

APPENDIX 4

PHYSICAL EXAMINATION: BOVINE



BASICS

OVERVIEW

- Gather information by asking appropriate questions and use interpersonal skills to clarify concerns and expectations; methodically evaluate body systems, and identify possible health problems. Obtain history, perform physical examination, and evaluate the herd environment. The overall goal of examination is to establish an accurate diagnosis or conclusion and to establish a plan of action.
- Formulate a complete problem list, define appropriate differential diagnoses, and determine the need for additional diagnostic tests.
- There are four major parts to a thorough health evaluation: history collection, physical examination, diagnostic testing, and data analysis.
- Physical examination on a herd basis requires a detailed history of the problem, number of animals affected, duration, factors that may have contributed to development or exacerbation of the problem, and how the problem has been managed to date.

INCIDENCE/PREVALENCE

- N/A

GEOGRAPHIC DISTRIBUTION

- N/A

SYSTEMS AFFECTED

- All systems must be examined in a thorough physical examination

PATHOPHYSIOLOGY

- N/A

GENETICS

- N/A

HISTORICAL FINDINGS

- Prior to beginning the clinical examination ask the owner for the presenting problem(s), the signalment (age, sex, production group), history of the animal(s) affected, and other relevant information. The history should encompass the type, onset, and duration of clinical signs,

and epidemiologic data such as the number of affected animals and the distribution of disease in the herd.

SIGNALMENT

- Bovine

PHYSICAL EXAMINATION FINDINGS

- Observe the animal(s) at a distance for abnormalities of behavior, posture, gait, body condition, symmetry, and abdominal distention.
- If the animal is lame, identify the affected leg by observing the animal walk, or via abnormal weight bearing at rest. For more subtle lameness, examine carriage of the head and hips when the animal walks. Lameness often affects the front feet and the animal will raise its head while bearing weight on the affected front leg and lower its head while bearing weight on the non-affected front leg. The animal will hike its hip when bearing weight on an affected hind leg. Once the affected leg is identified, the animal should be restrained and the foot and leg examined. The most common causes of foot lameness are sole ulcer, sole abscess, “strawberry” (digital dermatitis), and “foot rot” (interdigital necrobacillosis). Palpate joints and tendon sheaths for size, effusion and pain. Septic joints are generally enlarged, distended with fluid and very painful.
- Use a geographical approach to perform a detailed examination. Commence at the rear of the animal and proceed to examine the left and right sides of the animal. Perform a per rectum examination and examine the head last. Follow the same sequence of steps (steps 1-12 on Figures 1 and 8) each time an examination is performed.



Figure 1 – Left side of the cow

Step 1 – Rear of the animal – Figure 1

- Obtain a urine sample. Normal passage of urine that is clear and amber suggests a normal urinary tract. A urine sample may be obtained from a cow or heifer by stroking the vulva or perineum. Straining and/or difficult urination suggest an abnormality of the urinary tract and require further examination. Observe the vulva for blood, fetal membranes, discharge or pus. In the male, observe the prepuce for

blood, pus, or ventral swelling. Examine the preputial hairs of male animals for crystals/uroliths.

- Urine, blood or milk should be examined for ketone bodies using a cowside test. The presence of ketone bodies indicates the cow is mobilizing body fat faster than the liver can metabolize it. The circulating ketones are acetone, acetoacetate and beta-hydroxybutyrate (BHBA). Cowside tests measure both acetone and acetoacetate or BHBA. The gold standard for ketone testing is measurement of BHBA. Routine monitoring of BHBA in early lactation cows on a herd level using $>1.4\text{mmol/L}$ BHBA as positive, is often used as a diagnostic tool to monitor the transition period from dry to lactating cow.
- Insert a lubricated thermometer into the rectum. Normal temperature is 38.5°C (101.3°F ; range $38.0\text{--}39.0^{\circ}\text{C}$ [$100.4\text{--}102.2^{\circ}\text{F}$]) for adults, and for calves is 39.0°C ($38.5\text{--}39.5^{\circ}\text{C}$ [$101.3\text{--}103.1^{\circ}\text{F}$]). Temperatures of pen mates can be used to assess seasonal influences.
- Obtain a pulse from the coccygeal artery on the ventral midline of the tail. The normal pulse is 60–80 beats per minute (bpm). Examine the vulvar mucous membranes of cows and heifers which should be moist and pink.

