University of California Cooperative Extension • Tulare County

The Milk Lines

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Update on Small Grain Silage Variety Studies

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Small grain silage variety studies were conducted in 2007 and 2008 at Milk Way Dairy with Gil Replogle. Varieties included in the study were selected based on stripe rust resistance and their chance of being grown in the San Joaquin Valley. Plot sizes were 1300' by 20' with 4 replications.

Forage varieties were sampled at harvesting time. To determine the nutritional value for dairy purposes, samples were analyzed for Crude Protein, Acid Detergent Fiber (ADF) and Neutral Detergent Fiber (NDF). Total Digestible Nutrients (TDN) were estimated based on ADF results with the formula for alfalfa. Results from 2007 and 2008 studies are presented in Table 1. All of the varieties performed outstanding and had extremely high yields. There were some but minor differences in fiber quality.

Table 1. Small Grain Silage Variety Study

Variety	Type	Harvest % H_20	Tons/Acre 70% H_20	Height (in)	Lodging %	TDN[2] 90% DM	Protein[3] %	ADF[4] %	NDF[5] %
Tulare County 2008 - Wright, Collar, Banuelos, Silva-del-Rio									
Trical 118	Tricale	63.8	29.5 **A**[1]	39	4	53.8 **A**	8.7 B	30.2 A**B**	45.8 AB**C**
Trical 105	Tricale	63.7	29.2 **A**	41	10	53.0 **AB**	8.3 B	31.1 A**B**	47.3 AB
PR 1404	Beardless Wheat	62.5	28.7 **AB**	39	31	53.0 **AB**	9.0 **AB**	31.2 A**B**	46.2 AB**C**
Red Wing	White Wheat	60.1	28.6 **AB**	32	0	52.4 B	8.6 B	32.1 A	48.6 A
Trical 110	Tricale	65.7	28.5 **AB**	36	0	53.7 **A**	8.7 B	30.1 A**B**	45.0 B**C**
Trical Camelot	Tricale	64.3	27.1 **ABC**	39	0	53.3 **AB**	8.9 **AB**	30.8 A**B**	46.8 AB
Ultra	Red Wheat	60.1	26.6 **ABC**	32	0	53.3 **AB**	8.6 B	30.8 A**B**	45.6 AB**C**
Blanca Royal	White Wheat	57.9	25.9 BC	33	16	52.4 B	8.9 **AB**	32.2 A	48.1 AB
Blanca Fuerte	White Wheat	61.7	25.3 BC	32	0	54.3 **A**	10.0 **A**	29.4 **B**	43.3 **C**
Joaquin	Red Wheat	59.0	25.1 C	35	9	53.0 **AB**	9.0 **AB**	31.3 A**B**	45.6 AB**C**
LSD .05		*2.21*	*3.11*			*1.50*	*1.13*	*2.23*	*3.16*
% CV		*3.99*	*7.82*			*1.94*	*8.78*	*4.97*	*4.72*
Tulare County 2007 - Wright, Collar, Banuelos, Bacon									
Trical 118	118	63.8	28.6 **A**	42	0	53.1 **AB**	10.1 C	31.0 B**C**	47.2 ABC**D**
Blanca Fuerte	White	63.8	28.4 **AB**	37	0	54.0 **A**	11.6 B	29.8 **C**	46.2 ABC**D**
Summit	Red	62.9	27.8 BC	38	0	52.0 BC	11.3 B	32.6 AB	47.6 ABC**D**
Ultra	Red	63.1	27.4 BCD	36	0	51.7 C	11.8 **AB**	33.1 A	48.5 AB
Joaquin	Red	61.92	27.2 BCDE	40	1	52.4 BC	12.0 **AB**	32.3 AB	45.4 **D**
Cal Rojo	Red	60.81	27.1 BCDE	36	0	53.2 **AB**	11.4 B	31.0 B**C**	45.6 C**D**
RSI 64	White Durum	65.7	26.8 CDE	40	1	52.2 BC	12.3 **A**	32.5 AB	45.9 C**D**
Trical 116	116	65.3	26.4 DE	44	1	52.1 BC	10.6 C	32.6 AB	48.1 ABC
PR 1404	Beardless	65.6	26.1 DE	45	8	51.5 C	11.5 B	33.5 A	49.4 A
Trical 98	98	67.1	25.2 E	41	3	51.5 C	11.5 B	33.4 A	49.7 A
LSD .05		*1.48*	*3.29*			*1.26*	*0.63*	*1.86*	*2.57*
% CV		*1.38*	*1.42*			*1.66*	*3.80*	*4.00*	*3.74*

[1]Varieties followed by the same letter are not statistically different. Bolded letters indicate the most desirable outcome for the different variables.

