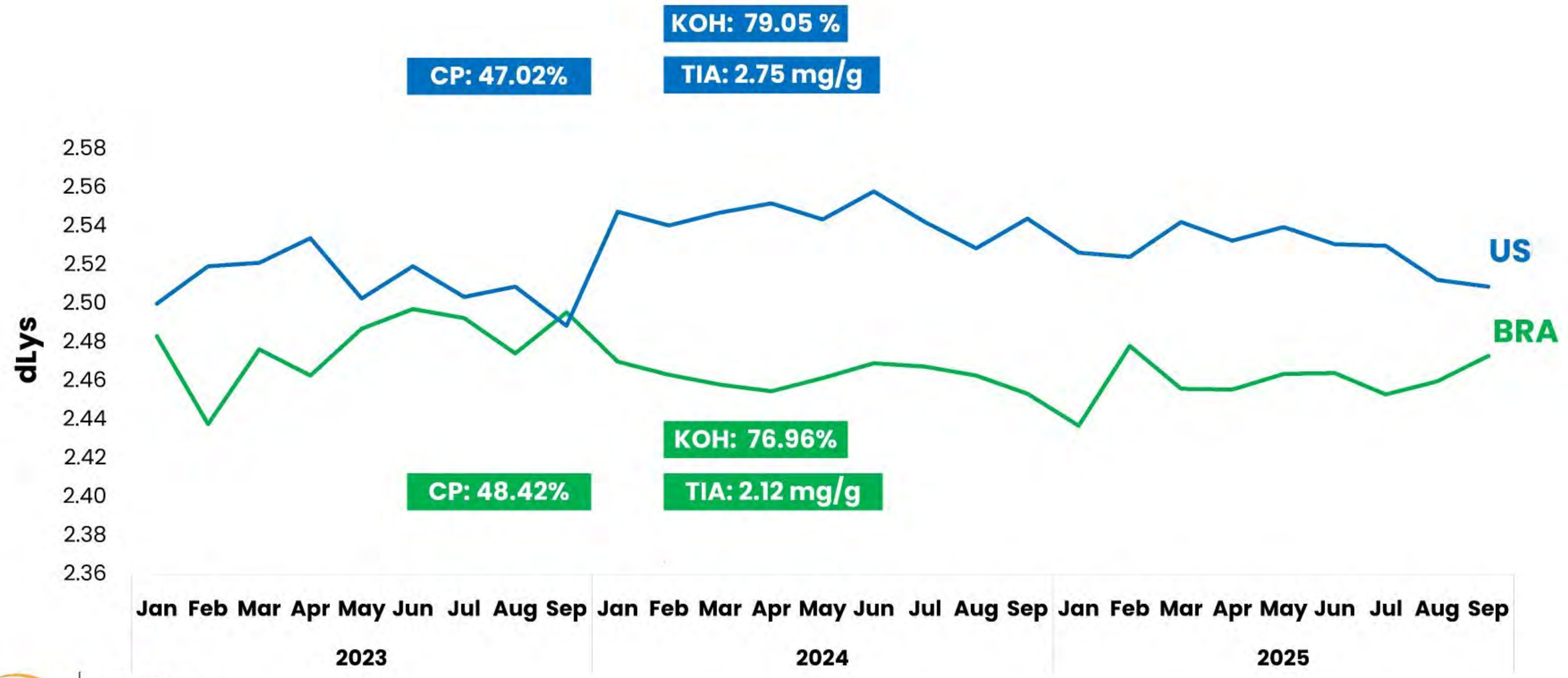

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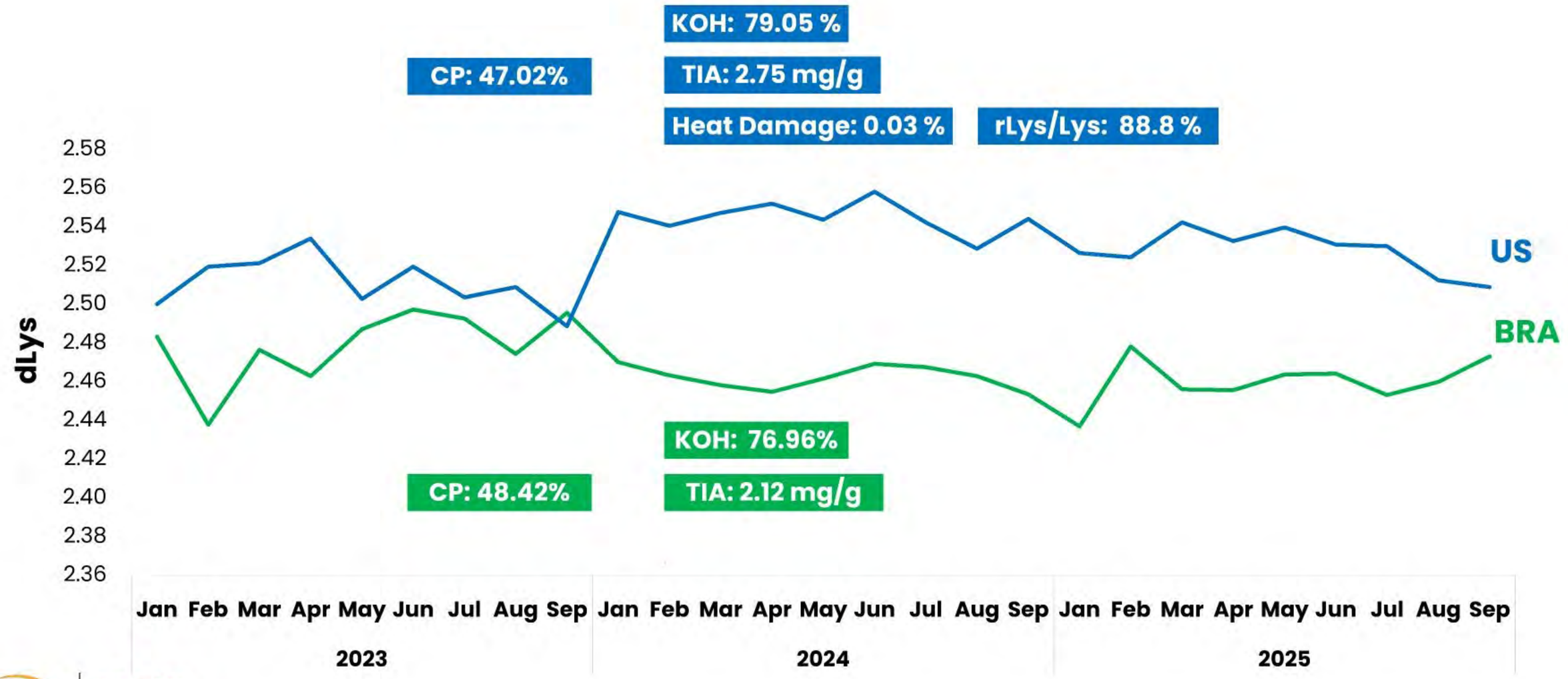

