

# FEEDING MANAGEMENT OF THE DAIRY HEIFER FROM 4 MONTHS TO CALVING

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# GOAL

- Dairy heifers represent a large expense of resources including feed, buildings, and labor; yet they return no money to the farm until they calve.
  - Feed is the largest cost – Control
- The goal of dairy heifer management is to rear heifers at a low economic and environmental cost without compromising future lactation performance.

# NUTRITIONAL MANAGEMENT

- Specifically, nutritional management from 4 mo of age until precalving must ensure that dairy heifers are fed adequately to achieve proper body size at an optimum age.
- nutritional management must facilitate dairy heifers reaching breeding BW at the appropriate age.
- prevent excessive energy intake during the rearing period to prevent excess deposition of adipose tissue
- **FAT HEIFER** = transitional metabolic disorders



**BCS = 1**



**BCS = 2**



**BCS = 4**



**BCS = 3**



**BCS = 5**

# NUTRITIONAL MANAGEMENT

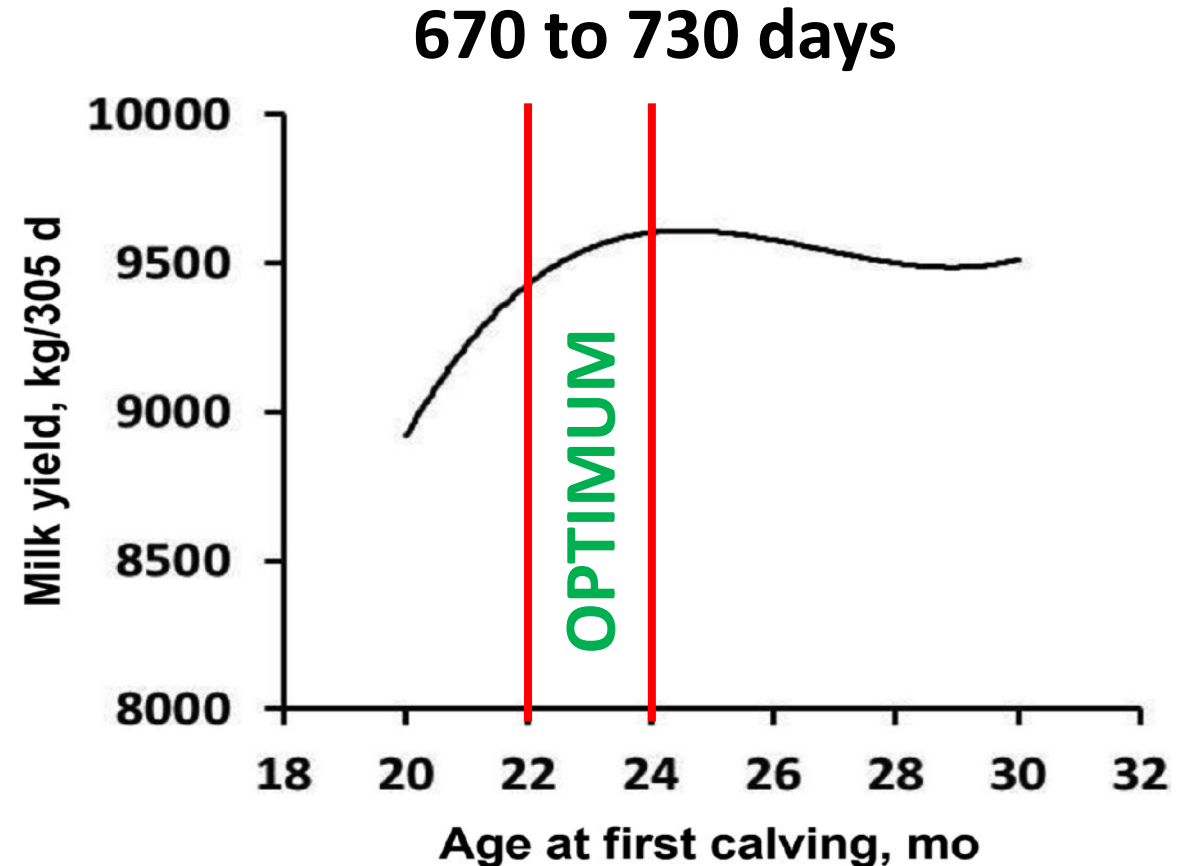
- dairy heifers have lower energy requirements than lactating dairy cows
- FORAGE BASED – HIGH NDF DIETS = **ECONOMIC**
  - require several grains, protein, mineral, and vitamin supplementation to fully support a dairy heifer's total nutrient needs

# SETTING HEIFER GROWTH TARGETS

- Target Calving Age:
- **ADGr** is calculated as  $[(\text{precalving BW} - \text{birth BW})/\text{DOF}]$
- For example, to rear a 40-kg Holstein calf to a 650-kg precalving BW at **22 mo** of age requires an ADGr of **910 g/d**.
- To rear the same 40-kg Holstein calf to a 650-kg precalving BW at **26 mo** of age requires an ADGr of **770 g/d**.
  - **REQUIREMENTS CHANGE DEPENDING ON YOUR GOALS, DIET COMPOSITION**

