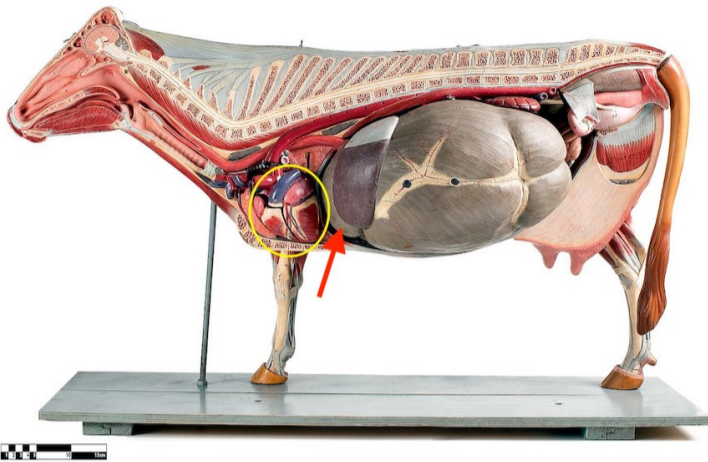


VTNE top topics: Bovine nursing overview part 1: Unique bovine anatomy and physiology



The bovine heart (circle) is in close proximity to the reticulum (arrow)

- 🐼 A cow's abdomen is mostly GI tract, so anatomy matters!
- 🐼 "Hardware disease" is a good example. A cow eats a nail (they do that!). It punctures the reticulum, diaphragm, and pericardial sac, causing severe heart damage (see image, left).
- 🐼 *Ruminate* on this...Cows spend 7-8 hours per day ruminating (regurgitating & rechewing half-digested grass)!

- Unique bovine anatomy to keep in mind (see image, right):
 - **Poll** (1): just caudal to the ears, overlying first cervical vertebra
 - **Withers** (2): bony “lump,” caudal aspect of mane; comprised of dorsal spinous processes of thoracic vertebrae
 - **Mammary gland** (3) or udder: highly developed in milk breeds; smaller in beef breeds
 - **Mammary vein** (4): large “subcutaneous abdominal vein” - drains large volume of blood away from mammary gland
 - Very large and close to skin surface!
 - Do NOT use mammary vein for venipuncture - complications (e.g., thrombophlebitis) may send a dairy cow to slaughter
 - **Short ribs** (5): transverse processes of the lumbar vertebrae (note: they are NOT ribs)
 - **Hocks** (6): tarsus (hind limb)
 - **Hooks** (7): tuber coxae of ilium of pelvis
 - Part of pelvis that protrude furthest lateral when view cow from behind
 - **Pins** (8): tuber ischii of ischium of pelvis

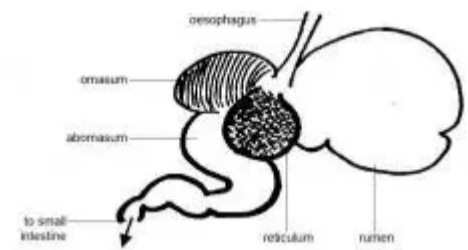


A cow with key external anatomical features labeled to correspond with text (click to enlarge)

- Part of pelvis that protrudes furthest dorsal when view cow from behind
- **Paralumbar fossa (9):** space on right and left caudal abdomen bounded by last rib cranially, short ribs dorsally, fold of flank caudo-ventrally
 - Auscultate digestive organs here

- Unique bovine GI physiology and related management

- Cows are ruminants, or foregut fermenters
- Four compartments of ruminant stomach, each with its own unique digestive function: rumen, reticulum, omasum, and abomasum
- **Rumen:** large (~40-gallon!) fermentation vat
 - Here microbes break down plant material into volatile fatty acids (VFAs)
 - Cow absorbs these VFAs to turn into fuel
- **Reticulum:** receives small batches of fermented feed from rumen to send down the digestive tract
 - Heavy ingested particles accumulate here because it is the most ventral compartment
 - Most cows have magnets in the reticulum to bind metal objects
 - Prevent objects from causing damage (i.e., “hardware disease” or traumatic reticuloperitonitis)
 - Administer to cow at < 1 year of age
- **Omasum:** has many folds of mucosa to absorb water from ingesta
- **Abomasum:** true, glandular stomach
 - Acidic pH
 - Digestive functions typical of carnivores and omnivores



A cow's forestomach consists of four separate chambers; see text for details



Cows regurgitate ruminal contents to remasticate large particles of feed and buffer it with saliva

- Unique bovine mammary gland physiology: dairy cows are athletes in their own way

- Average Holstein produces about 80 lbs/milk/day (= 10 gallons of milk!)
- We select cattle breeds for milk production (e.g., Holstein, Jersey, and Brown Swiss) that have well-developed mammary glands; producing far more milk than offspring need
- Milk cows for ~300 days per year
 - Usually milk cows 2-3 times per day
 - “Days in milk” refers to how many days a cow has been lactating
- Cows have a “dry period” of about 60 days prior to delivering their next calf
 - We do not milk them during this time



A cow's udder is highly developed and produces high volumes of milk in the lactating animal

- Udder has a chance to heal/rest and prepare for next lactation
 - Cow can devote all her energy stores to the last trimester of gestation
- Reproduction: milk production requires reproduction!
 - Breed most dairy breeds for the first time at 12 -13 months of age
 - 9-month gestation period
 - First 30 days after calving is called the “fresh period”: time of elevated disease risk
 - Usually rebreed cows at 60-90 days in milk
 - Ideally, cows give birth and start a new lactation once per year
- Unique bovine musculoskeletal anatomy and physiology: lameness is an important welfare concern in cattle
 - Distal limb has just two digits
 - More weight-bearing on front limbs than hind limbs
 - Cows typically lay down for 12-14 hours per day to ruminate and rest their limbs
 - Sole of the foot contains a thick fat pad
 - Helps with cushioning when standing
 - Decreased body condition can remove this fat store, thus increasing lameness
 - Typically trim hooves once or twice per year on commercial dairy farms
 - Beef cattle that live outdoors are more likely wear their hooves down naturally, depending on terrain



Cows should lay down on comfortable, clean bedding for 12-14 hours per day

Images courtesy of Liz Brock, DVM, MS except for anatomical specimen ([Museum of Veterinary Anatomy FMVZ USP](#), amended by Liz Brock, DVM, MS) and the forestomachs diagram ([Sunshineconnelly](#)).

Ruminants