Ruminant Animals: An Introduction

ANSC 324

What are Ruminants?

- Ruminare = latin 'to chew over'
- Websters
  - Mammals that have evolved a highly specialized mode of digestion that enables them to ingest/digest/utilize fibrous feeds more than herbivores
- A cud-chewing, even toed, hooved animal

Why ruminants?

- Ruminants obtain nourishment from forage and byproducts which people cannot directly consume
- Ruminants provide food, byproducts and services.

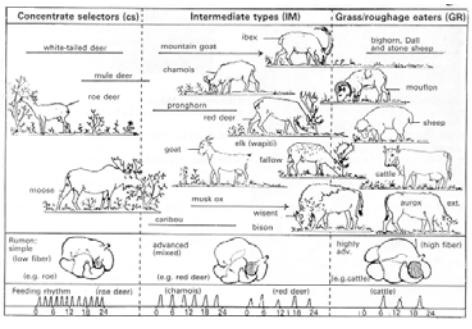
Ruminant Food Products

- Contain valuable nutrients
- Provide an adequate supply of essential amino acids
- Small quantities can prevent protein deficiency

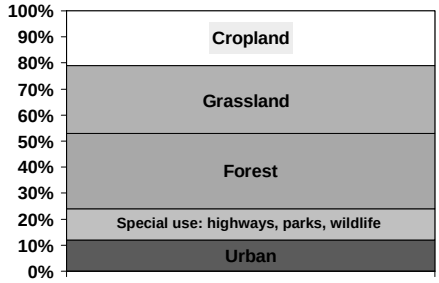
Value of Ruminant Products

- Clothing, shoes
- Medicinals
- Fuel
- Employment
- Fertilizer
- Conservation (open plains)
- Cultural and religious significance

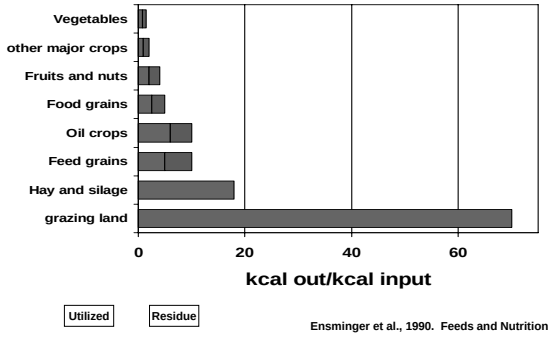
Ruminant Types (based on feeding patterns)



Land use: United States

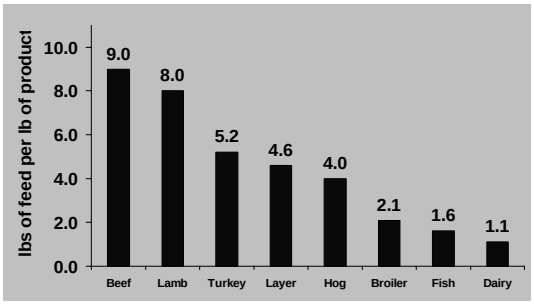


Energy recovered per energy expended



Ensminger et al., 1990. Feeds and Nutrition

Feed Efficiency



Ensminger et al., 1990. Feeds and Nutrition

Protein conversion and protein equivalents

1 Ton of corn = 178 lbs of protein

1 Ton of corn fed to beef cattle yields 128 lbs of protein

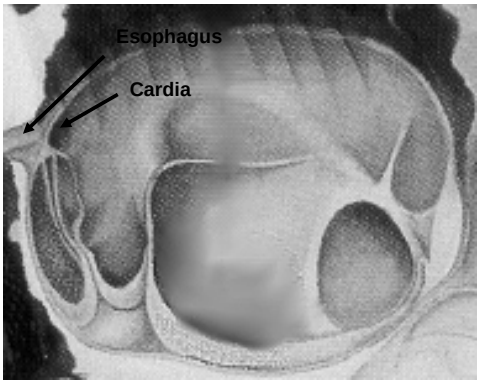
But on a protein value basis

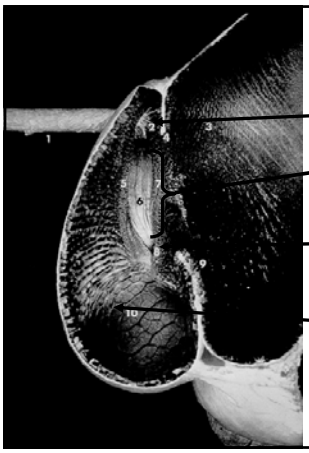
178 x .53 = 94.3 lbs of metabolizable protein

vs.