# SETTING HEIFER GROWTH TARGETS

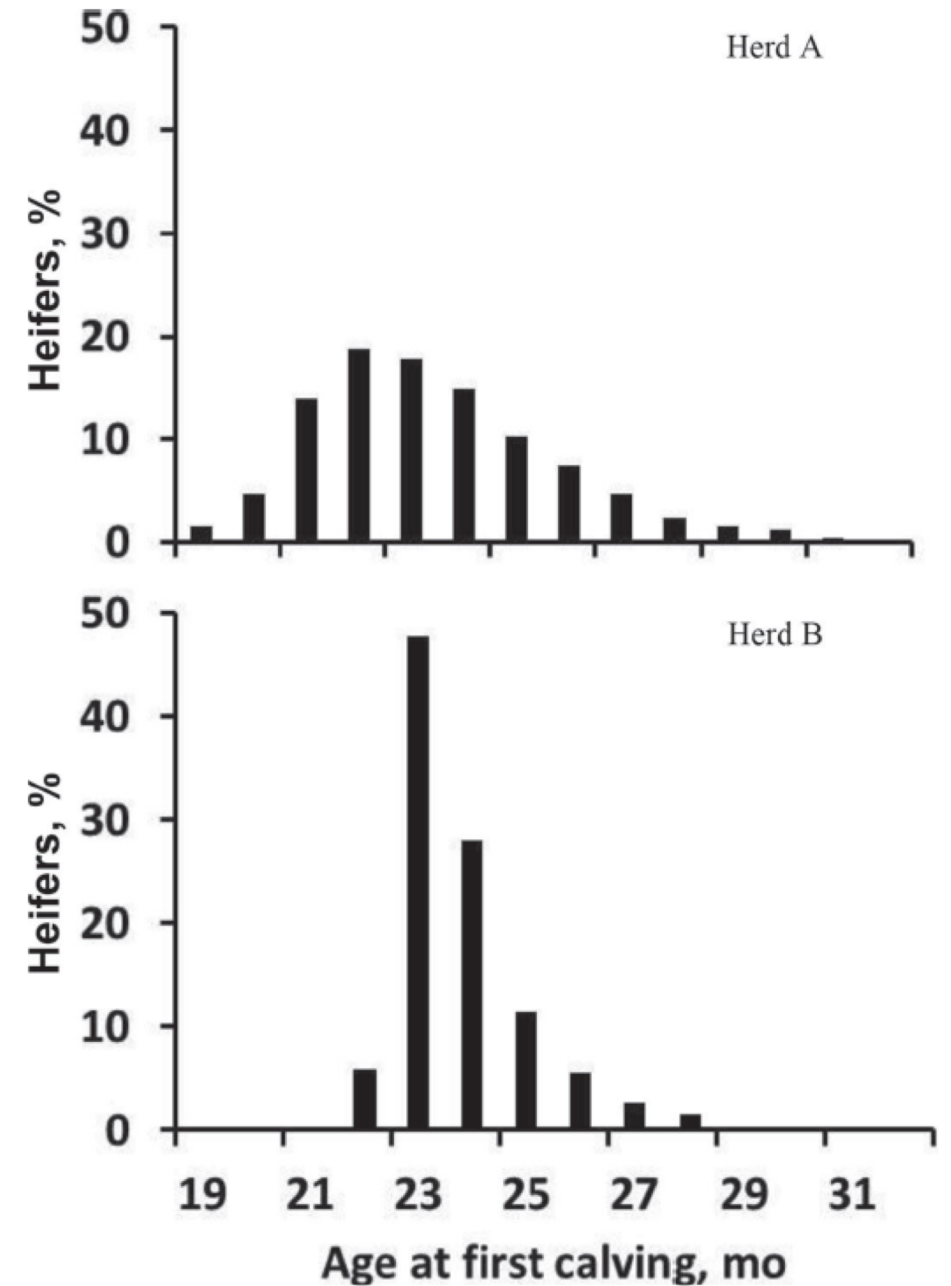
- optimum calving age **22 and 24 mo** of age. (Related to 1<sup>st</sup> lactation)
- In commercial dairy herds, first lactation milk yield did not differ when heifers calved at >23 mo of age but declined precipitously when heifers calved at <22 mo of age.



**Figure 1.** The relationship between age at first calving and 305-d first-lactation milk yield. Data represent 69,145 first-lactation records from commercial dairy herds as adapted from Curran et al. (2013).

