Designing Rations and Troubleshooting on Dairies

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Designing Rations
• Has to start with forage
  – Quality and availability

Quality of forage
• Harvested at correct maturity and moisture
• Packed well
• Sealed
• Good face management
Large Piles of Silage

Designing Rations
• Has to start with forage
  – Quality and availability
• Must understand the operations and limitations of the farm
  – Must feed certain feeds since they are grown by brother/cousin/etc. no matter the quality
• Add other ingredients to meet nutrient needs affordably

Troubleshooting Nutrition on Dairies
• Gather information from reliable sources
  – Milk yield & composition
  – Bulk tank
  – Pen averages
  – By DIM
  – By parity
  – History - Previous month, year
  – Any idea on dry matter intakes?
    • By pen
    • By DIM
    • Overall
• Know feed ingredients
  – Nutrient analyses
  – Who mixes diet
    – Type of mixer
  – How often is feed offered
    – Bunk management
    – Pushed up
• Feed inventories
Troubleshooting Nutrition on Dairies

- TMR
  - Particle size
- Rumen fermentation
  - Feet and legs
  - Fecal screens
  - Milk fat %

- Cows
  - Milk yield
  - Feet and legs
  - Locomotion scoring
  - Incidence of metabolic disorders
    - Milk fever, ketosis, DA
      - When do they occur?
  - Body condition score
  - Reproduction

Usefulness of milk urea nitrogen (MUN) to evaluate on-farm nutrition

Introduction

- On a gross scale, increasing crude protein content of diets:
  - Increases feed intake
  - Increases milk yield
  - May increase milk protein content
Concerns

- Inefficiency of nitrogen use
  - Costly if excess protein is fed
  - Environmental issues
  - Cheese

CHEESE

- Processing yields affected by true protein content
- Increased value of protein

Protein Fractions of Milk

- Casein (~80%)
- Whey (14-15%)
- NPN - nonprotein nitrogen (5-6%)
  - 25-30 mg/dl of milk
  - ~50% of NPN is urea N
Concerns (con’t)

- Inefficiency of nitrogen use
  - Costly if excess protein is fed
  - Environmental issues
  - Cheese
  - Poor reproductive performance

Butler et al., 1995 and 1996

BUN and MUN suggested as a measure to evaluate efficiency of protein utilization

Butler et al., 1995 and 1996
Urea

\[
\begin{array}{c}
\text{NH}_2 \\
\text{O=C} \\
\text{NH}_2
\end{array}
\]

- Excretory product of ammonia (NH\textsubscript{3})
  - Rumen
  - AA catabolism
- Formed in liver: urea cycle

Reticulo-rumen

- Released into blood for excretion by kidney
- Blood urea nitrogen - BUN, PUN or SUN
- Urea equilibrates with body water
- BUN highly correlated with milk urea N (MUN)
Summary of 35 trials

Broderick and Clayton, 1997

MUN

- Easier to sample
- Pre- and post-milking strip samples not different than typical milk sample

Gustafsson and Palmquist, 1993

Nutritional effects on MUN
Quick summary

• MUN increased with increasing dietary protein

• Response confounded with carbohydrate availability

• RDP as a % of crude protein increased with increasing dietary CP
Quick summary

- Excess RDP increases MUN
- Imbalance in protein supply contributes to increased MUN

Effect of RUP on MUN

Baker et al., 1995

Roseler et al., 1993
Quick summary

- MUN is affected by level of dietary RUP
- Non-urea NPN is stable

MUN may be a useful tool, BUT...
- Problem could be from a variety of nutritional issues
  - Dietary protein source
    - RDP
    - RUP
  - Dietary carbohydrate
  - Rumen fermentation (i.e., energy)
Milk Urea Nitrogen (MUN)

• What does it tell you?
  – Low MUN (<12 mg/dl) suggests a very efficient use of amino acids
    • possibly limiting

Milk Urea Nitrogen (MUN)

• What does it tell you?
  – High MUN (>18 mg/dl) suggests a significant rate of amino acid oxidation
    • overfeeding of protein
    • imbalanced amino acid pattern
    • excess urea fed
    • low energy
    • inadequate carbon for the bacteria to capture the N as microbial protein

How to Use MUN

• Sampling
  – with normal herd testing (individual animals)
  – more repeated in a subset of each ration fed or pen of cows (10-15% of cows sampled)
  – Time of day
    • little variation unless significant slug feeding or significant sorting occurring
How to Use MUN

• Results only can suggest that protein nutrition is improper (could be either protein or energy effect)
• Only provides a clue; does not give the full answer
• You must investigate to determine if there is a problem