



# ROCK RIVER LABORATORY CAPABILITIES

## Fatty Acid Variation in Feeds Impacting Dairy Nutrition



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# Fatty Acid Variation in Feeds

## Focal Points & The Future of FA Nutrition

- Focal Areas:
  - Energy density
  - Butterfat production / depression
  - Health & reproductive performance
- Personal Use and Intake of Omega-3s:
  - My dogs & family ~ 20 to 30 mg/kg n3 intake
- The Future Prediction:
  - Formulate for “metabolizable fatty acids (g)”



# Fatty Acid Variation in Feeds

## FA Nutrition Exemplary Research

- Moussavi et al. 2007–fish meal @ 1.25 to 5.0% of diet or 2.3% Ca Salt of fish oil (FO)
  - Greater insulin post calving with 5% FM or FO
  - Greater intake and milk production post calving with FM/FO
- Silvestre et al. 2011 - Safflower through pre/post partum periods & FO through breeding @ 1.5% of diet DM
  - Less preg loss in FO fed cows
  - Preg % greater in SO/FO
  - Milk greater in SO
- Sinedino et al. 2017 - DHA rich algae at 100 g/cow (10% DHA; 10 g DHA)
  - Improved pregnancy in primiparous cows
  - Milk increase 1.1 kg, protein incr. 30g, fat decrease 40g (\$0.20/cow @today's BF value)
- Feed efficiency impact:
  - Virtus' Fatty Acid Quick Guide





# Fatty Acid Variation in Feeds

## Economic Efficiency

Dairy	ECM*	DMI	Feed Cost/lb. DM	EC_FCE	Feed Cost/cwt (\$)
1	96.6	56.9	0.088	1.70	5.18
2	99.1	53.9	0.099	1.84	5.39
3	96.5	55.6	0.096	1.74	5.53
4	97.3	55.2	0.100	1.76	5.67
5	86.5	52.2	0.092	1.66	5.55
6	84.0	54.3	0.093	1.55	6.01
7	97.6	60.1	0.114	1.62	7.02
8	89.3	54.2	0.093	1.65	5.64
9	95.1	59.2	0.100	1.61	6.23
10	88.9	55.8	0.095	1.59	5.96
11	95.0	57.0	0.116	1.67	6.96
12	80.8	53.2	0.105	1.52	6.91
13	83.6	53.9	0.089	1.55	5.74
14	77.9	55.6	0.102	1.40	7.28

With credit & appreciation to Stacy Nichols



# Fatty Acid Variation in Feeds

## The Future of Fatty Acid Nutrition

TMR  
25 kg intake.  
How much  
TFA is really  
there?



60 - 70% RUFAL  
350 to 700+ g RUFAL?  
What's happening here?

FA (g) post rumen?