Step 2 – Left side – Heart – Figure 1

- Observe the jugular and mammary veins for distention or pulsation. Examine the jugular vein for filling and emptying and check the brisket and submandibular area for edema. Distended jugular veins are abnormal and suggest right-sided heart failure or pericardial effusion. Normal animals should not have significant jugular pulses when the head is elevated. Occlude the jugular vein with a finger. The jugular vein will fail to empty after releasing the occlusion if cardiac disease is present. Pinch the skin of the neck to assess hydration status.
- The stethoscope should be placed deep into the axilla to find the pulmonic (3rd intercostal space), aortic (4th intercostal space), and mitral (5th intercostal space) valves. Carefully evaluate the rate, rhythm and heart sounds. The heart should be clearly audible on the left side. S1 and S2 heart sounds are expected and S3 and S4 heart sounds occasionally heard. Muffled heart sounds can be caused by pericardial or pleural effusion. Normal heart rate is 60 to 80 bpm in adults, and 80–120 bpm in calves. Most animals with cardiac disease have tachycardia, but fever or toxemia also cause tachycardia. Bradycardia (less than 60 bpm) is most often associated with vagal indigestion. Occasionally bacterial endocarditis of the mitral valve will cause a left systolic murmur. Traumatic reticuloperitonitis typically presents with muffled heart sounds and a ‘washing machine murmur’. Atrial fibrillation is a common rhythm abnormality, reflected by an irregularly irregular heart rhythm. It is most often associated with GI problems such as a left displaced abomasum (LDA).

Step 3. Left Side – Lungs and skin – Figure 1

- Observe the rate and effort of respiration. Respiratory disease is common in cattle and is often first diagnosed by observation from a distance. Signs of respiratory disease include coughing, respiratory distress, open mouth breathing and mucopurulent nasal discharge. Most cattle with respiratory disease will initially have a fever. The normal respiratory rate in adult cattle is 15–35 breaths per minute and in calves 20–40 breaths per minute.
- Auscult the lungs, moving the stethoscope systematically over the entire lung field. The lung field in the bovine is small and the caudal border extends from the 11th rib to the elbow (Figure 2). Normal lung sounds are quiet during auscultation and louder

on inspiration than expiration, and in the ventral lung fields compared to the dorsal lung fields. Upper airway abnormalities can create referred abnormal inspiratory sounds. Breath sounds of increased or decreased intensity can be abnormal. Lung consolidation (pneumonia) often results in louder than normal large airway breath sounds in the ventral lung fields. Crackles, wheezes and pleural friction rubs are abnormal sounds. The animal can be induced to take deeper breaths by either holding off the nostrils or placing a plastic bag over the animal's muzzle for 30-60 seconds.



Figure 2. Normal lung field on the left side of a cow.

- Palpate the trachea. A cough can generally be elicited in animals with pneumonia.
- Palpate the skin on the left side and ventral abdomen. Feel dorsally for subcutaneous emphysema. Examine the prescapular (superficial cervical) lymph node cranial to the point of the shoulder and the prefemoral (subiliac) lymph node cranial to the stifle. Lymph nodes are enlarged in lymphosarcoma.

Step 4 - Left side – Pings – Figure 1

- “Ping” the left side of the animal by simultaneously percussing and auscultating the whole left abdomen by firmly flicking a finger against the body wall. A “ping” represents a fluid-gas interface. On the left side of the animal, gas may be present in the abomasum (LDA), rumen, or peritoneal cavity (Figure 3). Classically, an LDA ping occurs in the mid-thoracic area on a line between the elbow and the tuber coxa (Figure 4), and may extend to the cranial edge of the left paralumbar fossa. LDA pings and rumen pings often occur concurrently and are usually distinguished by location and different tones during auscultation and percussion. A rumen void ping occasionally occurs when the rumen is small on pre rectum palpation and extends over both the rumen and LDA area. The monotone nature of the rumen void ping helps to distinguish it from a concurrent LDA and rumen ping.

