

Nutritional Strategies for the Transition Cow: Does Forage Matter?

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Applied Nutrition Programming

Monday, June 22: Joint ARPAS and Ruminant Nutrition Symposium: Nutritional Management of Transition Dairy Cows

- New Insights in Calcium Utilization, Metabolism, and Dietary Management (*morning session*)
- Basic Physiology to Field Translation (*afternoon session*)



#ADSA2026 offers three days of applied nutrition programming and flexible **one-day registration options**





Rye

- Most common cover crops are rye (cereal rye or annual ryegrass) and wheat
- Most cold tolerant cereal crop available
- Can be grown under a wide range of soil moisture and fertility
- Extensive root system, so has drought resistance



Hybrid Rye

- KWS Progas, KWS Cereals USA, Champaign, IL
 - Elite nutrient digestibility, ideal for early cutting and double cropping systems, strong resistance against diseases
- Goal of hybrid breeding: maximize heterosis
 - Achieved by crossing two genetically distinct inbred rye lines
 - Result: production of superior F1 hybrid with improved traits



Hybrid Rye

- More growth above and below soil surface
 - Wider and deeper root system – improved drought resistance
 - Better utilization of available nutrients in soil
- Germinate in low temperatures (33°F in fall) and begins to grow in spring at 38° F
- Alleopathic growth inhibitors prevent weed seed development



Hybrid Rye

- Total of 10 acres of hybrid rye were planted for each treatment
 - Planting rate of 73.5 lbs/acre
- Fertilizer:
 - 123 units N
 - 40 units S
- Harvested at **boot stage** and **milky stage**



Quality

Yield

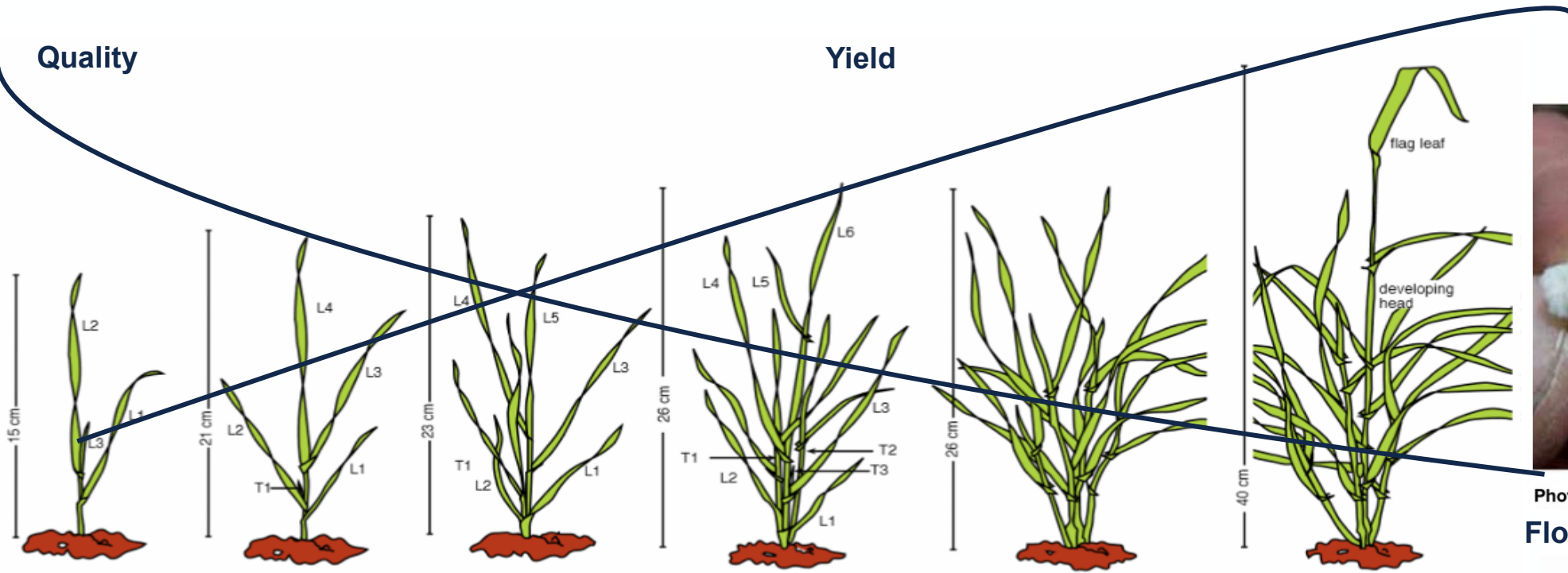


Photo 3: Cereal grain (left)

Flowering and grain formation



plant (right) at the soft dough stage.

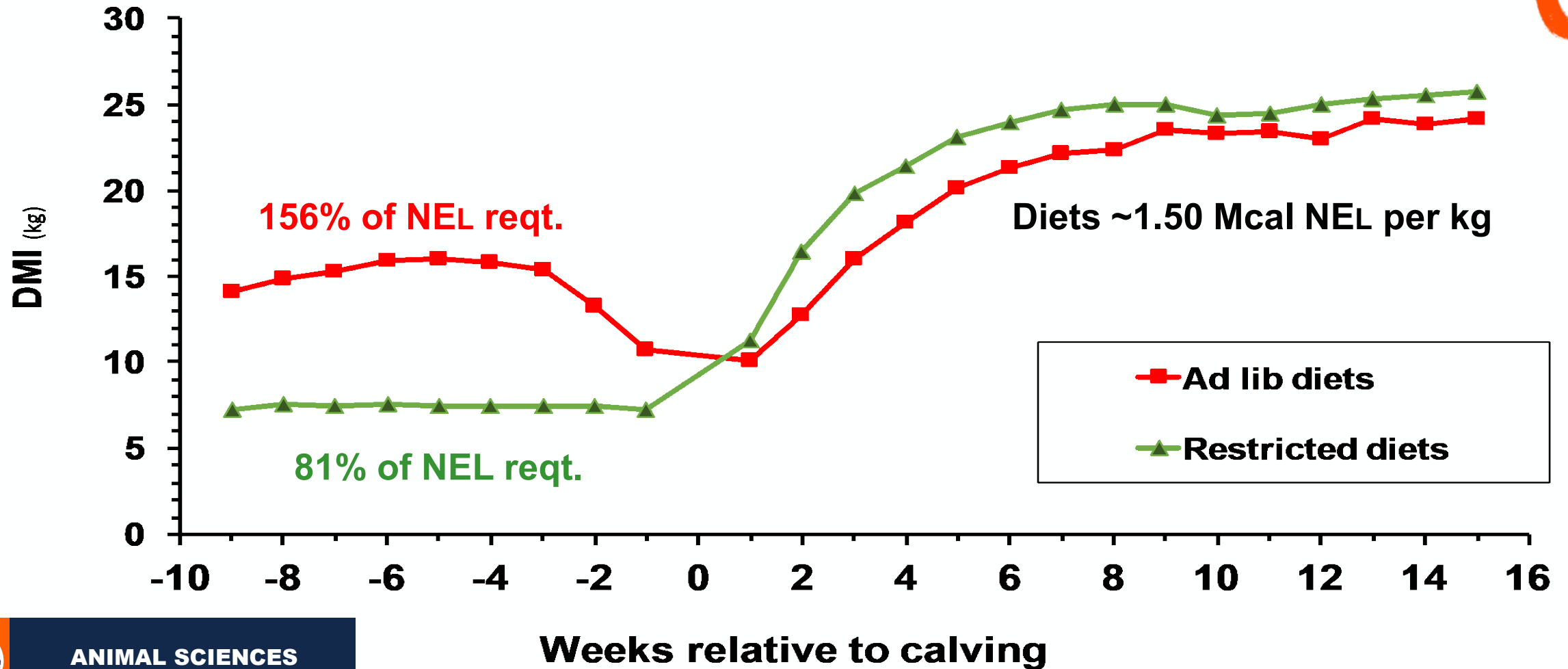
Crop growth stage

2-leaf stage	Start of tillering	Tillering stage	Fully tillered stage	Start of jointing	Early boot stage
Two leaves (L) have unfolded; third leaf present, yet to expand fully	First tiller (T1) appears from between a lower leaf and the main shoot. Usually 3 or 4 leaves are on the main tiller	Tillers come from the base where leaves join the stem and continue forming, usually until 5 leaves are on the main shoot. Secondary roots developing	Usually no more tillers form after the very young head starts forming in the main tiller. Tillering completed when first node detected at base of main stem	Jointing or node formation starts at the end of tillering. Small swellings (joints) form at the bottom of the main tiller. Heads continue developing and can be seen by dissecting a stem	The last leaf to form (the flag leaf) appears on top of the extended stem. The developing head can be felt as a swelling in the stem





Cows fed even moderate-energy diets during the dry period easily over-consume energy relative to requirements



How to build the dry cow diet?

- High forage digestibility is important
- Diets with more than 50% forage seem to work better
- No more than 4kg (~10 lb) of total DM coming from ingredients with more than 40% of NDF that are not from forage (by-product feeds)



How to build the dry cow diet?

- Cows usually eat 12–14 kg of dry matter (DM)
- 3 – 4 kg DM from chopped hay/straw
 - Particle size < 1.5 in (3 cm)
- No more than 4 kg DM from corn silage (only USA?)
 - Corn grain in the diet will come from corn silage
- Add forage with low energy and high NDF (hay/straw) if necessary





Dietary Recommendations for Dry Cows

- **NEL:** Control energy intake at 14 to 16 Mcal daily [diet ~ 1.32 Mcal/kg (0.60 Mcal/lb) DM] for mature cows
- **Crude protein:** 12 – 14% of DM
- **Metabolizable protein (MP):** > 1,200 g/d
- **Starch content:** 12 to 15% of DM (NFC < 26%)
- **NDF from forage:** 40 to 50% of total DM or 4.5 to 6 kg per head daily (~0.7 – 0.8% of BW). Target the high end of the range if more higher-energy fiber sources (like grass hay or low-quality alfalfa) are used, and the low end of the range if straw is used (2-5 kg)
- **Total ration DM content:** < 50% (add water if necessary)
- **Minerals and vitamins:** follow guidelines (For close-ups, target values are 0.40% magnesium (minimum), 0.35 – 0.40% sulfur, potassium as low as possible (Mg:K = 1:4), a DCAD of near zero or negative, calcium without anionic supplementation: 0.9 to 1.2% (~125g) calcium with full anion supplementation: 1.5 to 2.0% (~200g), 0.35 – 0.42% phosphorus, at least 1,500 IU of vitamin E, and 25,000 – 30,000 IU of Vitamin D (cholecalciferol)



University of Illinois at Urbana-Champaign

Forages with less energy

How to build the dry cow diet?

- High forage digestibility is important
- Diets with more than 50% forage seem to work better
- No more than 4kg (~10 lb) of total DM coming from ingredients with more than 40% of NDF that are not forage (by-product feeds)



University of Illinois at Urbana-Champaign



ANIMAL SCIENCES

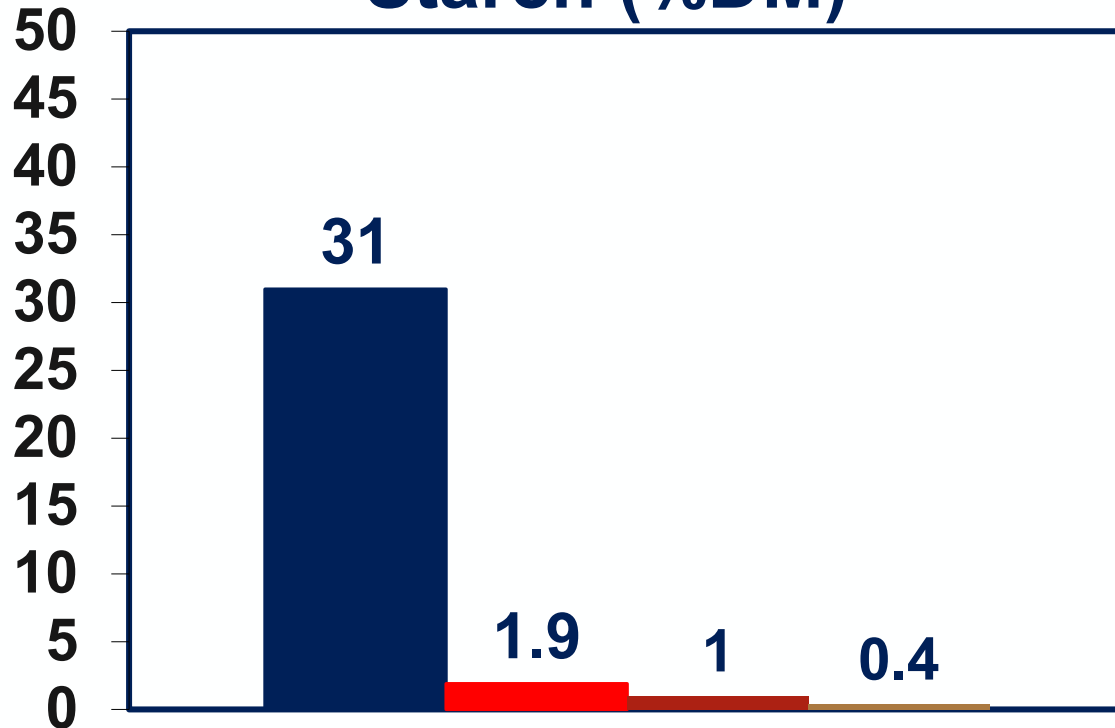




What forage to use?

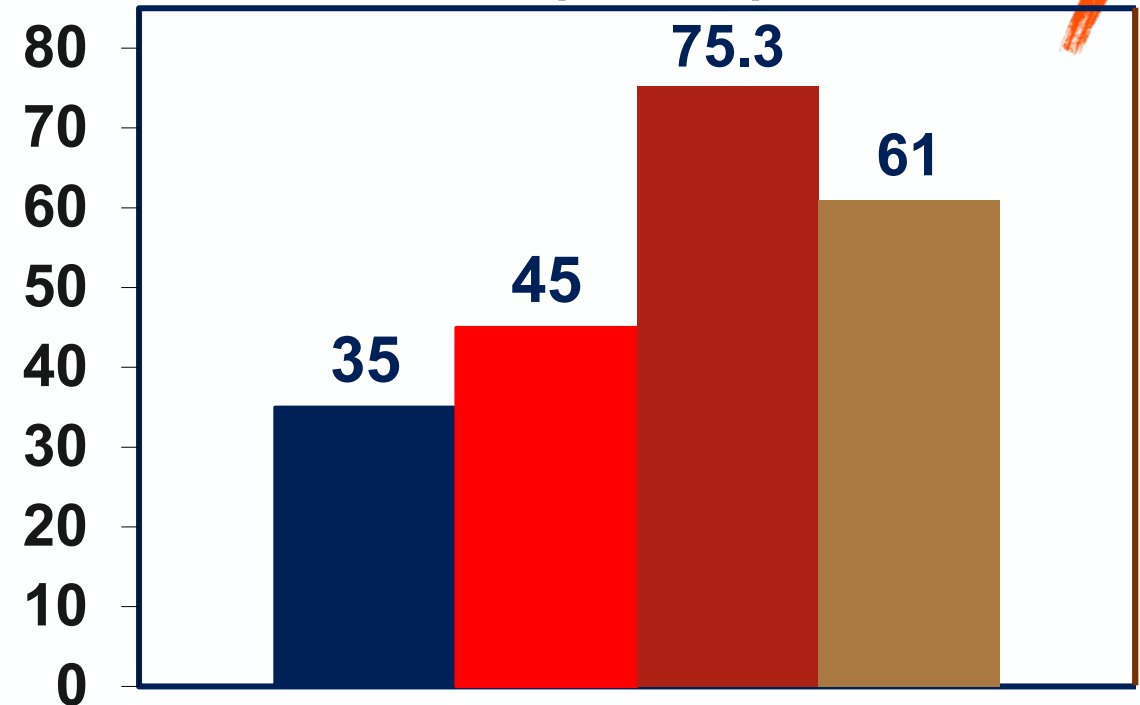


Starch (%DM)



■ Corn silage ■ Grass silage ■ Wheat straw ■ Rye silage

NDF (%DM)



■ Corn silage ■ Grass silage ■ Wheat straw ■ Rye silage



Boot Rye Harvest

- May 5, 2023
- Average DM content: $16.9 \pm 0.01\%$
- 20.9 tons/hectare (8.46 tons/acre)
- 3.53 tons/hectare DM (1.43 tons/acre DM)
- 126 bales total
- Each bale 0.67 ± 0.003 tons





Milky Rye Harvest

- June 2, 2023
- Average DM content: $29.0 \pm 0.06\%$
- 33.7 tons/hectare (13.6 tons/acre)
- 10.6 tons/hectare DM (4.29 tons/acre DM)
- 204 bales total
- Each bale 0.67 ± 0.02 tons

Fermentation – Materials and Methods

- Rye baleage time points:
 - Day 0, 30, 60, 90 and 150
 - 6 samples per time point
- Samples were removed directly from the bales using a forage sampler and immediately frozen at -20°C for a minimum of 24 h
- Thawed and composited in an identical fashion for a total of 2 composites per treatment per time point
- Sent to commercial lab for nutrient and fermentation analyses



Statistical Analysis

Statistical analyses were conducted using the MIXED procedure of SAS

$$Y_{ij} = \mu + T_i + W_j + T_i \times W_j + \varepsilon_{ij}$$

Y_{ij} = the observation for dependent variables

μ = the overall mean

T_i = the fixed effect of the i^{th} treatment

W_j = the repeated measurement effect of the j^{th} time point

$T_i \times W_j$ = the interaction between the treatment and time point

ε_{ij} = the random residual error

Bale was the experimental unit

Statistical significance was considered at $P \leq 0.05$ and tendencies at $0.05 < P \leq 0.10$

Table 1. Least squares means and associated standard errors for wet chemistry at the first sampling point (**BOOT**) and the second time point (**MILKY**) for rye baleage.