# SETTING HEIFER GROWTH TARGETS

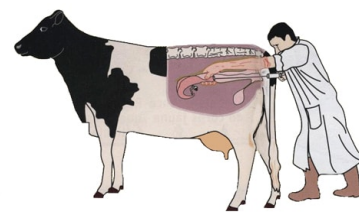
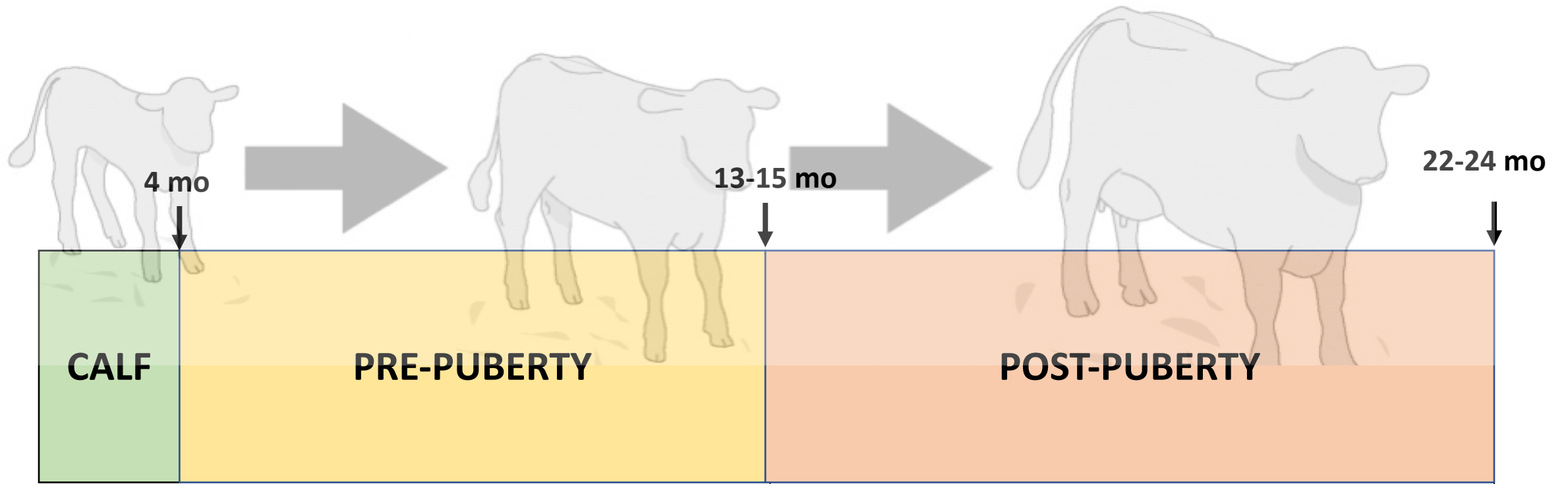
- *Heifer Reproductive Efficiency.*
- DOF is not the only determinant
- AI reproductive efficiency
  - not all heifers are bred at the same age nor conceive on the same AI service





# SETTING HEIFER GROWTH TARGETS

- (1) setting a clearly defined target age of first calving,
- (2) defining a minimum and maximum AI service age,
- (3) defining a minimum BW at which a heifer can be bred
- (4) implementing an efficient AI breeding protocol, which results in heifer pregnancy rates >40%, and
- (5) limiting the number of AI services, which prevents excessive DOF and reduces the risk of overconditioned heifers.

