
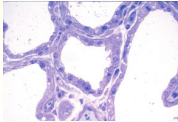
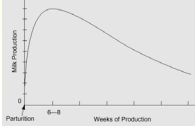


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Cow Introduction to Milk Production

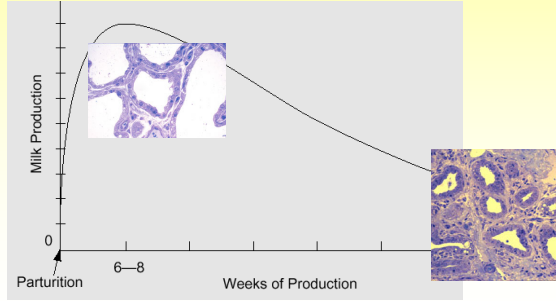



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Objectives

● In this module we will review milk production terminology and the lactation cycle.



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2

Milk Production

🐄 Dairy cows have been genetically selected to produce more and more milk to supply the human demand for this important food.

- For instance, specialized dairy cows (Holstein, Jersey, etc.) can produce 150 pounds of milk per day.

🐄 The more productive cows are, the more challenging it is to manage them.

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Milk production depends on:

<p>🐄 The cows</p> <ul style="list-style-type: none"> ● Breed ● Genetic potential ● Health ● Age ● Stage of lactation 	<p>🐄 Herd management</p> <ul style="list-style-type: none"> ● Nutrition ● Number of milkings per day ● Milking efficiency ● Health prevention practices ● Environmental management
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In this module we will discuss the factors related to the cows.

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How Milk Is Produced

- 🐮 Cows produce milk to feed their calves.
 - ❶ In order to have a calf, a cow must get pregnant.
 - ❷ In commercial farms, cows are usually bred when they are around fourteen months old.
- 🐮 Each cow's pregnancy lasts for nine months.
 - ❶ During pregnancy, the mammary alveoli form in the udder and the milk begin to accumulate.

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Beginning of Milk Production

- 🐮 When a cow gives birth to a calf, it is called parturition.
- 🐮 During the first days after each parturition, cows produce milk with a special concentration of nutrients (high protein, low lactose) and defense components (immunoglobulin) to feed and protect their young.
 - ❶ This initial milk is called colostrum.



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Milk Composition

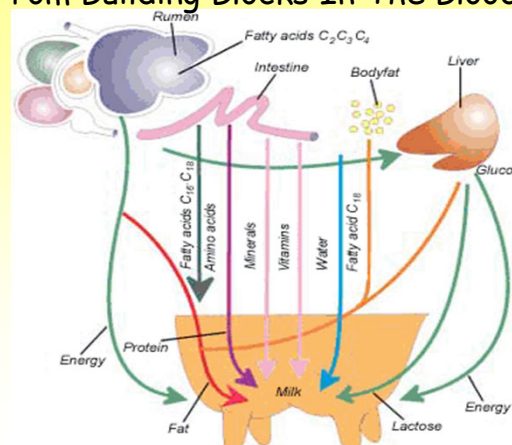
- 🐮 A few days after parturition the composition of the mammary secretions progressively changes from colostrum to normal milk.
- 🐮 The composition of milk is, on average:
 - ❶ 87.0% water
 - ❷ 3.8% fat
 - ❸ 3.4% protein (mainly casein)
 - ❹ 4.5% sugars (mainly lactose)
 - ❺ 1.3% other solids (minerals such as calcium)

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The Components Used To Make Milk Come From Building Blocks In The Blood.

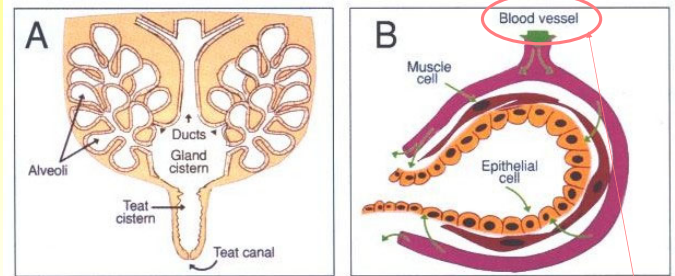


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Milk Secretion



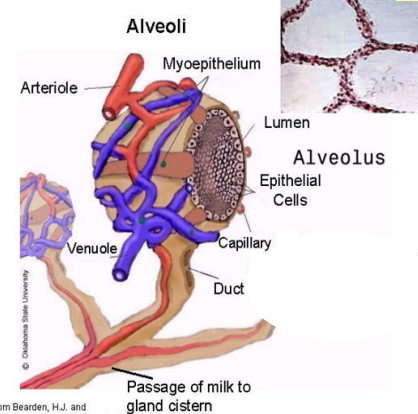
- 1 The milk-secreting cells of the alveoli in the mammary gland are provided with a continuous supply of nutrients from blood.

