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<p>Ultrasound imaging is a noninvasive and readily available diagnostic modality that meets increasing applications in bovine medicine. This article presents the basis of physical principles of this imaging modality based on the interaction of ultrasound with the tissues, different modes of examination, and ways to obtain good quality images. The main artifacts that may be encountered during ultrasound imaging are also described. Finally, Doppler ultrasound is briefly explained. This article aims to help practitioners perform an optimal ultrasonographic examination.</p>	
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<p>Ultrasonography is an ideal diagnostic tool for investigating gastrointestinal disorders in cattle. In animals with traumatic reticuloperitonitis, inflammatory fibrinous changes and abscesses can be imaged. Ultrasonography can be used to assess the size, position, and contents of the abomasum. This article describes the ultrasonographic techniques used for examination of the reticulum, rumen, omasum, abomasum, small intestine, and large intestine. The normal findings are presented followed by a description of the most important diseases of these organs.</p>	
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<p>Ultrasonography is a valuable tool for the diagnosis of liver disease. Discrete or diffuse lesions can be imaged, aspirated, and biopsied under visual guidance. The ultrasonographic examination of the liver is performed on the right side of the standing animal using a real-time 3.5 to 5.0 MHz linear or convex transducer. This imaging modality also can be used to aspirate bile from the gallbladder for the diagnosis of liver flukes. Ultrasonography cannot be used to evaluate liver regions obscured by the lungs, however.</p>	
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<p>Assessment of the bovine cardiovascular system is challenging because the position of the heart, deep in the thorax, may interfere with clinical findings. With advances in bovine ultrasonography, normal and abnormal findings of the bovine cardiovascular system have been described. Cardiovascular ultrasound can be of valuable help as a noninvasive diagnostic</p>	

tool, especially when clinical findings are inconclusive. This article presents an up-to-date review of echocardiography and vascular ultrasound in the diagnosis and prognosis of the most common cardiovascular diseases in cattle.

Ultrasonography of the Bovine Respiratory System and Its Practical Application 633

Marie Babkine and Laurent Blond

Ultrasonography of the respiratory system is a noninvasive and readily available tool that allows an accurate evaluation of the pleura and some superficial lung lesions. It can aid clinicians in the diagnosis and treatment of various thoracic conditions that affect cattle.

Ultrasonography of Bovine Urinary Tract Disorders 651

Martina Floeck

Ultrasonography is a helpful diagnostic tool in cattle with urinary tract disorders. It can be used to diagnose pyelonephritis, urolithiasis, hydronephrosis, renal cysts, renal tumors, amyloidosis, cystitis, bladder paralysis, bladder rupture, bladder neoplasms, and, occasionally, nephrosis, glomerulonephritis, and embolic nephritis. This article describes the anatomy, scanning technique, indications, limitations, normal and pathologic sonographic appearance of the bovine urinary tract. References from horses and humans are included, especially when the sonographic findings in these species may complement the understanding of similar diseases reported in cattle.

Ultrasonography of the Bovine Udder and Teat 669

Sonja Franz, Martina Floeck, and Margarete Hofmann-Parisot

Ultrasonography is a noninvasive technique for examining the bovine udder and teats. It is performed in the standing animal using a high frequency scanner (7.5–10.0 MHz) for examination of the teat structures (teat canal, rosette of Fuerstenberg, teat cistern, gland cistern) and a 5.0 MHz probe for examining the glandular parenchyma. Ultrasonography is a helpful tool to diagnose pathologic alterations of the udder such as inflammation, mucosal lesions, tissue proliferation, foreign bodies, milk stones, congenital changes, hematoma, and abscess. However, ultrasonography of the teat allows for the localization and demarcation of the extent of pathologic changes and therefore is an important additional diagnostic examination technique.