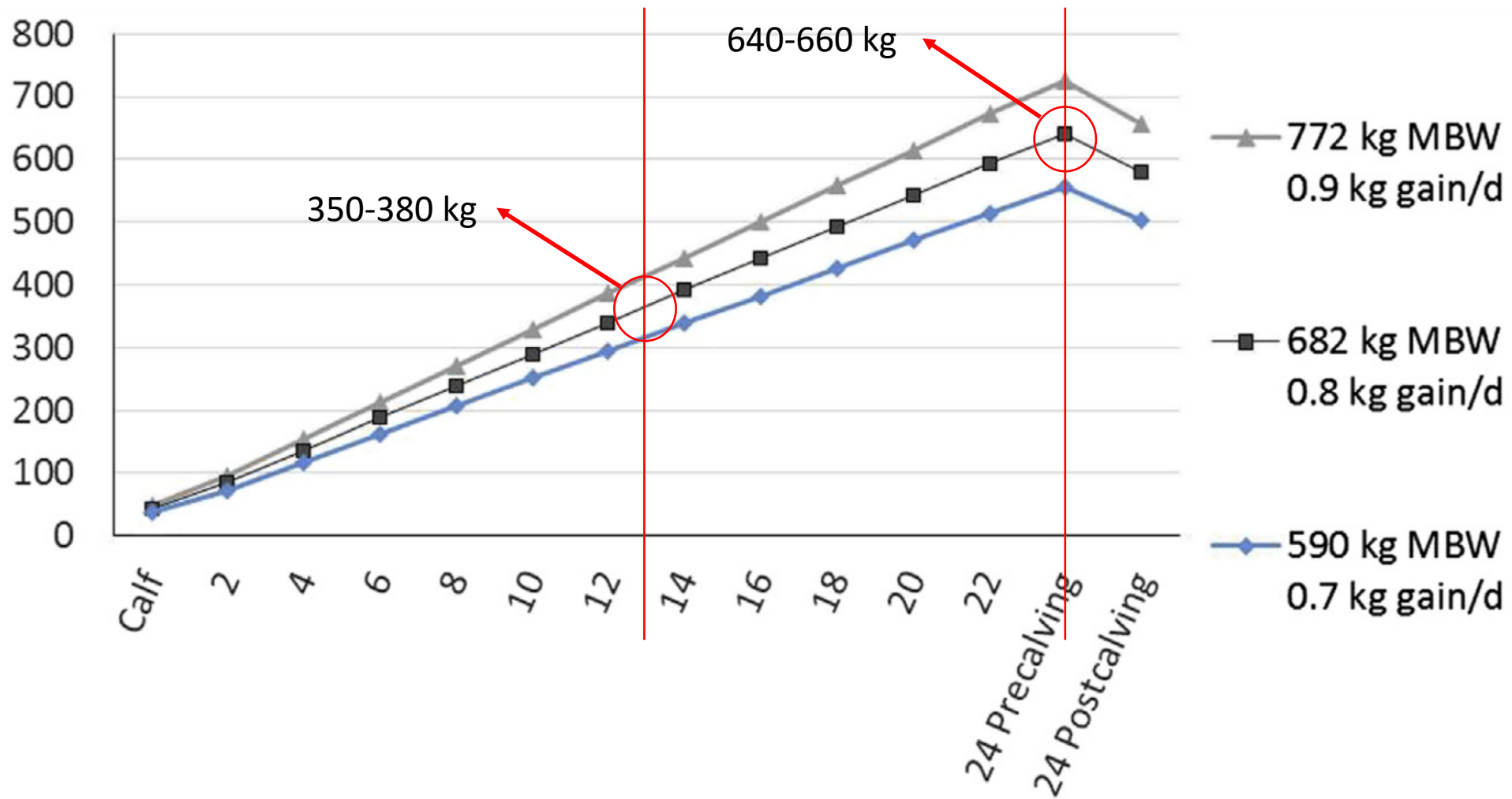


**BW: 55% of MBW**  
**350-380 kg**



**BW: 92% of MBW**  
**640-660 kg**

**MATURE BW(MBW): 700-720 kg (Holstein)**



**Fig. 1.** Growth curves for heifers with estimated MBW of 590, 682, and 772 kg. Legend includes average daily gain needed to attain precalving weight. (Courtesy of P.C. Hoffman, MS Dairy Science, Marshfield, WI: Universal Heifer Growth Chart; <http://fyi.uwex.edu/heifermgmt/growth-charts>.)

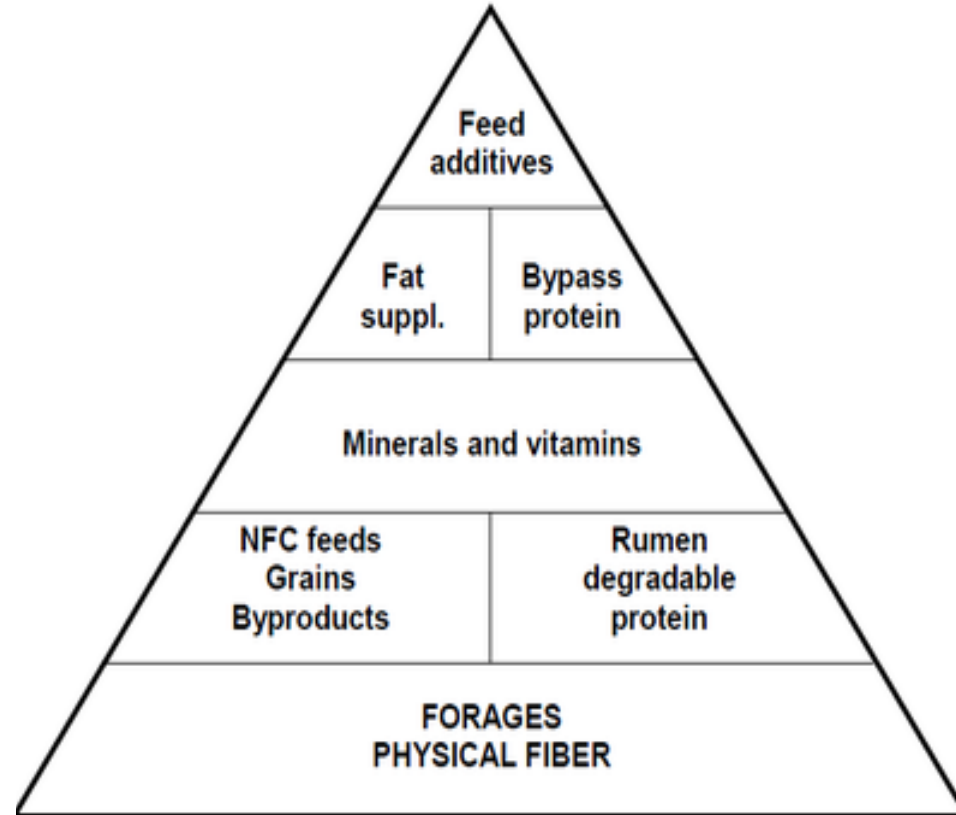
TABLE 11-2 Target Weights, Ages, and Daily Gains for Growing Dairy Cattle

|                               | Percent of<br>Mature BW | Holstein | Jersey |
|-------------------------------|-------------------------|----------|--------|
| Mature BW                     | 100                     | 700      | 520    |
| Birth BW                      | 6                       | 42       | 31     |
| Weaning BW                    | 12                      | 84       | 62     |
| Conception BW                 | 55                      | 385      | 286    |
| First calving prepartum BW    | 91                      | 638      | 426    |
| First calving postpartum BW   | 82                      | 574      | 474    |
| Second calving postpartum BW  | 92                      | 644      | 478    |
| Conception age, months        |                         | 13       | 13     |
| First calving age, months     |                         | 22       | 22     |
| Prepubertal ADG               | 0.13                    | 0.90     | 0.67   |
| Postpubertal ADG              | 0.10                    | 0.69     | 0.51   |
| Postpubertal gain + pregnancy | 0.13                    | 0.92     | 0.69   |
| First-lactation ADG           | 0.027                   | 0.19     | 0.14   |
| Second-lactation ADG          | 0.022                   | 0.15     | 0.11   |