Composition	BOOT	MILKY	SEM	P-value Trt
DM, %	40.0	38.6	0.50	0.19
CP, % of DM	15.5	10.7	0.21	0.004
ADF, % of DM	34.0	39.0	0.14	0.002
NDF, % of DM	54.8	58.3	0.41	0.03
Lignin, % of DM	3.02	6.12	0.04	<0.001
Starch, % of DM	0.35	1.83	0.03	<0.001
WSC, % of DM	12.6	11.6	0.33	0.17
Crude fat, % of DM	4.27	3.32	0.07	0.01
Ash, % of DM	10.8	7.87	0.15	0.01
Ca, % of DM	0.34	0.45	0.01	0.01
P, % of DM	0.52	0.42	0.003	0.005
Mg, % of DM	0.17	0.17	0.002	0.43
K, % of DM	3.71	2.50	0.01	<0.001
S, % of DM	0.33	0.25	0.004	0.01
Na, % of DM	0.01	0.01	<0.001	0.61
Fe, ppm in DM	213.7	150.8	3.84	0.01
Zn, ppm in DM	32.9	34.1	0.36	0.14
Cu, ppm in DM	7.20	6.20	0.20	0.07
Mn, ppm in DM	22.5	17.5	0.22	0.004
Mo, ppm in DM	1.65	1.78	0.06	0.24

Highlighted in yellow variables with a TRT × TP interaction*

n = 20



Table 1. Least squares means and associated standard errors for fermentation products at the first sampling point (**BOOT**) and the second time point (**MILKY**) for rye baleage.

Fermentation Products ¹	BOOT	MILKY	SEM	<i>P</i> -value Trt
pH	5.27	4.82	0.05	0.02
Lactic Acid, %	2.97	4.56	0.12	0.01
Acetic Acid, %	1.13	1.33	0.04	0.16
Lactic/Acetic Ratio	4.78	3.98	0.23	0.12
Butyric Acid, %	0.10	0.07	0.01	0.09
Isobutyric Acid, %	0.21	0.18	0.01	0.07
Total Acids, %	4.19	6.25	0.31	0.04
Ammonia-N, % of Total N	6.10	9.50	0.30	0.02
VFA Score	6.79	7.63	0.07	0.01

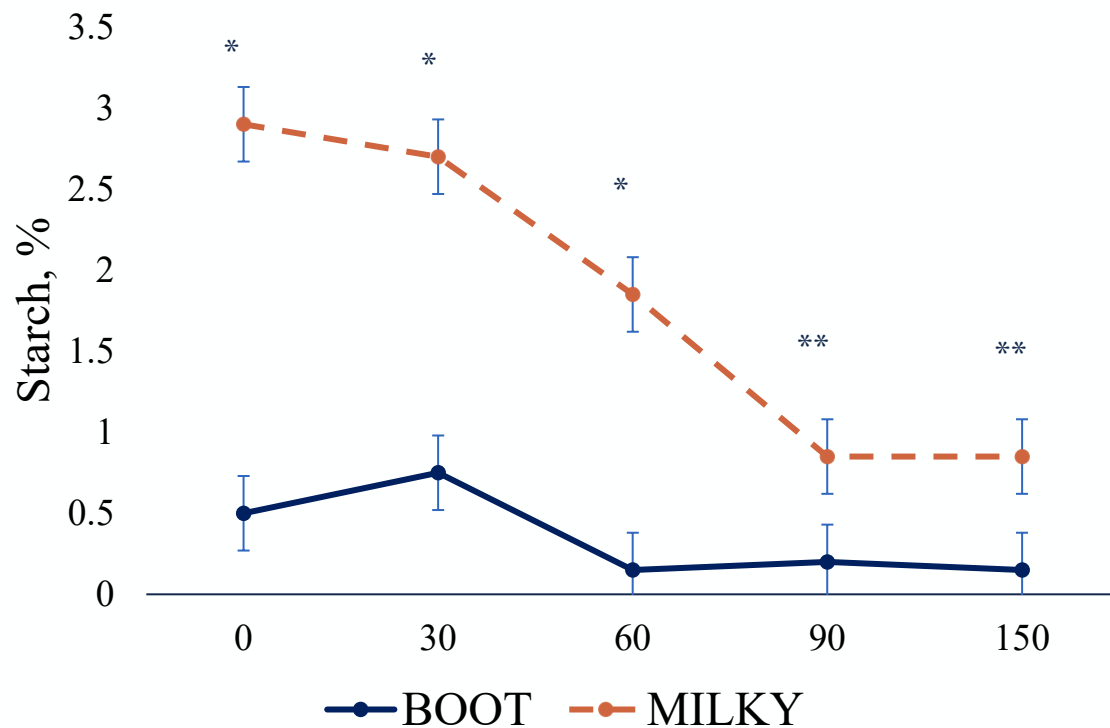
¹Propionic acid was non-detectable.

Highlighted in yellow variables with a TRT × TP interaction*

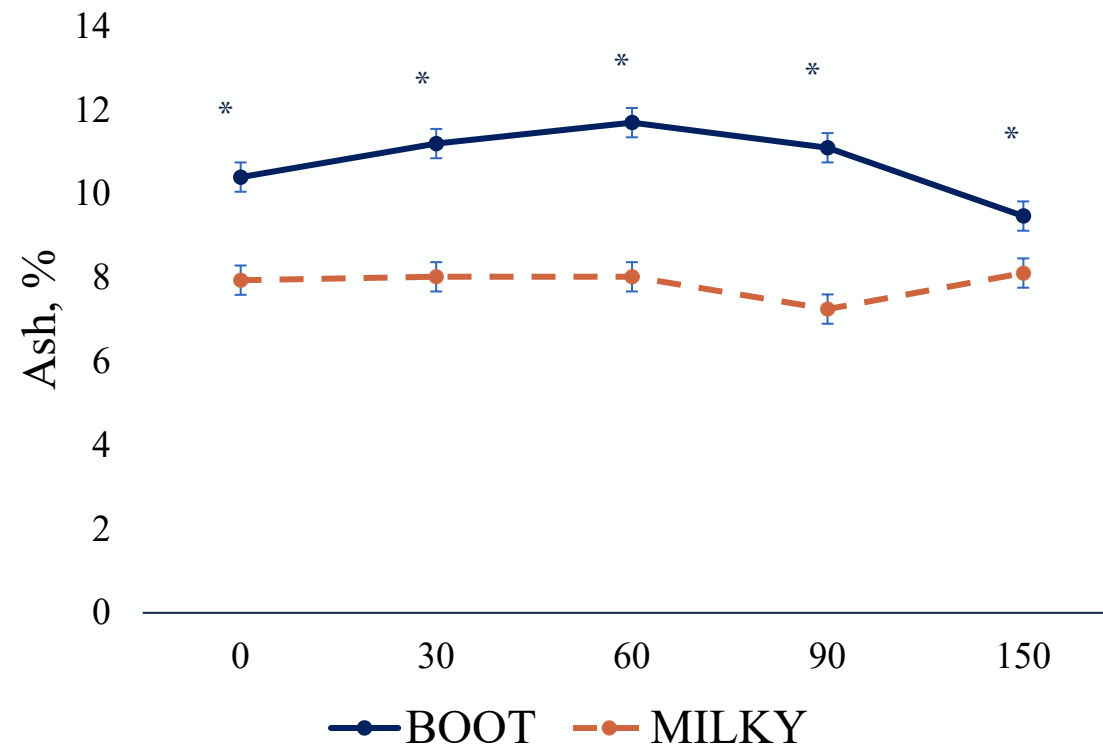
n = 20



TRT × TP = 0.03



TRT × TP = 0.04

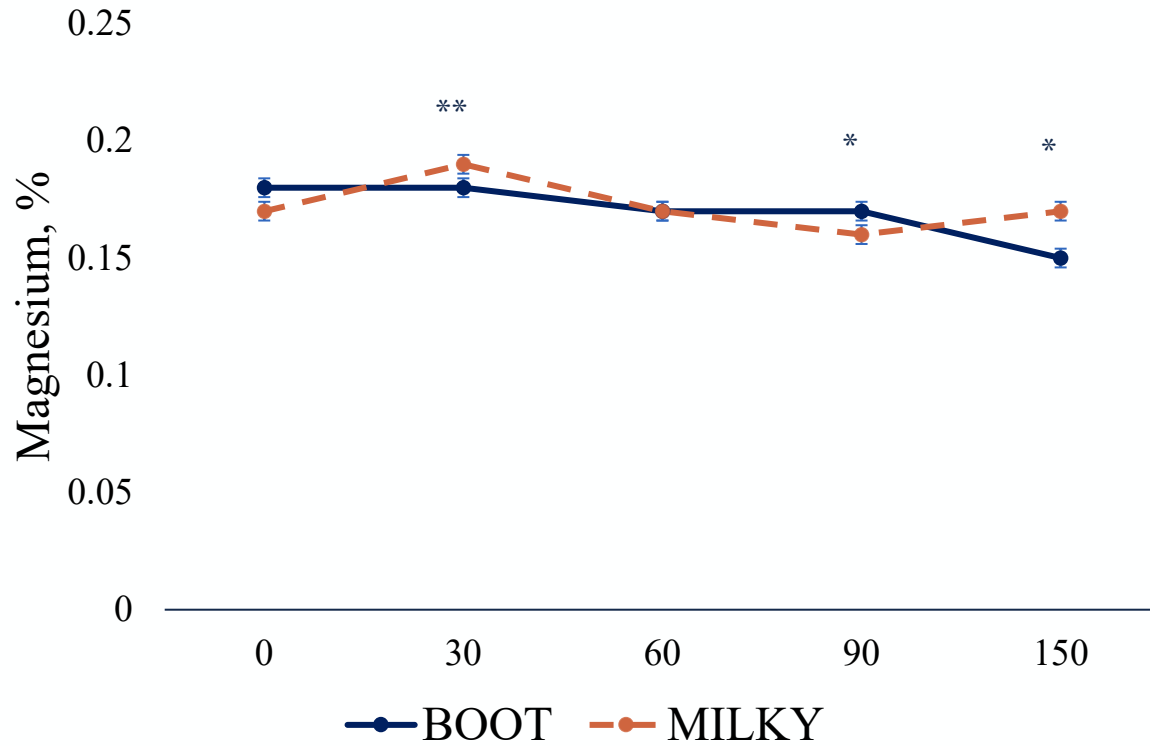


*Indicates a difference between treatments at that time point at $P \leq 0.05$

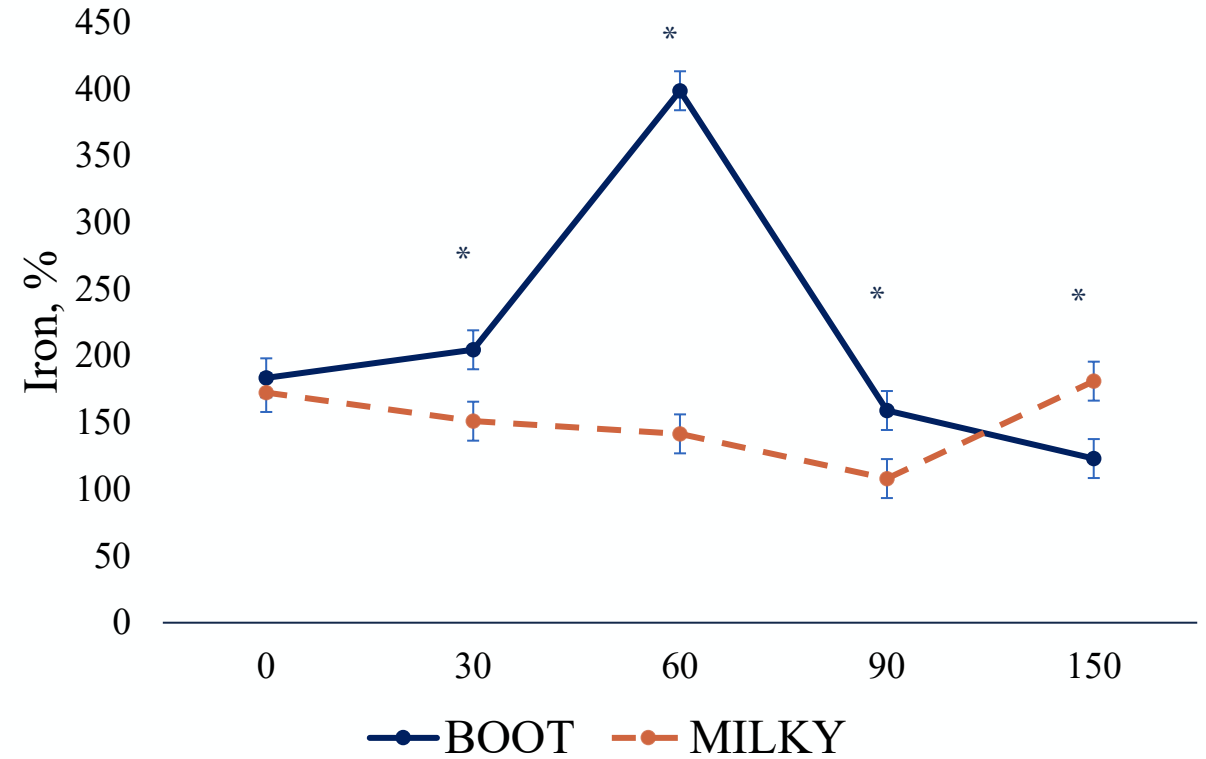
**Indicates a tendency between treatments at that time point at $P > 0.05$ or $P \leq 0.10$