# Fatty Acid Variations in Feeds

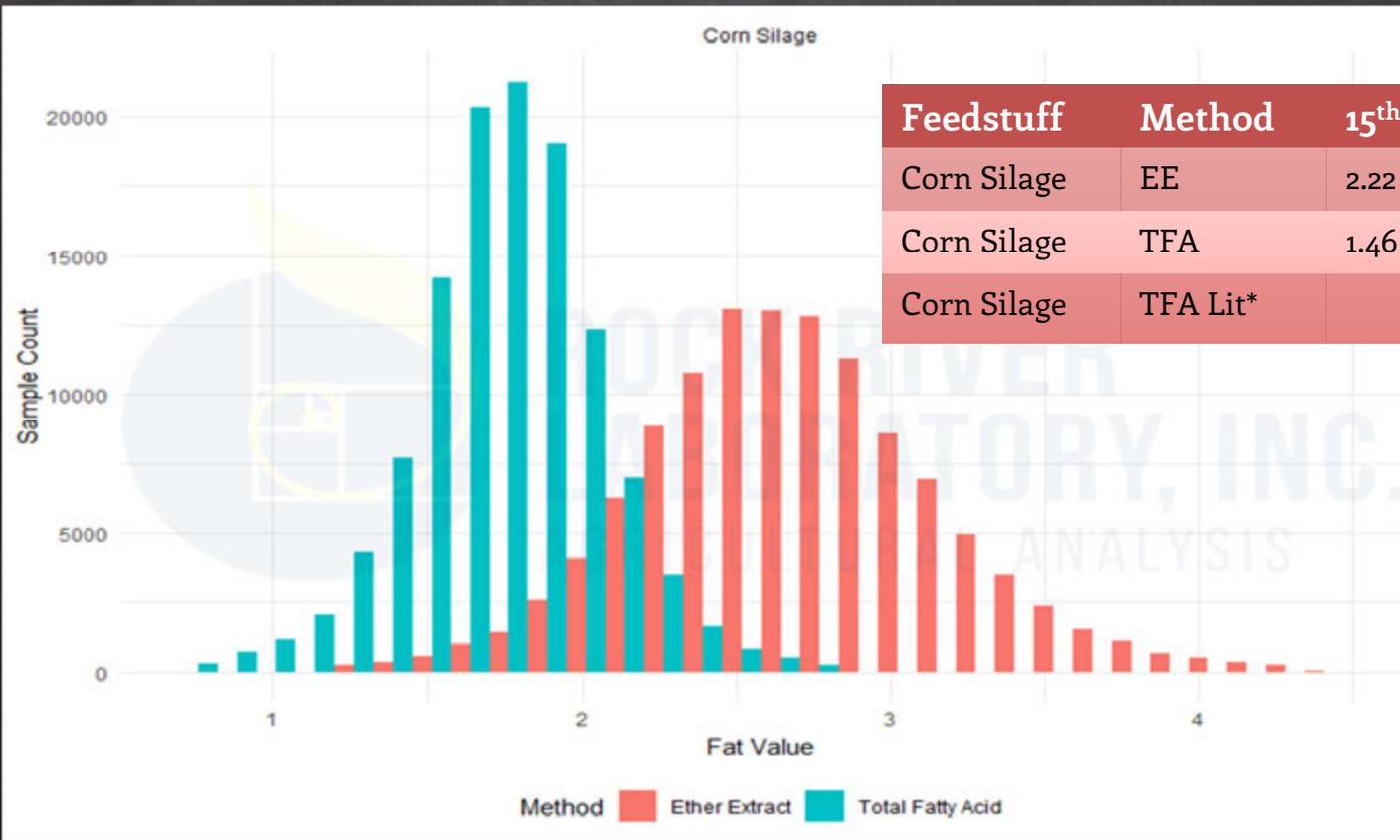
## Quantifying Fatty Acids: RRL

- NIR calibration models - 2017
  - Prof. Lock Laboratory chemistry database
- Total Fatty Acid, % of DM
  - Forages, grain, total mixed rations
- Fatty Acid Profile, % of TFA
  - Myristic, Palmitic, Stearic, Oleic, Linoleic, Linolenic
  - RUFAL
- Comprehensive Nutrition Analysis (by NIR)



# Fatty Acid Variation in Feeds

## Corn Silage EE & TFA

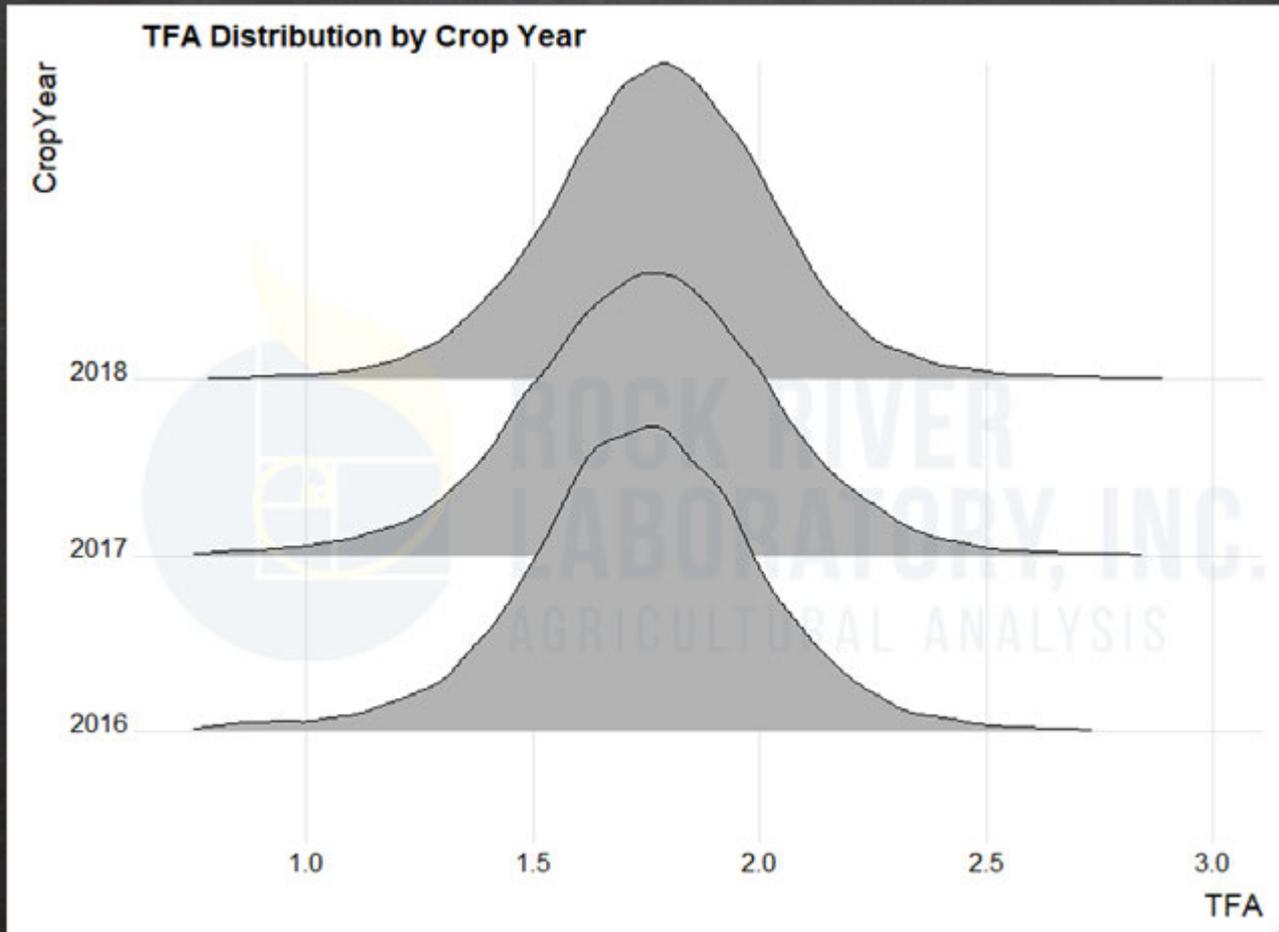


Feedstuff	Method	15 <sup>th</sup>	Mean	85 <sup>th</sup>
Corn Silage	EE	2.22	2.69	3.17
Corn Silage	TFA	1.46	1.75	2.03
Corn Silage	TFA Lit*		2.40	