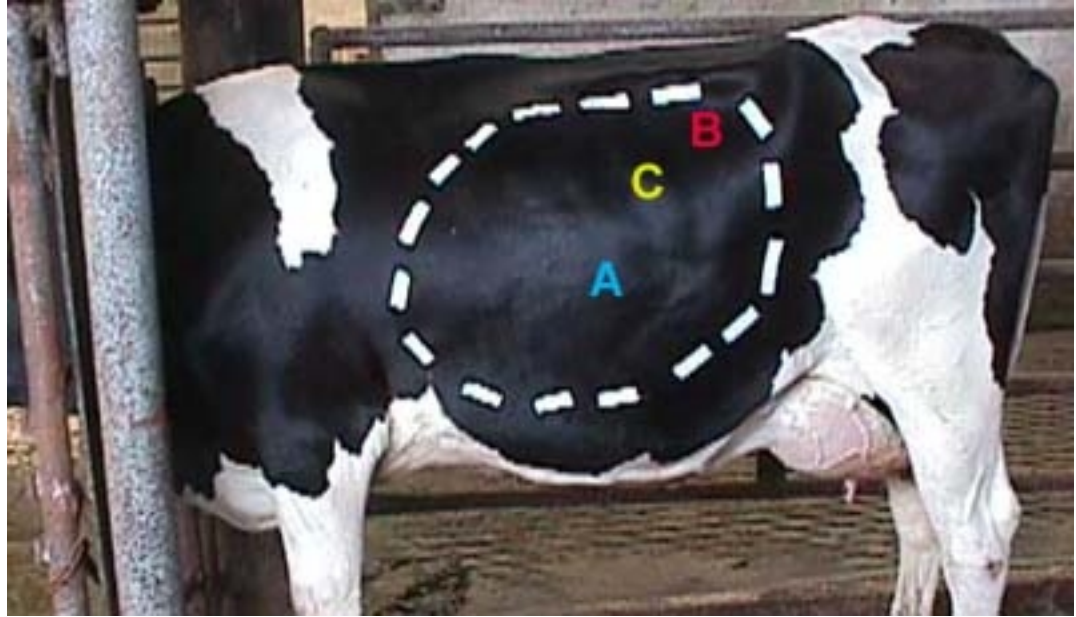


Figure 3. Dashed line is area to percuss for a 'ping' on the left side. A = location of left displaced abomasum (LDA) ping; B = location of rumen ping; C = location of both rumen and LDA ping.



Figure 4. Dashed line is typical location of ping for LDA.

- Observe the abdomen from a distance. The left caudal rib can have a 'sprung' appearance with an LDA. Animals with rumen bloat or vagal indigestion will have distention over the rumen and right ventral abdominal quadrant.

Step 5 – Left side – Rumen – Figure 1

- Listen to the rumen by placing the stethoscope over the left paralumbar fossa. Normal rumen contractions (1-3 per minute) are strong. Palpate, auscult and ballot the rumen to assess consistency. The dorsal sac of the rumen has a gas cap. The rumen becomes doughier towards the ventral fluid filled sac.

Step 6 – Left side – Withers pinch test – Figure 1

- Pinch the withers. A normal animal will flex ventrally when its withers are pinched, and an animal with thoracic or abdominal pain will not, although false negatives are common (Figure 5). Animals with GI pain will often stand hunched with their elbows abducted. They may tread their hind feet, but overt "colic" is rare. Common

reasons for abdominal pain are traumatic reticuloperitonitis (hardware) and abomasal ulcers.



Figure 5. Withers pinch test

- Perform a “grunt test” by either using a fist pushed up with a knee (Figure 6), or a board with one person on each side lifting the board to apply pressure to the xiphoid area. Grunting or kicking indicates pain. Often a grunt is only heard while simultaneously applying pressure to the xiphoid area at the peak of inspiration and auscultating over the trachea. As with the “withers pinch test”, false negatives are common.