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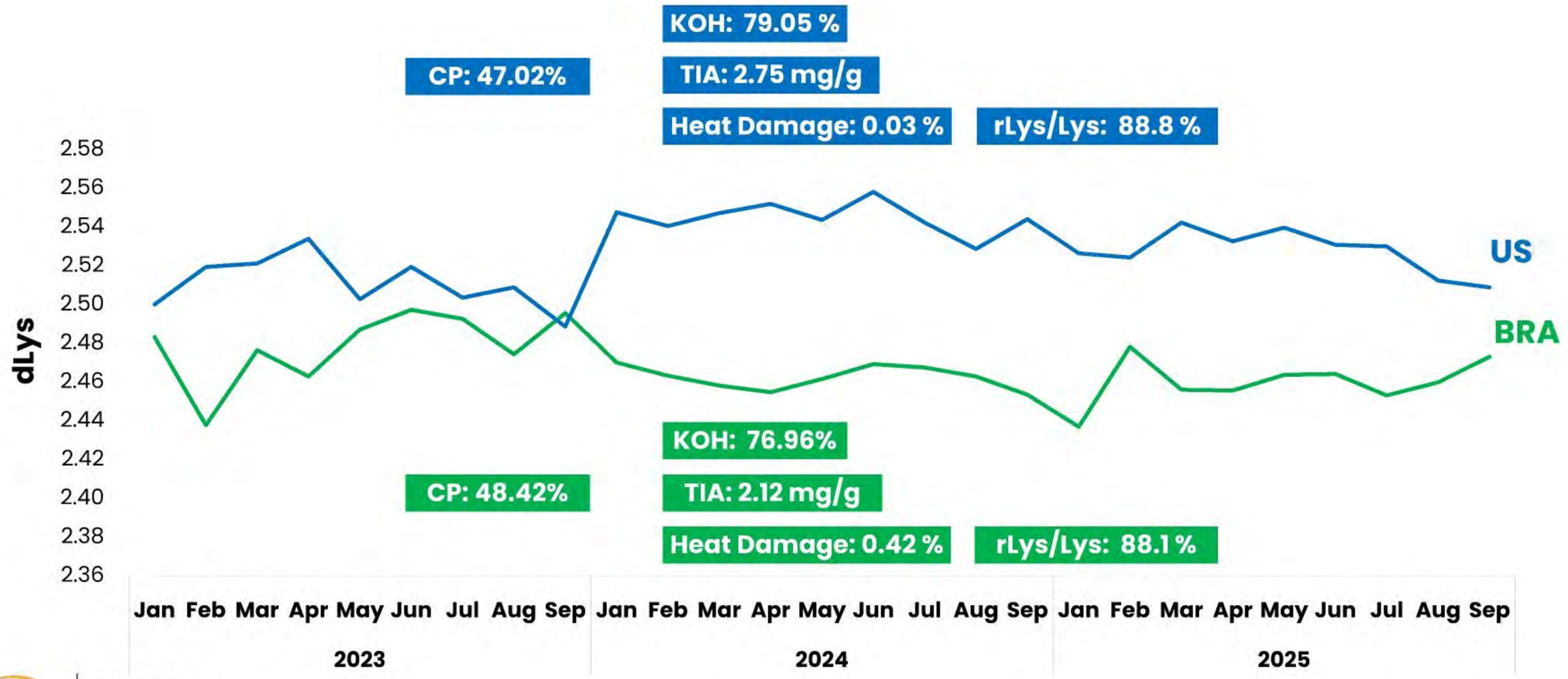

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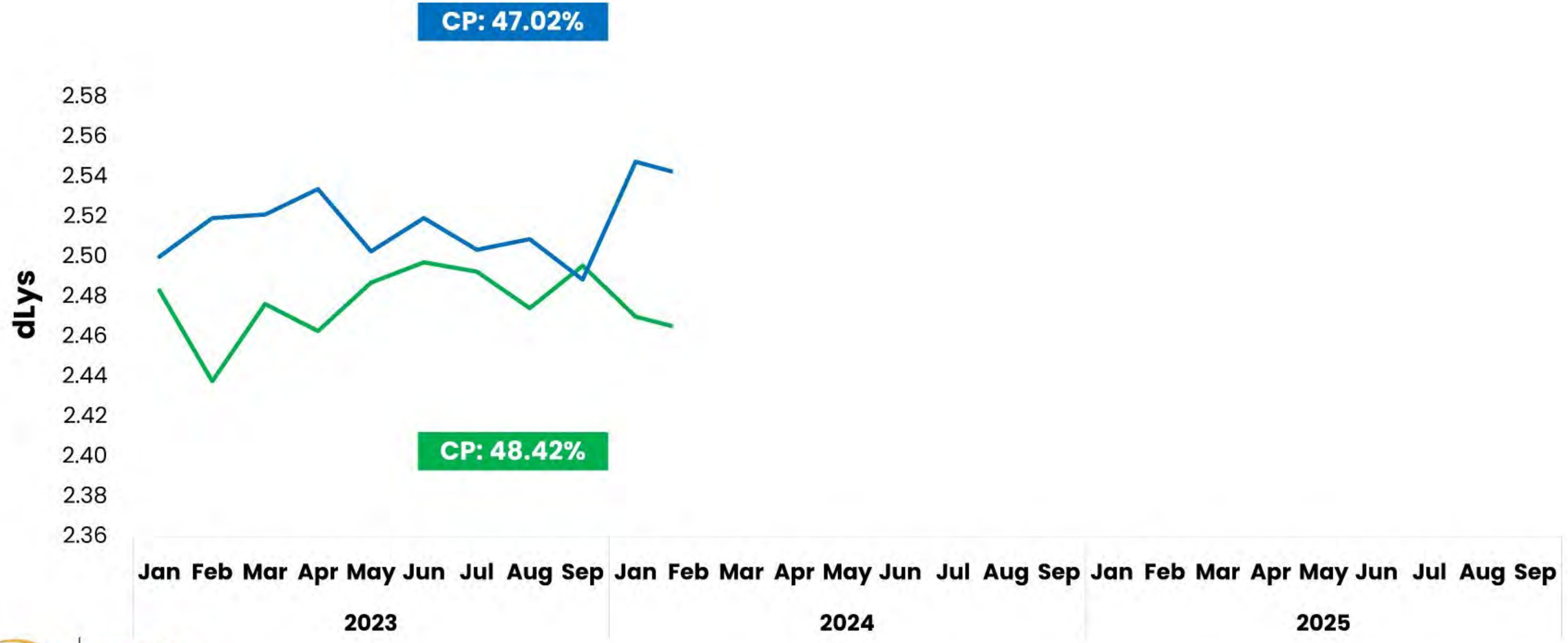