# Fatty Acid Variation in Feeds

## Corn Silage TFA by Year

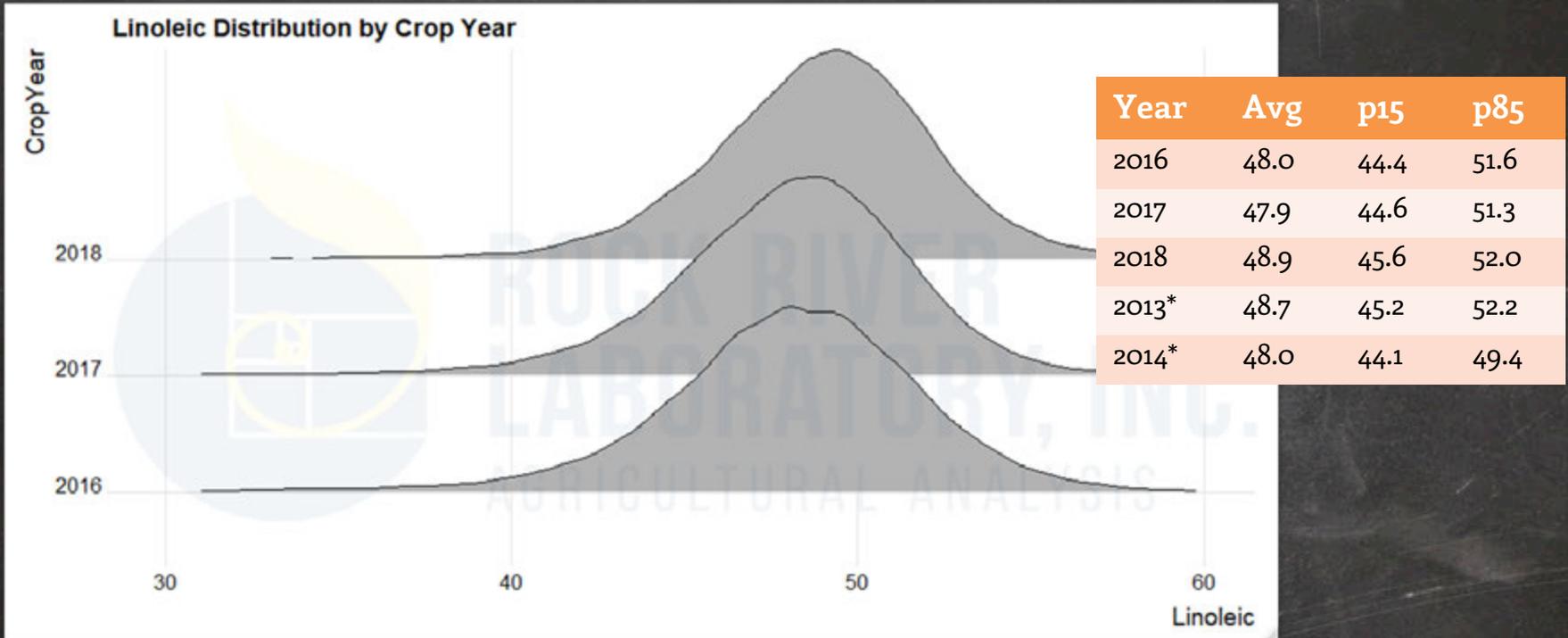


Year	Average
2016	1.74% DM
2017	1.76% DM
2018	1.79% DM