TRT × TP = 0.01



TRT × TP < 0.001

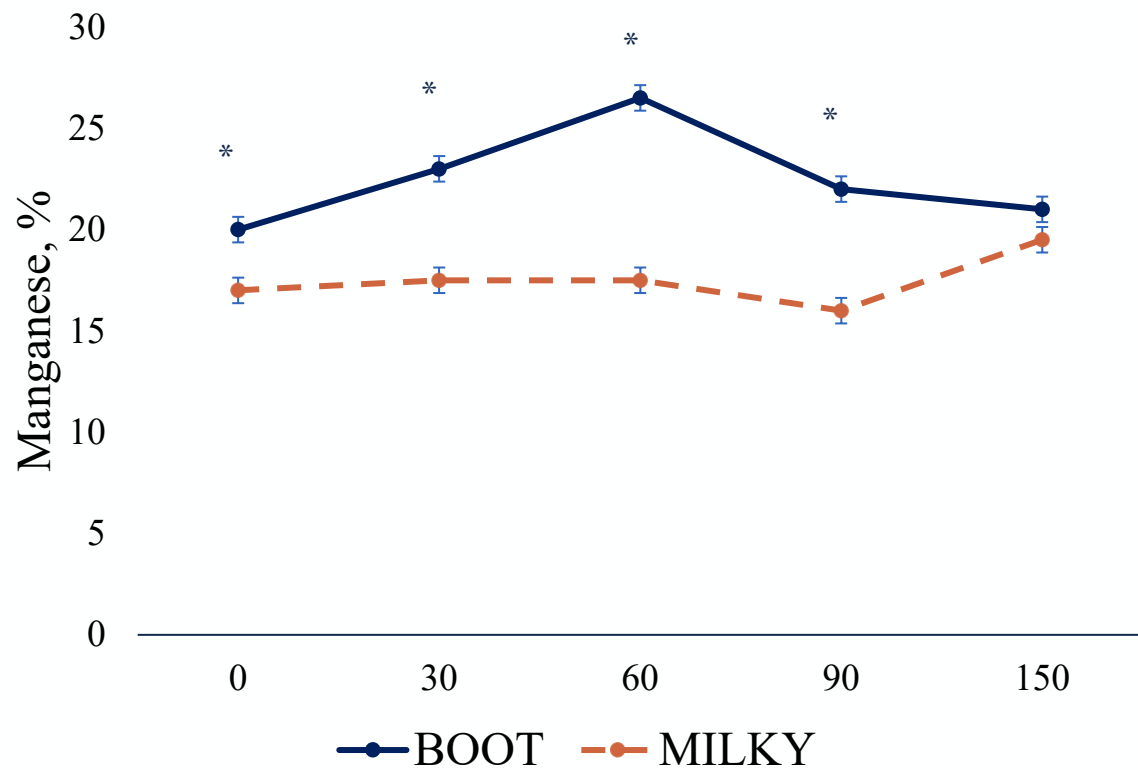


*Indicates a difference between treatments at that time point at $P \leq 0.05$

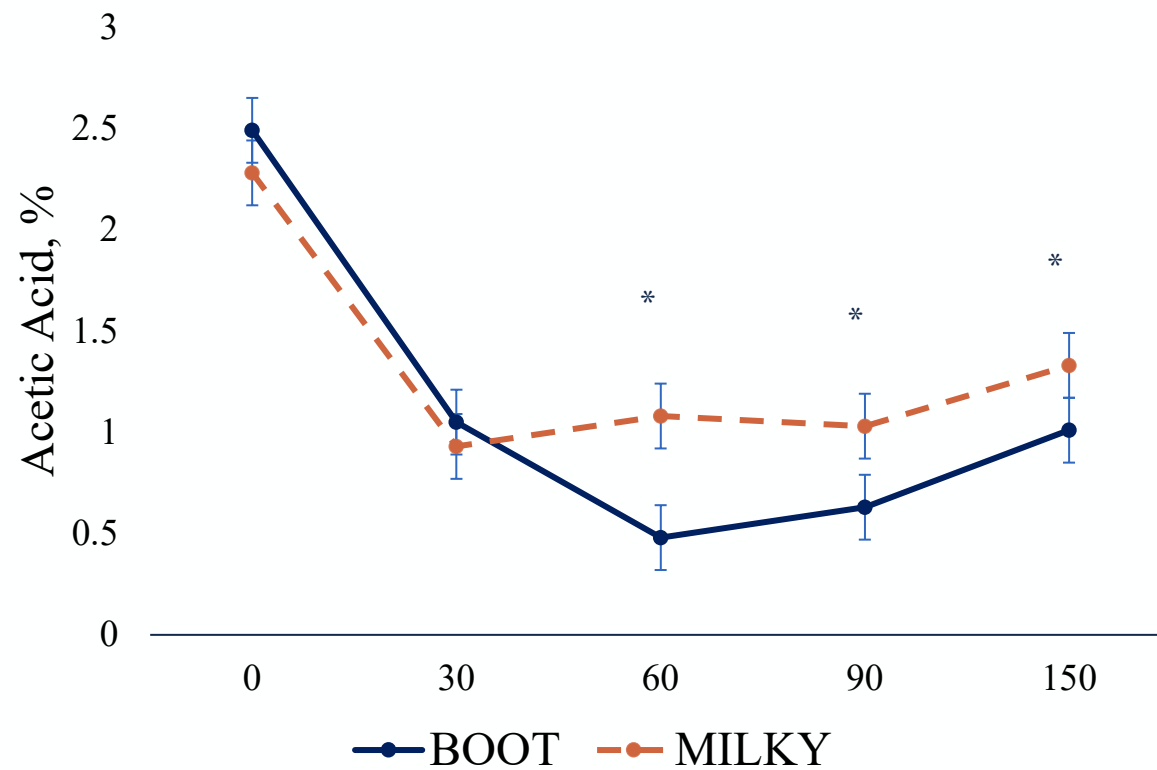
**Indicates a tendency between treatments at that time point at $P > 0.05$ or $P \leq 0.10$



TRT × TP = 0.004



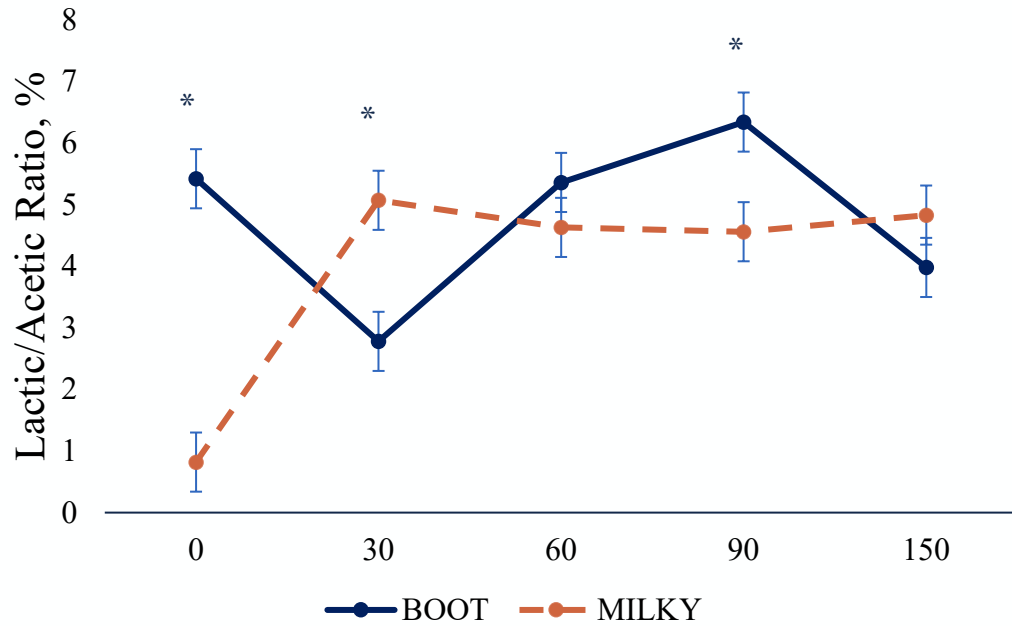
TRT × TP = 0.03



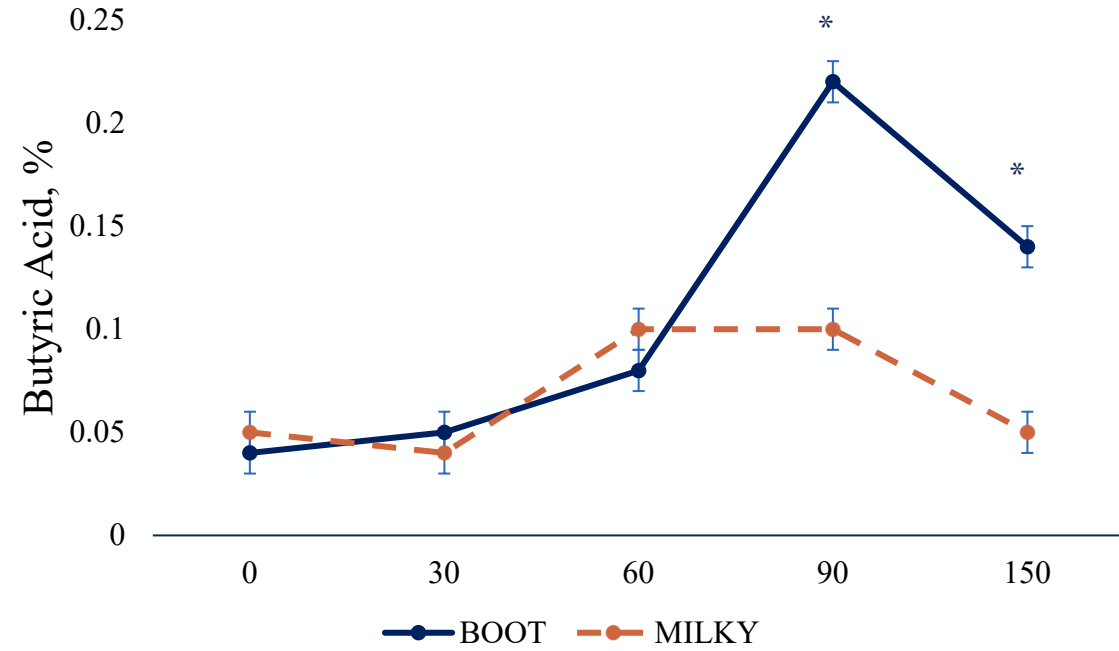
*Indicates a difference between treatments at that time point at $P \leq 0.05$



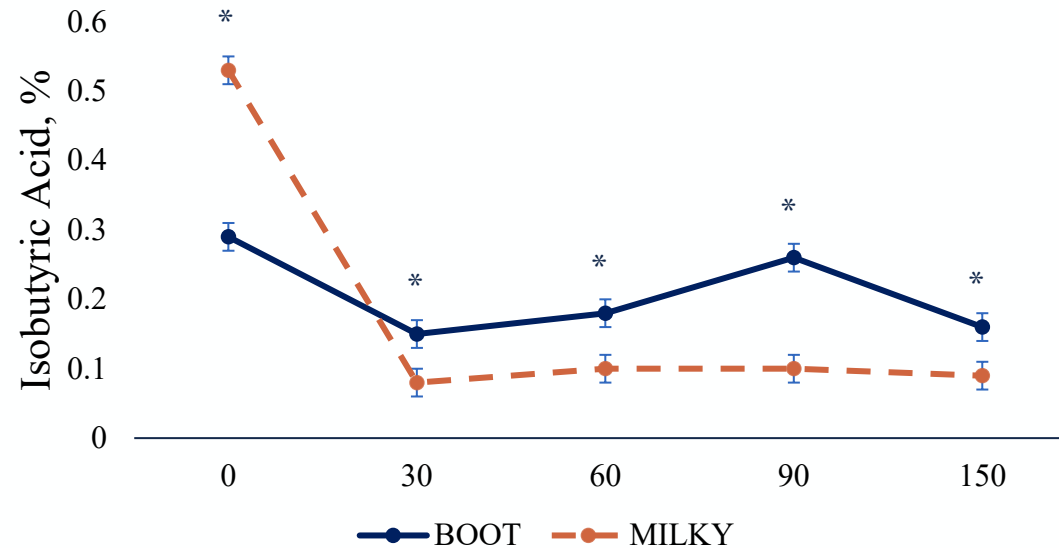
TRT × TP = 0.003



TRT × TP = 0.001



TRT × TP < 0.001

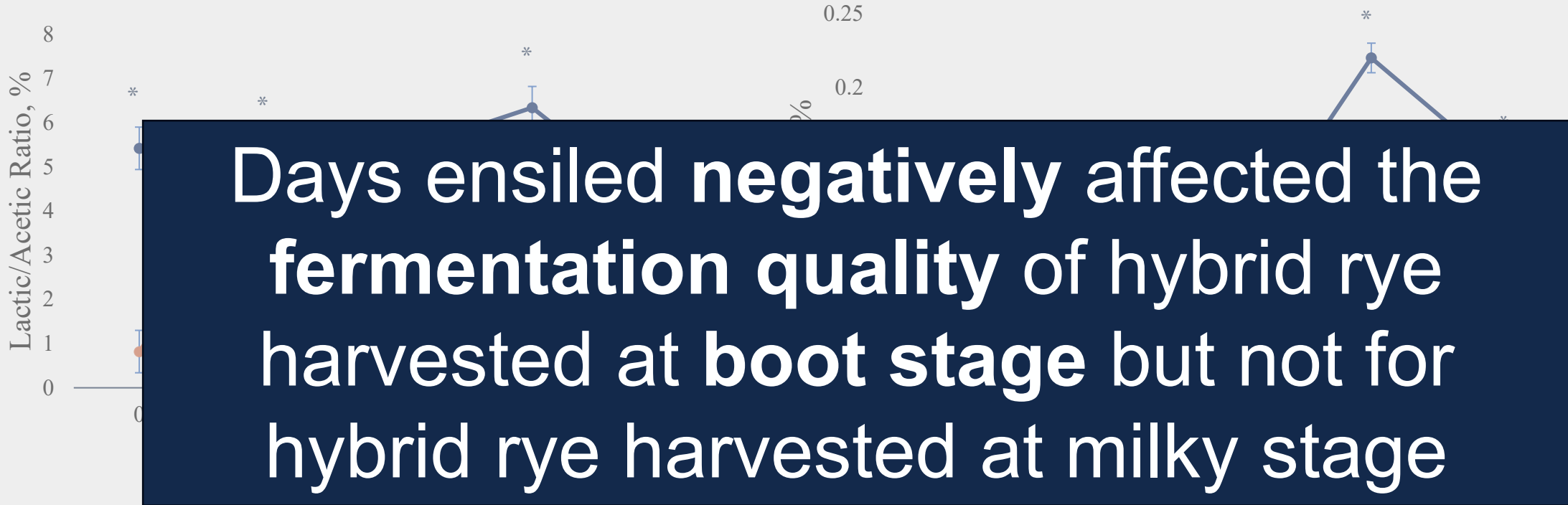


*Indicates a difference between treatments at that time point at $P \leq 0.05$

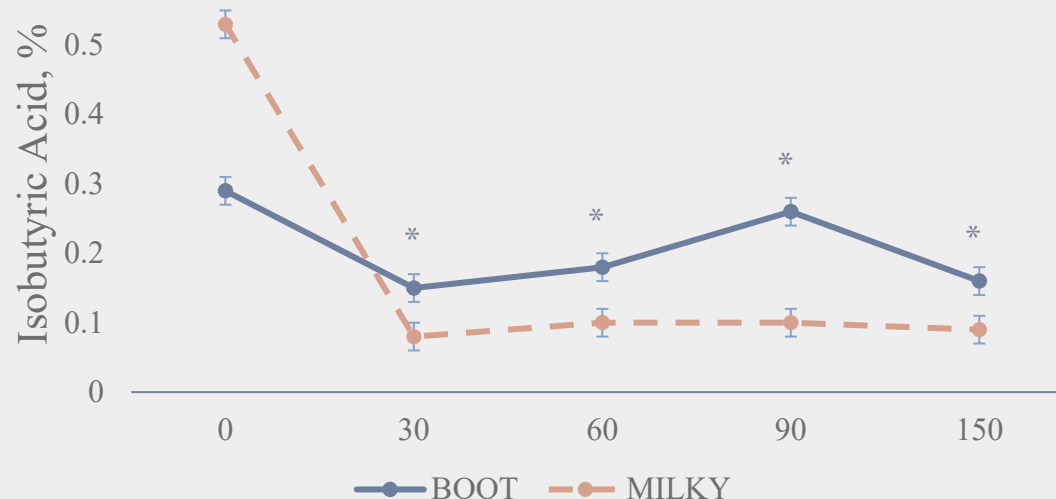


TRT × TP Interaction P = 0.003

TRT × TP Interaction P = 0.001



TRT × TP Interaction P < 0.001



KWS RYE TRANSITION TRIAL



Trial Overview

- 60 cows
- 13 – 15 cows/treatment
- -35 (-28) through +28
- April 2024 – December 2025