# FEED INTAKE OF DAIRY HEIFERS

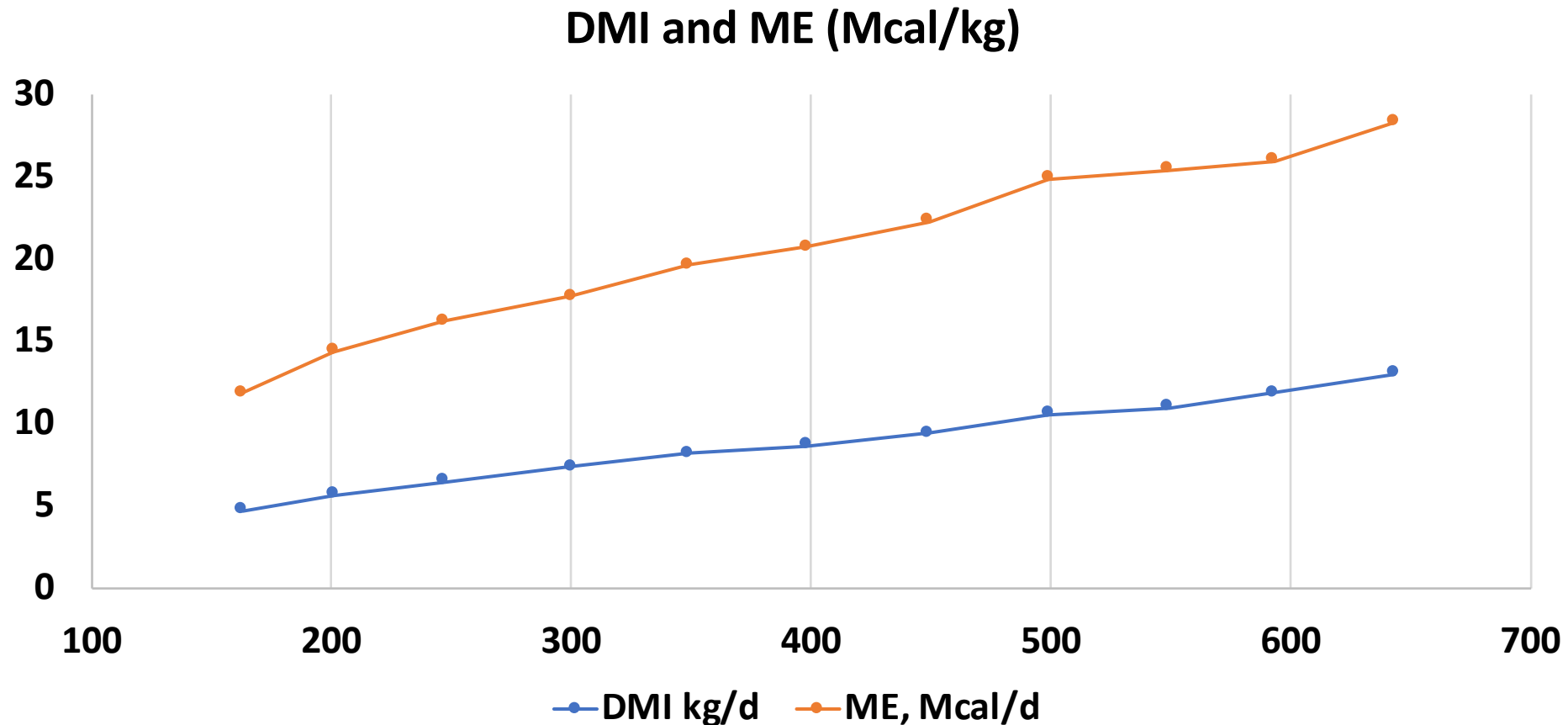
- **DRY MATTER INTAKE:**
- Precise DMI estimation = Efficient Nutrient intake
- Predicting DMI of dairy heifers is considered one of the most important aspects of dairy heifer nutrition
- DMI of dairy heifers was related to heifer BW
  - $DMI (\% \text{ of BW}) = 0.0000007 \times BW^2 - 0.0023 \times BW + 3.6564.$
- NDF intake = upto 1% of BW – limits DMI
- NDF levels helps to control energy intake = prevent overconditioning