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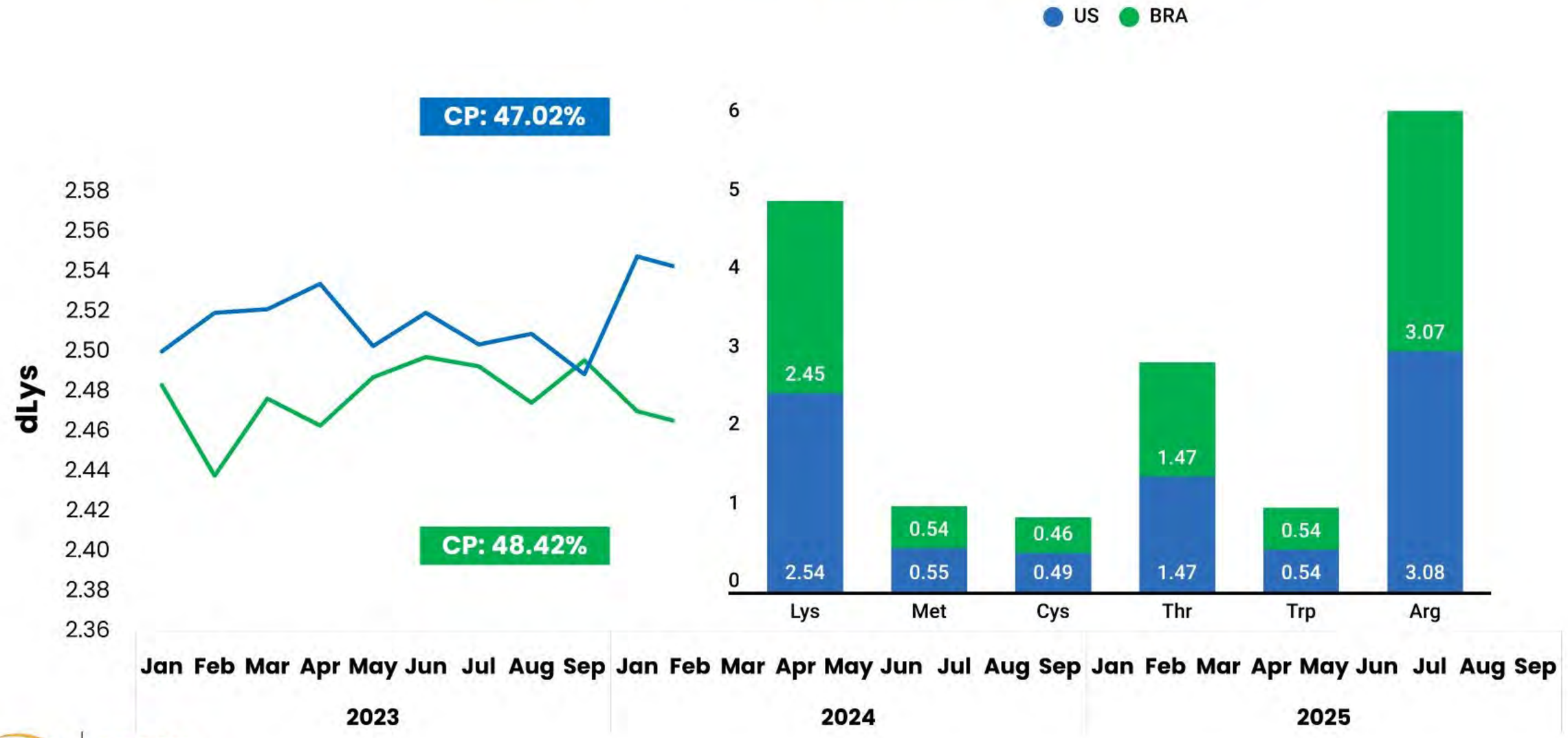

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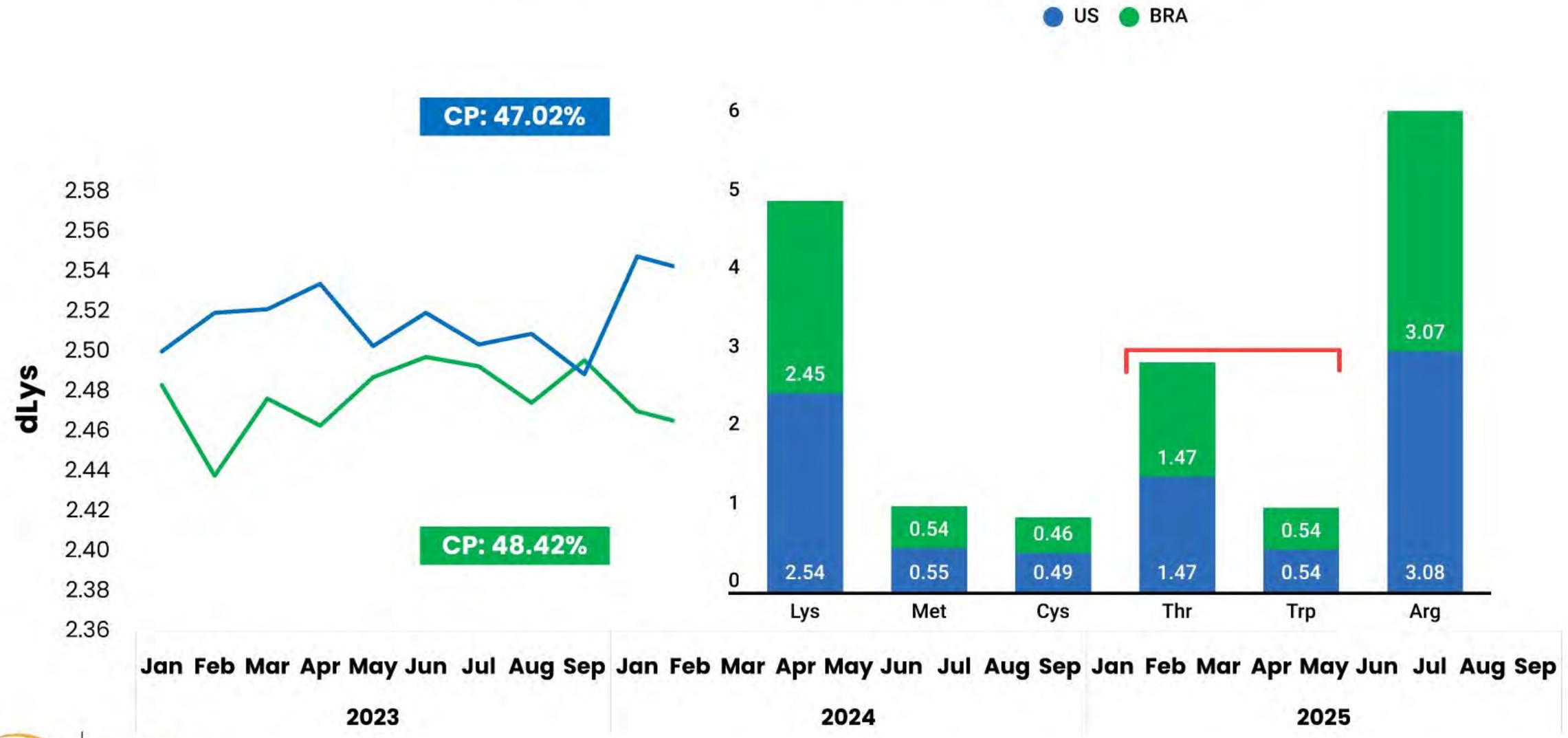

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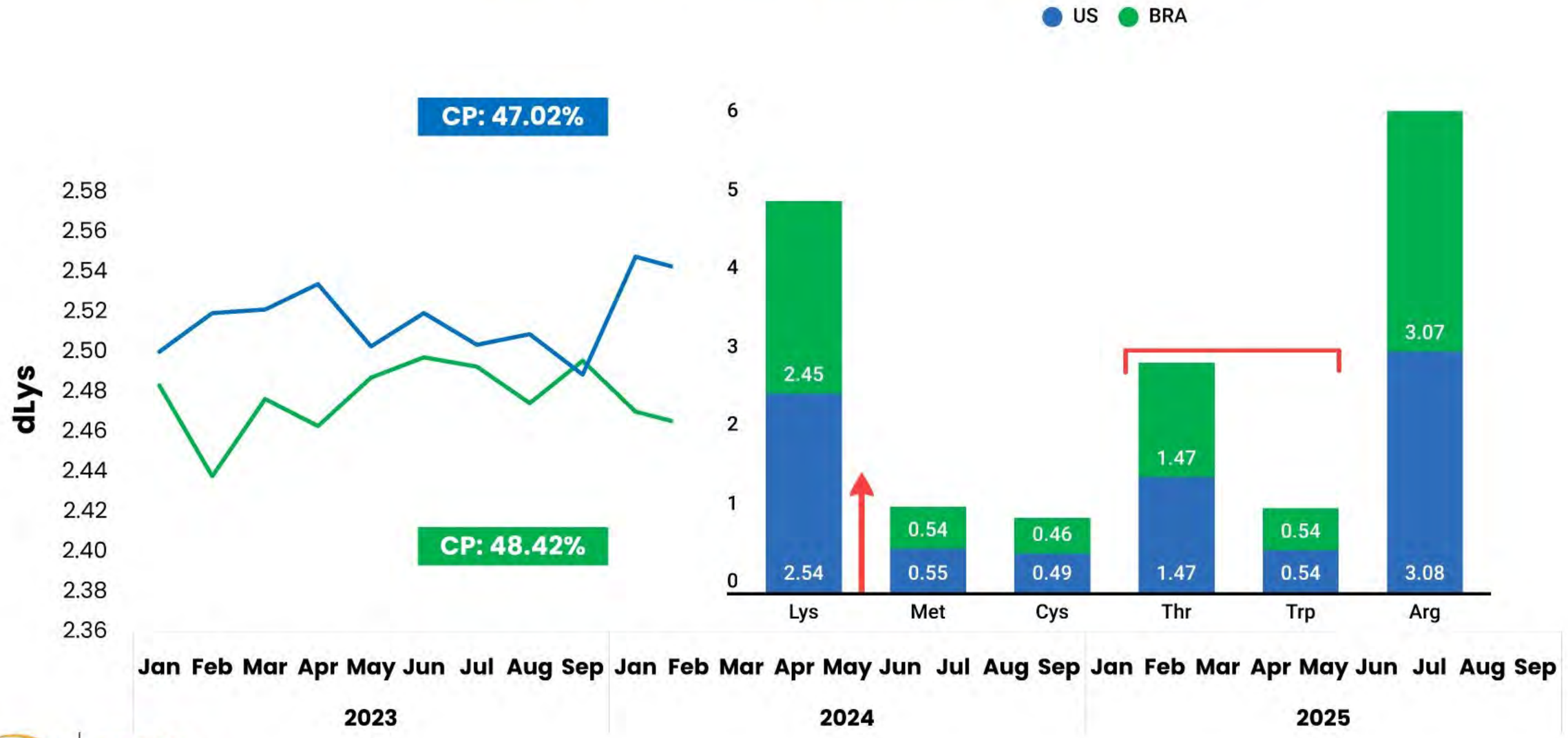