Trial Overview

- 61 cows prepartum
- 57 cows postpartum
-35 (-28) through +28



Trial Overview

- 61 cows prepartum
- 57 cows postpartum
- 35 (-28) through +28
- Four treatments
 - WSRB – 14 cows
 - WSAH – 14 cows
 - RMRB – 15 cows
 - RMAH – 14 cows



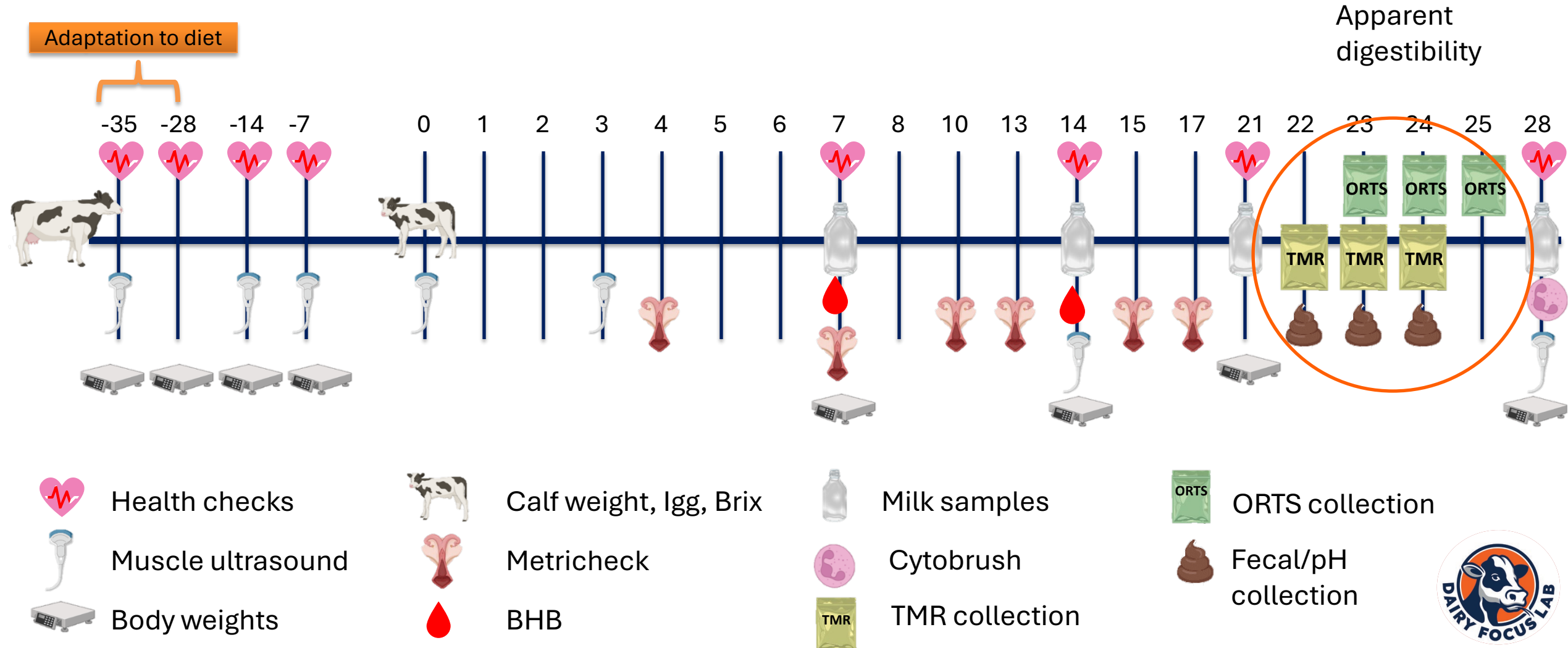
Cows Removed

Reason	WSAH	WSRB	RMAH	RMRB
Twins	3	0	0	2
Digestive problems	0	0	1	0
Fatty liver	0	2	0	1
Milk fever	0	0	1	0
Natural cause	0	0	0	1
Off feed	0	0	1	0

n = 12



KWS RYE TRANSITION – PRODUCTION & REPRODUCTION



Ingredient Composition ¹	PREPARTUM	
	Wheat Straw TMR	Rye Milky TMR
Corn silage	33.7	14.8
Wheat straw	32.6	-
Rye milky baleage	-	55.5
Corn gluten feed	7.23	1.77
Canola meal expelled	1.66	2.47
Dry ground corn grain	2.50	10.2
Soybean meal 47.5 CP	2.21	-
Salt white	0.36	0.35
Wheat middlings	6.51	5.30
Expeller soybean meal	5.91	1.77
Water	0.03	0.01
Anionic mineral supplement	3.07	3.87
Rumen-protected methionine	0.08	0.13
Rumen-protected lysine	0.18	0.64
Calcium carbonate	2.39	2.00
Vitamin and mineral mix	1.19	1.16
Urea 281 CP	0.48	-

¹Ingredients expressed as percentage of DM.



Mean Chemical Composition	PREPARTUM	
	Wheat Straw TMR	Rye Milky TMR
DM, %	43.5 ± 2.03	44.7 ± 2.74
CP, % of DM	14.1 ± 1.19	13.7 ± 0.77
ADF, % of DM	26.4 ± 2.37	27.3 ± 1.97
aNDF, % of DM	41.6 ± 2.18	40.0 ± 2.80
Lignin, % of DM	4.11 ± 0.60	4.83 ± 0.44
Starch, % of DM	15.6 ± 2.33	13.2 ± 1.85
Crude fat, % of DM	3.00 ± 0.51	3.63 ± 0.24
Ash, % of DM	9.29 ± 0.99	9.52 ± 0.74
NE _L , Mcal/kg of DM	1.50 ± 0.04	1.52 ± 0.04
Ca, % of DM	1.06 ± 0.30	1.05 ± 0.18
P, % of DM	0.36 ± 0.03	0.41 ± 0.02
Mg, % of DM	0.45 ± 0.12	0.42 ± 0.05
K, % of DM	1.11 ± 0.11	1.63 ± 0.08
Na, % of DM	0.23 ± 0.01	0.22 ± 0.03
S, % of DM	0.34 ± 0.02	0.41 ± 0.03
Fe, ppm	381 ± 177	519 ± 106
Zn, ppm	58.9 ± 5.52	67.0 ± 7.78
Cu, ppm	12.2 ± 0.95	12.9 ± 1.76
Mn, ppm	63.2 ± 10.2	55.7 ± 6.17



	POSTPARTUM	
Ingredient Composition ¹	Alfalfa Haylage TMR	Rye Boot TMR
Corn silage	37.2	34.0
Alfalfa haylage	25.2	11.5
Rye boot baleage	-	13.2
Canola meal expelled	6.24	5.52
Dry ground corn grain	13.8	17.5
Soybean meal 47.5 CP	0.90	1.96
Salt white	0.40	0.14
Limestone ground	-	0.65
Expeller soybean meal	6.68	7.48
Water	0.01	0.01
Rumen-inert fat	1.92	1.43
Rumen-protected methionine	0.16	0.14
Rumen-protected lysine	1.12	0.92
Magnesium oxide	-	0.10
Sodium bicarbonate	0.06	0.06
Calcium phosphate	0.25	0.23
Vitamin and mineral mix	2.93	3.54
Molasses dried	2.99	1.61
Urea 281 CP	0.12	-



¹Ingredients expressed as percentage of DM.



Mean Chemical Composition	POSTPARTUM	
	Alfalfa Haylage TMR	Rye Boot TMR
DM, %	41.9 ± 2.79	41.8 ± 2.17
CP, % of DM	16.9 ± 0.82	16.7 ± 1.06
ADF, % of DM	22.3 ± 2.04	21.4 ± 2.14
aNDF, % of DM	31.3 ± 2.54	31.9 ± 1.77
Lignin, % of DM	4.41 ± 0.51	4.07 ± 0.57
Starch, % of DM	21.2 ± 3.78	20.2 ± 2.06
Crude fat, % of DM	4.98 ± 0.53	5.03 ± 0.63
Ash, % of DM	8.16 ± 0.51	8.54 ± 0.39
NE _L , Mcal/kg of DM	1.68 ± 0.07	1.68 ± 0.02
Ca, % of DM	1.01 ± 0.16	0.94 ± 0.11
P, % of DM	0.36 ± 0.01	0.41 ± 0.01
Mg, % of DM	0.30 ± 0.04	0.31 ± 0.02
K, % of DM	1.46 ± 0.19	1.71 ± 0.10
Na, % of DM	0.46 ± 0.06	0.49 ± 0.05
S, % of DM	0.22 ± 0.02	0.24 ± 0.02
Fe, ppm	285 ± 50	322 ± 67
Zn, ppm	89.2 ± 34.9	91.4 ± 26.2
Cu, ppm	10.4 ± 0.94	11.2 ± 0.65
Mn, ppm	52.5 ± 6.76	55.3 ± 5.08

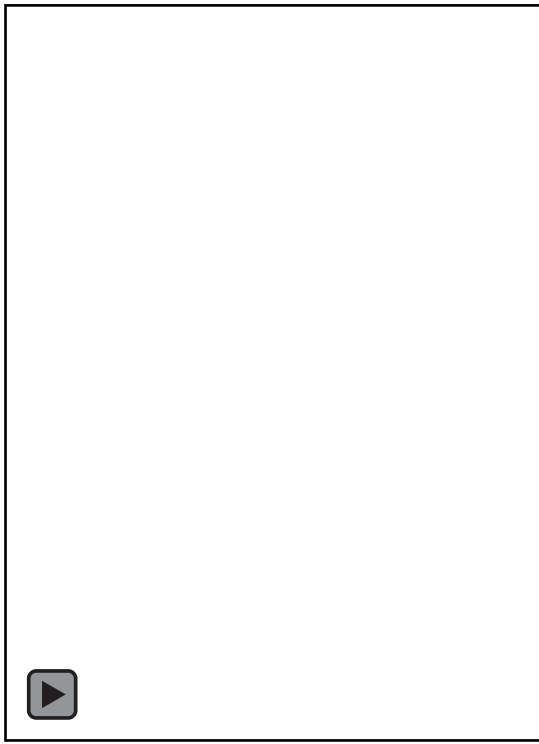


Penn State Particle Separator

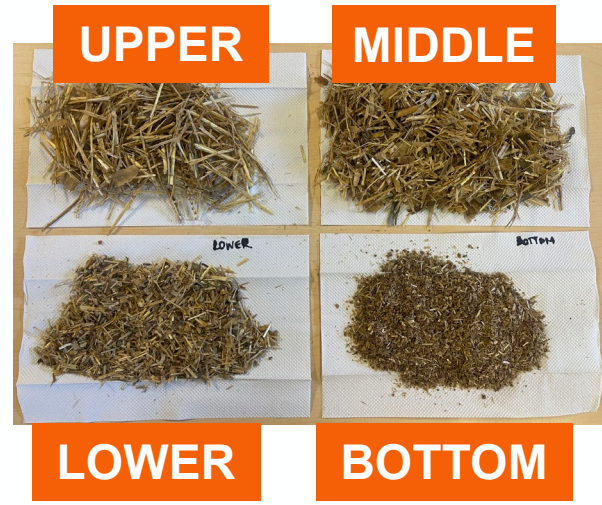


Upper Tray	2 – 8%
Middle Tray	30 – 50%
Lower Tray	10 – 20%
Bottom Tray	30 – 40%

Close-up Wheat Straw TMR



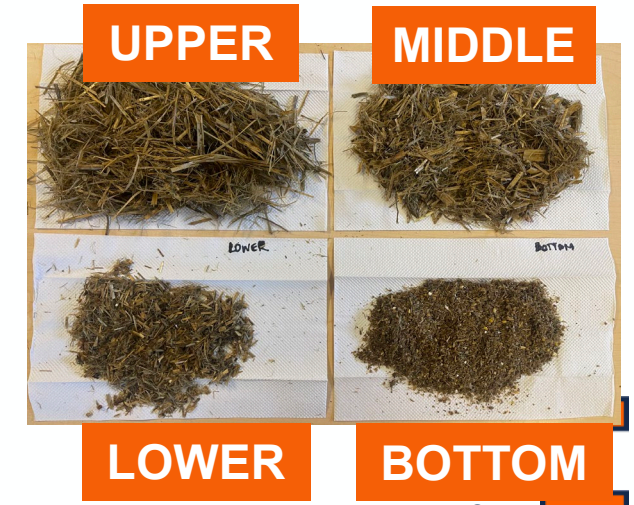
Sieve	
Upper, %	7 ± 3.6
Middle, %	47 ± 4.2
Lower, %	18 ± 2.0
Bottom, %	28 ± 5.0



Close-up Rye Milky TMR



Sieve	
Upper, %	46 ± 9.7
Middle, %	23 ± 5.1
Lower, %	11 ± 1.9
Bottom, %	20 ± 4.5



Penn State Particle Separator

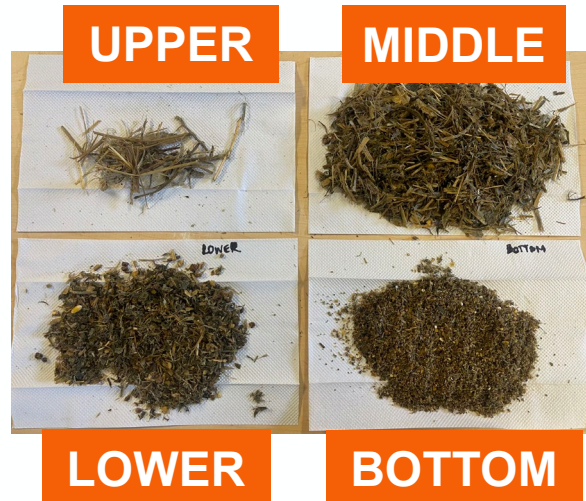


Upper Tray	2 – 8%
Middle Tray	30 – 50%
Lower Tray	10 – 20%
Bottom Tray	30 – 40%

Fresh Alfalfa Haylage TMR



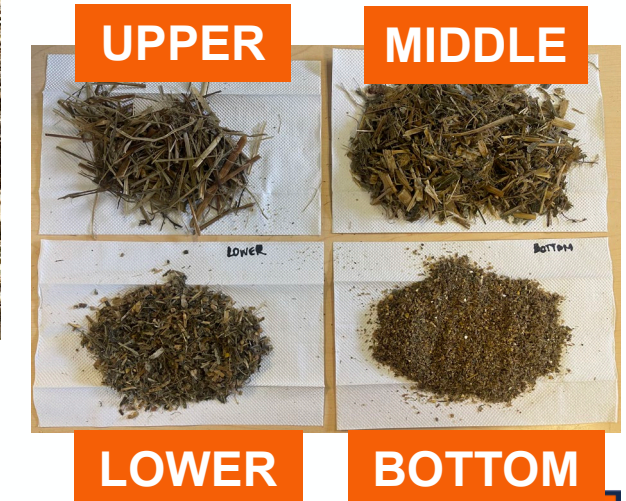
Sieve	
Upper, %	5 ± 2.5
Middle, %	48 ± 5.5
Lower, %	18 ± 1.9
Bottom, %	30 ± 5.7



Fresh Rye Boot TMR



Sieve	
Upper, %	13 ± 6.9
Middle, %	44 ± 6.6
Lower, %	15 ± 1.5
Bottom, %	28 ± 3.4



Statistical Analysis

Postpartum model (wk 1 to 4):

$$Y_{ijklm} = \mu + A_j + B_k + T_l + (AT)_{jl} + (BT)_{kl} + (ABT)_{jkl} + C_m + \varepsilon_{ijklm}$$

Y_{ij} = the observation for dependent variables

μ = the overall mean

A_j = the fixed effect of the prepartum forage (PRE)

B_k = the fixed effect of the postpartum forage (POST)

T_l = the repeated effect of time (T)

$(AT)_{jl}$ = the interaction of PRE and T

$(BT)_{kl}$ = the interaction of POST and T

$(ABT)_{jkl}$ = the interaction of PRE and POST and T

C_m = the random effect of cow

ε_{ijklm} = the random residual error

Cow utilized as experimental unit

Statistical significance was considered at $P \leq 0.05$
and tendencies at $0.05 < P \leq 0.10$



Prepartum Performance

Variable ¹	Treatment			P-value ³	
	WS	RM	SEM ²	PRE	PRE × wk
DMI, kg/d	12.14	12.28	0.25	0.68	0.66
DMI, % of BW	1.53	1.51	0.06	0.85	0.97
EBAL, Mcal/d ⁴	2.54	2.50	0.61	0.96	0.81
BW, kg	829	824	3.14	0.25	0.73
BW change, (wk -4 to -1), kg	11.8	9.45	3.45	0.62	-
BCS	3.54	3.54	0.04	0.93	0.81
Urine pH	6.96	7.15	0.12	0.27	0.33

¹Data were collected daily or once per week and consolidated to weekly averages (DMI and EBAL) for 4 wk prepartum, ²Greatest value for standard error of the mean within treatment, ³Main effect of treatment and their interaction, ⁴Energy balance (EBAL) was calculated based on NRC (2001).



