Group feeding of lactating dairy cattle

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http://dairymgt.info/cluster/clustering.php
Rationale

• Every single cow in a herd has a different nutritional requirement
• Less productive animals are normally overfed to assure enough nutrients for the most productive animals
• Having groups of cows fed different diets would improve profitability and decrease environmental impacts
Strategies of Grouping

- Decision depends on:
  - Individual cow’s nutrient requirements
  - Number of lactating animals
  - Facilities and equipment
  - Management and labor availability
A Proposed Approach

• 1. Get the Farm Data
  – Monthly test dataset containing:
    • Cow ID
    • Parity
    • Days in milk (DIM)
    • Milk production
    • Milk fat content
    • Body Weight (BW, optional)
2. Cow’s Nutritional Requirement

- In function of: Parity, DIM, milk, fat, BW
- Net Energy (NE) for maintenance
- Net Energy for production
- Crude Protein (CP) for maintenance
- Crude Protein for production
- Dry Matter Intake (DMI)
3. Nutritional Requirements of a Group

- 83rd percentile (mean + 1 SD) of the CP and NE
- If the average cow in a group requires:
  - 1.5 Mcal and 15% CP
- And the SD deviation of the group is:
  - 0.2 Mcal and 1.5% CP
- Then the requirement for the group will be:
  - 1.7 Mcal and 16.5% CP
4. Determine Number of Groups

- Previous research and empirical results indicate that it is not worthwhile to do more than 4 lactating groups.
- It may also be not practical or feasible to do more than 4 lactating groups in commercial herds.
- Number of lactating cow groups: 1, 2, 3, or 4.
5. Criteria for Grouping

- Days after calving or DIM
- Fat corrected milk (FCM)
- Merit = FCM/BW^{0.75}
- Cluster= Uses Mcal and CP requirement combined
6. Optimize Cows Inside a Group

- Goal = Maximum IOFC (income over feed cost)
- Price of Milk, Mcal, and CP
- Price per Mcal and pound of CP can be estimated from referee feeds such as corn and soybean meal (SBM)
- Including/excluding a cow in a group affects the Mcal and CP requirements, the production of the group and therefore the IOFC
7. Assess Other Costs or Grouping

- Cost of additional management when
- Additional labor required
- Estimate of milk depression because of social interactions
  - Amount of milk depression
  - Number of days until recover
Compare the Net Return of Grouping Strategies

- Farmer can’t do more groups
  - Still an opportunity to use a better criterion for grouping
- Farmer can do more groups
  - Select the right number of groups
  - Select the right group criterion
  - Optimize the number and type of animals in groups
Compare the Net Return of Grouping Strategies

• Farmer does not group and can do groups
  • Test the additional net return of doing 2, 3, or 4 groups
  • Select the right group criterion
  • Optimize the number and type of animals in each group