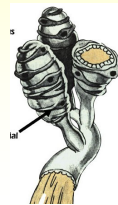
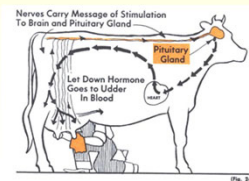




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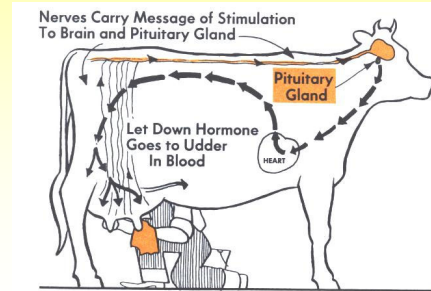
Cow Introduction Milk Letdown



1

Objectives

- 1 This module defines the terminology and physiology of milk letdown.



(Fig. 24)

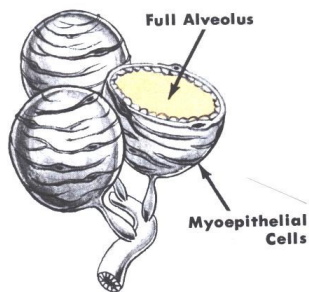
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2

2

Milk Harvesting Process



1st STAGE

- 1 Milk is produced in a cow's udder by myoepithelial cells that form the inner walls of an alveolus.
- 2 Milk is stored in the alveoli until it is full.
- 3 Restrictions at the base of each alveolus act to keep milk in the alveolus so that it fills and swells as milk is being produced.
- 4 After it is full milk drains slowly into to the milk ducts.

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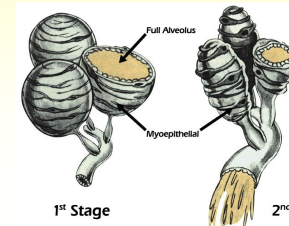
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3

3

How Milk Leaves the Alveoli

- 1 When the udder is full, most of the milk (80%) is stored in the alveoli.
- 2 This alveolar milk cannot be removed by a vacuum, suckling, or hand milking alone.
- 3 The alveoli must contract so that this milk is expelled into the udder cistern where it can be removed.
- 4 The contraction of the alveoli and expulsion of alveolar milk into the udder cistern is called milk letdown.



1st Stage

2nd Stage

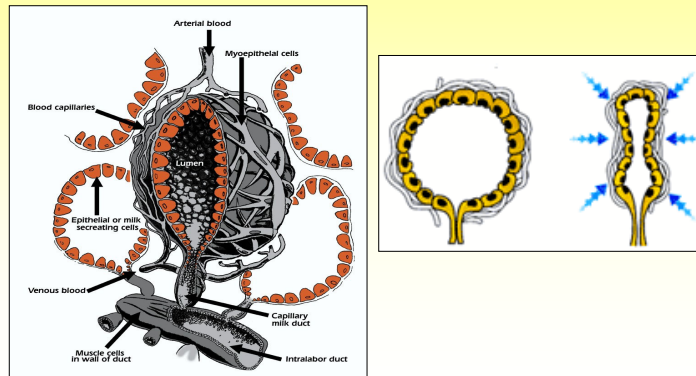
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4

4

- The hormone oxytocin is transported by blood circulation to the myoepithelial cells, the cells will contract and expel milk.



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Oxytocin

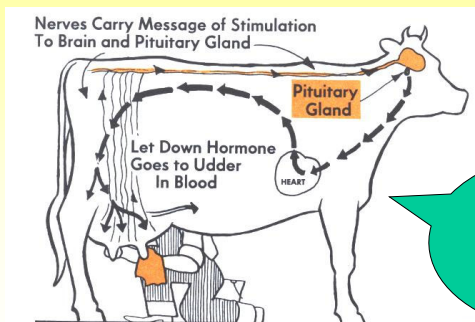
- Myoepithelial contraction (milk ejection) is activated by the hormone oxytocin.
- Oxytocin is secreted by the pituitary gland.
 - Tactile stimulation of the teats sends a signal to the pituitary gland to release oxytocin into the bloodstream.
 - ✓ This is a neuroendocrine reflex.

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- The mammary gland is densely innervated, especially in the teat. The teat skin contains sensory nerves that are sensitive to suckling calves, and massaging by the milker and machine milking.



(Fig. 24)

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- Milk is ejected after a cow receives stimulation that causes the release of oxytocin into the bloodstream.
- Massaging the teats (tactile stimulation) is a primary trigger of ejection.
- Oxytocin circulates in the blood and causes the myoepithelial cells and alveoli to contract.

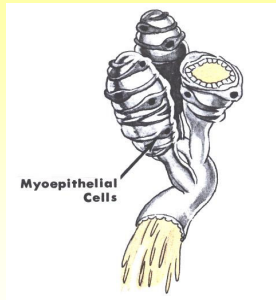
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Milk Ejection

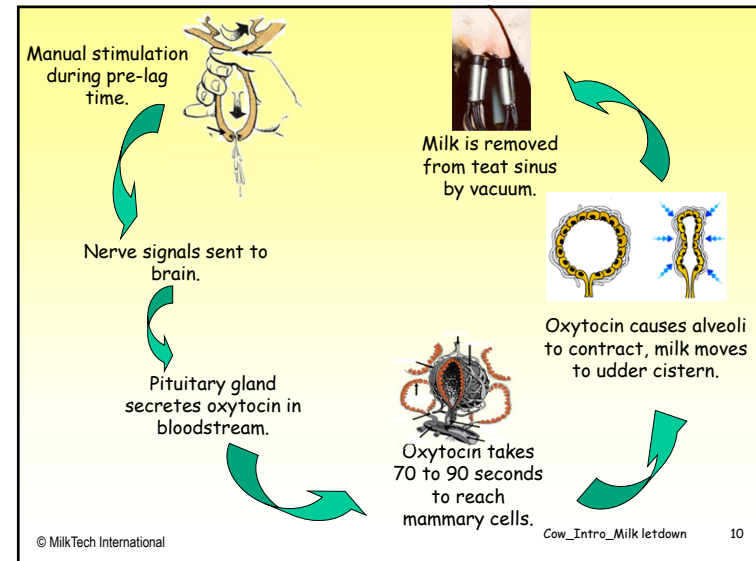
- Alveolar contraction ejects milk into the milk ducts.
- After milk is in the milk ducts, it can drain into the udder cistern and teat sinus where it can be removed by the suction applied by a milking machine.



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Oxytocin Life

- When oxytocin is first released into the bloodstream its concentration is very high.
- The oxytocin fills receptor sites in the myoepithelial cells.
- Oxytocin is gradually metabolized and receptor sites reopen.

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Continuous Stimulation and Oxytocin Release

- The action of the milking machine, hand milking, or calf suckling continuously stimulates the teats and maintains the release of oxytocin from the pituitary gland.
- The continuous oxytocin release during milking occurs at a lower concentration than the initial release, but is sufficient to keep the receptor sites filled.

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Oxytocin Disruption

- 🐄 Once the milk letdown response has been activated, there is an initial rush of oxytocin.
- 🐄 The milking process will maintain teat stimulation and lower level oxytocin release.
- 🐄 The only way to disrupt milk letdown is through the release of the hormone adrenaline.
 - Adrenaline is released in response to fear or pain.
- 🐄 It is important to keep cows calm and comfortable during milking to prevent the release of adrenaline.