# Fatty Acid Variation in Feeds

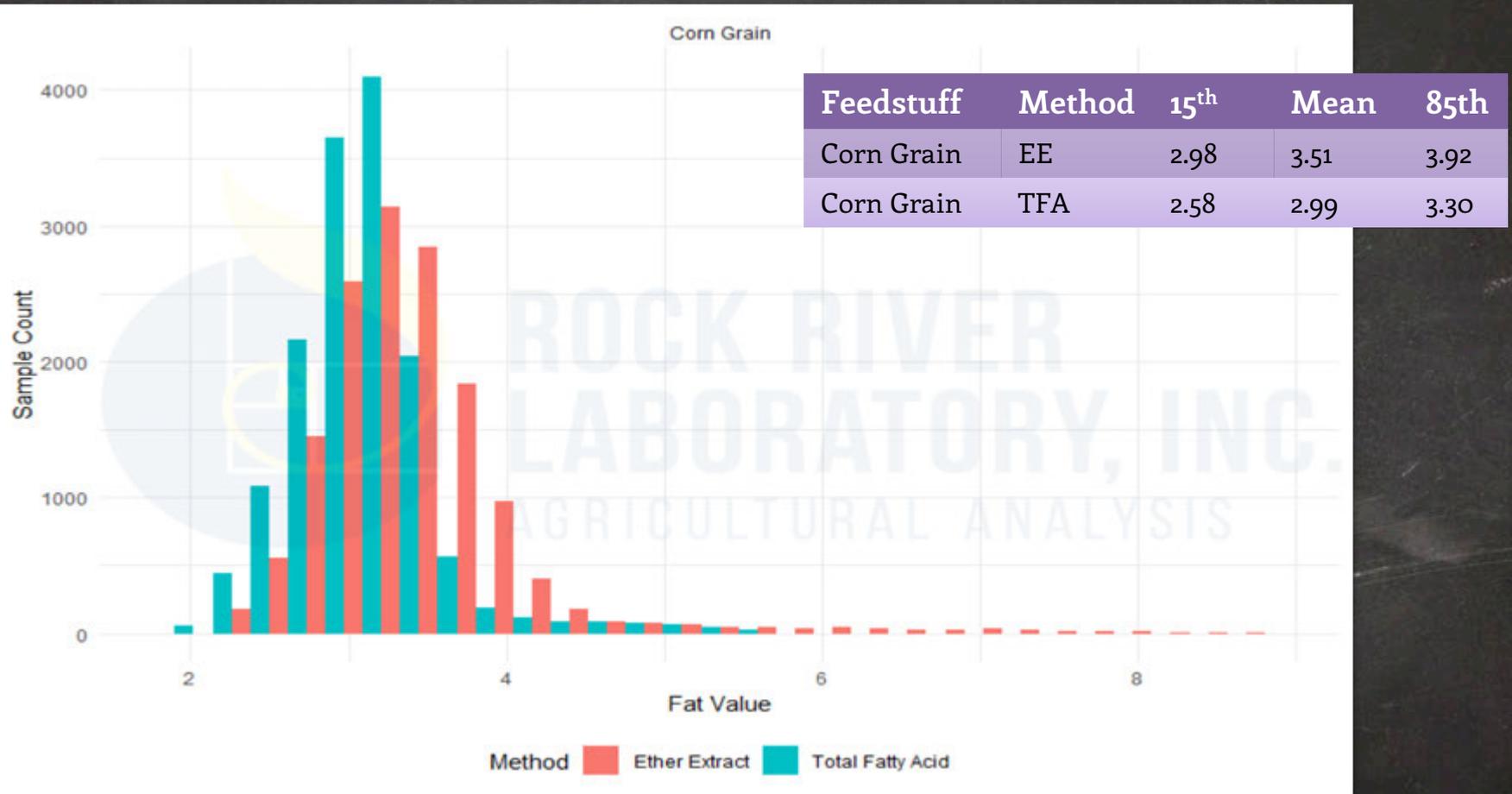
## Corn Silage Linoleic Content





# Fatty Acid Variation in Feeds

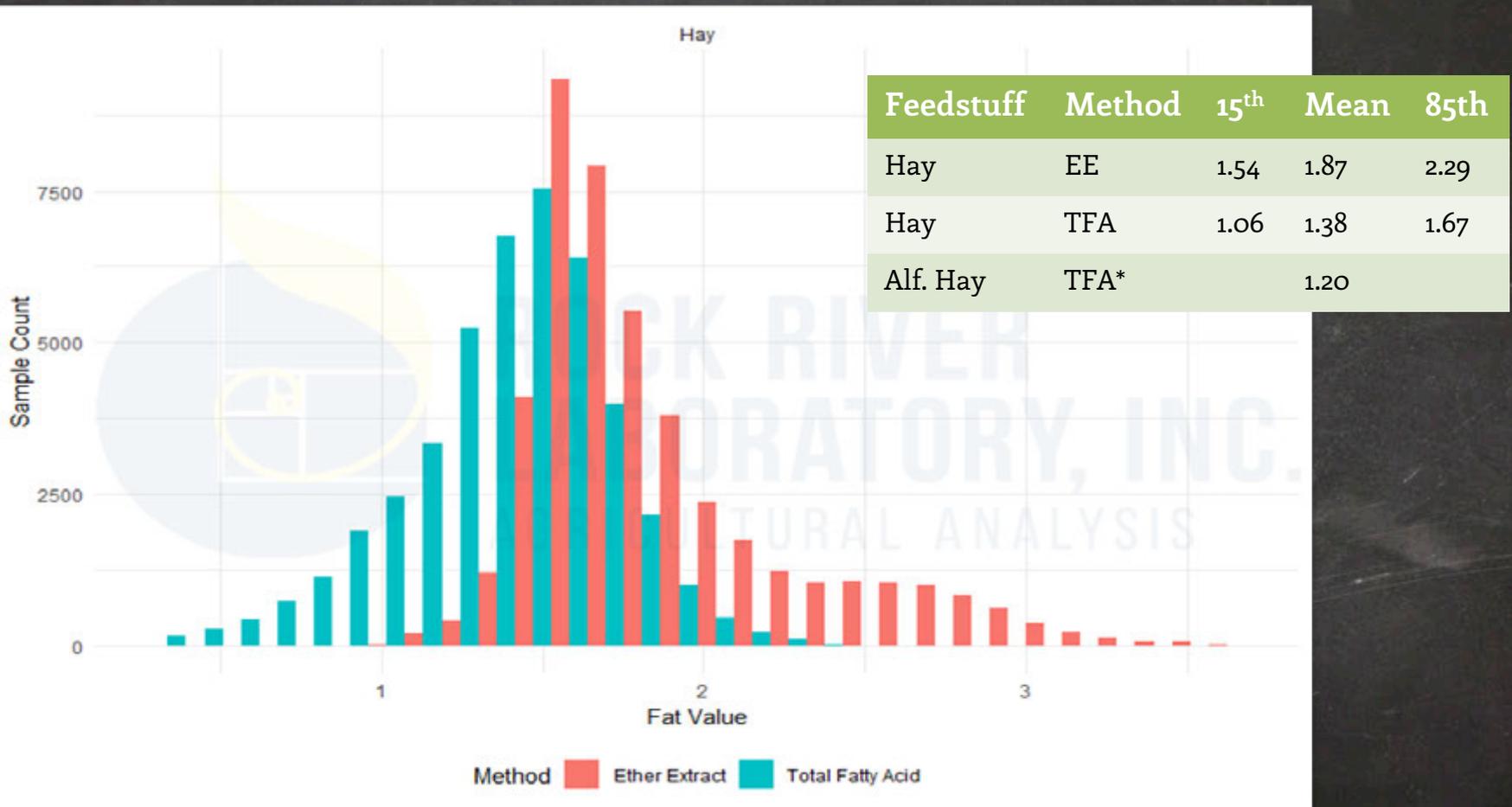
