

Québec/2004 Canada



23^e Congrès mondial de buiatrie • Québec, Canada, 11-16 juillet 2004
23 Congreso Mundial de Buiatria • Québec, Canada, 11-16 de Julio 2004

23rd World Buiatrics Congress • Québec, Canada, July 11-16, 2004
23. Welt-Kongress für Buiatrik • Québec, Canada, 11.-16. Juli 2004

Diagnostic ultrasonography in bovine internal diseases

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Ultrasonography is an integral part of contemporary bovine medicine. For most diagnostic work, a 3.5 MHz transducer provides adequate depth and good resolution. A 2.5 MHz transducer can be used to examine structures that are more than 20 cm from the abdominal wall; however, the resolution is poorer. Structures close to the surface of the body are examined with a 5.0, 7.5 or even 10.0 MHz transducer. In principle, the depth of penetration of the sound waves and the resolution are inversely related; a low frequency is associated with greater penetration and lower resolution, and vice versa. The hair in the area to be examined must be clipped. Further information about ultrasonography of internal organs in cattle may be found in a text²⁴ and in numerous publications.^{16,17,37} In bovine medicine, ultrasonography is used to examine the following areas and organs:

1. Thorax

Technique

The lungs^{18, 22} and heart^{29,30,38} are examined by scanning both sides of the costal part of the abdominal wall using a 3.5 MHz linear (lungs) or sector transducer (heart).

Indications

- Evaluation of pleura, surface of lungs, and heart
- Visualization of pleural and superficial pulmonary lesions including pleuritis, superficial abscesses and severe bronchopneumonia in which lesions extend to the pulmonary surface²²
- Visualization and percutaneous ultrasound-guided centesis of pleural effusions and lung biopsy²⁸
- Diagnosis of valvular endocarditis, cardiomyopathy and traumatic pericarditis.³⁸

2. Abdomen

2.1. Liver

Technique

The costal part of the abdominal wall is scanned starting at the 12th intercostal space (ICS) and moving cranially to the 7th ICS using a 3.5 MHz linear transducer.

Indications

- Determination of position and size of the liver and its vessels^{1,9}
- Visualization of diffuse and focal liver changes including hepatic lipidosis, abscesses, tumours, calcified bile ducts and cholestasis^{7,14,15,16,17,19,27}
- Diagnosis of thrombosis of the caudal vena cava³³
- Percutaneous ultrasound-guided centesis and biopsy of the liver for histological, cytological and bacteriological examination
- Percutaneous ultrasound-guided cholecystocentesis for microscopic examination of bile for liver fluke eggs (currently, this is the most reliable diagnostic method in individual animals)^{3,13}
- Percutaneous ultrasound-guided centesis of the portal vein for experimental purposes.³⁶

2.2. Reticulum

Technique

The reticulum is examined by scanning the ventral and lateral thorax on the right and left sides of the sternum to the level of the elbows using a 3.5 MHz linear transducer.

Indications

- Evaluation of the contour and motility of the reticulum and adjacent organs (spleen, diaphragm, abomasum, liver)^{8,34,35}
- Visualization of lesions caused by traumatic reticuloperitonitis^{5,25,37} such as
 - Abnormal reticular motility
 - Fibrinous deposits on the reticular wall and between the reticulum and adjacent organs
 - Effusions
 - Reticular abscesses and percutaneous lancing thereof under the guidance of ultrasonography²⁵

Note: Foreign bodies in the reticulum are best identified using radiography.⁴ Rarely can foreign bodies in the reticulum be visualized via ultrasonography. A combination of radiography and ultrasonography is recommended for optimal identification of foreign bodies.¹⁰

2.3. Abomasum, small intestine, caecum and peritoneum

Technique

The flank and lateral and ventral abdominal wall are scanned on both sides using a 3.5 MHz linear transducer.