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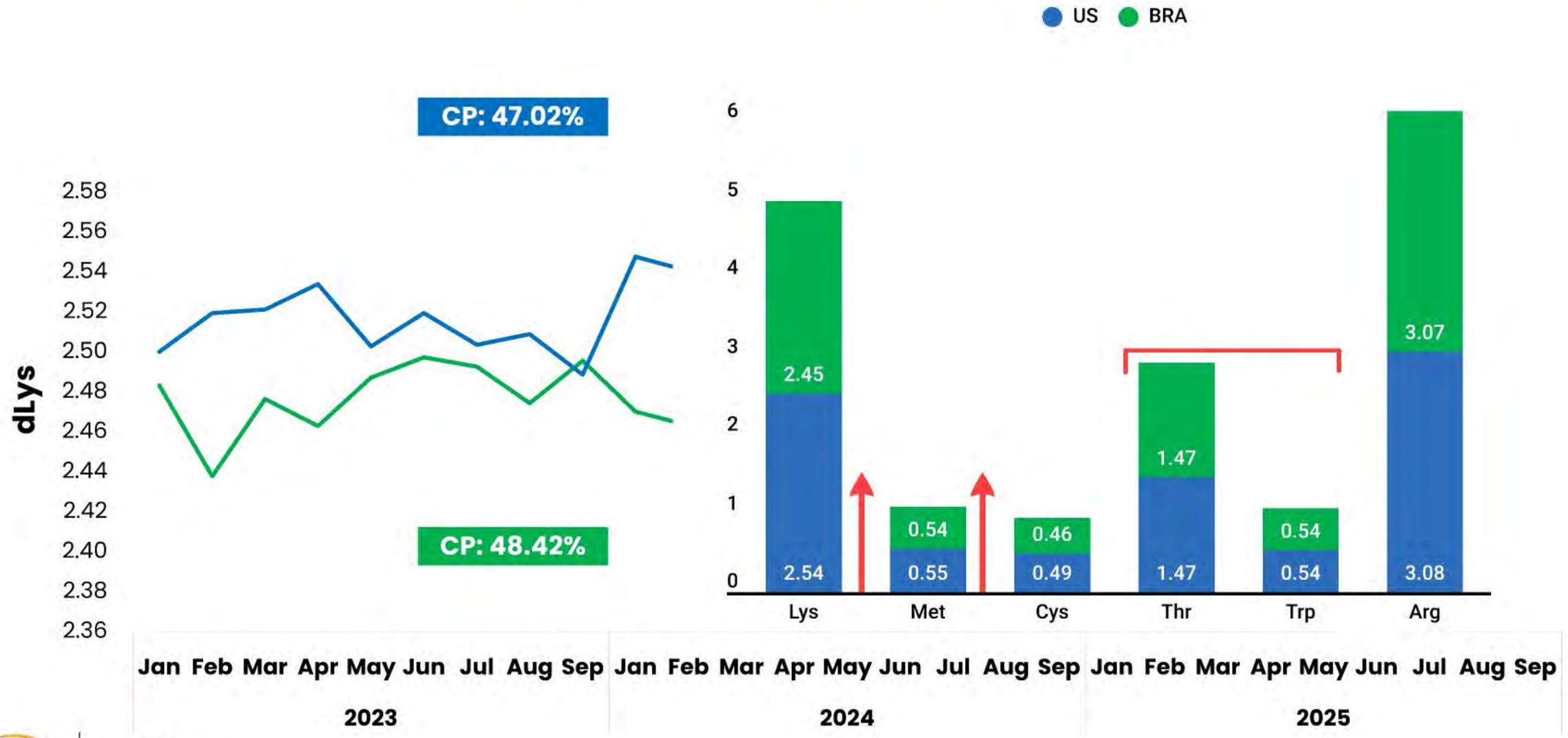

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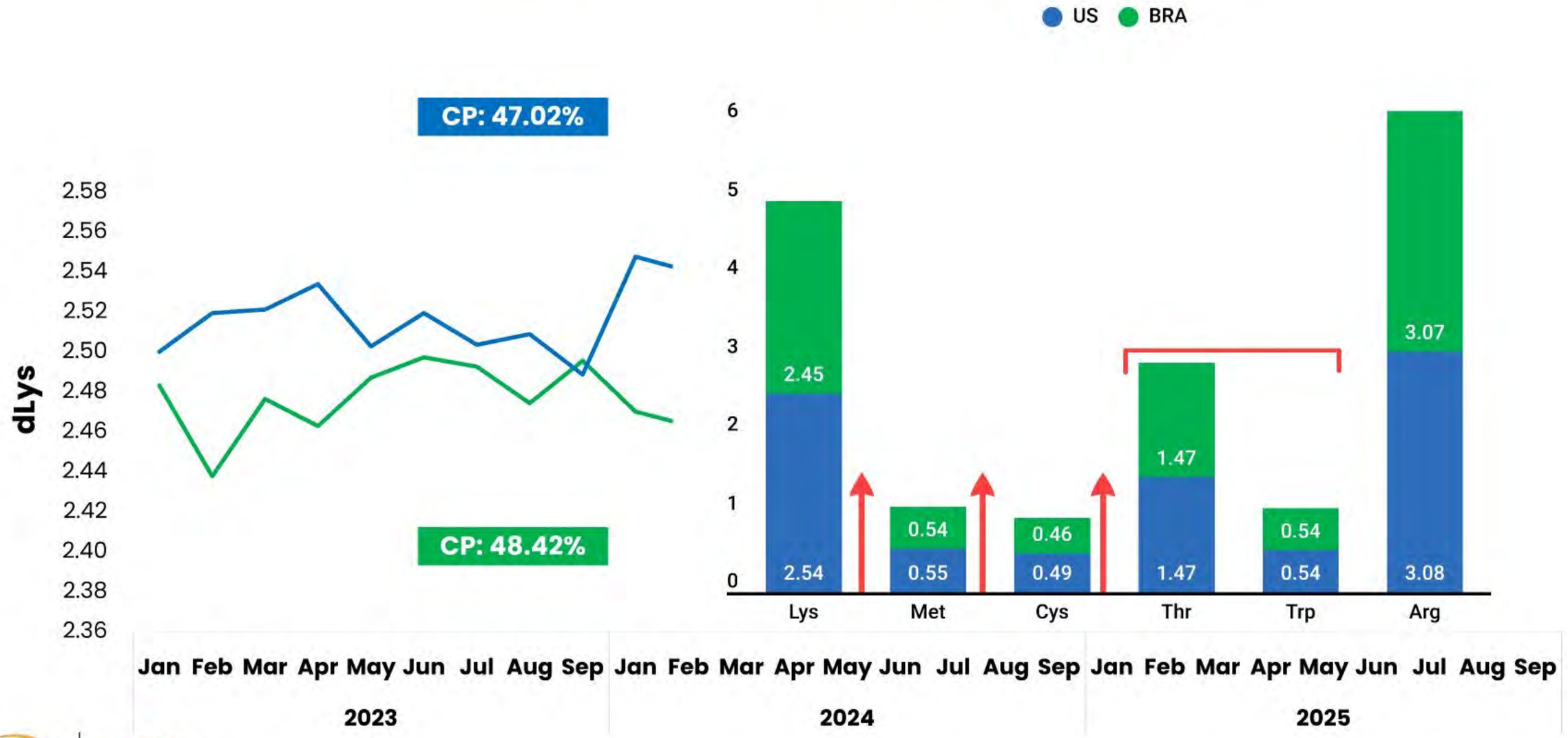