## Corn Grain EE & TFA





# Fatty Acid Variation in Feeds

## Hay EE & TFA



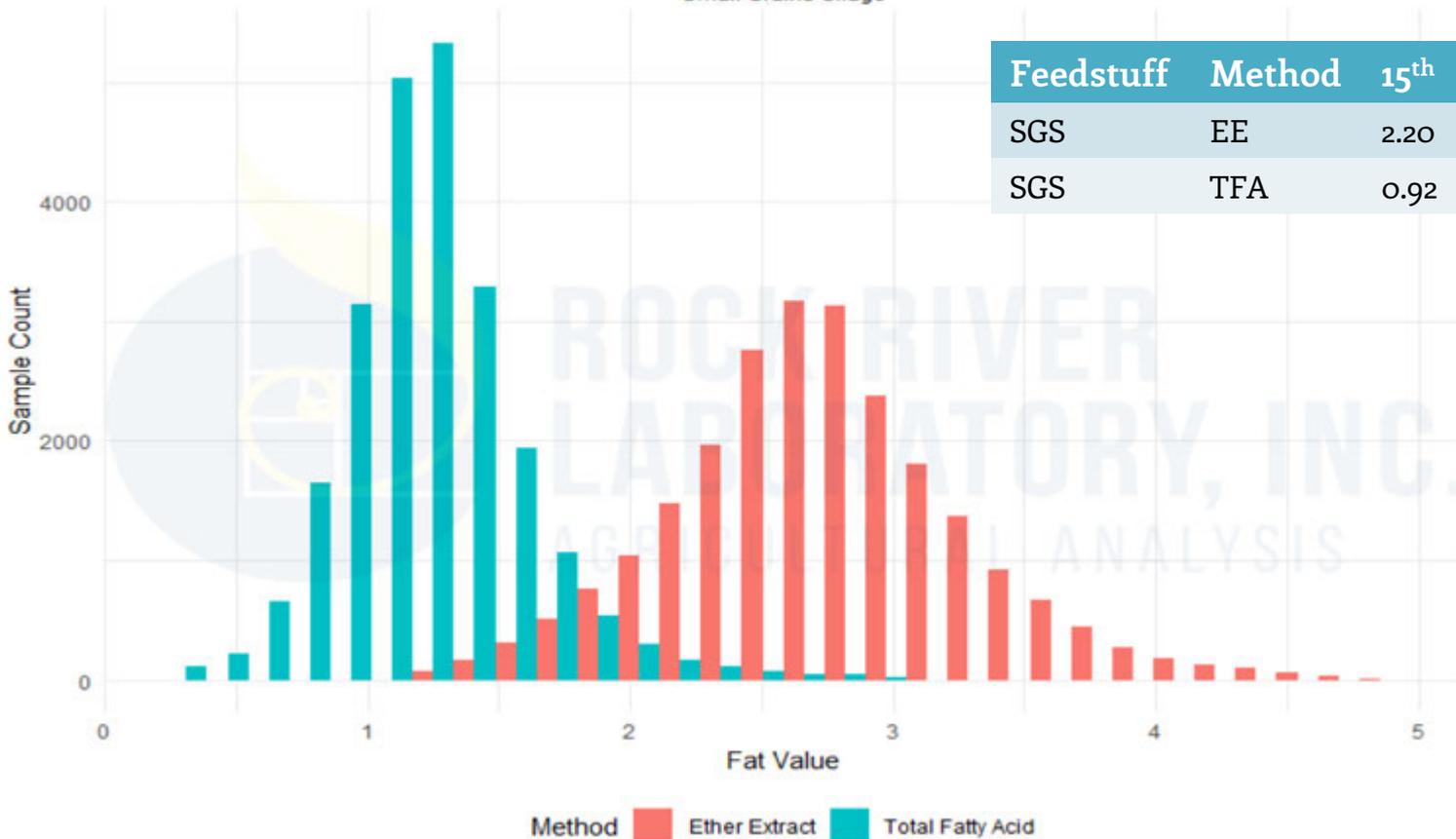
\* TFA mean adapted from Glasser et al. (2013)