Colostrum Results

Variable ¹	Treatment			P-value ³
	WS	RM	SEM ²	PRE
Colostrum weight, kg	7.22	8.13	1.07	0.54
Colostrum IgG, g/dL	71.1	70.7	5.02	0.86
Colostrum Brix, %	26.9	25.7	0.78	0.29

¹Data were collected at the first milking after calving, ²Greatest value for standard error of the mean within treatment, ³Main effect of treatment and their interaction.



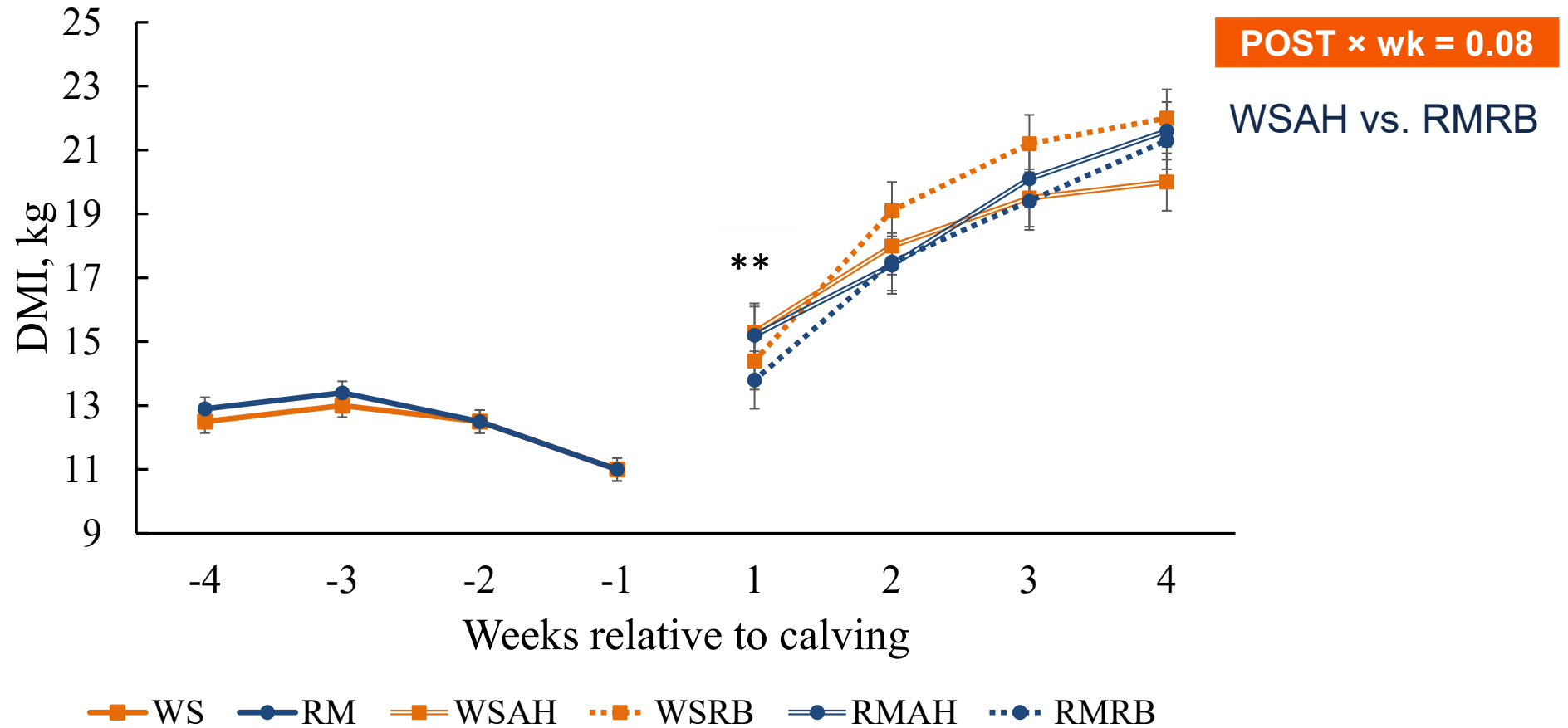
Postpartum Performance

Variable ¹	Treatment				SEM ²	P-value ³				
	WSAH	WSRB	RMAH	RMRB		PRE	POST	PRE × wk	POST × wk	PRE × POST × wk
DMI, kg/d	18.2	19.2	18.6	18.0	0.80	0.61	0.76	0.34	0.08	0.58
Milk yield, kg/d	36.2	38.7	36.0	34.6	1.64	0.18	0.76	0.96	0.44	0.16
ECM, kg/d	43.4	44.4	42.9	41.7	1.88	0.38	0.97	0.90	0.62	0.02
FCM, kg/d	45.1	45.8	44.4	42.9	1.96	0.35	0.87	0.89	0.51	0.02
Fat, %	4.80	4.72	4.79	4.78	0.14	0.83	0.73	0.53	0.73	0.16
Protein, %	3.25	3.29	3.34	3.37	0.05	0.08	0.47	0.02	0.78	0.96
Casein, %	2.68	2.69	2.75	2.79	0.04	0.09	0.62	0.05	0.62	0.51
Lactose, %	4.81	4.81	4.80	4.79	0.03	0.59	0.79	0.50	0.18	0.56
Milk/DMI	2.15	2.01	2.05	2.01	0.09	0.61	0.30	0.60	0.62	0.99

¹Data were collected daily or once per week and consolidated to weekly averages (DMI and milk) for 4 wk postpartum, ²Greatest value for standard error of the mean within treatment, ³Main effect of prepartum forage (PRE), the main effect of the postpartum forage (POST), the main effect of wk, and their interactions. There was no effect of PRE × POST and therefore was not included in the table.



Dry Matter Intake



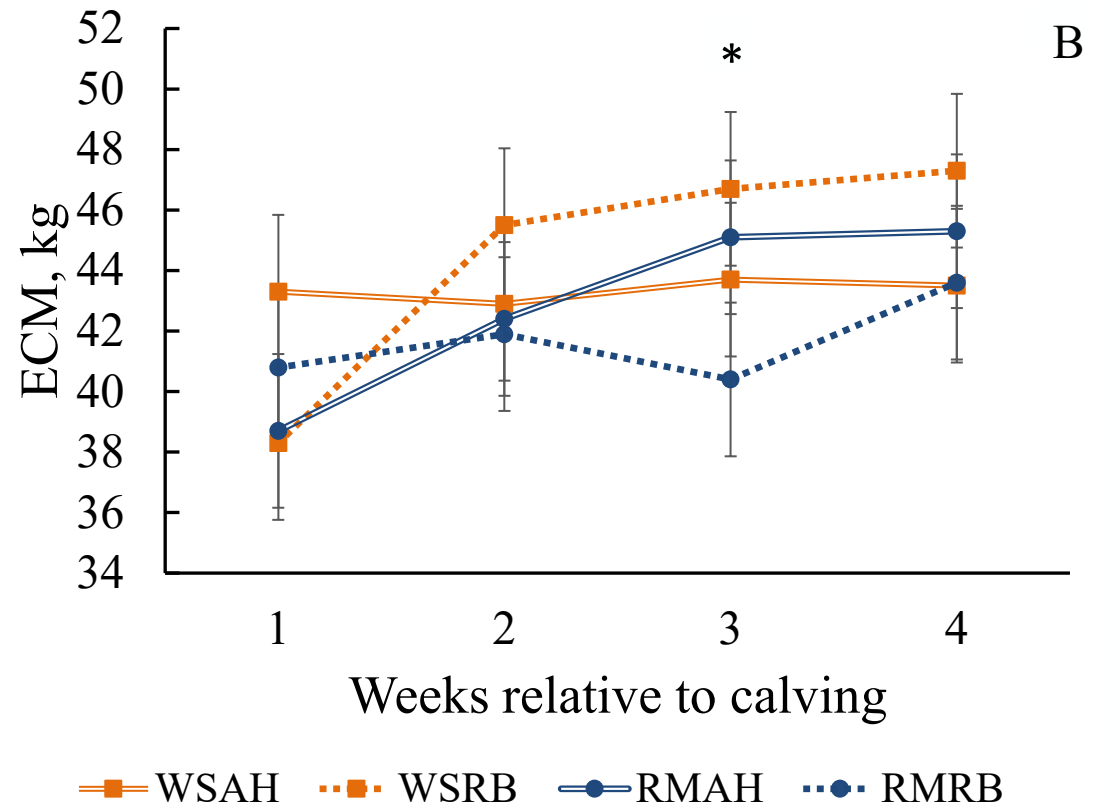
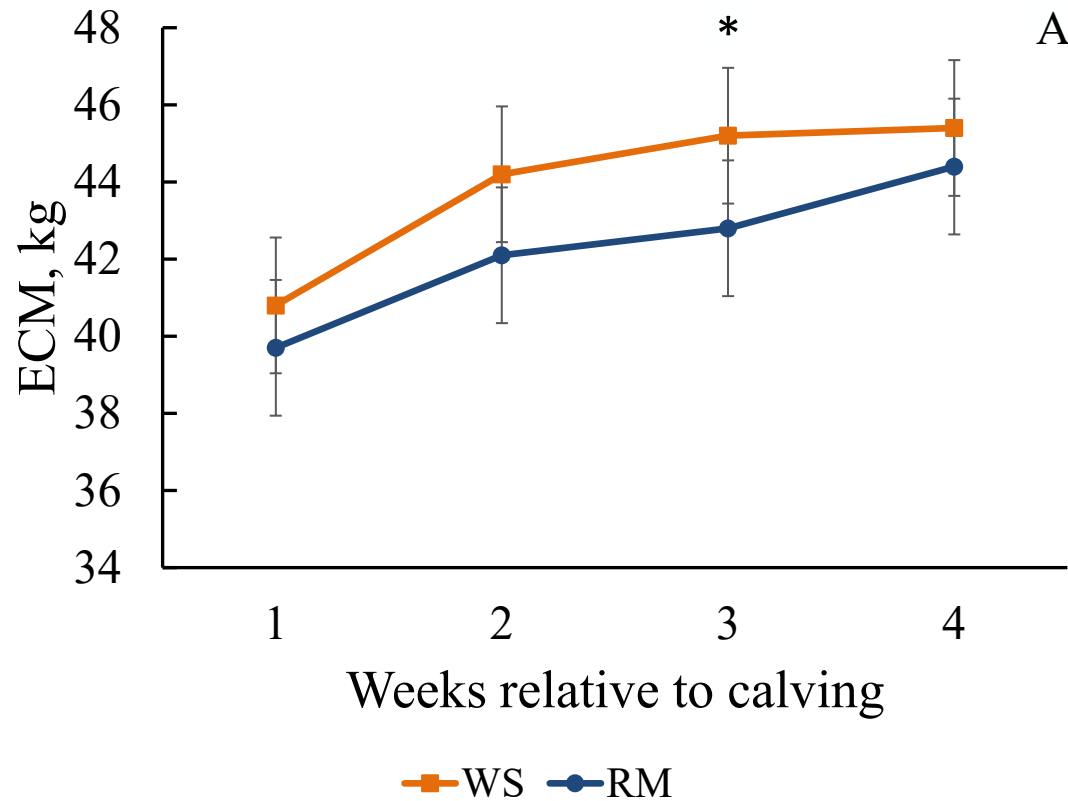
**Indicates a tendency between treatments at that time point at $P > 0.05$ or $P \leq 0.10$



Energy-Corrected Milk

PRE × POST × wk = 0.02

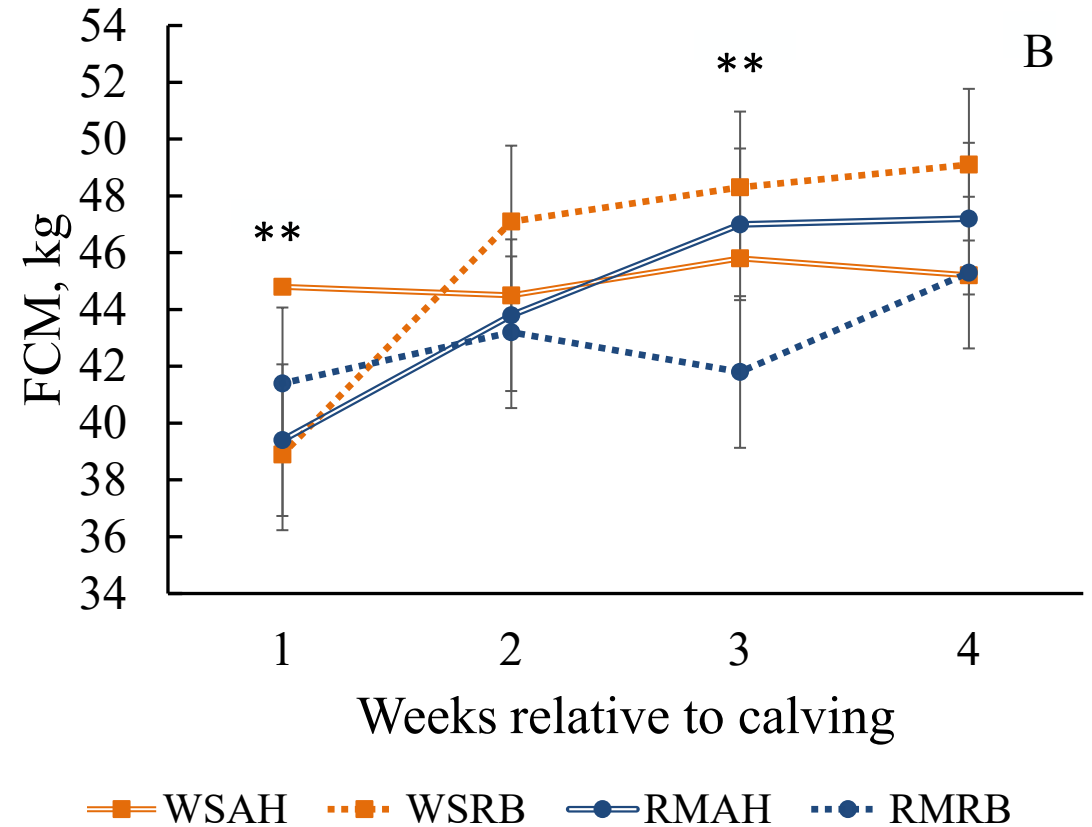
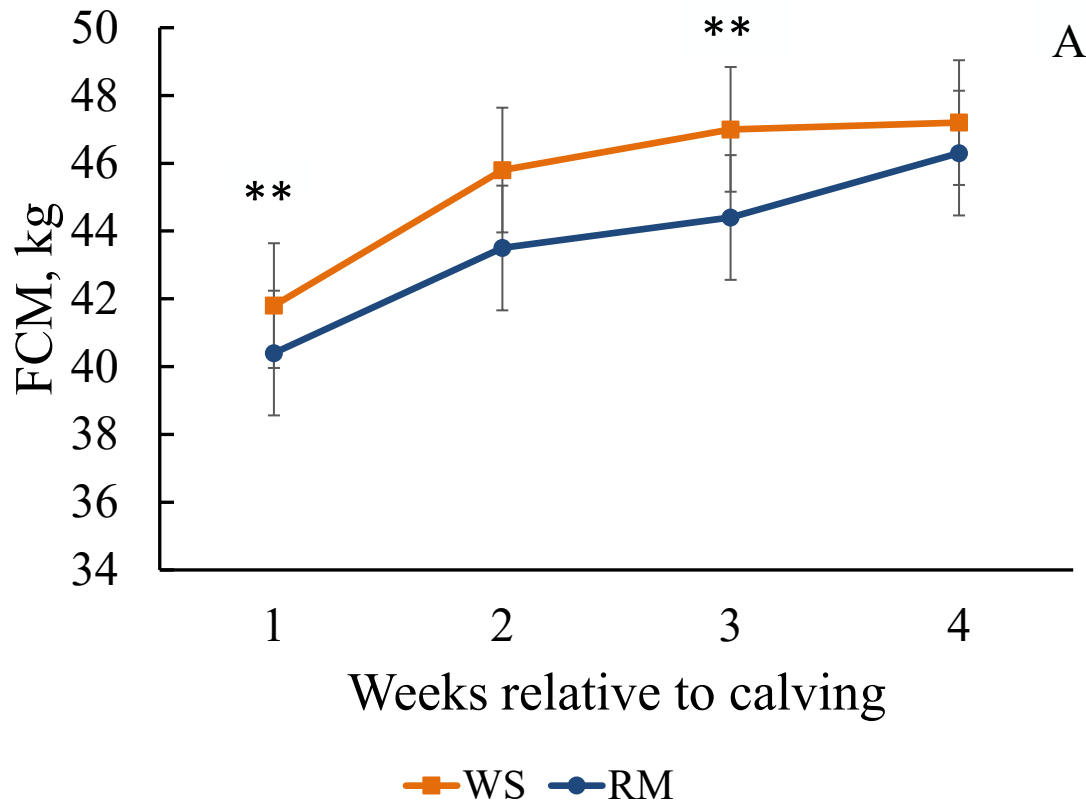
WSRB vs. RMRB