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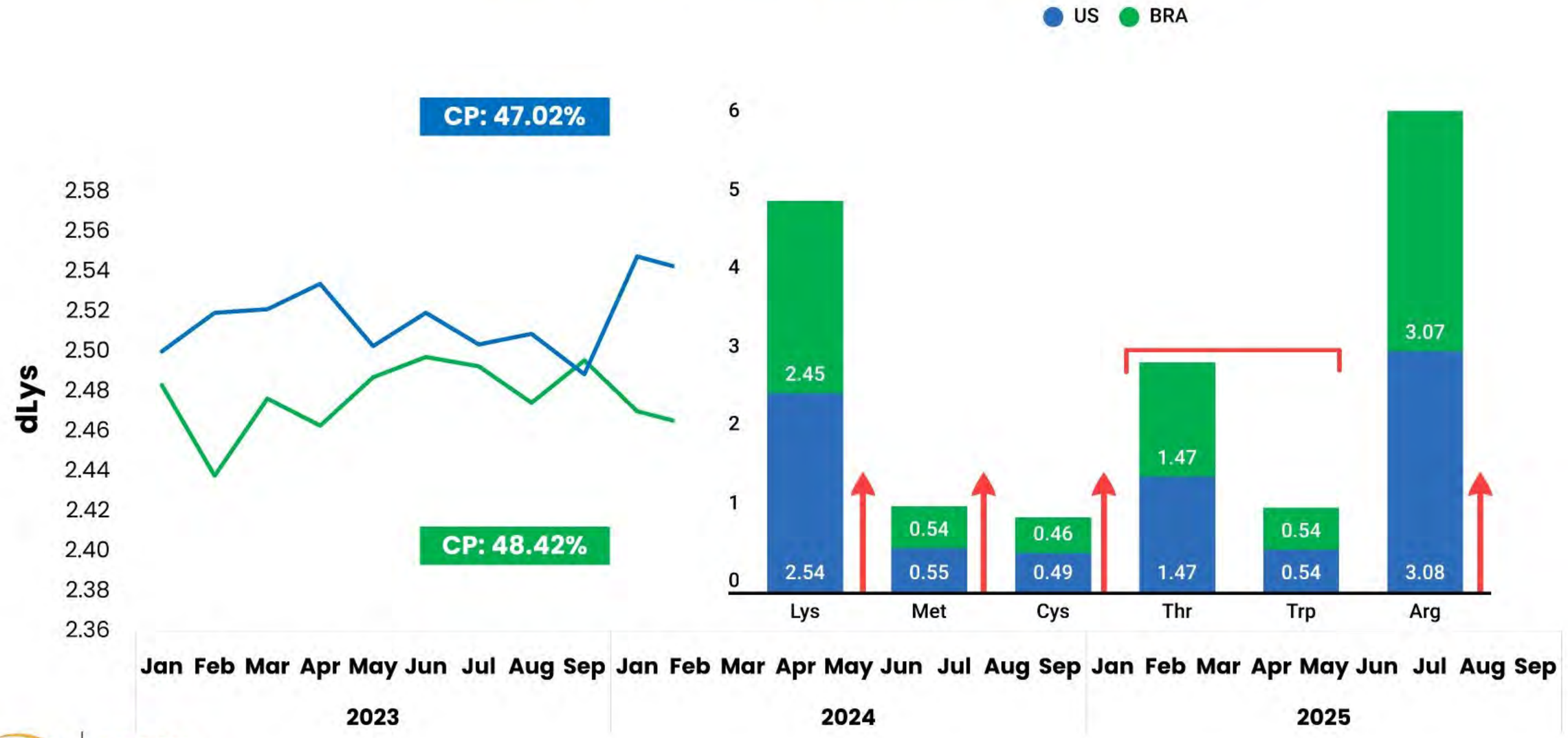

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Animal Utilization Lead - AMERICAS

What Evonik's Data Tells Us?

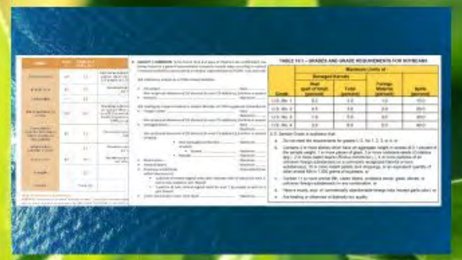
Taipei, Taiwan
November, 2025

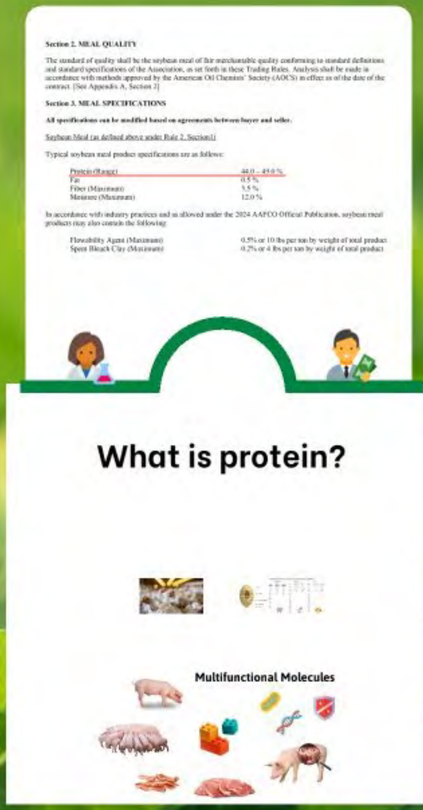
Bean Quality

Regional Differences

Soybean Meal Quality

Supporting The Animal Protein Industry





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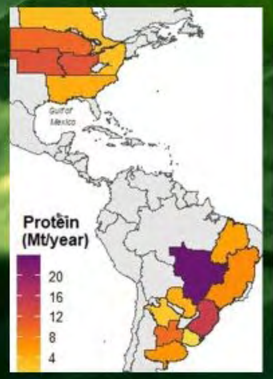
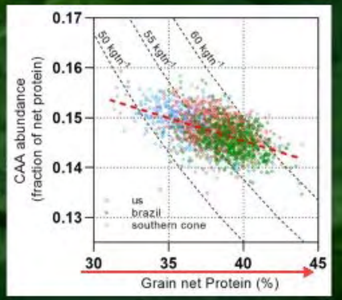
United States Soybean Meal Quality Differentiators

Harvest and storage.
Consistency (post-harvest and processing).
Amino acids profile.
Energy content.