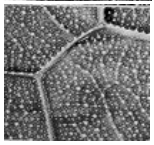
128 x .73 = 93.4 lbs of metabolizable protein

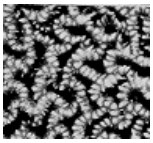
Structures of the rumen



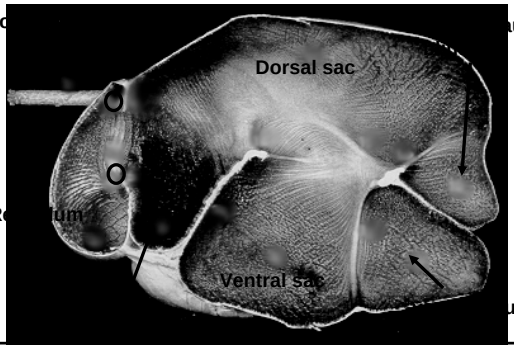


Contractions of the reticulum sieve out large feed particles for remastication

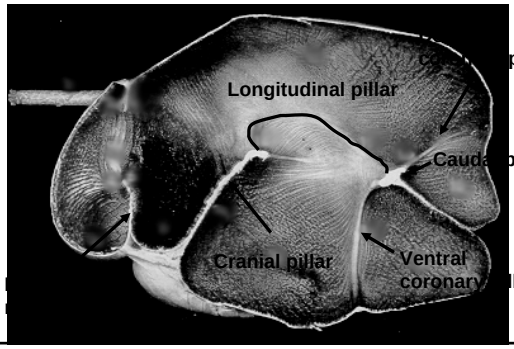




Structures of the rumen

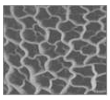


Structures of the rumen



Linings of the Rumen, Omasum and Abomasum

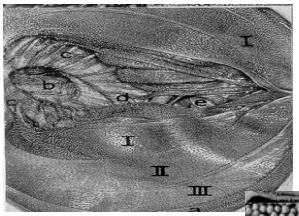
- Reticulum

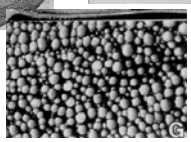


- Omasum

- Abomasum

Structures of the omasum





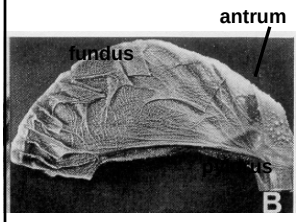
Structures of the omasum

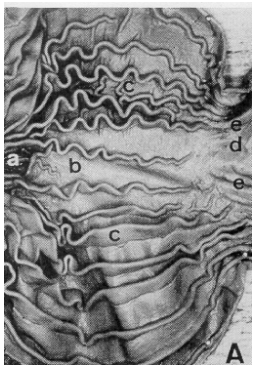
- Leaves = laminae
- Spaces between leaves = intralaminar recesses
- Omasal groove
  - continuous with the ROO and the opening to the abomasum
  - is an extension of the esophagenal groove (ventricular groove)
- Vestibule(s) – spaces between the edge of the laminae and the omasal groove.

Omasum

- Presence of many leaves (manyplies)
- Functions to absorb water from the digesta
  - Decreases bicarbonate levels
  - Increase DM content
- Acts as a 2-stage pump
  - 1) pulls digesta in and 2 pushes it out (to the abomasum)
- Absorb peptides and amino acids

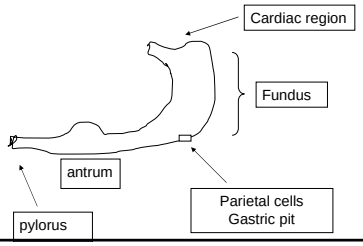
Abomasum



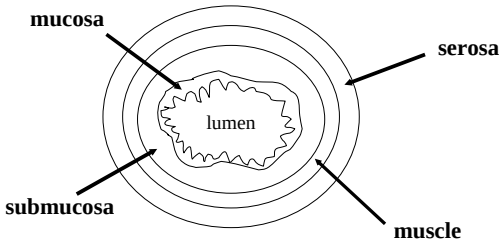


Abomasum

- Glandular gastric mucosa
- HCl secretion - stimulated by VFA and contractions of the abomasum



Intestinal Layers

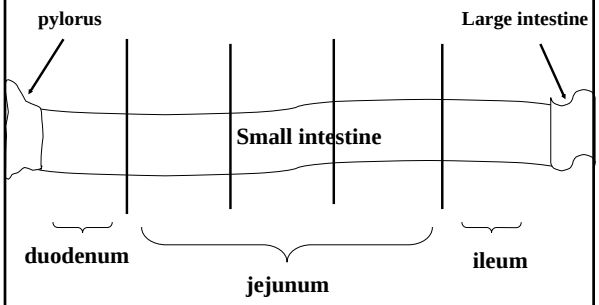


Intestinal Sections

1/3 Duodenum + 1/3 Jejunum + 1/3 Ileum??

NO!!

Intestinal Sections (cont.)



Intestinal Length

- Length relative to body length
- High forage diet = longer (80:20)
- Low forage diet = shorter (70:30)

Large Intestine Structure

- Cecum – larger in concentrate selectors
- Colon – longer in concentrate selectors
- Same layers as small intestine
- Epithelium has crypts and goblet cells, no villi

Are ruminants the same as non-ruminants from the intestines on?

NO!