Welcome to
Manure Du Jour – Season II
Serving Pennsylvania’s Best Practices for Animal Ag-, Air- and Water Quality Protection

Precision Feeding – Science and Application of Pollution Prevention at its Best

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Precision Feeding Projects in PA

Virginia Ishler
Nutrient Management Specialist and Dairy Complex Manager
University Park, Pa
Chesapeake Bay Watershed in southwestern PA – 12 dairy farms
Virginia Ishler and Gene Schurman

Monocacy Watershed in Adams county – 5 dairy farms
Virginia Ishler and Erica Cowan
SW PA Project

- Funding was by The Northeast Sustainable Agriculture Research and Education (SARE) program.

- Objective was to evaluate
  - The protein status of the farms’ lactating cow diets
  - Compare actual vs. formulated levels in the diet
  - Monitor milk urea nitrogen (MUNs) over time as the barometer of the herd’s nitrogen utilization.
SW PA Project

- All herds fed a total mixed ration (TMR).
- Herd size ranged from 52 to 335 cows.
- Sampling of the bulk tank milk and TMR occurred every other month from June 2007 through February 2009.
Formulated dry matter intake

Herd (Number of lactating cows)

DM lbs

Aug-07F
Oct-07F
Dec-07F
Feb-08F
Apr-08F
Jun-08F
Aug-08F
Oct-08F
Dec-08F
Feb-09F

40.0
45.0
50.0
55.0
60.0
Actual dry matter intake

DM lbs

Herd (# of lactating cows)

Aug-07A
Oct-07A
Dec-07A
Feb-08A
Apr-08A
Jun-08A
Aug-08A
Oct-08A
Dec-08A
Feb-09A

NESARE Project
Actual (TMR) vs. Formulated (Ration) Crude Protein % and MUN Level
Observations

• The dry matter percent of the TMR was significantly lower compared to the formulated diet by 3.5% (46.84% vs. 50.41%).

• The crude protein percent was significantly lower by 0.95% for the actual versus the formulated (16.43% vs. 17.38%).

• These discrepancies may not appear to be extreme, but they could become an issue as nutritionists balance protein closer to the cow’s requirement. Rations that are not implemented properly could result in diet protein levels that could be too low and result in less than optimum performance.
Observations - MUNs

• For the duration of the project, eight farms maintained MUNs between 10-12 mg/dl. These levels are reflective of the TMR protein levels holding at 16%.

• The other four herds consistently maintained MUNs between 13-15 mg/dl and their average TMR protein level was 17.2%.

• There was a tendency for higher protein to result in higher MUNs, however, examining the sampling periods, this trend did not always show up, especially during different times of the year (i.e. temperature affect).
Actual P% (TMR) vs. Formulated P% (Ration)
P as a % of requirement – 2001 NRC (based on intake and milk production)
Observations - P

• There was extremely good agreement between what the nutritionist formulated and what came back in the TMR analysis.

• Using actual intakes and milk production, P as a percent of requirement was good with ten herds maintaining between 100-110% of requirement.
  • P% ranged from 0.35 to 0.42%

• Two herds were at 114% and 119% of requirement.
  • P percent for the two high herds was 0.34% and 0.42% respectively. The herd with the average P of 0.34% was the herd with very poor dry matter intake efficiency.
Monocacy Watershed
Monocacy Watershed Project

- Funded by The National Fish and Wildlife Foundation
  - Collaborators with The University of Maryland
- 10 dairy farms in the watershed (Adams county)
  - 6 farms participated in the project for 2 yrs
  - 5 farms participated in the project for 3 yrs
- Project timeline – 2006 - 2009
Objectives

• Assess the current farms’ ration status on nitrogen and phosphorus.

• Based on preliminary data, meet with producers and nutritionists to affect changes in protein and phosphorus nutrition.

• Monitor progress over time.
MUN: All Farms

Preliminary Data - Baseline
Met with producers and nutritionists to review preliminary results.
Fixed scales on mixer

Adjusted ration for protein fractions
Observations - MUNs

- Producers implemented suggestions to improve MUNs
  - Dramatic improvements observed and they were consistent.
Impact on phosphorus

- Phosphorus intake as a percent of requirement was not controlled very well in three out of the five farms.
  - Based on milk production and dry matter intake

- Two of the farms stayed in the range of 100 to 110% for most of the project.
  - The level of phosphorus in the TMR was appropriate for their level of milk production and dry matter consumed.

- The other two Holstein farms struggled with low milk production and the phosphorus content was consistently too high. The ration was formulated that way and the TMR analysis matched the paper ration.

