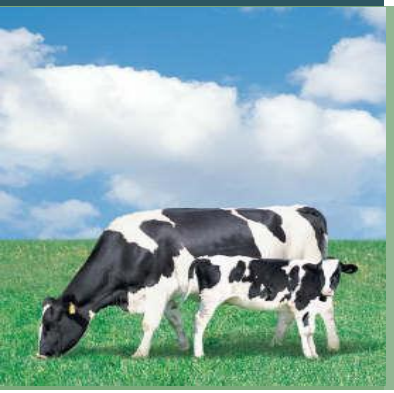
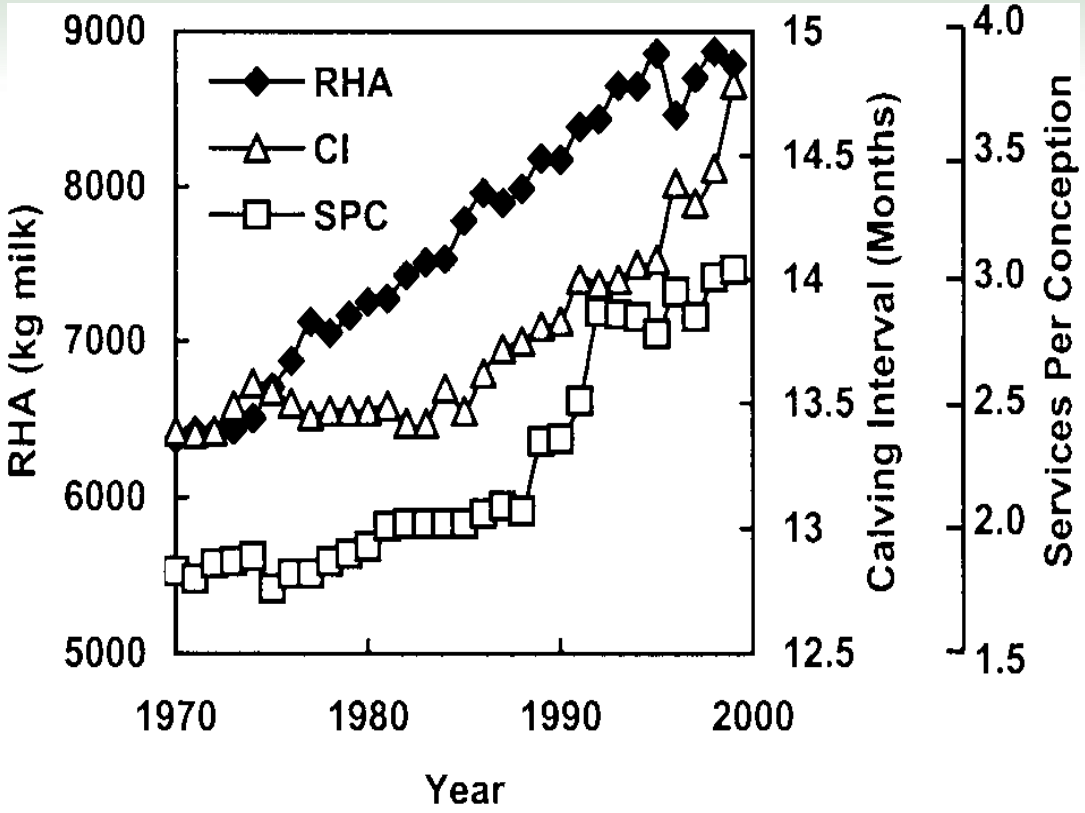
Nutritional Factors Affecting Reproductive Performance of Dairy Cows