Fat-Corrected Milk

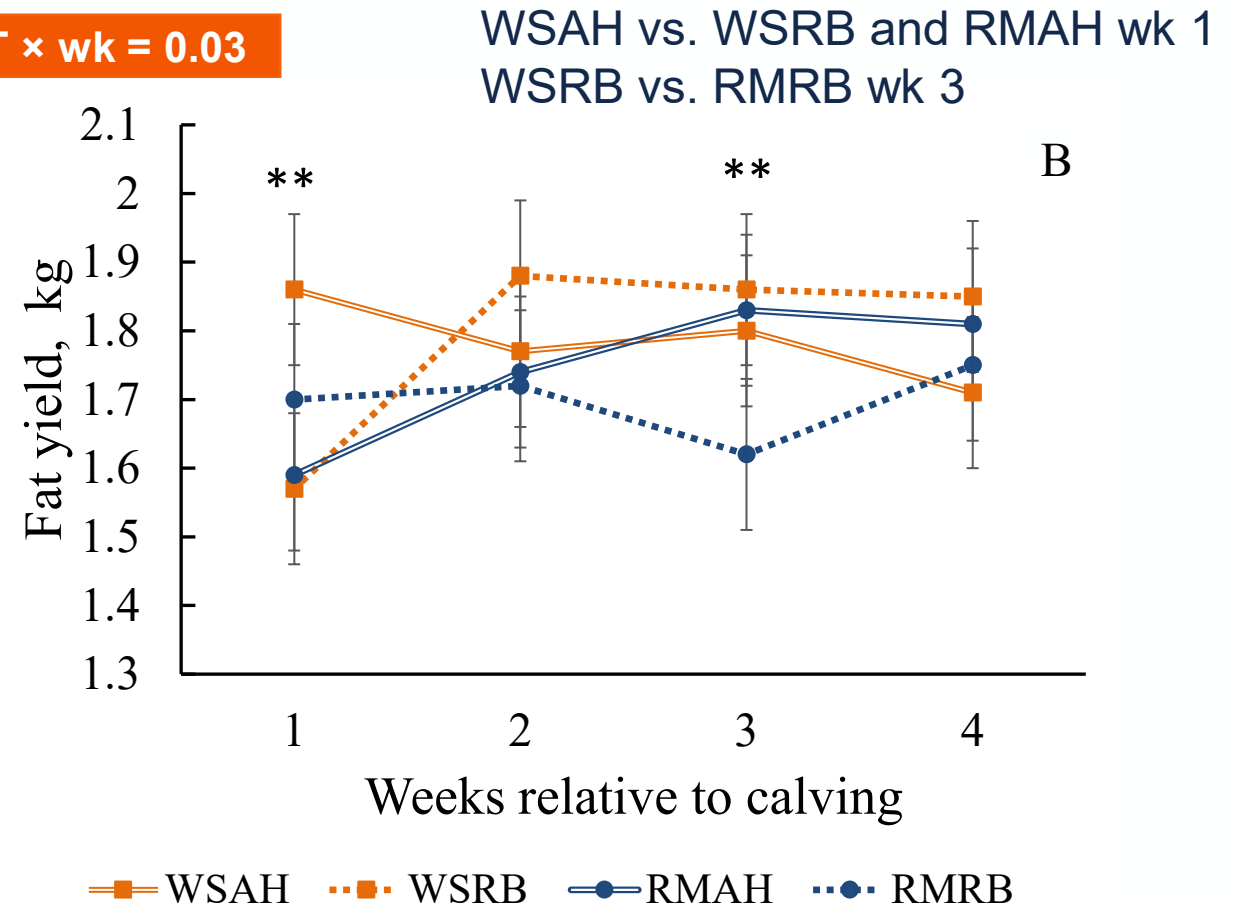
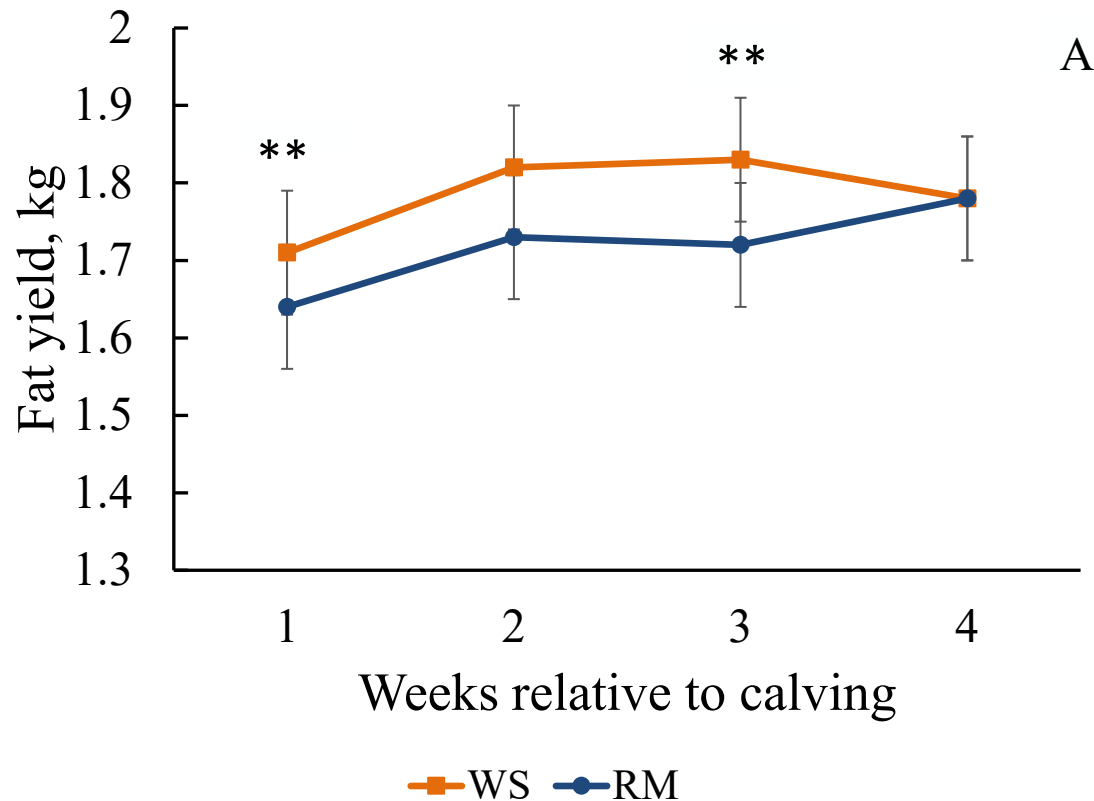
PRE × POST × wk = 0.02

WSAH vs. WSRB wk 1
WSRB vs. RMRB wk 3

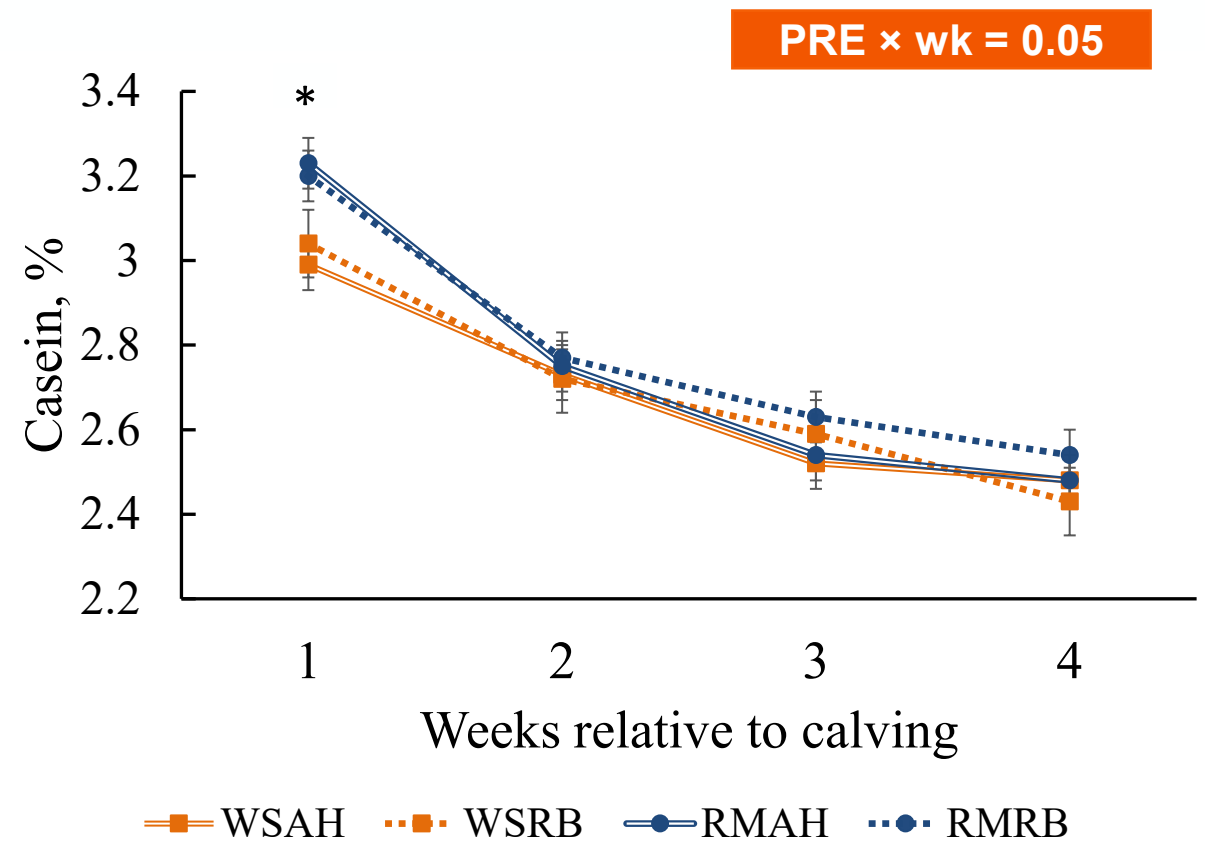
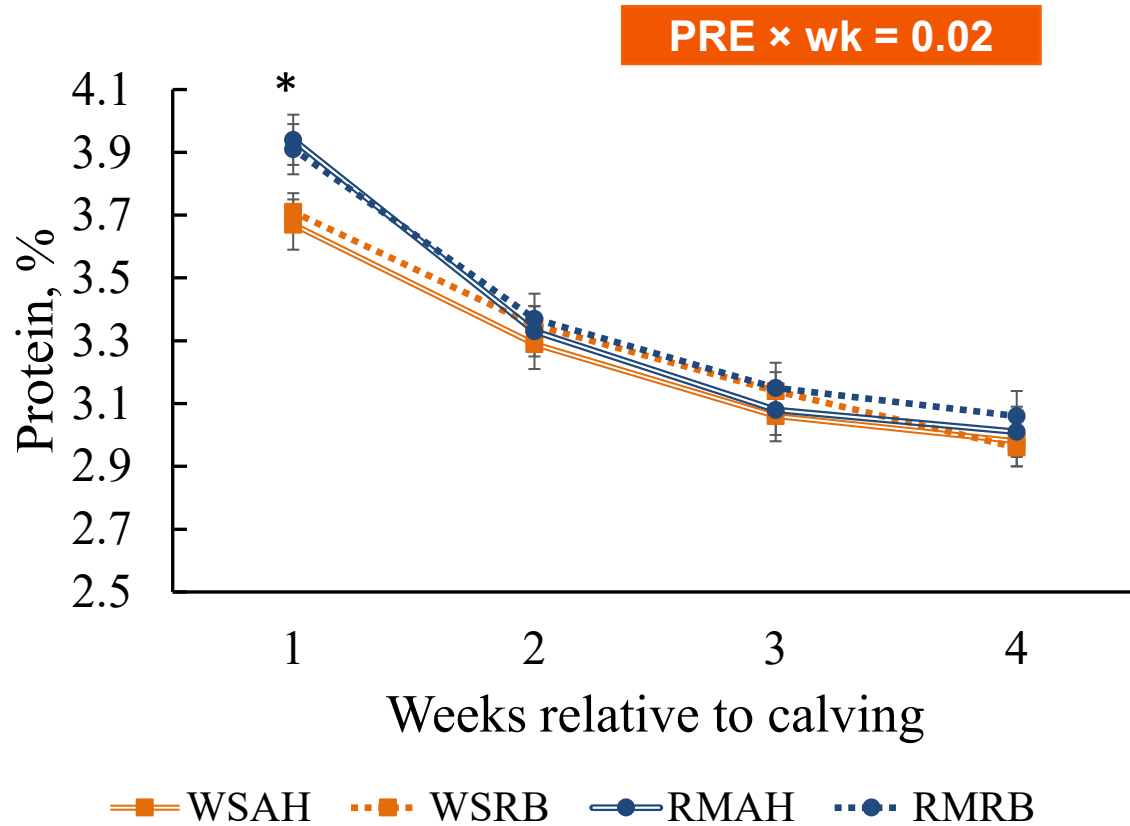