Figure 6. Grunt test

Step 7 – Left side – Udder – Figure 1

- Strip milk from each quarter into a strip cup (Figure 7) or onto a mastitis plate. It is possible to compare quarters by stripping each quarter's secretion onto the last quarter's secretion, then repeat in reverse order. Subtle abnormalities in secretion from quarter to quarter will be picked up by this method.



Figure 7. Obtaining milk from each quarter.

- Palpate each quarter for edema, hardening and swelling to detect clinical mastitis.
- Palpate the mammary lymph nodes in the proximal caudal aspect of the udder.

- Integrate findings with the rest of the physical examination; e.g. a cow with clots in the milk and a normal examination is not likely to be sick from the mastitis; whereas a cow with a watery secretion, acute swelling of the udder and an elevated heart rate and temperature is likely sick from the mastitis.
- Bacterial culture of the milk can identify specific bacterial agents causing mastitis.
- Many cow side tests are available to determine degree of inflammation in the udder. The California mastitis test gives a semi-quantitative estimate of the somatic cell count (SCC) in milk.
- Electronic SCC counters are commonly used to assess inflammation in the udder and to determine udder infection status on a herd level. The SCC data can be used to identify cows with high SCC, the percentage of SCC each cow contributes to the bulk tank and overall SCC trends in the herd. Ideally a composite milk sample should have SCC below 200,000 cells/ml.

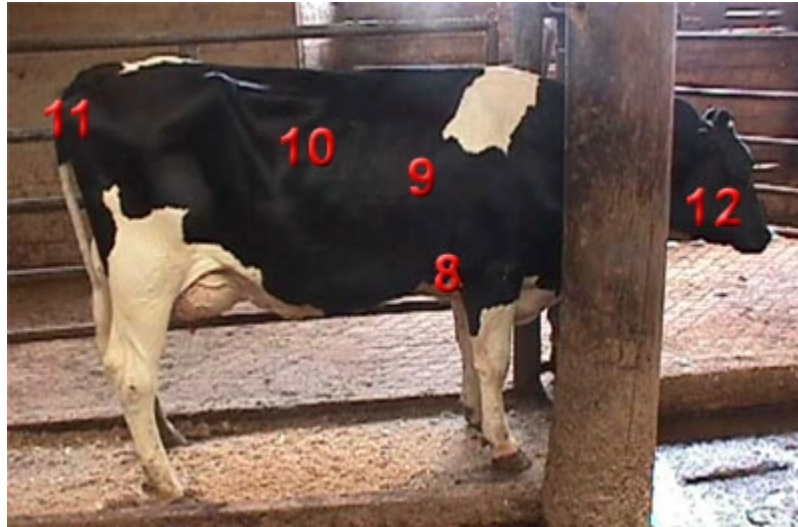
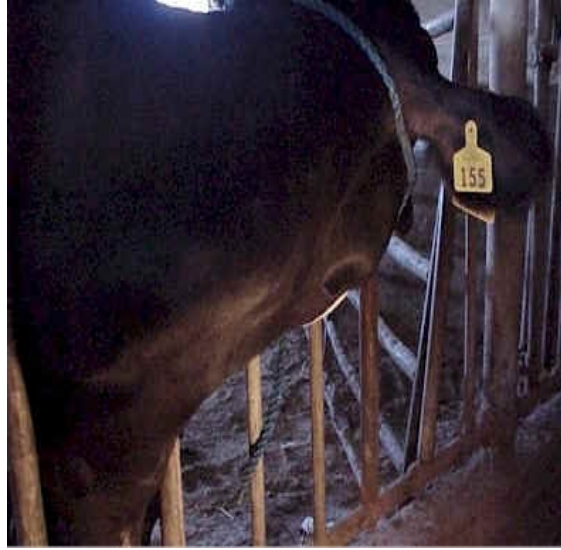


Figure 8. Right side of the cow.

