Lactation

ANSC 1000
Introductory Animal Science

I. Composition of Milk and Factors Affecting Composition

• Species differences
• Breed differences

Species differences in milk composition

<table>
<thead>
<tr>
<th>Species</th>
<th>Fat (%)</th>
<th>Protein (%)</th>
<th>Lactose (%)</th>
<th>Solids (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow</td>
<td>3.6</td>
<td>3.3</td>
<td>4.6</td>
<td>12.5</td>
</tr>
<tr>
<td>Ewe</td>
<td>5.4</td>
<td>4.8</td>
<td>4.6</td>
<td>15.7</td>
</tr>
<tr>
<td>Sow</td>
<td>6.8</td>
<td>5.1</td>
<td>5.5</td>
<td>17-18</td>
</tr>
<tr>
<td>Mare</td>
<td>1.3</td>
<td>2.2</td>
<td>5.9</td>
<td>9.8</td>
</tr>
<tr>
<td>Woman</td>
<td>4.5</td>
<td>1.1</td>
<td>6.8</td>
<td>12.6</td>
</tr>
</tbody>
</table>
Breed Differences

<table>
<thead>
<tr>
<th>Breed</th>
<th>Milk fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein</td>
<td>3.3-3.6</td>
</tr>
<tr>
<td>Ayrshire</td>
<td>3.9</td>
</tr>
<tr>
<td>Brown Swiss</td>
<td>4.0</td>
</tr>
<tr>
<td>Guernsey</td>
<td>4.6</td>
</tr>
<tr>
<td>Jersey</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Physiological & Environmental Factors Affecting Milk Composition

- Season
- Stage of lactation
- Time of sampling during milking
Physiological & Environmental Factors

- Age
  
- Calving (colostrum)

Physiological & Environmental Factors

- Calving (colostrum)

Physiological & Environmental Factors

- Calving (colostrum)
  
  Why important?
  - Newborn immunity
  
  - Intestinal absorption
  
  - Frozen colostrum
II. Udder Development
A. Starts early in growth of fetus.
B. At birth:
C. Birth to puberty:
D. At puberty:
E. Final growth

III. Structure of the Udder
A. Species differences
   • Cow:
   • Mare:
   • Sheep & Goat:
   • Multiparous animals

B. Udder of the cow (Fig. 19.2 in text)
   • Suspension
   • Four glands or quarters
   • Mature cow
III. Structure of the Udder
B. Udder of the cow
   • Teats
     »
   • Milk collecting system
     »
     »
   • Alveoli
     »

B. Udder of the cow
   • Alveoli
     »
     »
     »
     »
     »

An individual alveolus enlarged...

III. Structure of the Udder
B. Udder of the cow
   • Alveolus
     »
     »
     »
     »
     »
     »
     »

Milk is stored

Myoepithelial cells –
IV. Milk Secretion
A. General information
   • Milk synthesis
   • Very efficient
   • Blood supply
   • Synthesis is continuous
     › Intramammary pressure

B. Milk let-down
   Udder stimulation
   • Impulses conducted via nerves to pituitary gland
   • Posterior pituitary
   • Anterior pituitary
   • Blood transport
   • Oxytocin causes
     › Prolactin stimulates

Oxytocin from posterior pituitary
Prolactin from anterior pituitary
IV. Milk Secretion
C. Milk “hold-up”

IV. Milk Secretion
D. Lactation curve
• Peak (6-8 weeks)
• Persistency (90-92%)
• Dry period

V. Mastitis
• Inflammation of the udder
• Costly
• Usually caused by
• Three main causes