# HEIFER DIET FORMULATION

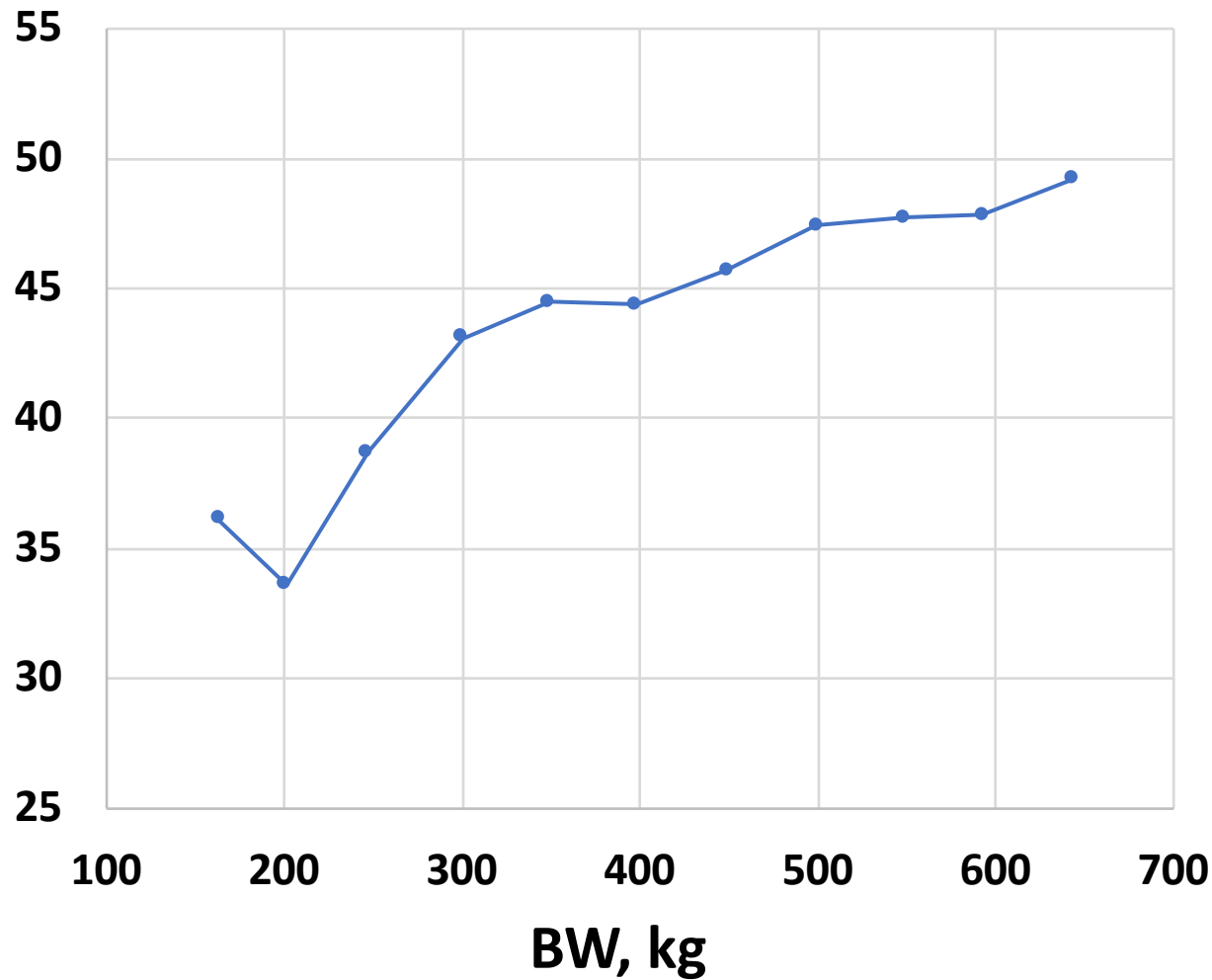


# DIETARY ENERGY

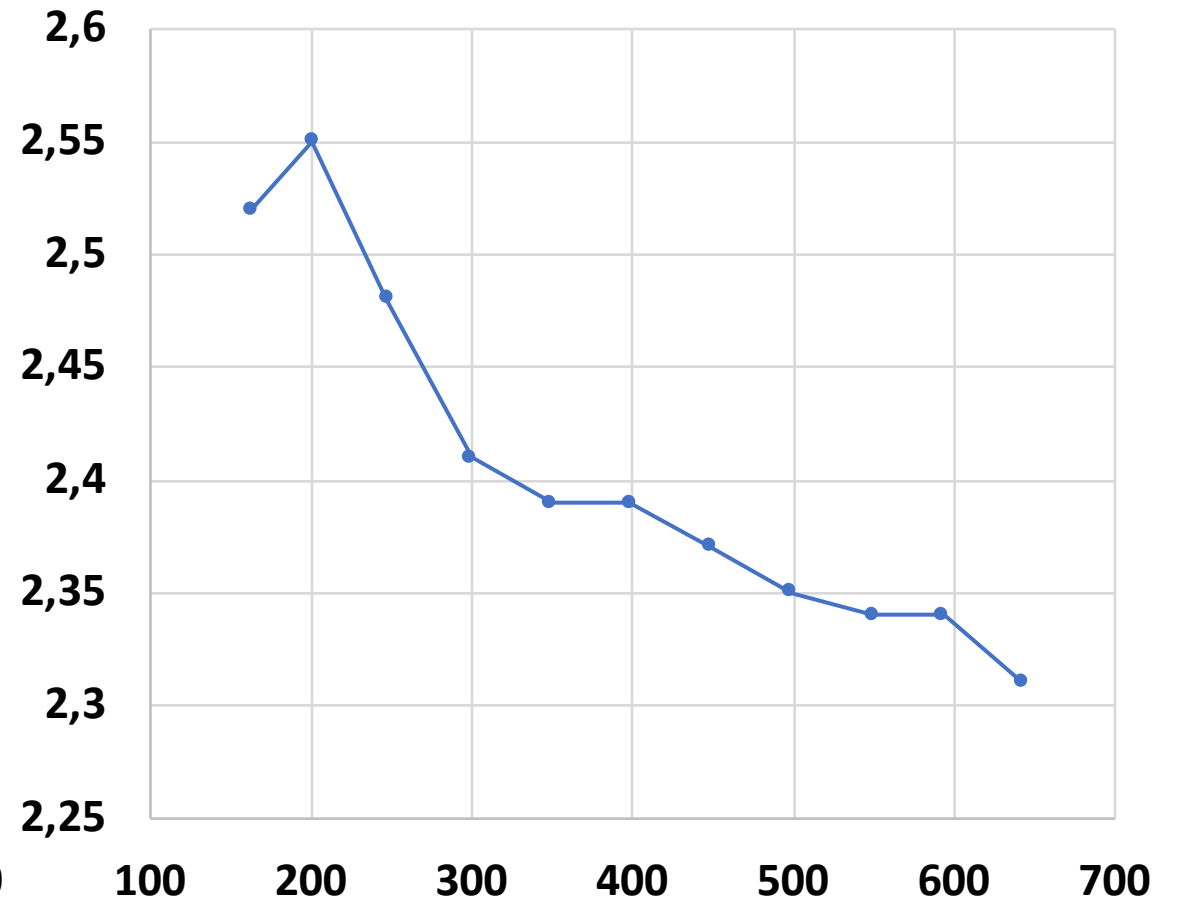
- Total ME req. (Mcal/d) =  $ME_M + ME_G + ME_{pre}$