- Step 8 – Right side – Heart – Figure 8
- Examine the right jugular vein for filling. Distended jugular veins abnormal animals and suggest cardiac disease (Figure 9) or thrombosis. Jugular pulses should be minimal when the head is elevated. Occlude the jugular vein – failure to empty after releasing occlusion suggests cardiac disease is present.



○ Figure 9. Distended jugular vein at rest.

- The heart is auscultated similarly on the right side as the left, but cardiac sounds are usually quieter than from the left side. The tricuspid valve is located at the third intercostal space halfway between the elbow and shoulder, and is the most common site for bacterial endocarditis. Early signs of bacterial endocarditis are fever, pain, and tachycardia. Advanced signs include murmur, distended jugular veins and submandibular (Figure 10) and brisket edema (Figure 11), resulting from right sided heart failure.



Figure 10. Submandibular edema.



Figure 11. Brisket edema.

Step 9 – Right side- Lungs and skin – Figure 8

- Auscult the lungs by moving the stethoscope systematically over the entire lung field which is comparable in size the left lung field and the caudal border extends from the 11th rib to the elbow.
- Palpate the skin of the right side and ventral abdomen. Examine the prescapular and prefemoral lymph nodes.

Step 10 – Right side – Pings – Figure 8

- “Ping” the right abdomen and carefully delineate the borders of any pings (Figure 12). Right side pings can arise from gas and fluid accumulation in the cecum, spiral colon, small intestine, duodenum, uterus (post-calving), peritoneum, rectum and abomasum (from right displaced abomasum [RDA] and right displacement with torsion [RTA]). It is not uncommon to find a ping in the right paralumbar fossa of sick cows. A distended cecum will produce a large ping and is palpable per rectum. Pings from RDA and RTA are usually cranial to the 8th rib, and more cranial in location compared LDA pings. The severity and degree of torsion of the abomasum on the right side is associated with the heart rate and degree of dehydration of the cow.
- Ballot the right abdomen for detection of a fetus (≥ 7 months) or infrequently a mass (abscess, tumor etc)

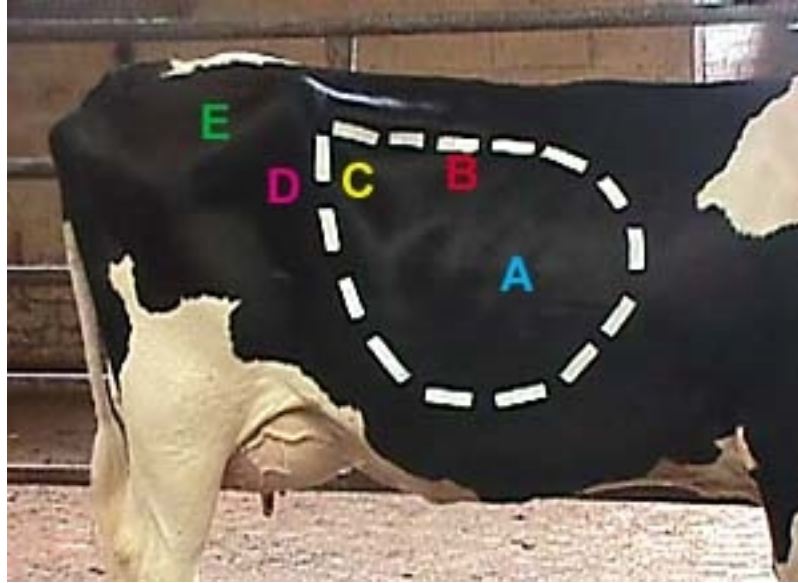


Figure 12. Dashed line represents area to percuss ('ping') on the right side. A = Location of RDA or RTA; B = location of spiral colon ping; C = location of cecal ping; D = location of uterine ping; E = location of rectal ping.