- Fecal samples were taken the last 2 sampling periods.
  - Ideal fecal P as a % of dry matter – 0.50 to 0.70%
One of the better herds for P

Phosphorus (% of requirement)

The Chesapeake Bay BMP Recommendation
One of the better herds for P

Phosphorus (% of requirement)

Date | P intake as % of requirement | Fecal P, % dry matter
--- | --- | ---
June, 2009 | 126 | 0.89
July, 2009 | 119 | 0.79
Herd with ideal fecal P

Phosphorus (% of requirement)

- Actual
- Formulated

The Chesapeake Bay BMP Recommendation
Herd with ideal fecal P

Phosphorus (% of requirement)

Date | Fecal P, % dry matter
--- | ---
2 year old group | 
June, 2009 | 0.66
July, 2009 | 0.50
High group | 
June, 2009 | 0.69
July, 2009 | 0.79
Low group | 
June, 2009 | 0.57
July, 2009 | 0.58
Producer switched to heavy inclusion of byproduct feeds when feed prices rose

<table>
<thead>
<tr>
<th>Date</th>
<th>Fecal P, % dry matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>June, 2009</td>
<td>0.83</td>
</tr>
<tr>
<td>July, 2009</td>
<td>0.87</td>
</tr>
</tbody>
</table>
Economics – Income Over Feed Costs*  
(yr 3 only)

• The Jersey herd switched nutritionist to improve profitability; however, it was at the expense of keeping P in line.

• The two highest producing Holstein herds maintained an IOFC that remained within the recommended benchmark.
  • Also the best P balance

• The other two Holstein herds had very low IOFC
  • Feed costs too high for the milk produced.
  • The worse farms for P balance

* Milk income/cow minus feed cost/cow = IOFC/cow/day
Conclusion

• Dairy nutrition is moving in the right direction regarding the levels (percents) of both protein and phosphorus being formulated and what is observed in the TMR analysis.
  • Fecal sampling for P reflective of diet
  • MUN sampling for N reflective of diet

• There are still discrepancies between the formulated and actual diets, which is a big component of precision feeding.

• Knowing actual dry matter intake is still a challenge.

• There are opportunities for the nutritionist and the producer to make improvements on the side of ration development and implementation and perhaps even improve the income over feed costs.
Precision Feeding – View From Lancaster County

Sarah Dinh, Ph.D.
Dairy/Environment Educator
Lancaster County
Manure Du Jour, March 4, 2010
Programming Successes

- Efficient Farming for Small-scale Dairies
- Feed industry meetings
- Outreach
- UPenn precision feeding
Efficient Farming for Small-scale Dairies Program

- Held in 3 locations throughout the county
- 30 people in attendance, half Amish
- Good interaction and discussion on precision feeding
  - N and P utilization efficiency
  - Manure application and calculating a manure budget by Jeff Graybill, Agronomy Educator
Feed Industry Meetings

- Presented updates on Chesapeake Bay regulations and TMDL
- Four major feed company meetings
- ~1000 producers in attendance – many Amish farmers
- A lot of interest in what they might be expected to do and what they can start doing now
Outreach

- Monthly column in *Lancaster Farming*
  - Well read by Amish and farming community
- “Where Agriculture and the Environment Meet” at [http://agenvironment.blogspot.com](http://agenvironment.blogspot.com)
- Received feedback and questions
On-farm Successes

- Many farmers monitoring milk urea nitrogen levels to some degree
- Farmers taking initiative and challenging nutritionists to reduce N and P in diet
- Lower N and P diets are being fed
- Less manure volume to deal with when utilizing precision feeding
On-farm Challenges

- Precision feeding requires a higher level of management
  - Need very good forage quality for it to work
  - Increased monitoring and adjustments
- Precision feeding is not a priority
  - Precision feeding is never the reason for the call
- Lack of ownership – nutritionists deal with it
- Linking feeding to the agronomic side
- Farmers want to know the relationship between what they do and how that impacts local waterways
Challenges for Nutritionists

- Need for basic understanding by nutritionists on how N and P is utilized by the cow
- Some nutritionists still overfeeding P
- Feed analyses need to be faster and more accurate
  - Digestibility of forages and starch
  - Faster methods are not accurate enough but producers don’t want to wait for the slower more accurate method
- Implementing precision feeding on component fed farms is difficult
- How low can MUNs go?
Precision feeding is hard to define
  ◦ Precision feeding takes on many forms
  ◦ Farm specific

Bringing everyone up to a minimum level
  ◦ Management
  ◦ Meeting current regulations

EPA investigation of local watersheds

Executive Order

TMDL
Dairy discussion group in Conewago Watershed
- Group of 7-9 farms that meeting regularly
- Topics driven by group, but with nutrient management focus.
  - Feed Management
  - Cropping and manure application
- Allows for interaction between farmers
- Good follow-up with participating farms
Spring is Coming...
Question and Answers

• Questions received in writing will be directed to the speakers by the moderator.
• If your question is not answered during the time remaining, responses to the questions will be posted at www.aec.cas.psu.edu
• Recordings of this session can also be viewed at the URL listed above.
What’s ahead for season II?

• Next week:
  – Follow the Nutrients: On farm treatments (including digesters) and regional systems
    • BOB GRAVES, Penn State Agricultural and Biological Engineering
    • BILL SHUFFSTALL, Penn State Agricultural Economics & Rural Sociology
  – Full schedule for the Manure du jour program: http://aec.psu.edu

• Nutrient Management Continuing Education Credits ARE AVAILABLE for next week’s program.
• CECs also for Mar 18, Apr 15, Apr 22, Apr 29