**NDF, % DM**



**ME, Mcal/kg diet**





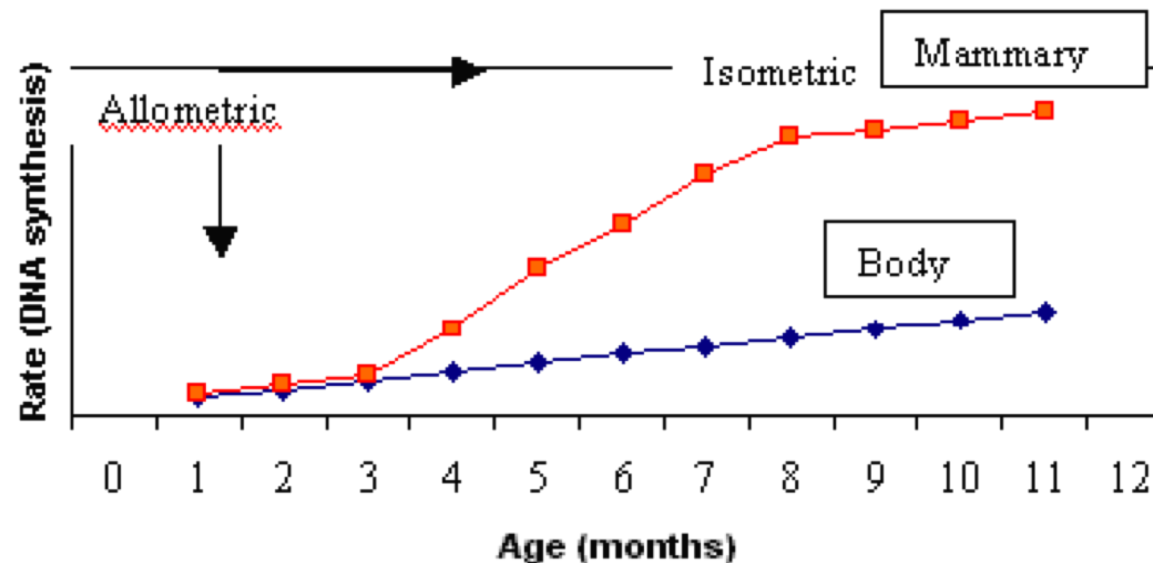
# DIETARY ENERGY

- ENERGY: mostly forage + concentrate
- Watch weight gain and BCS
- Heifer body condition should be observed for excess adipose deposition, especially when feeding for faster weight gains to allow for earlier breeding and calving

# DIETARY ENERGY

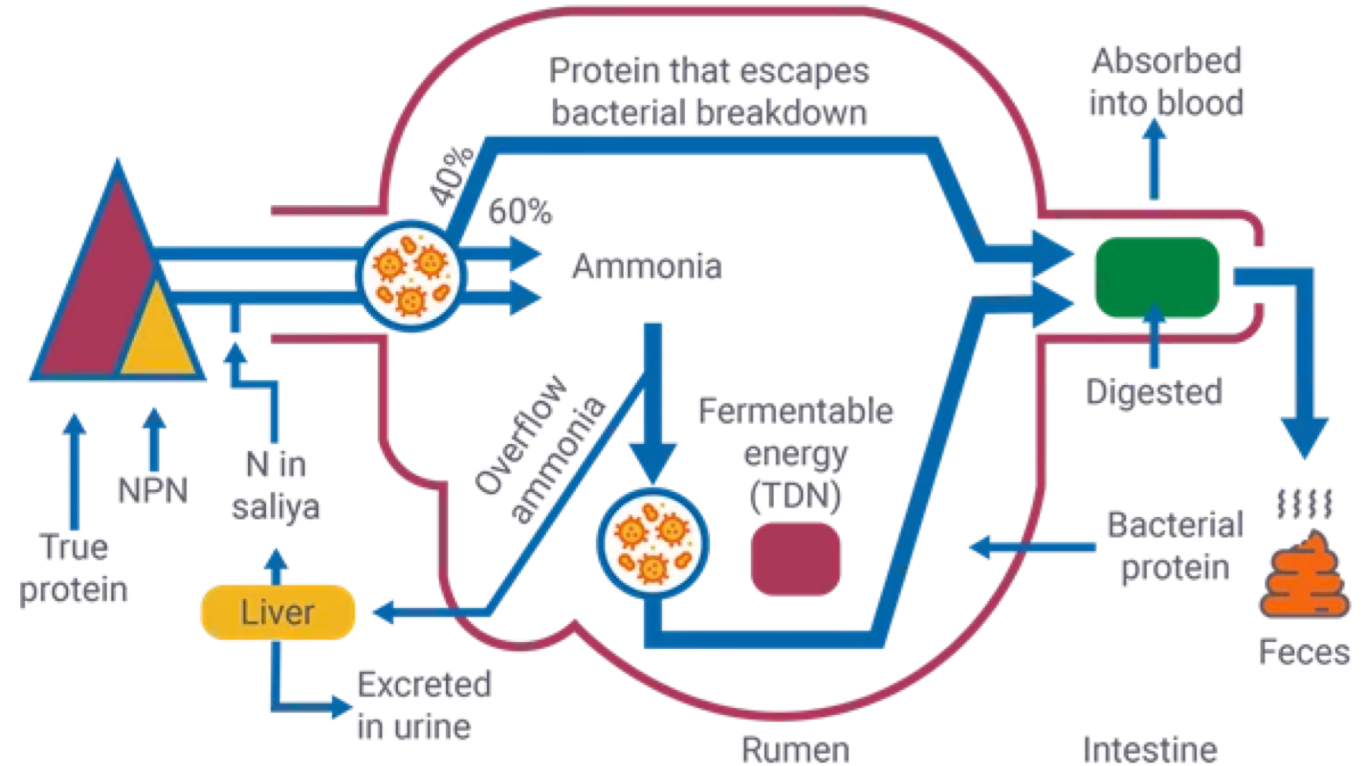
- From about 3 to 9 months of age, mammary development occurs at a faster rate than in other organs (allometric growth) and can be affected by nutrition during this period.
- When fed excess energy, epithelial tissue cell proliferation was decreased and additional adipose tissue was deposited in the mammary gland, which was associated with reduced later milk production

