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**FEEDING SYSTEMS**

- Total mixed rations (TMR)
- Electronic grain feeders
- Grain fed in the milk parlor
- Individually top dressed
- Intensive pasture

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**TMR Principles**

- All feed ingredients are included
- The ration is uniformly blended
- Predetermined nutrient levels
- Offered free choice



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## How Much to Feed?



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## Feeding a TMR Free Choice

- Feed bunk management is critical
  - 2-4% weigh back (orts); as fed
    - 400-800# feed in a 200-cow pen, \$\$\$\$
  - Weigh back is uniform
  - Weigh back is not sorted
  - Feed is available > 20 hours a day
    - Think about time away from the bunk (milking)

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## Empty Bunk?



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### TMR GUIDELINES

- Avoid rations over 50% moisture from fermented feeds
- May want to add water to reach 50-55% DM; decreases sorting, increase palatability
- Seasonal feeding for less spoilage and greater intakes
  - Offer larger portions in early evening during summer
- Reformulate if wet ration ingredients change
  - Need to monitor the dry matter content of wet feeds

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### MEASURING DRY MATTER IN SILAGES AND TMR

- Koster tester (\$300)
- Microwave oven (\$25 to \$100)
- Electronic moisture tester (\$200 to \$300)

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### Rations Delivered to the Cow

- The ration on paper
- The ration in the bunk
- The ration consumed by the cow
- The ration absorbed in the blood stream



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## The Ration on Paper

- Inputs are good if they are correct
  - Cows
    - Parity, BW, milk production, composition, #cows in pen
  - Feed ingredients
    - Actual feed analysis
    - Properly sampled
    - Identify lots/stacks for proper mixing
      - Sources constantly changing on large dairies

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## The Ration on Paper

- Most use equations from NRC with slight changes
  - Dairy Nutrition Software
    - NRC
      - Straight-forward
      - Equations and calculation well described
      - Does not include feed costs
      - Cost is good! (i.e., free)
    - Others
      - Spartan Dairy Ration Program 3.0
      - CPM/CNCPS
        - » Both provide least cost formulation

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## The Ration in the Bunk

- Mixing proper amounts of ingredients is required
- What error rate is allowable? (<3%)
  - 10 ton mixes with some components representing very minor portions
  - Expectation when using a large payloader
- Determine using feed monitoring systems  
(e.g., EZ Feed, Feed Watch, TMR Tracker, Feed Supervisor)



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## The Ration in the Bunk

- Mixing order and times
  - Function of ingredients and composition
  - Also, feed truck plays a significant role
    - Vertical vs horizontal mixer
- Impact on forage length
- Desire is for a consistent TMR in front of the cows every day!!!




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## The Ration Consumed

- Is one end of the bunk similar to the other end?
- Is sorting occurring?
  - Check through Penn State separator box and proximate analysis




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## The Ration Consumed

### Variation in ADF

Herd	Calculated	Tested	Orts
	----- % ADF -----		
A	24.2	22.3	29.5
B	19.4	21.2	28.0
C	17.9	19.2	20.1

Tested checks for mixing or feed analysis issues  
Orts checks for sorting

**NOTE:** Lots of fiber left in bunk of Herds A & B (i.e., sorting)

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## The Ration Consumed

### Variation in Crude Protein

Herd	Calculated ----- % CP	Tested ----- % CP	Orts ----- % CP
A	18.7	19.7	17.0
B	18.3	21.1	18.8
C	15.4	16.4	15.7

Tested checks for mixing or feed analysis issues  
Orts checks for sorting

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## Testing TMR OR Weigh Backs

USE THE 1-2-3 RULE

- 1: +/- one unit of crude protein
- 2: +/- two units of ADF
- 3: +/- three units of dry matter

TMR: CALCULATED VS TESTED TMR

WEIGH BACK: TESTED TMR VS ORTS

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## The Ration Absorbed



Depends on what is formulated, delivered and consumed

Impacts are on nutrients consumed and effects on rumen fermentation that the computer do not assume or detect

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## Sources

- Some slides adapted from Dairy Nutrition & Management (ANSCI 200/492), University of Illinois at Urbana-Champaign, Dr. Mike Hutjens

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