ISSUE: Dairy Precision Feeding (PA)

revisit the criteria for this practice to incorporate the use of Milk Urea Nitrogen (MUN) as a proxy for measurement of implementation of precision feeding in the dairy industry

BACKGROUND:

Approved by WQGIT (2009)
Simpson and Weammert, 2009 (CBWM Phase 5 report)

Definition (excerpts truncated from Dairy Management Chapter (164-197)
reduces the quantity of phosphorous and nitrogen fed to livestock by **formulating diets within 110% of Nutritional Research Council (NRC)** recommended level in order to minimize the excretion of nutrients without negatively affecting milk production.

…The other purpose of feed management is to reduce the quantity of nutrients excreted in manure by minimizing the over-feeding of nutrients. It is this purpose, decreased manure nutrient content for improved water quality, which this report focuses. **To receive credit for dairy precision feeding as a water quality BMP the ultimate goal is to demonstrate decreased manure nutrient content.**

The National Research Council (NRC) recommended rate for P in dairy diets is .32 to .38% P, depending on milk production (Dou et al 2003). A survey and sampling of NY, PA, DE, MD and VA found P diets are being feed 34% above the NRC recommendations (Dou et al 2007). **Milk Urea Nitrogen (MUN) and fecal tests for nitrogen (N), and total mixed ration (TMR) and fecal P analysis for phosphorous (P) is the preferred approach to determine changes in nutrient content to estimate N and P reductions from implementing dairy precision feeding. If a jurisdiction would like to use another tool to predict nutrient excretion it must be independently reviewed and approved by the Chesapeake Bay Program**. When MUN and fecal N analysis, or TMR and fecal P analysis results are not available, average literature values will be assigned to estimate performance.

Effectiveness Estimates
determined via direct testing, however, **without test results TP reduction is assumed to be 25% and TN reductions are assumed to be 24%** with no TSS associated with dairy precision feeding.

TN: 25%
TP: 24%
TSS: 0%
Land Use: Feed Space, Permitted Feed Space, Non-permitted Feed Space

As excreted fecal testing and MUN or TMR testing for N and P, respectively, will be utilized to determine reductions in manure nutrient content. P feeding after the NRC requirement is met results in a direct increase in the excreted P in the manure. Therefore, reductions in the feed will result in reduced P in the manure in a proportional manner as long as dry matter intake stays the same. However, feed testing alone does not guarantee that the cows are consuming the recommended levels or that something in the feed(s) has not changed. **CBP recommends taking "fecal samples" to document the specific group of animals versus manure samples from the storage structure. A significant barrier to obtaining an as excreted fecal sample is that it is difficult in production systems, while it is easier in research projects.** With traditional storage structures one cannot get a representative sample in the lagoon, pit, etc. as manure is exposed to contamination from other sources and subject to volatilization. **While both MUN and TMR**

have their limitations, they are valuable monitoring tools and UMD/MAWP and CBP recommends requiring both for monitoring manure nutrient changes when as excreted fecal sampling may be difficult or impossible to obtain.

MUN, a rapid, simple and noninvasive process, can be used to predict nitrogen excretion in dairy cows (Jonker et al., 1998; Figure 1), and target MUN concentrations can be derived by predicting urinary nitrogen excretion for cows consuming ideal diets (Jonker et al., 1999). MUN will be tested by milk cooperatives as there is a strong correlation between MUN and manure N content that can be used to determine the reduction in manure N content by feeding a diet within 110% of the NRC recommended rate. If manure testing is conducted, interested parties can accumulate a database of results to determine general manure N content changes and with time note trends in reduction. This data can be expanded to determine actual reductions in nitrogen.

While Jonker et al's (1998) equation, 12.54 ± 0.24 (Figure 1), fits data collected before DHIA laboratories changed its standards, Kohn et al. (2002) concluded the amount of nitrogen excreted should now be estimated as 0.026 x body weight (kg) x MUN (mg/dl). The close relationship between MUN and excreted urinary nitrogen (UN) remains.

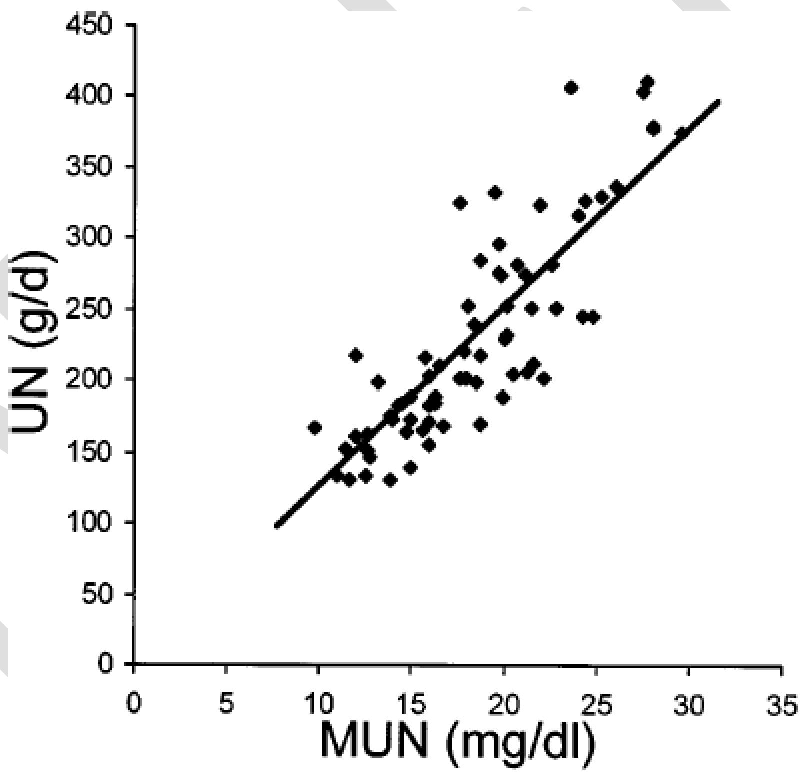

Figure 1. Relationship between milk urea N (MUN; milligrams per deciliter) and urinary N excretion (UN; grams per day); slope = 12.54 ± 0.24 (Jonker et al 1998).

<u>Possible NRCS codes:</u>

Feed Management (592) - Managing the quantity of available nutrients fed to livestock and poultry for their intended purpose.

SUGGESTED ACTION:
Interested party provide presentation and discussion to the AgWG on suggested change in implementation tracking based on updated science on MUN and tracking among individual animal groups. Dairy expertise necessary (e.g. Penn State dairy specialist).

CHALLENGE:
- Enabling and ensuring accurate tracking of farm operations utilizing the Dairy Precision Feeding BMP, which is implemented on voluntary basis.
- The CBP-approved recommendations for the Dairy Precision Feeding BMP are from 2009. In need of updating.

LEAD: Bill Angstadt, Angstadt Consulting

TIMELINE:
CAST-21 (Sept 2021)
Discussion: Yes
Change: Possible, pending AgWG discussion & partnership approval

CAST-23 (Sept 2023)
Discussion: Yes
Change: Possible, pending AgWG discussion & partnership approval

Future Watershed Model?
Discussion: Yes, as part of full review of ag inputs, BMP tracking methods & modeling approaches.
Change: Possible

TASK CLUSTER:
Tracking & Reporting

WIP III SNAPSHOT:

State	2019 Progress % Implementation	WIP 2025 % Implementation (AU)
DE	0	100 (4308.11)
MD	0	47 (19400.0)
NY	3.8	3.7 (10371.0)
PA	0	42.2 (25879.34)
VA	0	100 (68962.26)
WV	0	0