Step 11 – Back – Per rectum examination

- Examine the perineum and tail for blood, mucus and feces. Normal cows have a clean perineal area. Fresh blood on the tail indicates recent estrus, clear mucus suggests a cow proximity to estrus or parturition. Post-partum metritis can cause watery brown-red malodorous uterine discharge. Examine quantity, color and consistency of feces in the rectum. Lack of feces suggests reduced fecal output. Large quantities of liquid feces suggest an intestinal problem such as Johne's disease, winter dysentery or salmonellosis. Black feces (melena) suggest bleeding from the small intestine or abomasum (ulcer). Fresh blood indicates bleeding from the distal large intestine (e.g. coccidiosis). Cows with hemorrhagic bowel syndrome often have large quantities of fresh blood in the feces.
- Perform per rectum examination in a consistent sequence. Palpate the rumen left of midline for size and consistency. The rumen should be palpable in the cranial abdomen. The dorsal contents may have some gas and are generally doughy or will "pit" compared to the ventral more fluid contents. Absence of a readily palpable rumen often results in a "rumen void" ping which can be confused with an LDA. Then palpate the left kidney located to the right of the rumen on the midline. The palpator's arm is normally inserted beyond the elbow to find the left kidney unless it is enlarged, which most commonly occurs in pyelonephritis. Continue to palpate towards the right abdominal wall. The right abdomen should feel empty in normal animals. There should be no discernible distention of the cecum or small intestine in this region. An RTA can occasionally be palpated in the far cranial right abdominal region. Palpate the deep inguinal (iliofemoral) lymph nodes cranially along each shaft of the ileum.
- In female animals the cervix lies on the floor of the pelvis. Examine the reproductive tract and determine the reproductive stage of the cow. The bladder is occasionally palpated cranial to the brim of the pelvis if it is full.

- In intact male animals used for breeding purposes a detailed examination of both the internal and external genital organs should be performed. Per rectum, examine the pelvic urethra, ampullae of the vas deferens, prostate gland, seminal vesicles and bulbourethral glands. Examine all the external genital organs including the scrotum, testes, epididymis, spermatic cord and penis.

Step 12 – Head – Figure 8

- Examine the head last, since cattle often resent manipulation. Palpate the ears – coolness indicates poor perfusion (shock, milk fever). Evaluate symmetry and ocular and nasal discharge. Although nasal discharge commonly occurs with respiratory conditions, a dry dirty nose usually indicates the cow is sick. Neurologic signs such as a head tilt, droopy ear, and eyelid paresis are commonly associated with listeriosis. Cows with listeriosis may have asymmetry of the muzzle with uneven flaring of the nostrils. Failure to swallow suggests botulism or listeriosis. Tent the eyelid to assess hydration. Assess the eyes for vision, position and pupillary reflexes. Blindness is associated with polioencephalomalacia, and constricted pupils with organophosphate toxicity. Check the sclera for color and injection of the scleral vessels. Pale sclera indicate anemia often due to blood loss (abomasal ulceration in adults, parasites in younger animals). Icterus is almost always due to hemolytic disease. Large prominent scleral vessels and hypopyon are associated with septic conditions.
- Examine the mouth by pressing the fingers against the hard palate to induce the animal to open its mouth. Examine the gums and palate for ulcers and vesicles which can occur with Bovine Virus Diarrhea (BVD) and other viral disorders. Check the mucosal papillae for blunting (BVD), and the nasal passages for vesicles commonly seen in viral infections such as Infectious Bovine Rhinotracheitis. The pharynx can be examined by pushing the tongue between the molars with the back of the hand. Retropharyngeal abscess and “wooden tongue” are palpable conditions. “Lumpy jaw” causes osteomyelitis of the mandible. Palpate the mandibular lymph nodes in the intermandibular space.



MISCELLANEOUS

ASSOCIATED CONDITIONS

- N/A

AGE-RELATED FACTORS

- N/A

ZOONOTIC POTENTIAL

- N/A

PREGNANCY

- N/A

BIOSECURITY

- N/A

PRODUCTION MANAGEMENT

- N/A

SYNONYMS

- N/A

SEE ALSO

- Physical Examination: Small Ruminant (*See Appendix 6*)

ABBREVIATIONS

- BHBA=beta-hydroxybutyrate
- BVD= bovine virus diarrhea
- LDA= left displaced abomasum
- RDA= right displaced abomasum
- RTA= right displaced torsion of the abomasum
- SCC=somatic cell count

Suggested Reading

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