# Fatty Acid Variation in Feeds

## Small Grain Silage EE & TFA

Small Grains Silage

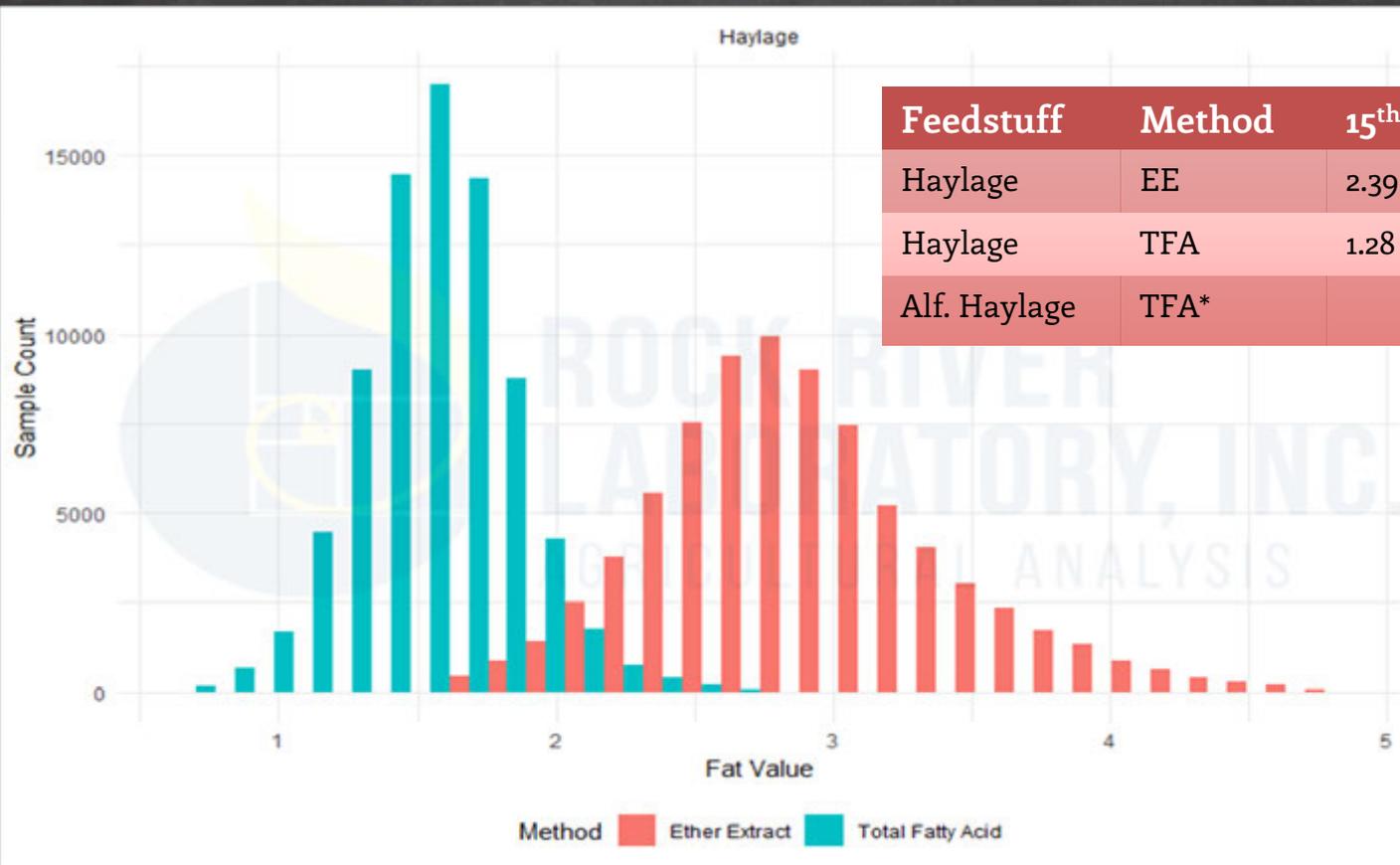


Feedstuff	Method	15 <sup>th</sup>	Mean	85 <sup>th</sup>
SGS	EE	2.20	2.74	3.27
SGS	TFA	0.92	1.23	1.54



# Fatty Acid Variation in Feeds

## Haylage EE & TFA



Feedstuff	Method	15 <sup>th</sup>	Mean	85 <sup>th</sup>
Haylage	EE	2.39	2.89	3.41
Haylage	TFA	1.28	1.55	1.82
Alf. Haylage	TFA*		1.97	