Milk Components

PRE × POST × wk = 0.03



Milk Components



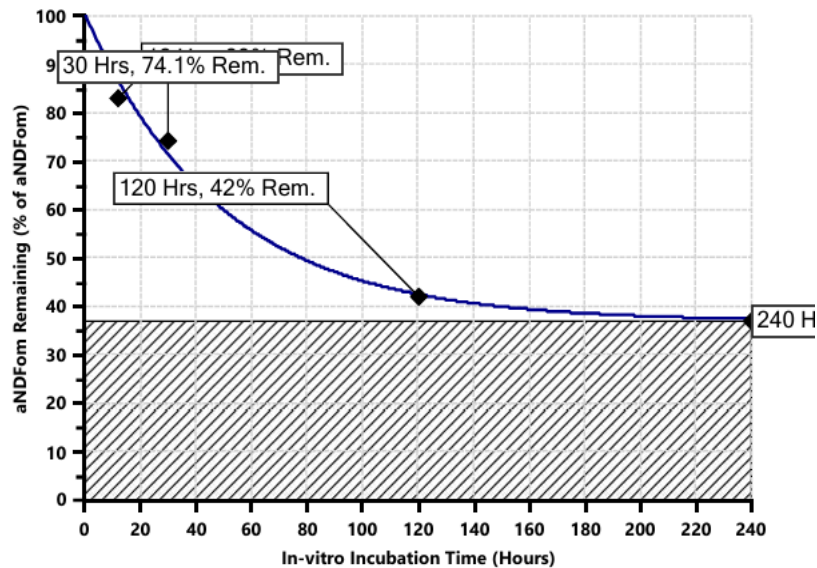
*Indicates a difference between treatments at that time point at $P \leq 0.05$



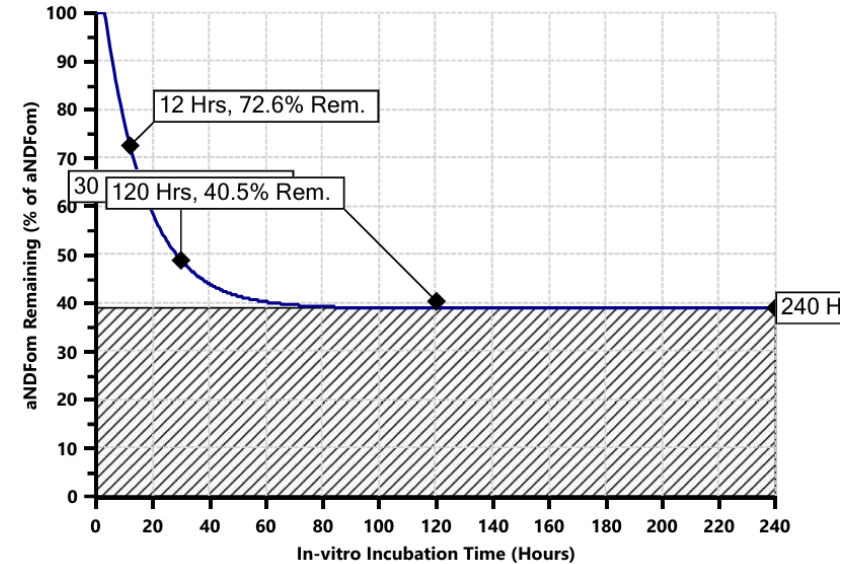
Performance Discussion

- Hybrid rye at the milky stage can replace wheat straw in controlled-energy prepartum diets without negatively affecting prepartum performance
- Feeding RM prepartum:
 - Increased milk protein and casein concentration during the first week of lactation

Wheat
straw



Hybrid
rye milky



Prepartum Ultrasound Results

Variable ¹	Treatment			P-value ³	
	WS	RM	SEM ²	PRE	PRE × DRC
Backfat thickness, cm	0.48	0.52	0.03	0.33	0.63
Backfat thickness change (wk -5 to calving), cm	0.003	-0.014	0.02	0.64	-
Longissimus dorsi thickness, cm	4.54	4.58	0.11	0.79	0.17
Longissimus dorsi thickness change (wk -5 to calving), cm	-0.15	0.07	0.20	0.41	-

¹Data were collected at -11 ± 4.3 , -6 ± 3.5 , and 1 ± 0.8 days relative to calving (DRC) with -32 ± 5.4 DRC used as a covariate in the prepartum model, ²Greatest value for standard error of the mean within treatment, ³Main effect of treatment and their interaction. There was no effect of DRC and therefore was not included in the table.



Postpartum Ultrasound Results

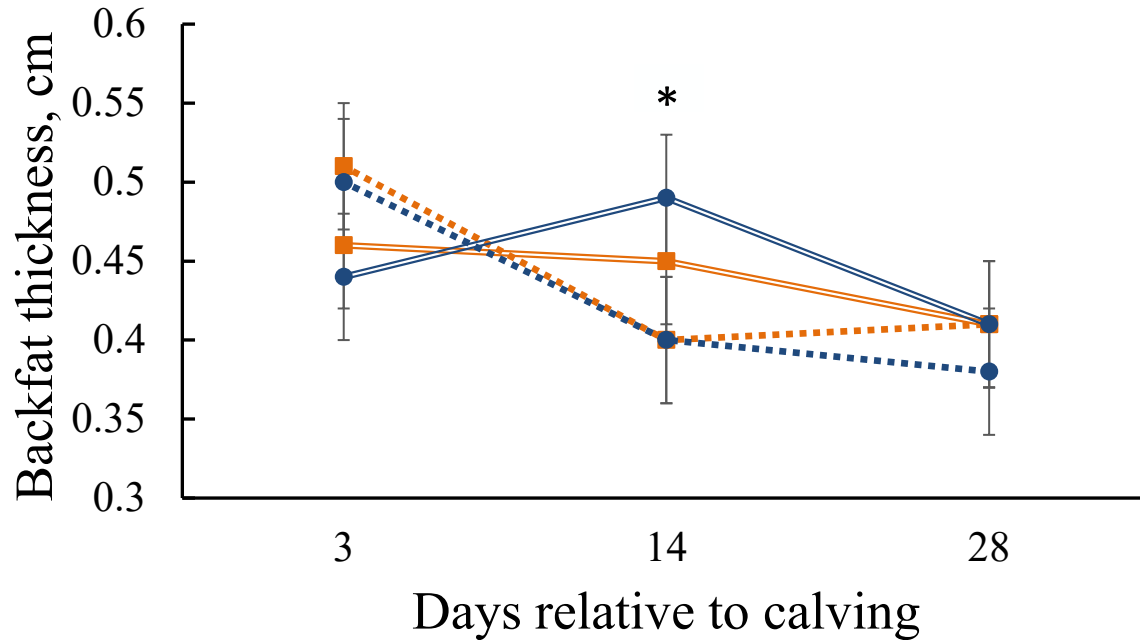
Variable ¹	Treatment					P-value ³				
	WSAH	WSRB	RMAH	RMRB	SEM ²	PRE	POST	DRC	PRE × DRC	POST × DRC
Backfat thickness, cm	0.44	0.44	0.45	0.43	0.03	0.94	0.76	<0.01	0.53	0.01
Backfat thickness change (wk 1 to 4), cm	-0.05	-0.11	-0.04	-0.13	0.04	0.83	0.06	-	-	-
Longissimus dorsi thickness, cm	4.44	4.33	4.30	4.23	0.18	0.49	0.62	0.13	0.03	0.09
Longissimus dorsi thickness change (wk 1 to 4), cm	-0.11	-0.88	0.37	-0.07	0.29	0.02	0.03	-	-	-

¹Data were collected at 4 ± 1.0, 14 ± 0.8, and 27 ± 1.0 days relative to calving (DRC) with -32 ± 5.4 DRC used as a covariate in the postpartum model, ²Greatest value for standard error of the mean within treatment, ³Main effect of prepartum forage (PRE), the main effect of the postpartum forage (POST), the main effect of DRC, and their interactions. There was no effect of PRE × POST and therefore was not included in the table.



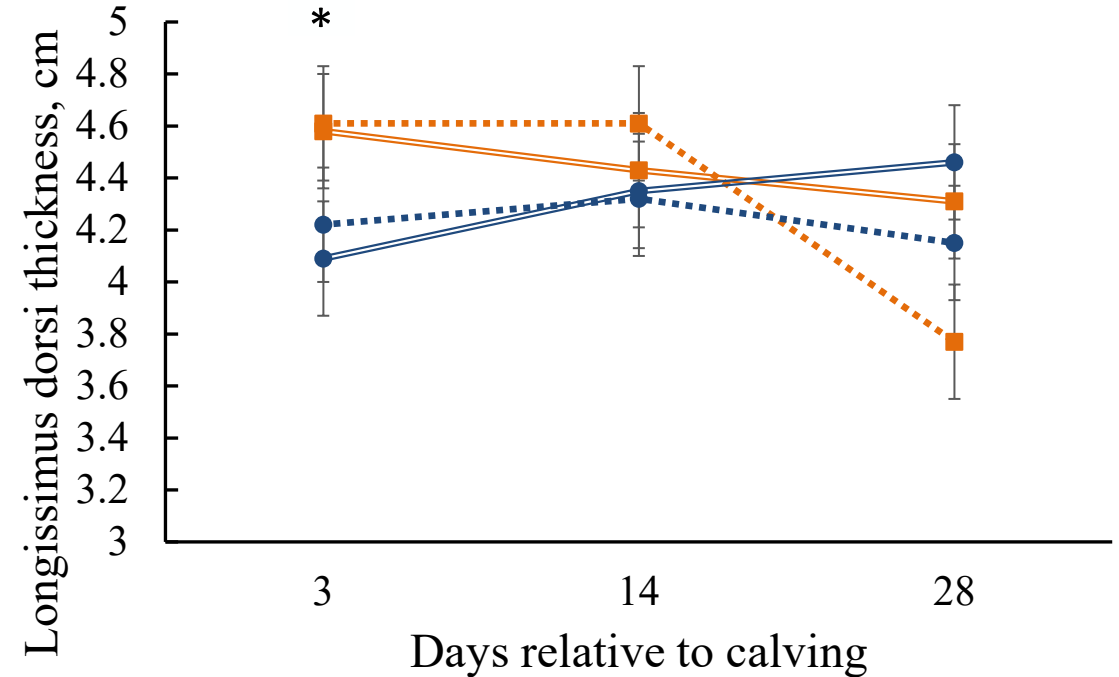
Postpartum Ultrasound Results

POS × DRC = 0.01



—■— WSAH - - ■ - - WSRB —●— RMAH - - ● - - RMRB

PRE × DRC = 0.03



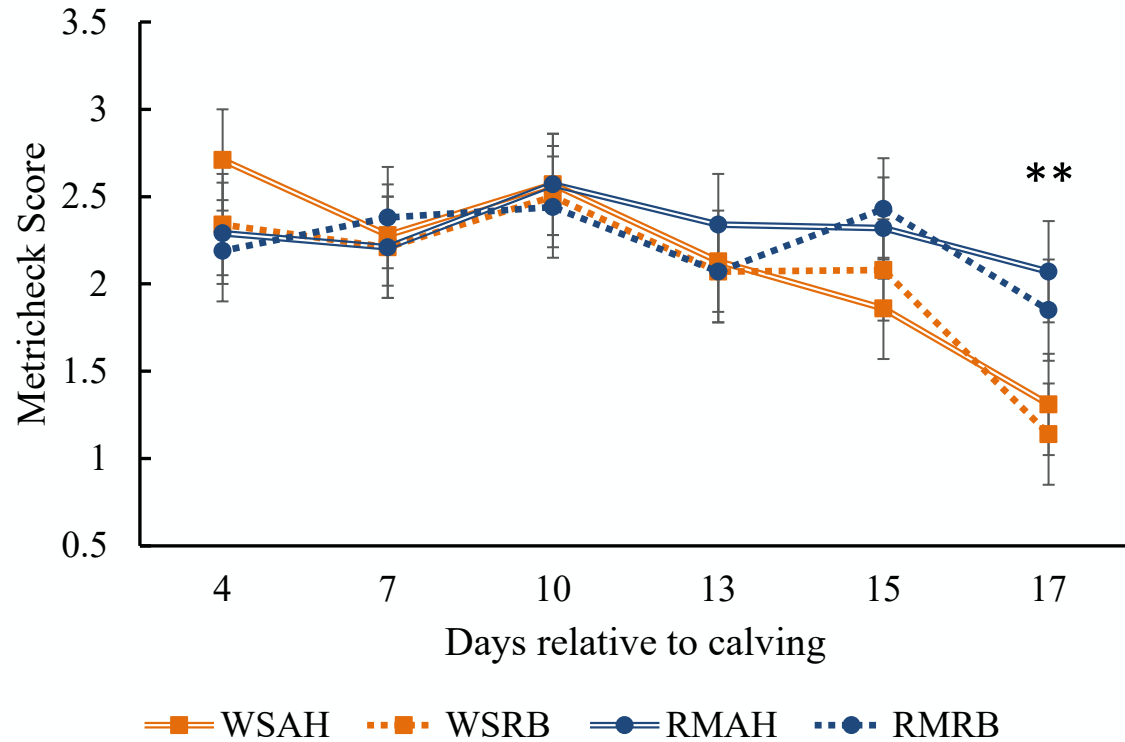
—■— WSAH - - ■ - - WSRB —●— RMAH - - ● - - RMRB