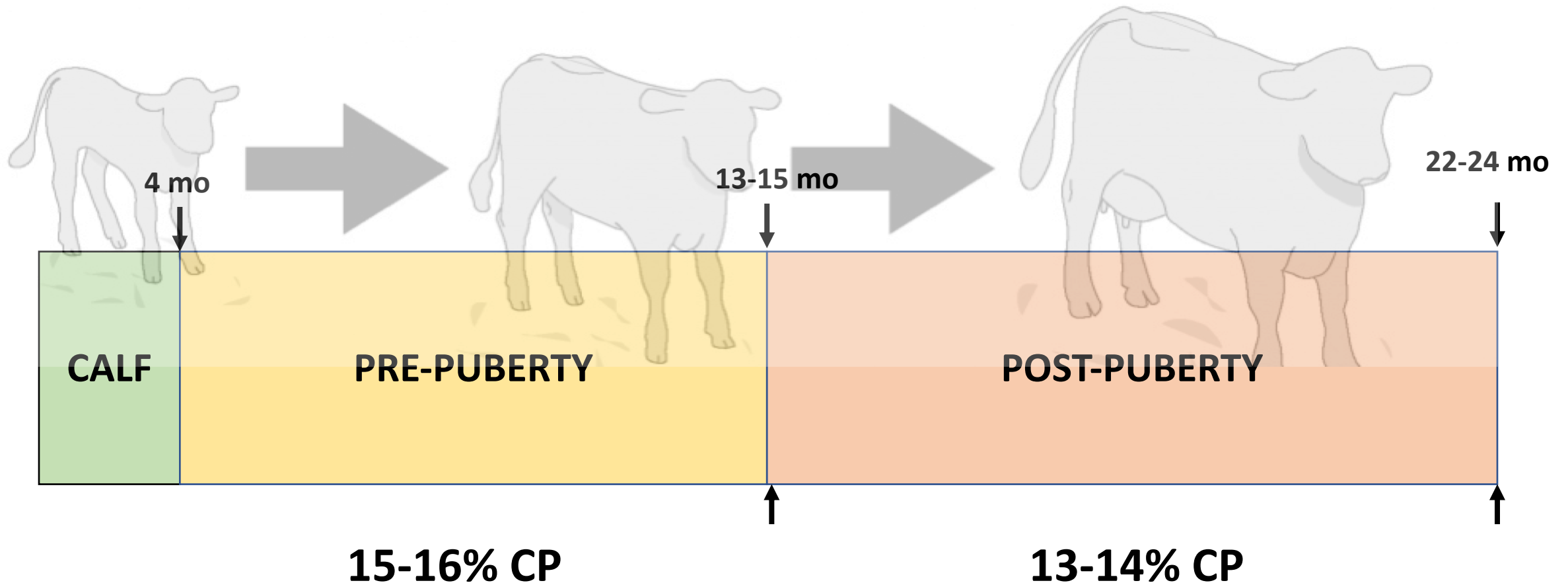
Relationship between growth rates of the mammary gland and body, as measured by increases in DNA.



# PROTEIN

- Linked to dietary energy and heifer growth rate
- Optimum Protein nutrition
  - Optimize lean tissue and structural growth
  - Maximize mammary development





Maintain at least 30 to 35% **soluable protein** of total CP - **UREA**

**RUP:** 25-35% of total CP – no need bypass proteins

# WEANING TO 6 MONTHS

- Forage based TMR – Limited corn silage
- Diets based on 2.5-3 kg concentrate/day
- 900-1000 g ADG
  - Over gains negatively impact mammary development
- TMR CP: 16% - 30-35% can be soluble.
- WATCH BCS – 2.75 (2.5-3.0)

# 6 MONTHS TO PUBERTY/BREEDING

- Diets based on forage
- 1-1.5 kg/day concentrate
- CP: 15%
- Rumen degradable proteins
- BCS: 3.0 (2.75 – 3.25)
- TMR

# BREEDING TO PRE-CALVING

- Forage based diets (limit corn silage)
  - NDF limit 1% BW
- Cheaper feeds can be used and intake adjusted accordingly
- 13-14% CP – need soluble and RDP sources
- BCS: 3.0-3.5
- TMR

**THANK YOU**