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Milk Production Process



- 2 Milk-producing epithelial cells take ingredients from the blood (brought by blood capillaries) and produce the components of milk.

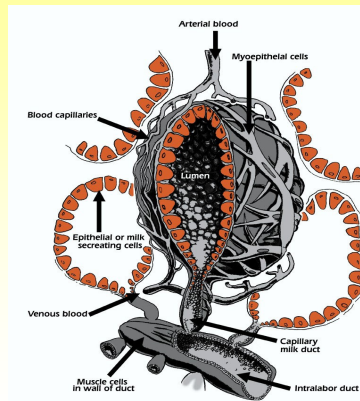
Redrawn from Bearden, H.J. and Fogarty (1997) Applied Animal Reproduction © MilkTech International

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Milk Production Process

- 3 Milk is continuously synthesized in the alveoli.
- 4 Milk is stored in:
 - 1 Alveoli
 - ✓ Alveolar lumen or space
 - 2 Milk ducts
 - 3 Udder cistern
 - 4 Teat cistern

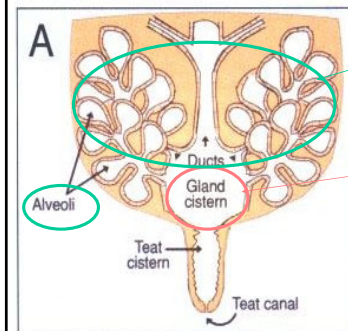


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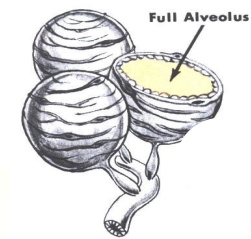
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Milk Storage



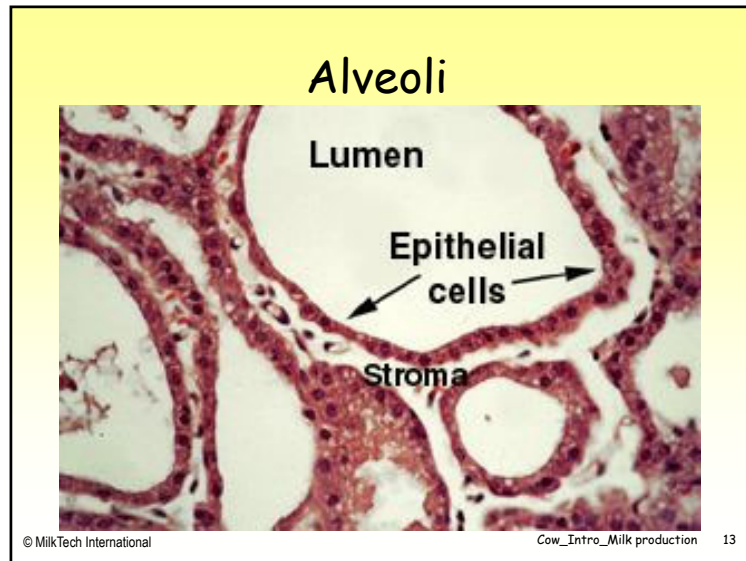
- 5 60-80% of the milk is stored in the alveoli and small milk ducts, while the cistern contains 20-40% of the milk.