Ultrasonography as a Diagnostic Aid in Bovine Musculoskeletal Disorders 687

Johann Kofler

In the last 15 years, ultrasonography of the bovine musculoskeletal system has become an established diagnostic method used routinely in many veterinary teaching hospitals worldwide. Ultrasonography is ideal for the evaluation of musculoskeletal disorders because they are often associated

with extensive soft tissue swelling and inflammatory exudation. The goal of this article is to encourage veterinarians to use ultrasonography for the evaluation of bovine orthopedic disorders. Not only does ultrasonography improve the likelihood of a definitive diagnosis, added use of the machine helps recoup expenses.

Ultrasonography of the Bovine Female Genital Tract

733

Luc DesCôteaux, Giovanni Gnemmi, and Jill Colloton

The objective of this article is to help interested readers learn to use ultrasound for female bovine reproductive tract examinations. The first section discusses practical issues for using ultrasound in the field, such as animal restraint and preparation, type of ultrasound units available, and scanning technique. The second section reviews ultrasound diagnosis of various ovarian structures. The third section explores uterine changes during the estrous cycle, in addition to uterine pathologic conditions. The fourth section covers early pregnancy, twinning, embryonic and fetal viability, and fetal anomalies. The final section considers the use of ultrasound with advanced techniques, such as embryo transfer, in vitro fertilization, and color Doppler technology, and as a complement tool in reproduction synchronization protocols for dairy cattle.

Ultrasonographic Assessment of Late Term Pregnancy in Cattle

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Sébastien Buczinski

The ultrasonographic examination of the late-term pregnancy in cattle consists of collecting pertinent information on the fetus, the uterine adnexa, and dam health by transabdominal or transrectal ultrasonography. All these parameters may help the clinician assess fetal well-being. Fetal well-being is a general term to define the multiple interactions between the fetus and the uteroplacental unit that may be assessed by multiple ancillary tests including ultrasonography. Various diseases of the dam or fetus may have adverse effects on the pregnancy. Although extensively studied in human and ovine pregnancies, the data are scant on the ultrasonographic manifestations of any anomaly in the last trimester of pregnancy. This article reviews the current data available on the ultrasonographic assessment of fetal well-being in bovine late pregnancy.

Ultrasound Imaging of the Bull Reproductive Tract: An Important Field of Expertise for Veterinarians

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Giovanni Gnemmi and Réjean C. Lefebvre

Diagnosing male reproductive system pathologies can often be frustrating because of the challenge involved in precisely determining their site, severity, and prognosis. The introduction of complementary ultrasonographic examination enables clinicians to address these important questions. This procedure should be performed not only on bulls destined to artificial insemination, but on all farm bulls. The examination is easy to perform with a versatile ultrasonographic unit designed for bovine

theriogenology. To recognize abnormal tissues, however, the operator must have an excellent knowledge of the ultrasonographic anatomy of the reproductive system. This article discusses the basis of ultrasound technique for male reproductive tract examination. Ultrasound evaluation of physiologic and pathologic conditions of external and internal reproduction organs is proposed.

Ultrasonographic Assessment of Umbilical Disorders

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Adrian Steiner and Beatrice Lejeune

Umbilical disorders are of great clinical relevance in calves during the early postnatal period. They may be classified as (1) noninfectious disorders such as hernias and urachal cysts, (2) infectious disorders involving extra- and intra-abdominal umbilical structures, or (3) combinations thereof. Supplementing clinical examination, umbilical ultrasonography allows the identification of the structures involved and differentiation of the various disorders with a high diagnostic sensitivity. A specific diagnosis of the umbilical disorder is important, because the treatment regimen, prognosis, and treatment costs completely depend upon the extent of the disease and the structures involved.

Bonus Article

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Nutritional Diseases of Llamas and Alpacas

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Robert J. Van Saun

Limited published reports of nutritional diseases affecting llamas and alpacas were found in a detailed review of relevant literature sources. Anecdotal clinical experiences and nutritional diseases that have been reported range from those diagnosed in common with other species to diseases having a presentation unique to camelids. Vitamin D-associated rickets and greater susceptibility to hepatic lipidosis and zinc deficiency are distinctive nutritional problems for llamas and alpacas. This article will review commonly encountered nutritional diseases, based on literature reports and clinical experience, in llamas and alpacas.

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