Origins





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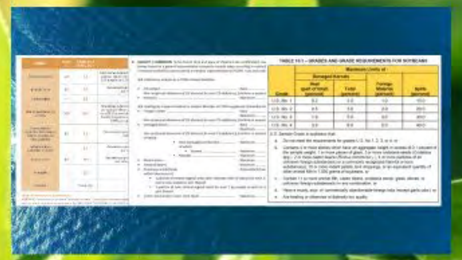

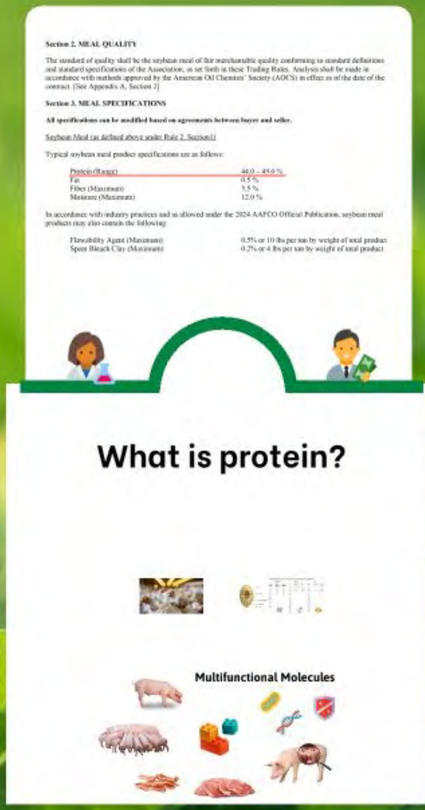

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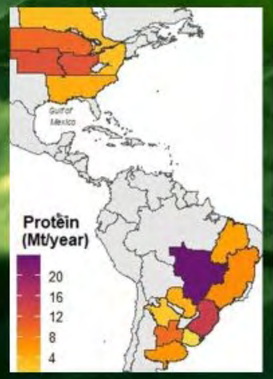

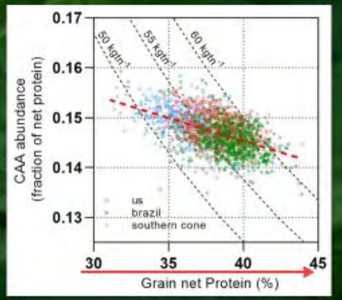

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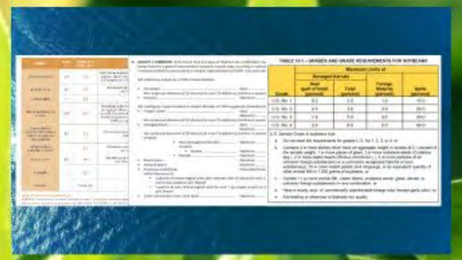

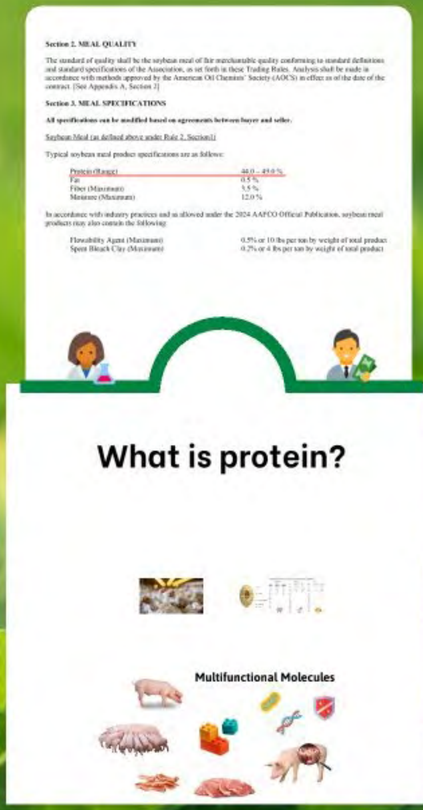

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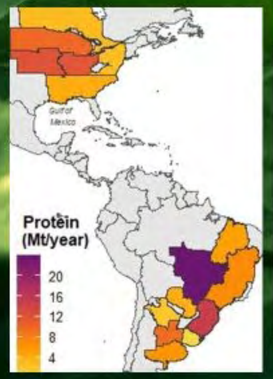

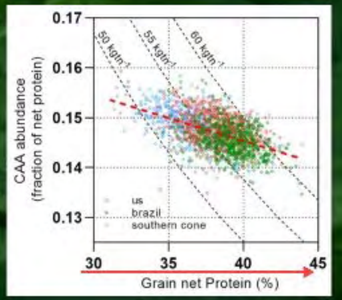

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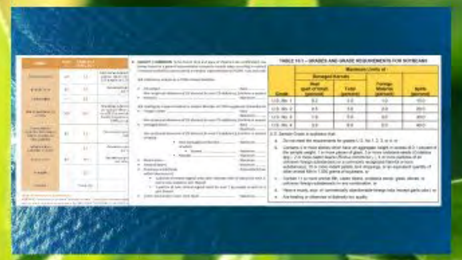

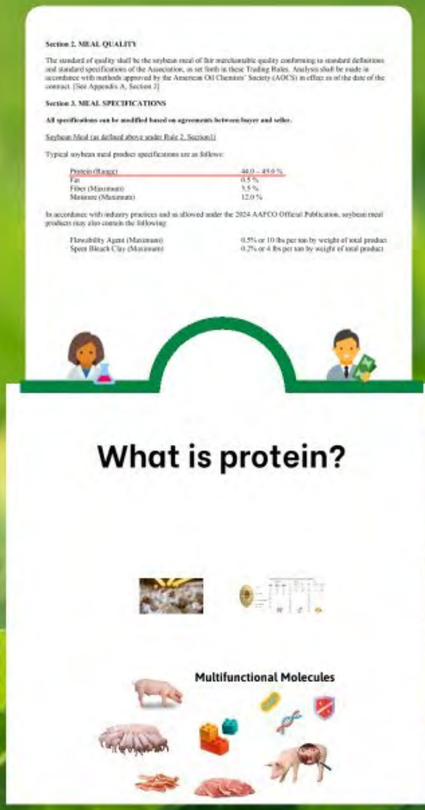

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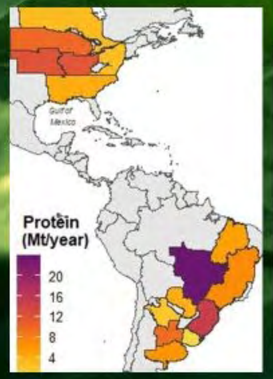

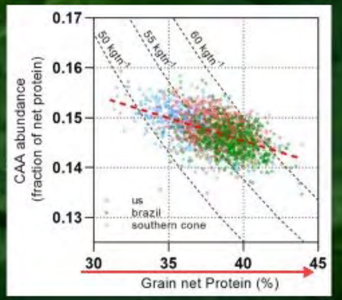

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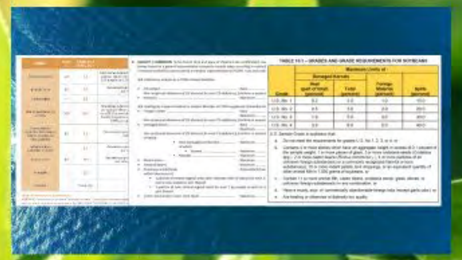