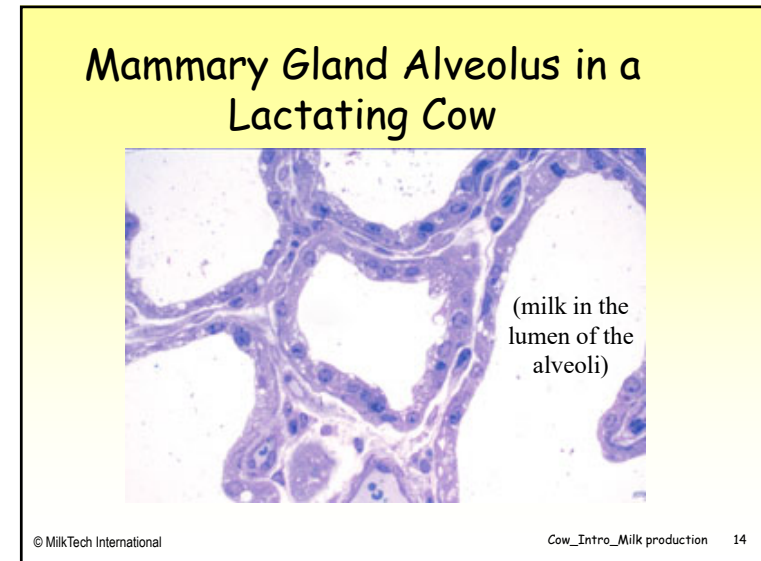
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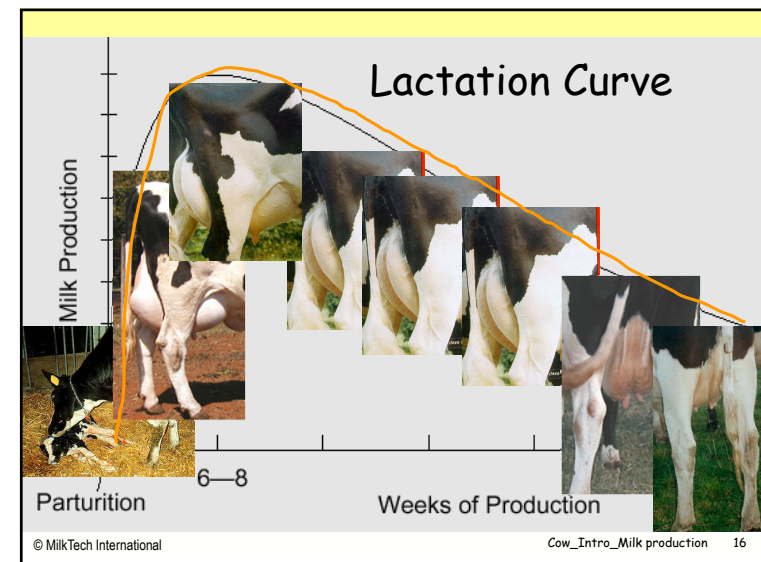
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Lactation

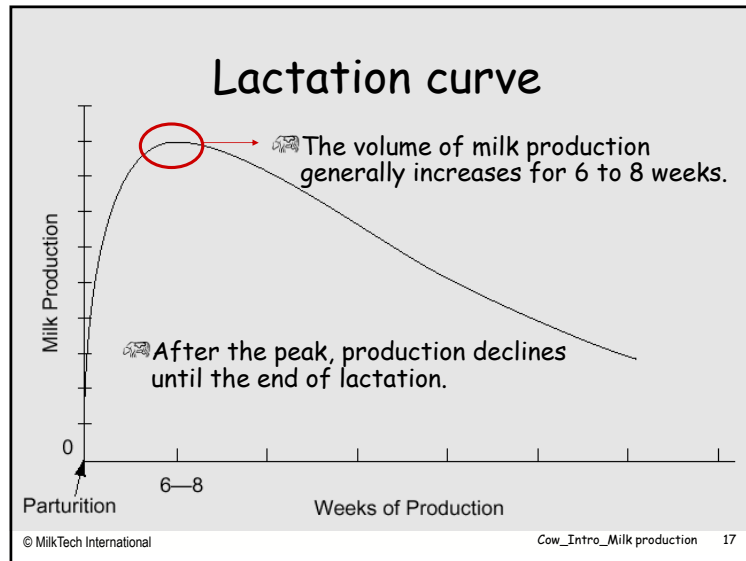
- ☞ The period in which cows produce milk that starts at parturition is called lactation.
- ☞ The amount of milk produced changes as lactation continues.
 - ❶ The volume generally increases for 6 to 8 weeks.
 - ❷ After peak production milk production declines.
 - ❸ This process is called the lactation curve.

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Lactating Cow

- 🐄 A few weeks after a cow gives birth and starts producing milk, she can be bred and give birth to another calf.
 - 🕒 When the cow gives birth to the other calf, another lactation starts.

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Pregnancy and Parturition

- 🐄 Milk production depends on a cow's parturition.
 - 🕒 Reproduction efficiency is important to farmers.
 - ✓ Farmers need the cows to reproduce well so that they lactate as often as possible.

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How Milk Production Ends

- 🐄 If they are well-fed and stimulated, cows can produce milk nonstop for more than a year.
- 🐄 After reaching a peak, milk production decreases slowly.
- 🐄 In order to get more milk, dairy farmers usually manage herds so that each cow gives birth once a year and restarts production after a break called the dry period.

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End of Lactation

🐄 If a lactating cow gets pregnant again, it is recommended to interrupt her lactation 45 to 60 days before the next parturition.