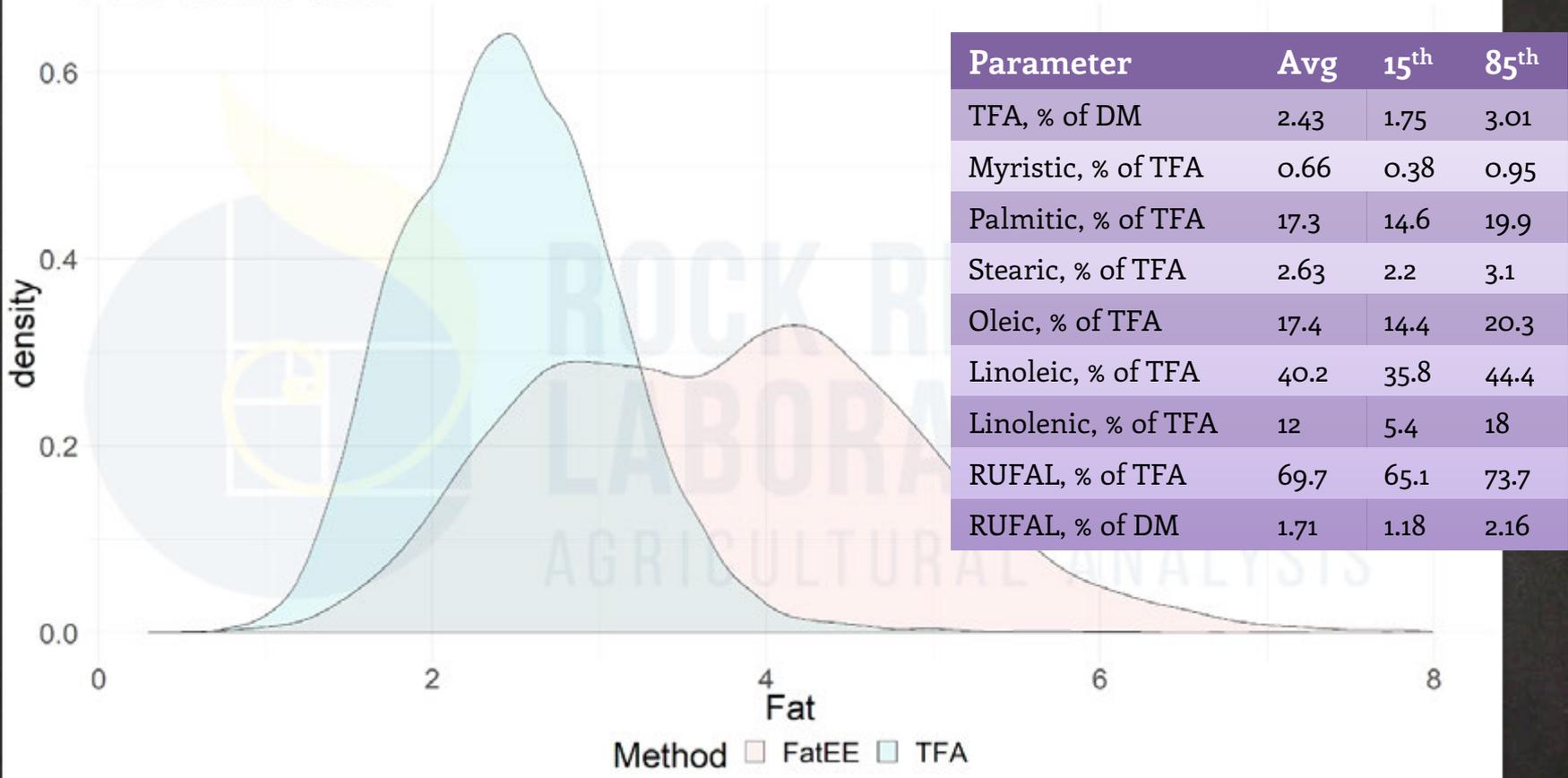
TFA mean adapted from Glasser et al. (2013)