*Indicates a difference between treatments at that time point at $P \leq 0.05$



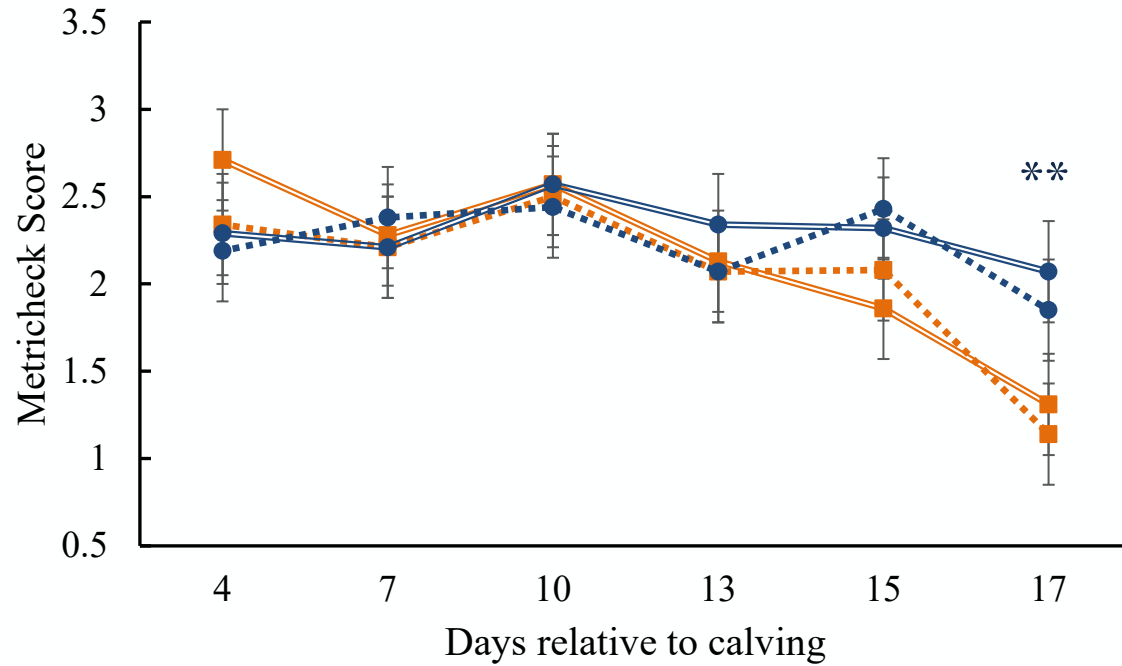
Reproduction Results

PRE × DRC = 0.06



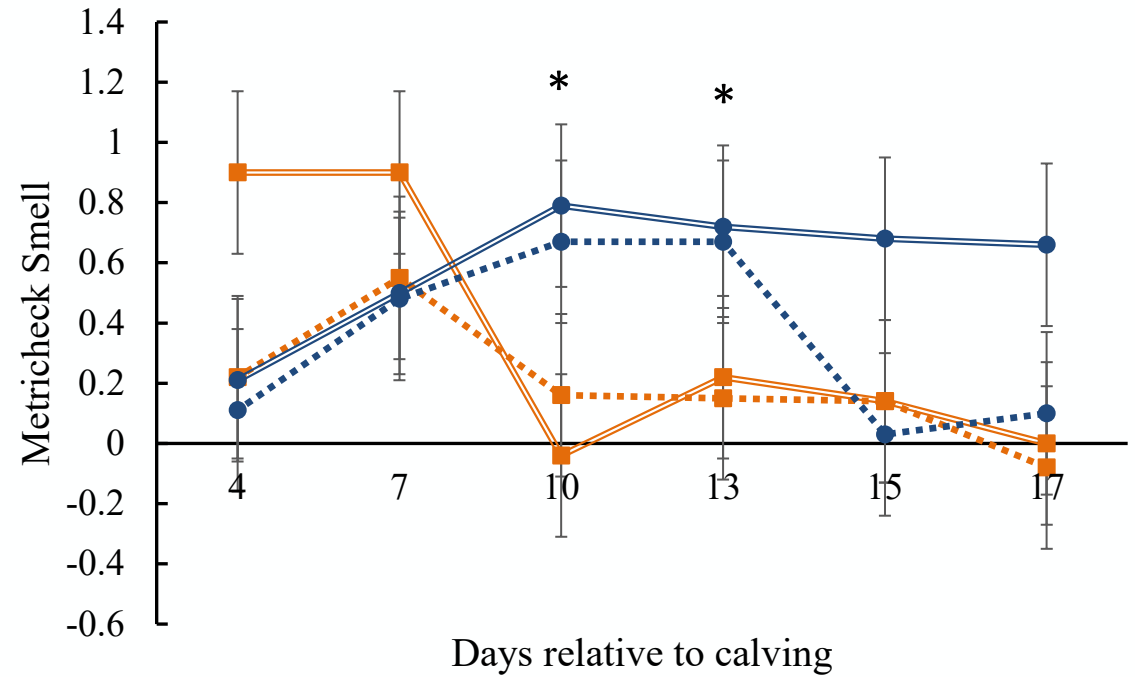
Reproduction Results

PRE × DRC = 0.06



—■— WSAH - - ■ - - WSRB —●— RMAH - - ● - - RMRB

PRE × DRC < 0.01

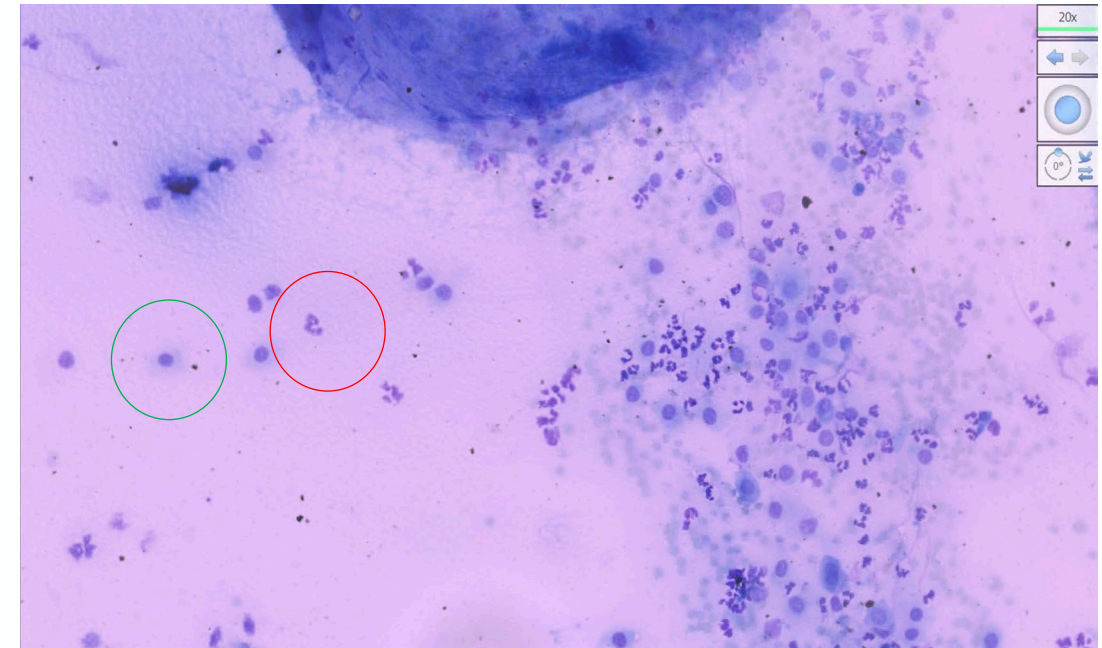
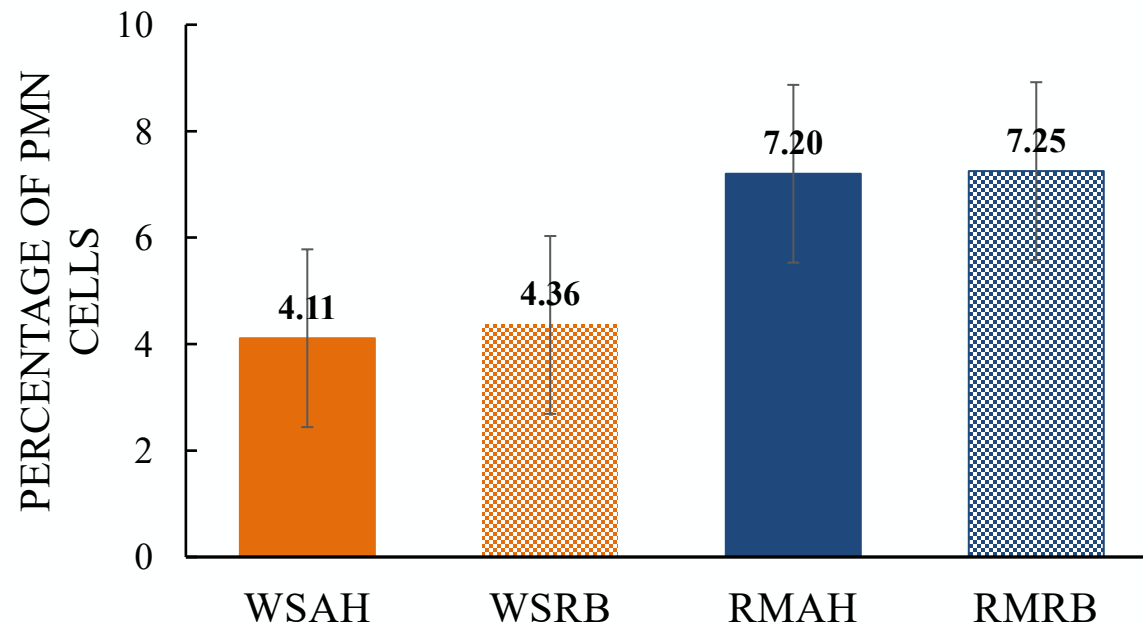


—■— WSAH - - ■ - - WSRB —●— RMAH - - ● - - RMRB



Reproduction Results

PRE = 0.06



Stained cytology slide used to count PMN cells.
Green Circle = Healthy, epithelial cell
Red Circle = PMN cell

Apparent Digestibility Results



Apparent digestibility, %	Treatment				SEM ¹	P-value ²		
	WSAH	WSRB	RMAH	RMRB		PRE	POST	PRE × POST
DM	65.3	67.2	66.0	65.8	1.90	0.83	0.63	0.57
OM	67.3	69.2	65.9	67.7	1.81	0.43	0.32	0.99
CP	64.9	65.2	64.0	64.4	2.34	0.74	0.90	0.99
NDF	45.0	49.7	42.2	47.9	3.02	0.46	0.10	0.86
ADF	51.7	55.2	45.3	52.6	3.08	0.16	0.09	0.55
Starch	98.0	97.6	97.5	97.9	0.36	0.74	0.98	0.24

¹Greatest value for standard error of the mean within treatment, ²Main effect of prepartum forage (PRE), the main effect of the postpartum forage (POST) and their interaction.

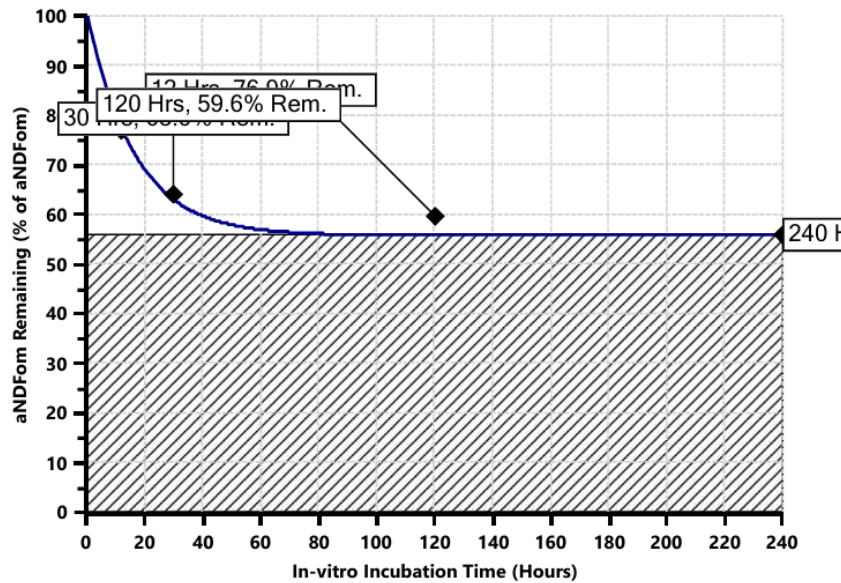
n = 32



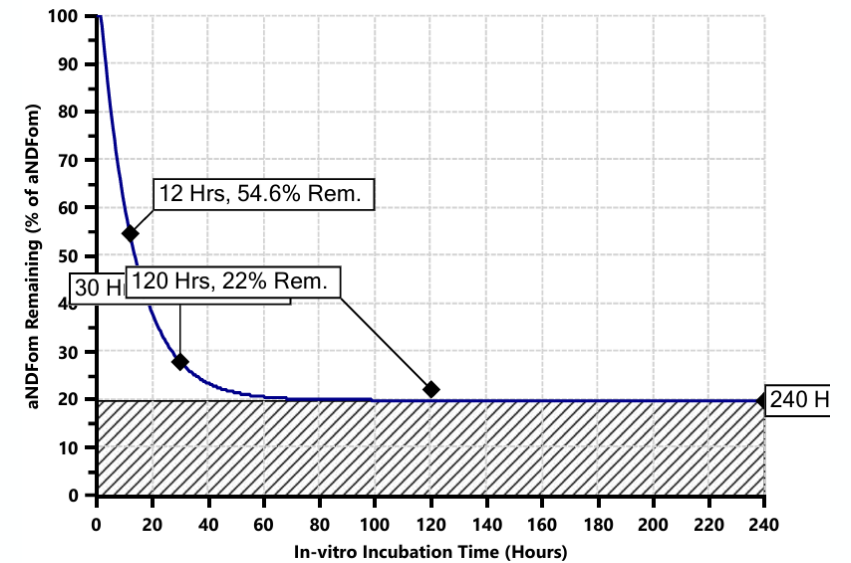
Apparent Digestibility Discussion

- Cows fed hybrid rye boot postpartum tended to have greater NDF and ADF digestibility
 - More available energy and microbial protein → increase in ECM

Alfalfa haylage



Hybrid rye boot



Economics

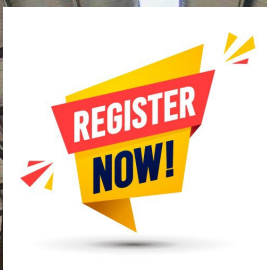
Treatments	\$/lb DM TMR prepartum	\$/lb DM TMR postpartum	Feeding cost prepartum	Feeding cost postpartum	Milk income	IOFC
WSAH	0.13	0.17	3.44	6.82	24.19	13.93
WSRB	0.13	0.16	3.44	6.77	25.80	15.59
RMAH	0.14	0.17	3.85	6.97	24.18	13.36
RMRB	0.14	0.16	3.85	6.35	23.27	13.07



I ILLINOIS

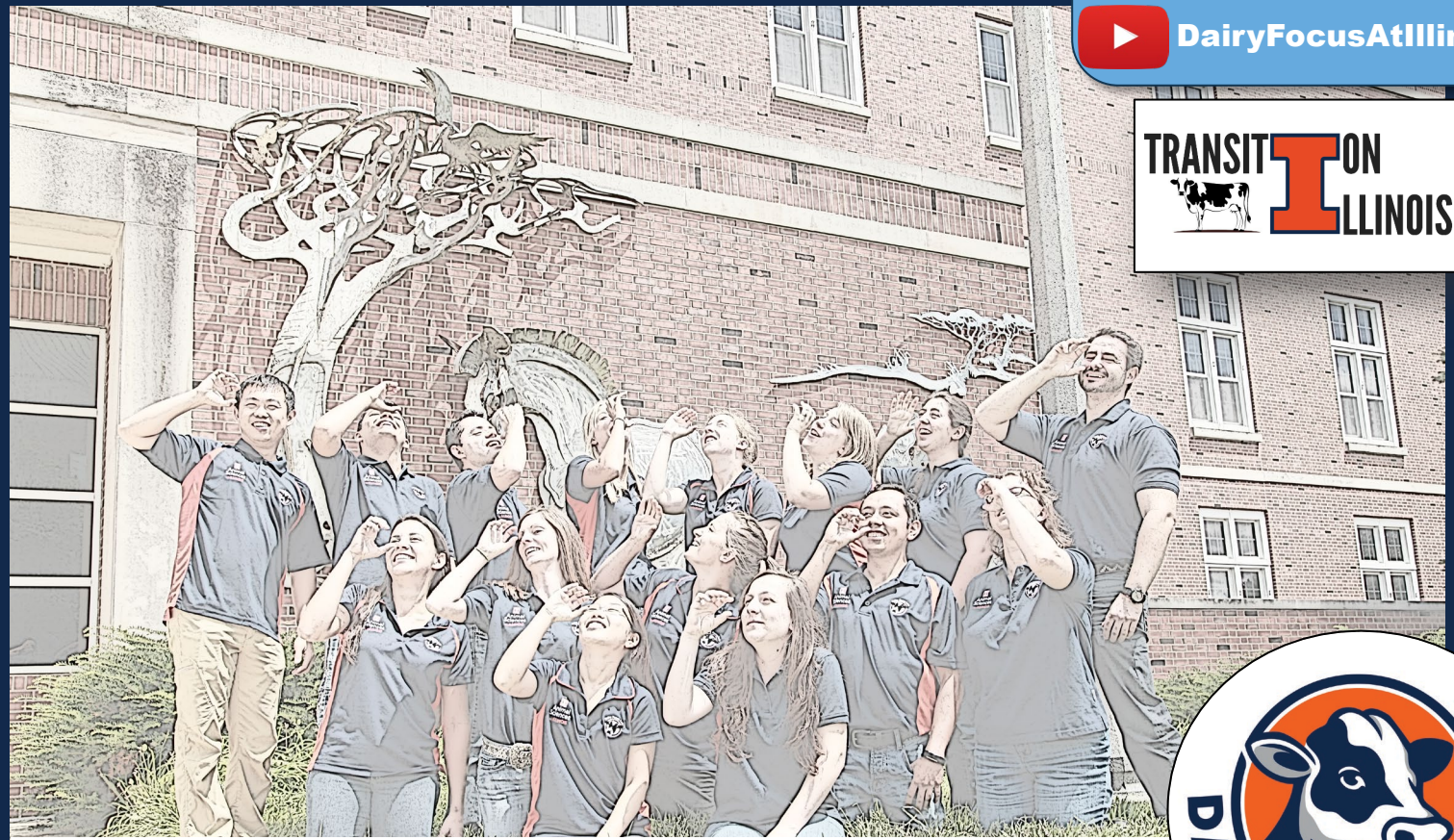
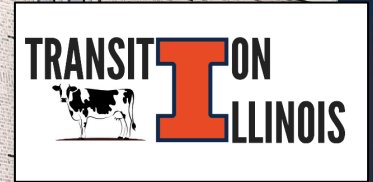
Animal Sciences

COLLEGE OF AGRICULTURAL, CONSUMER
& ENVIRONMENTAL SCIENCES



THANKS!

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