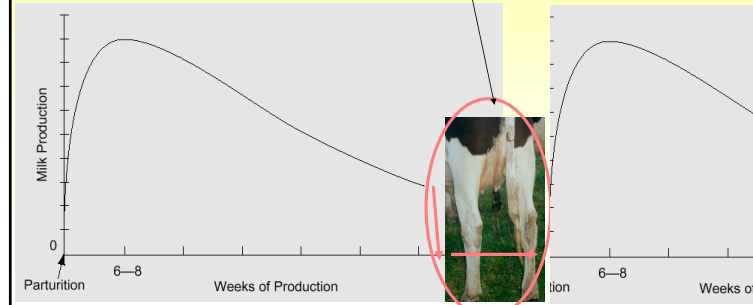
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Dry Period

🐄 The period that the cow does not produce milk, in which lactation is interrupted before the next parturition, is called the dry period.



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Importance of Dry Period

🐄 During the dry period, the mammary gland involutes and prepares to start a new lactation, which will begin with colostrum.

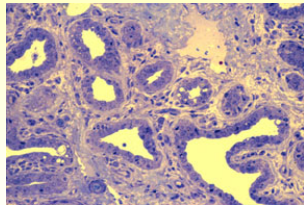


Figure: alveoli in a mammary gland of a non-lactating cow (in the dry period)

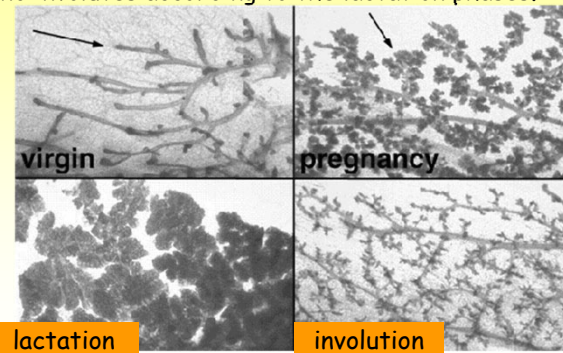
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Lactation Phases

🐄 The secretory tissue of the mammary gland develops and involutes according to the lactation phases.



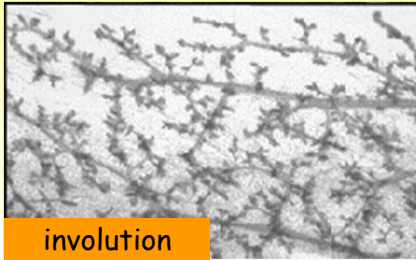
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Figure: mammatogenesis in rats Cow_Intro_Milk production 24

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Dry Period

☞ During the dry period, the secretory tissue of the mammary gland involutes.



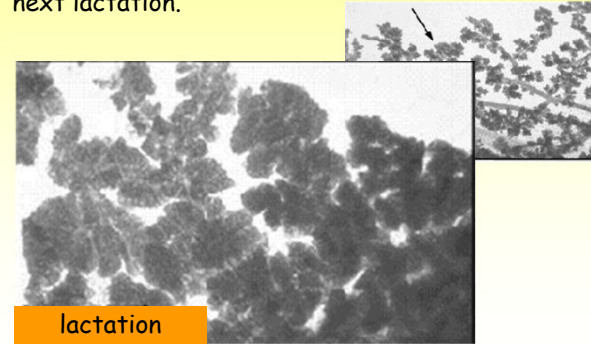
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Figure: mammogenesis in rats Cow_Intro_Milk production 25

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From Dry Period to Lactation

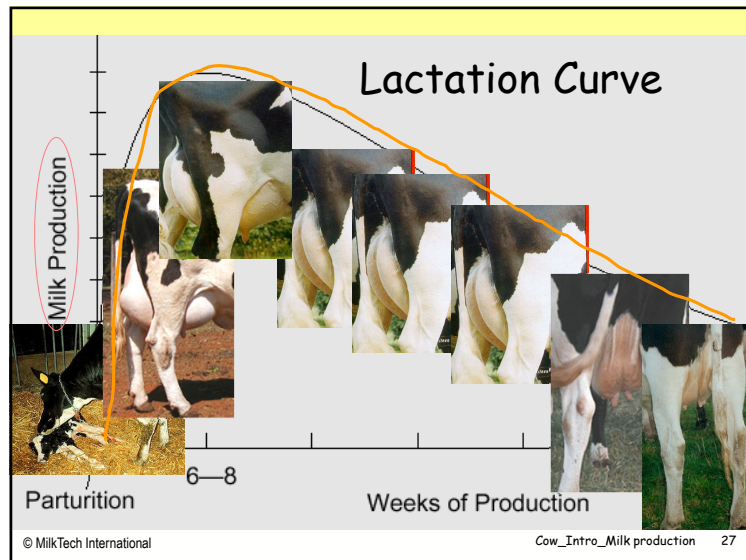
☞ Before the next parturition, the secretory tissue of the mammary gland develops to produce milk during the next lactation.



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Figure: mammogenesis in rats Cow_Intro_Milk production 26

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