# Fatty Acid Variation in Feeds

## Ether Extract v Total Fatty Acid: TMR

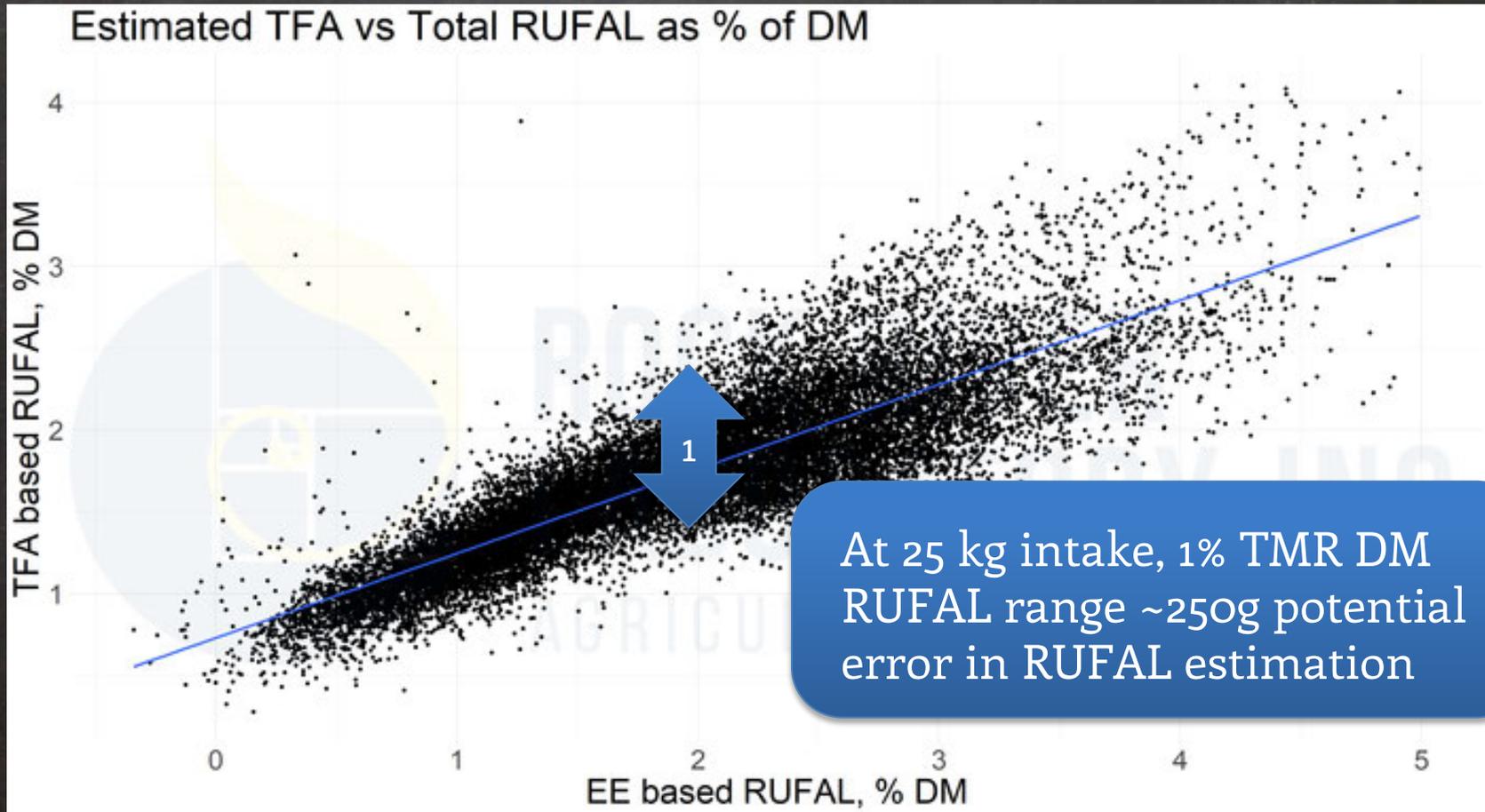
EE Fat and TFA





# Fatty Acid Variation in Feeds

## EE v TFA based RUFAL estimates

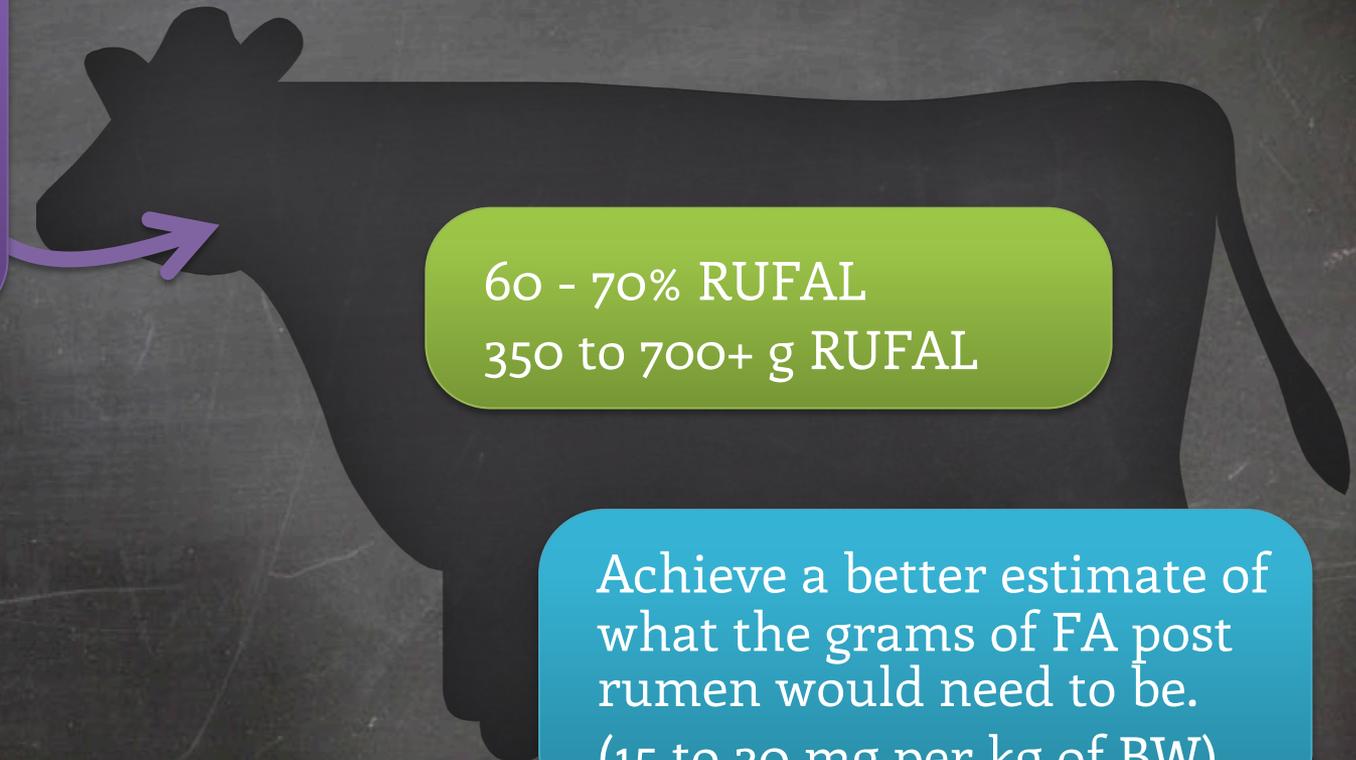




# Fatty Acid Variation in Feeds

## EE v TFA based RUFAL Estimates

TMR  
25 kg intake.  
How much  
TFA is really  
there?



60 - 70% RUFAL  
350 to 700+ g RUFAL

Achieve a better estimate of  
what the grams of FA post  
rumen would need to be.  
(15 to 30 mg per kg of BW)



## Fatty Acid Variation in Feeds Take Home Points

- Recognize dairy industry economics
  - Connect improved FA nutrition to cash flow
- FA Variation exists in many forms
- Grasp TFA first, then profile second
  - Sort out TFA differences between labs
  - What's 1.75 v 2.4 % DM TFA mean?
- 15 to 30 mg/kg supply post rumen



## Fatty Acid Variation in Feeds With Appreciation to:

- Prof. Adam Lock, MSU
- Prof. Kevin Harvatine, PSU
- Prof. Tom Jenkins, Clemson
- Dr. Kevin Murphy, Virtus Nutrition
- Cliff Ocker, RRL
- Jacob Karlen, RRL



# Fatty Acid Variation in Feeds

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## Fatty Acid Variation in Feeds References

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