[2] Calculated based on ADF value and the formula for alfalfa.

[3] Official Method of analysis AOAC 990.33.

[4] Official Method of analysis AOAC 973.18.

[5] Method of analysis based on Van Soest et al. (1991).

Milk Urea Nitrogen

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What is Milk Urea Nitrogen?

Milk urea nitrogen (MUN), the concentration of urea in milk, is another tool that nutritionists and veterinarians can use to monitor the protein nutritional status of dairy cows.

In the rumen, microbes degrade dietarian protein to ammonia. When ammonia is coupled with fermentable carbohydrates, rumen microbes are able to capture it and synthesize amino acids and microbial protein. However, excess ammonia in the rumen is absorbed across the rumen wall and taken to the liver to be converted to urea. Blood urea is freely diffusible to milk, and therefore, MUN reflects the urea concentration in blood.

What factors influence Milk Urea Nitrogen?

The factors that influence the most MUN values are the concentration and balance of nutrients in the diet. Feeding the following rations will result in wasted feed protein and high MUN values:

- Rations high in crude protein.
- Rations high in rumen degradable protein and soluble protein.
- Rations low in fermentable carbohydrates.

Other factors that affect the MUN concentrations are:

- Water intake: increasing water intake, increases urinary production and decreases MUN.
- Dry matter intake: urea concentrations are the highest 6 hours after feeding and the lowest prior to feeding.
- Time of feeding related to milking: a.m. samples are usually lower in MUN than p.m. samples.
- Level of production: MUN is higher in high producing herds than in low producing herds.
- Method of feeding: separate ingredient feeding increases urea concentration more than TMR feeding.
- Parity: MUN is higher in multiparous cows.
- Season: heat stress increases MUN values.
- Milking frequency: herds milked 3 times a day tend to have higher MUN than those milked 2 times a day.

How should I use MUN values?

Research studies suggest that the most desirable MUN for Holstein cows range from 10 to 14 milligrams per deciliter (mg/dl). High concentrations of MUN (> 14 mg/dl) indicate an excess in protein feeding and/or deficiency in rapid fermentable carbohydrates. Low concentrations of MUN (< 10 mg/dl) indicate protein-limited diets. If MUN values are outside the normal range, the ration, the milk components, the feeding program and the nutrient balance should be evaluated.

As previously described, many factors affect the MUN values, across herds and within herds. The variation is so wide that MUN in individual Holstein cows ranges from 5 to 20 mg/dl. So, every herd can have a **different optimal MUN** value. Individual cow samples should be summarized into groups to establish the different baselines. The cow group baselines may range from 8 to 16 mg/dl.

Changes in MUN baseline greater than 2 to 3 points should be investigated to identify the factors causing the shift. High **cow-to-cow variation** within a group, even if MUN falls within the normal range, suggests feed bunk problems such as feed mixing, delivery or sorting.

What should I do if MUN falls outside the normal range?

If MUN indicate inefficiency in protein feeding, you should evaluate your feeding program:

- Check that formulated rations are targeting the nutrient requirements especially for crude protein, rumen degradable protein, rumen undegradable protein, starch and sugars.
- Check that the ration is balanced based on current feedstuff lab analysis.
- Make sure rations are routinely reformulated based on dry matter.
- Make sure your employees follow the proper loading instructions and they are consistent in their mixing and delivery time practices.
- Evaluate the feed efficiency and conversion of nitrogen from feed to milk.

As an example, a shift in MUN can be observed when cows are fed: a corn silage that is lower in fermentable carbohydrates, unprocessed or improperly process; an alfalfa hay that is higher in crude protein; a protein source that has a larger fraction of rumen degradable protein.

Take home message

MUN is another tool to monitor the protein nutritional status of dairy cows. MUN values should only be interpreted after examining the entire feeding program.

MUN values are highly variable across herds, so the greatest benefit is to evaluate a group of cows within a herd, and the cow-to-cow variation within a group.

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