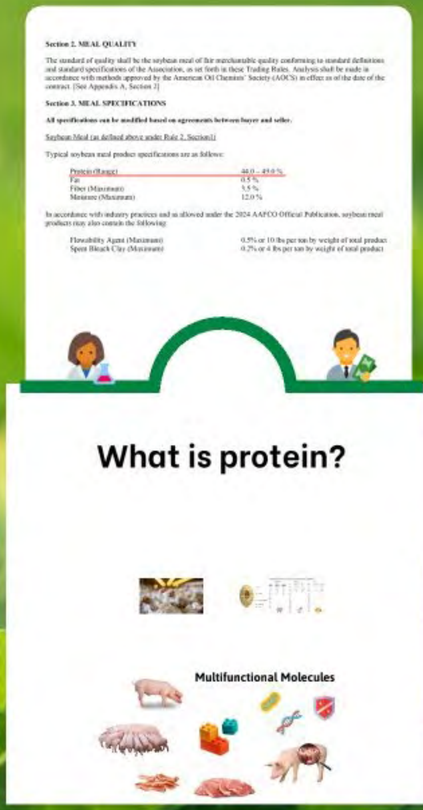

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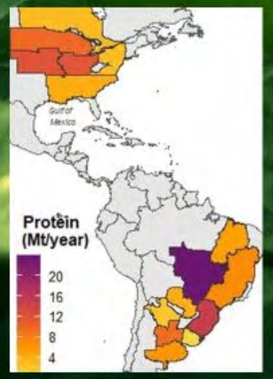

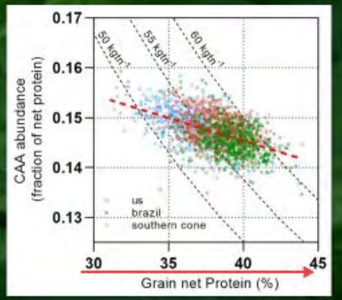

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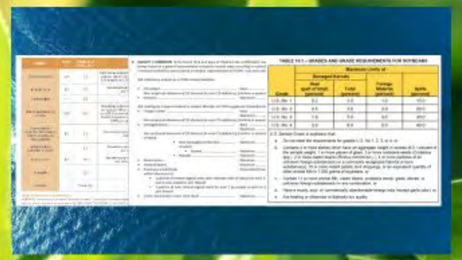

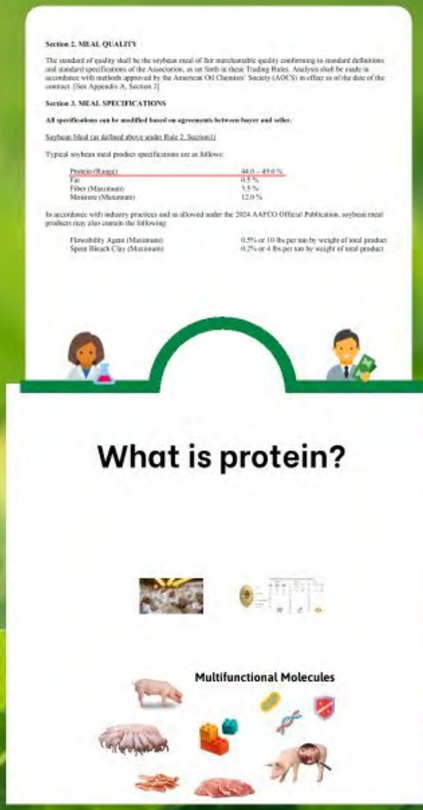

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Energy content.

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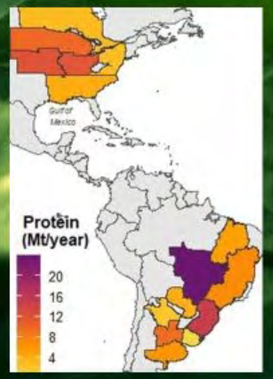

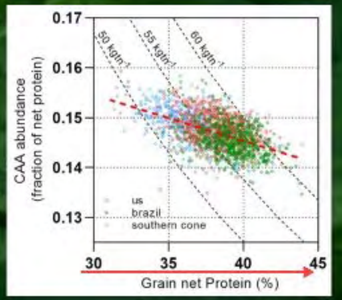

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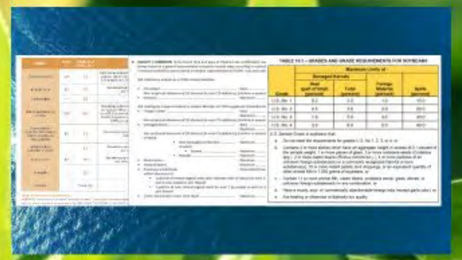

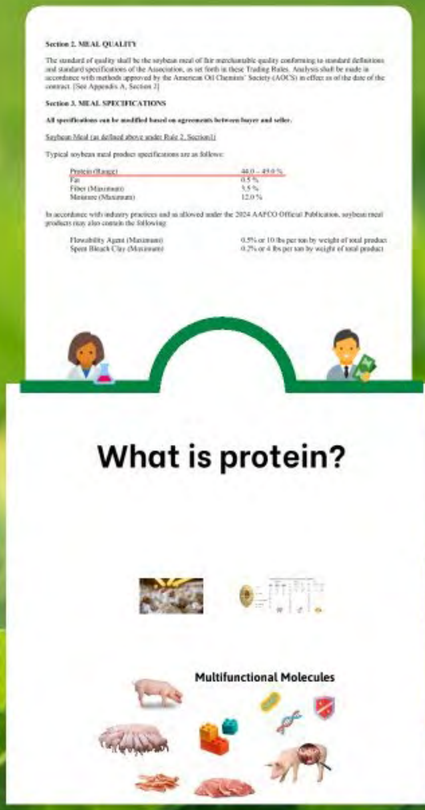

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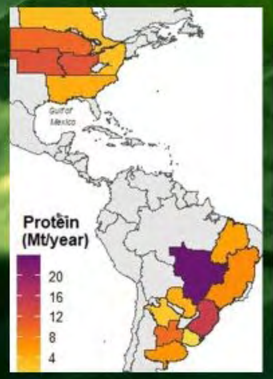

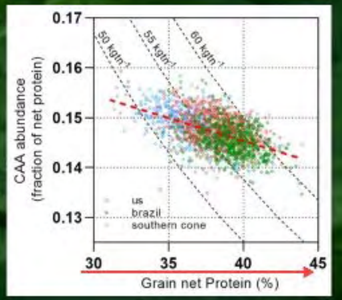

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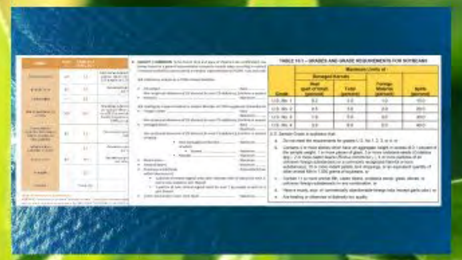

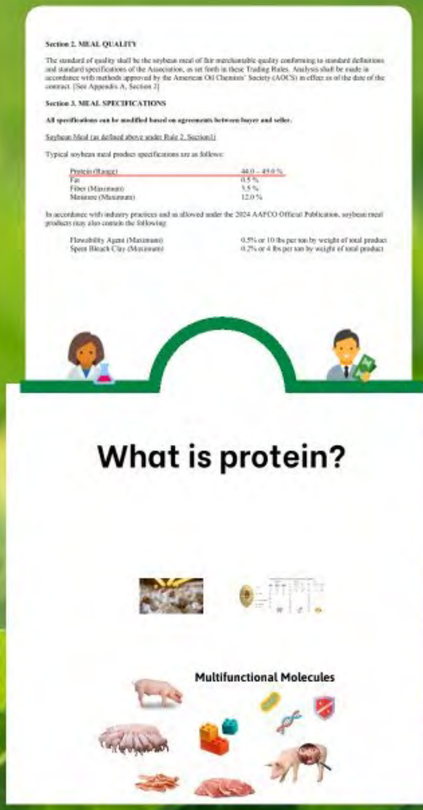

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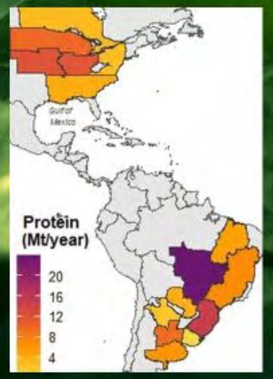