Based on an undergraduate thesis by Janna Moats
Animal Science 492.3



By: Janna Moats and Dave Christensen

Decline in Fertility

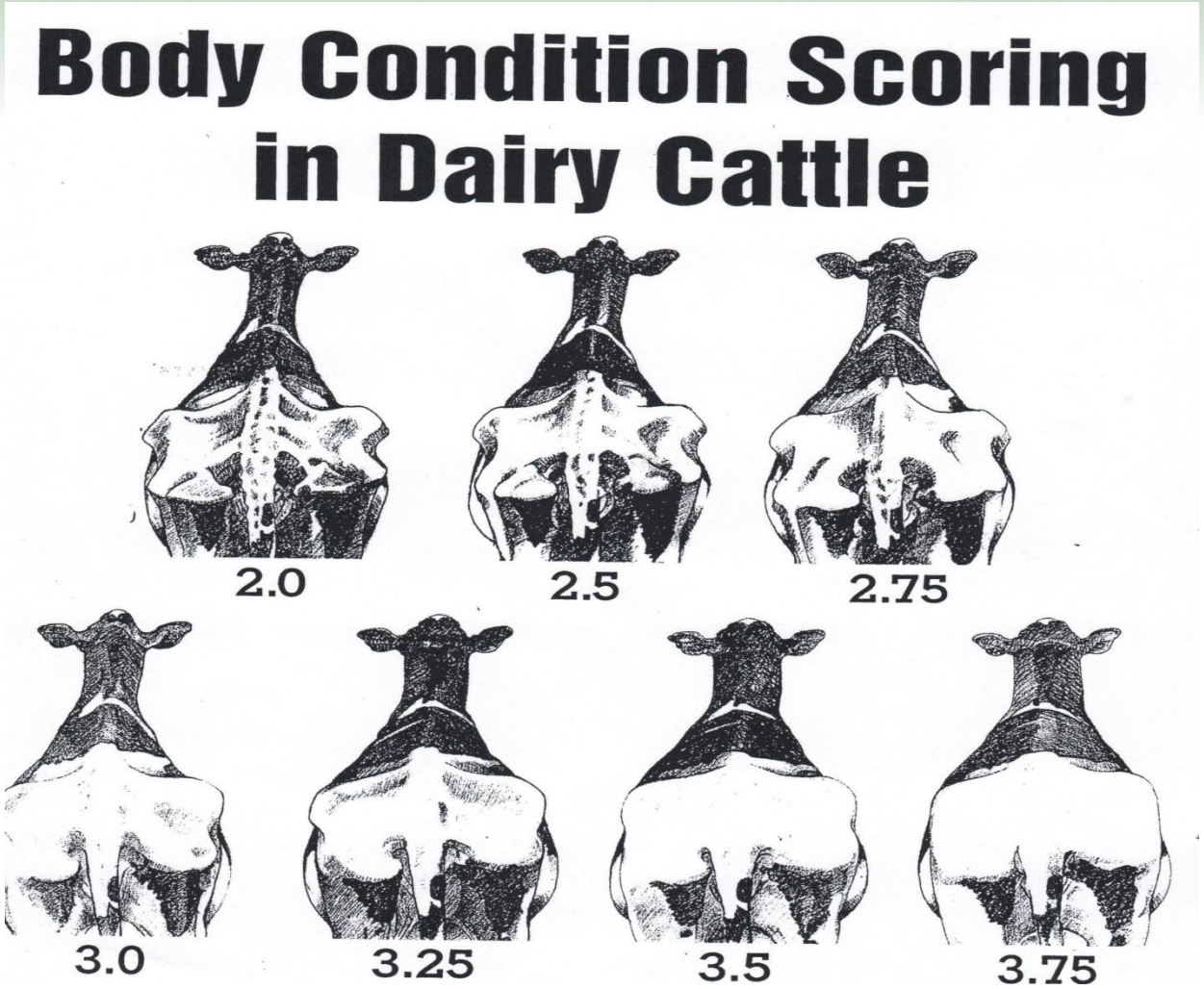


Rolling herd average (RHA, kg milk per lactation), calving interval (CI), and services preconception (SPC) for 143 dairy herds enrolled in the DHIA record keeping system from 1970-1999 Adapted from Lucy (2001).

Energy

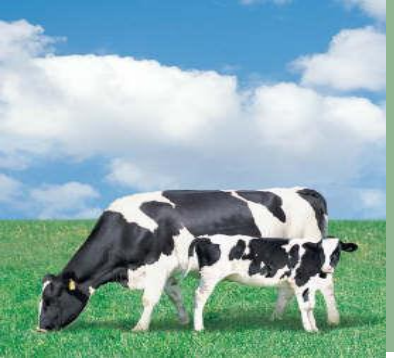
- Most important nutritional factor affecting reproduction
- Requirements increase drastically during early lactation
  - Expend more energy than they can consume in diet
    - Negative Energy Balance (NEBAL)

Energy cont'd



Energy cont'd

- Low BCS are associated with:
  - Delay in ovarian activity
  - Poor follicular response
  - Infrequent LH pulses
  - Reduced functional competence of the follicle



Energy Cont'd

	Body condition loss group		
Variable	BCL_1	BCL_2	BCL_3
First service conception rate, %	65 a	53 a	17 b
Services per conception	1.8 ± .4	2.3 ± .2	2.3 ± .4

TABLE 1: The relationship between body condition loss during the first 5 wk postpartum and reproductive performance.(Butler and Smith 1989)

BCL1 = <.5. Body condition score unit loss; BCL 2 = .5 -1.0 unit loss and BCL 3 = >1.0 unit loss.

Energy Supplementation

- Starch and Fat are the most common supplements used to increase energy content in the diet
- Elevated levels will alter hormone metabolism
  - Insulin metabolism

Energy Supplementation

- Starch
  - Increase circulatory insulin
    - Decrease days to first ovulation
    - Deleterious effects on oocyte development and quality

Energy Supplementation

- Fat
  - Decrease levels of circulating insulin
    - Increase PGF2α
    - Improve embryo survival
- Replace high ration starch with increasing fat levels several weeks before breeding

Protein: high cp levels can affect fertility through Urea production.

- **High levels of MUN/PUN** :
  - Decrease uterine pH
  - Lower conception rates
  - Decrease progesterone levels
  - Decrease embryo survival
- Recommended levels:
  - MUN 12-18 mg/ dl
  - PUN less than 20 mg/dl

Protein cont'd

- Factors to consider :
  - Inclusion levels
  - Protein type
    - RDP
    - RUP
  - Carbohydrate: Protein ratio

The Future of Reproduction

- Long-run
  - Genetic selection for improved reproductive traits
- Short-run
  - Nutritional Management
    - Understanding relationship between nutritional factors and reproductive efficiency

Questions ?