

# Rumen development

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## Key Points

1. The newborn calf can only digest milk. It needs to move to a fully functioning ruminant which can digest a complex diet like pasture.
2. Milk does not develop the rumen. Grain causes much more rapid rumen development than pasture because it stimulates papillae development.

Calf fed milk and hay-



Calf fed milk and grain-



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Calf Rearing Fact Sheet 3.5

## Digestion in the new born calf

- At birth the young calf has a simple digestive system with only one of the four stomachs (abomasum) functional. The abomasum in a 40 kg calf can hold 1.5 litres but it expands rapidly to a capacity of 2.5–3 litres within a week.
- Since the calf can only handle a highly digestible milk diet when it is born the digestive tract has to undergo major changes before it can handle a less digestible diet like pasture.

## Digestion in the adult

- Diets such as pasture and silage contain fibre that cannot be absorbed directly - it needs to be broken down by microbial fermentation before it can be absorbed. To deal with this fibre, adult ruminants have a large fermentation vat (rumen) which operates at a neutral pH so micro-organisms can digest complex carbohydrates/fibre.
- The lining of a fully functioning rumen is covered in papillae which are finger like projections which greatly increase the surface area for absorbing the nutrient produced by microbial fermentation.

## Developing the rumen

- The rumen is small at birth and milk causes no rumen development at all as it by-passes the rumen and goes straight to the abomasum. Soon after birth, the rumen begins to develop a population of microbes. These enter the rumen when the calf nibbles on grass, straw or bedding. The microbes that develop will be those that best digest whatever dry feed the calf is eating.
- Water is important for the growth and multiplication of these micro-organisms and if it is not provided, rumen development is restricted.
- In order for the rumen to become functional, the rumen papillae need to develop. Calves fed grain (or meal) develop a functional rumen much more quickly than calves fed on milk, grass or hay. This is because grain produces butyrate and proprionate when fermented and these products develop the rumen papillae. Calves fed on milk and grass eventually develop a functional rumen but the process takes much longer. Thus milk has to be fed for longer and therefore rearing costs increase.
- To optimise rumen development, and achieve successful early weaning, calves need to have a palatable grain based ration on offer as soon as possible (Note: palm kernel is not palatable for young calves).