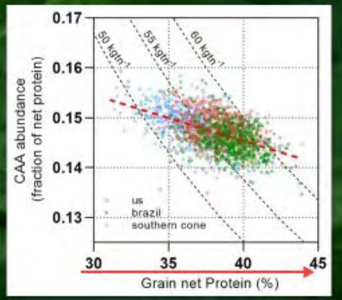

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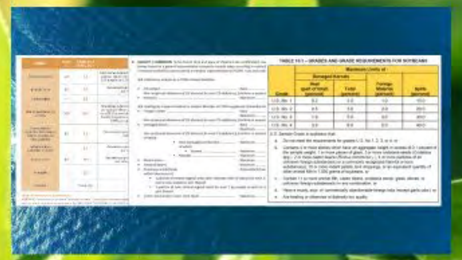

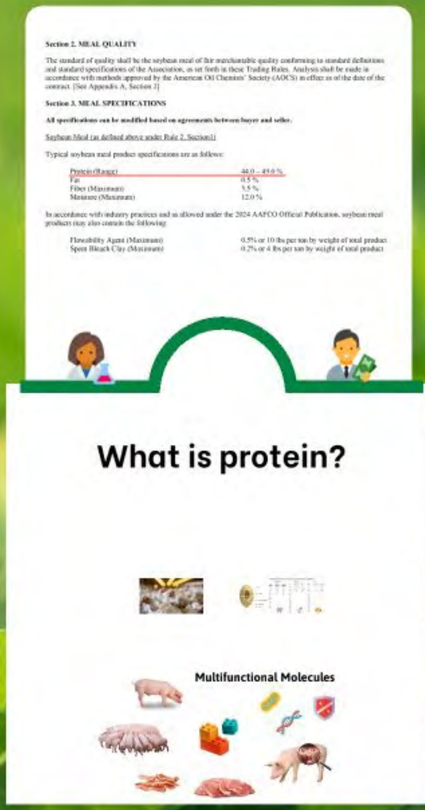

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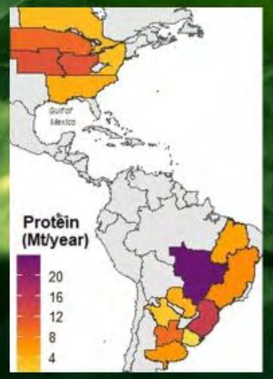

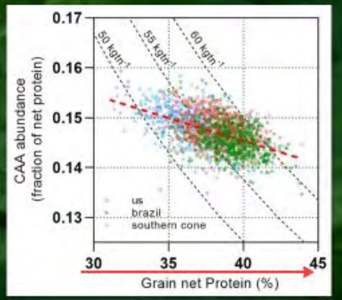

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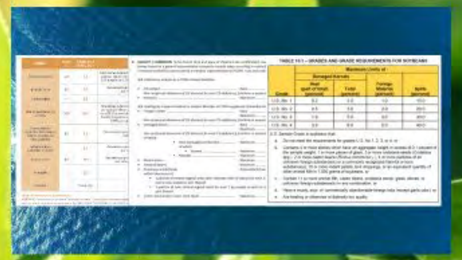

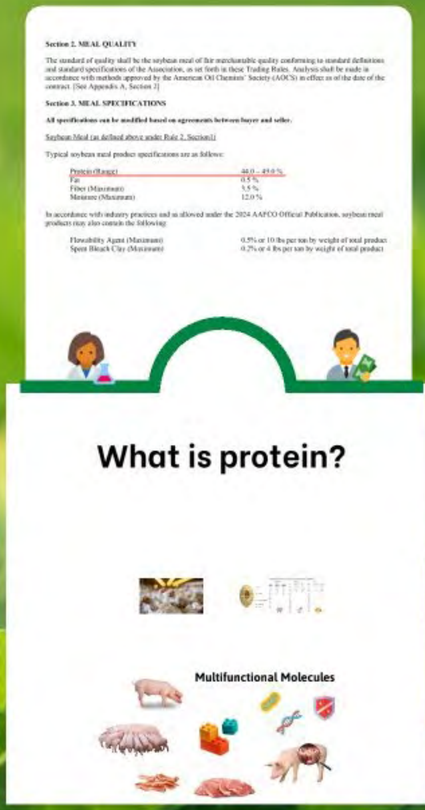

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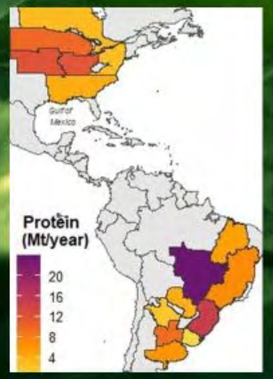

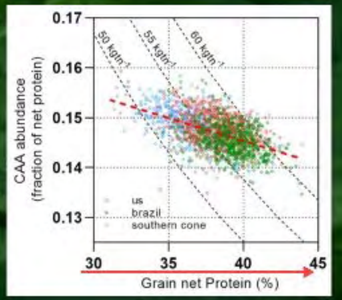

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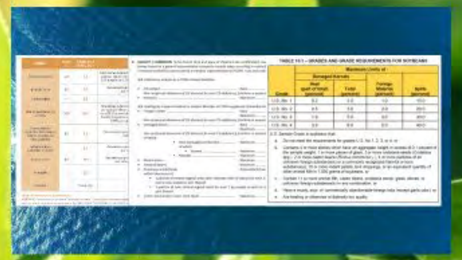

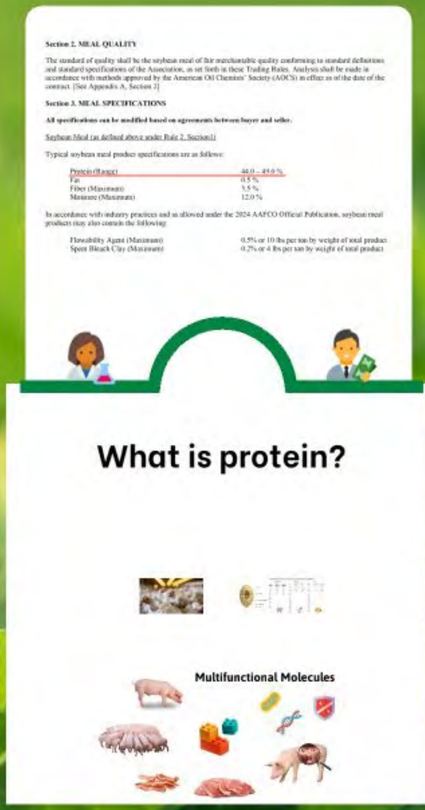

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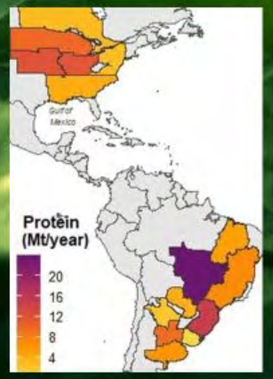

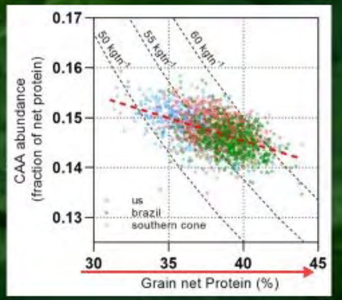

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