Indications

- Identification of free fluid in the abdomen, percutaneous ultrasound-guided centesis of the fluid for diagnostic purposes (ascites, peritonitis, uroperitoneum, haemoperitoneum)
- Evaluation and percutaneous ultrasound-guided centesis of the abomasum^{20,21}
- Evaluation of the small and large intestine.^{11,31} Diagnosis of ileus of the small intestine¹²
- Differentiation between caecal dilatation³² and right-sided abomasal displacement/torsion when results of transrectal palpation are unclear

- Diagnosis of left-sided abomasal displacement²³ when clinical findings are not straightforward
- Differentiation of peritonitis, omental bursitis, tumours and intraabdominal abscesses
- Evaluation of the peritoneum and abdominal wall in cases with delayed healing after laparotomy, Caesarian section, ruminotomy or trocharization of the rumen.²⁶

2.4. Urinary tract

Technique

The left kidney and ureter, bladder and urethra are scanned transrectally using a 5.0 MHz linear transducer, whereas the right kidney and ureter are scanned from the right flank using a 3.5 MHz linear transducer.

Indications

- Evaluation of the dimensions and appearance of the renal medulla, cortex and pelvis and the proximal ureter^{2,6}
- Identification of changes in the ureter and/or kidney associated with urolithiasis and rupture of the ureter
- Characterization of findings in cases with bacterial pyelonephritis, hydronephrosis and renal amyloidosis. Evaluation of both kidneys before unilateral nephrectomy (bacterial pyelonephritis or hydronephrosis)
- Percutaneous ultrasound-guided biopsy of the kidney
- Evaluation of the urinary bladder and its content.

Abstract

L'examen sonographique des organes internes du boeuf est un enrichissement essentiel du diagnostic des maladies internes. Il est utilisé chez le boeuf pour l'examen des poumons, du cœur, du bonnet, de la caillette, des intestins et de l'appareil urinaire. À l'exception du cœur tous les organes peuvent être examinés avec une tête sonore de 3,5 MMHz.

References

1. Braun U. Ultrasonographic examination of the liver in cows. Am J Vet Res 1990; 51: 1522-1526.
2. BRAUN U. Ultrasonographic examination of the right kidney in cows. Am J Vet Res 1991; 52: 1933-1939.
3. Braun U, Gerber D. Percutaneous ultrasound-guided cholecystocentesis in cows. Am J Vet Res 1992; 53: 1079-1084.
4. Braun U, Flückiger M, Nägeli F. Radiography as an aid in the diagnosis of traumatic reticuloperitonitis in cattle. Vet Rec 1993; 132:103-109.
5. Braun U, Götz M, Marmier O. Ultrasonographic findings in cows with traumatic reticuloperitonitis. Vet Rec 1993; 133: 416-422.
6. Braun U. Ultrasonography of the left kidney, the urinary bladder, and the urethra in cows. J Vet Med A 1993; 40: 1-9.

7. Braun U, Götz M, Guscetti F. Ultrasonographic findings in a cow with extra-hepatic cholestasis and cholangitis. *Schweiz Arch Tierheilk* 1994; 136: 275-279.
8. Braun U, Götz M. Ultrasonography of the reticulum in cows. *Am J Vet Res* 1994; 55: 325-332.
9. Braun U, Gerber D. Influence of age, breed, and stage of pregnancy on hepatic ultrasonographic findings in cows. *Am J Vet Res* 1994; 55: 1201-1205.
10. Braun U, Flückiger M, Götz M. Comparison of ultrasonographic and radiographic findings in cows with traumatic reticuloperitonitis. *Vet Rec* 1994; 135: 470-478.
11. Braun U, Marmier O. Ultrasonographic examination of the small intestine of cows. *Vet Rec* 1995; 136: 239-244.
12. Braun U, Marmier O, Pusterla N. Ultrasonographic examination of the small intestine of cows with ileus of the duodenum, jejunum or ileum. *Vet Rec* 1995; 137: 209-215.
13. Braun U, Wolfensberger R, Hertzberg H. Diagnosis of liver flukes in cows - a comparison of the findings in the liver, in the feces, and in the bile. *Schweiz Arch Tierheilk* 1995; 137: 438-444.
14. Braun U, Pusterla N, Wild K. Ultrasonographic findings in 11 cows with a hepatic abscess. *Vet Rec* 1995; 137: 284-290.
15. Braun U, Pospischil A, Pusterla N, Winder C. Ultrasonographic findings in cows with cholestasis. *Vet Rec* 1995; 137: 537-543.
16. Braun U. Ultrasonographic examination of the liver and gallbladder in cows. Part 1. Normal findings. *Comp Cont Educ Pract Vet* 1996; 18, Supplement Food Animal Medicine & Management: S61-S72.
17. Braun U, Pusterla N, Wild K. Ultrasonographic examination of the liver and gallbladder in cows. Part 2. Abnormal findings. *Comp Cont Educ Pract Vet* 1996; 18: 1255-1270.
18. Braun U, Sicher D, Pusterla N. Ultrasonography of the lungs, pleura, and mediastinum in healthy cows. *Am J Vet Res* 1996; 57: 432-438.
19. Braun U, Caplazi P, Sicher D. Polyglobulie infolge Leberkarzinom bei Rind und Schaf. *Schweiz Arch Tierheilk* 1997; 139: 165-171.
20. Braun U, Wild K, Guscetti F. Ultrasonographic examination of the abomasum of 50 cows. *Vet Rec* 1997; 140: 93-98.
21. Braun U, Wild K, Merz M, Hertzberg H. Percutaneous ultrasound-guided abomasocentesis in cows. *Vet Rec* 1997; 140: 599-602.
22. Braun U, Pusterla N, Flückiger M. Ultrasonographic findings in cattle with pleuropneumonia. *Vet Rec* 1997; 141: 12-17.
23. Braun U, Pusterla N, Schönmann M. Ultrasonographic findings in cows with left displacement of the abomasum. *Vet Rec* 1997; 141: 331-335.
24. Braun U.: *Atlas und Lehrbuch der Ultraschalldiagnostik beim Rind*. Parey Buchverlag, Berlin, 1997.
25. Braun U, Iselin U, Lischer C, Fluri E. Ultrasonographic findings in five cows before and after treatment of reticular abscesses. *Vet Rec* 1998; 142: 184-189.
26. Braun U, Pusterla N, Anliker H. Ultrasonographic findings in three cows with peritonitis in the left flank region. *Vet Rec* 1998; 142: 338-340.
27. Braun U, Linggi T, Pospischil A. Ultrasonographic findings in three cows with chronic ragwort (*Senecio alpinus*) poisoning. *Vet Rec* 1999; 144: 122-126.
28. Braun U, Estermann U, Feige K, Sydler T, Pospischil A. Percutaneous lung biopsy in cattle. *J Amer Vet Med Assoc* 1999; 215: 679-681.

29. Braun U, Schweizer T. Bestimmung der Herzdimensionen beim Rind mit Hilfe der 2-D-Mode-Echokardiographie. *Berl Münch Tierärztl Wschr* 2001; 114: 46-50.
30. Braun U, Schweizer T, Pusterla N. Echocardiography of the normal bovine heart: technique and ultrasonographic appearance. *Vet Rec* 2001; 148: 47-51.
31. Braun U, Amrein E. Ultrasonographic examination of the caecum and proximal and spiral ansa of the colon of cattle. *Vet Rec* 2001; 149: 45-48.
32. Braun U, Amrein E, Koller U, Lischer C. Ultrasonographic findings in cows with dilatation, torsion and retroflexion of the caecum. *Vet Rec* 2002; 150: 75-79.
33. Braun U, Flückiger M, Feige K, Pospischil A. Diagnosis by ultrasonography of congestion of the caudal vena cava secondary to thrombosis in 12 cows. *Vet Rec* 2002; 150: 209-213.
34. Braun U, Schweizer G, Flückiger M. Radiographic and ultrasonographic findings in three cows with reticulo-omasal obstruction due to a foreign body. *Vet Rec* 2002; 150: 580-581.
35. Braun U, Gansohr B, Haessig M. Ultrasonographic evaluation of reticular motility in cows after administration of atropine, scopolamine and xylazine. *J Vet Med A* 2002; 49: 299-302.
36. Braun U, Camenzind D, Ossent P. Ultrasound-guided catheterization of the portal vein in 11 cows using the Seldinger technique. *J Vet Med A* 2003; 50: 1-7.
37. Braun U. Ultrasonography in gastrointestinal disease in cattle. *Vet J* 2003; 166: 112-124.
38. Schweizer T, Sydler T, Braun U. Kardiomyopathie, Endokarditis valvularis und Perikarditis traumatica beim Rind – Klinische und echokardiographische Befunde an drei Fallberichten. *Schweiz Arch Tierheilk* 2003; 145: 425-430.