REPRODUCTIVE ULTRASONOGRAPY IN BOVINES

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Technique of Ultrasonography in the cow

The ultrasonographic examination of uterus and o varies in cows is performed by transrectal sonography. In the cow, the examination is performed in a way similar to that of the rectal palpation. After the rectum has been evacuated and the internal genitalia have been palpated in the usual manner, the hand held ultrasound probe is introduced through the anus and then advanced cranially along the rectal floor. Generally, all commonly available ultrasound scanners (linear, sector and convex) can be used for transrectal sonography in cattle. The only condition for their use is that one must be able to manipulate the chosen ultrasound probes inside the rectum without causing damage.

The cervix of the non-pregnant cow can be found at the level of the urinary bladder .The cervical structures that can be identified include the cervical rings and a central, hyperechoic line which represents the cervical canal. Immediately cranial to the cervix, usually in the midline, appear the body and horns of the uterus. Occasion ally, the uterus can also be found lateral to the urinary bladder. When the uterus has been recognized, the probe is positioned above the intercornual space. In the case of a linear array scanner with craniocaudal and dorsoventral sound beam the probe is swiveled from side to produce longitudinal images of the uterus. When using a sector scanner, the operator can turn the beam through 90 degrees and thus change the scanning plane from longitudinal to transverse in relation to the body axis. In this manner transverse sections of the uterus can be obtained.

After scanning the uterus, the probe can be rotated further laterally in order to visualize the ovaries. In their normal position, they can usually be reached by the sound beam and any additional digital fixation or repositioning of the ovaries is not necessary. Care should be taken to allocate each identified ovary to the correct side.

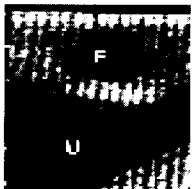
When cow genitalia are examined sonographically the imaging of small structures, such as the embryo and its thin embryonic vesicle, intra-uterine fluid accumulations as well as follicles and corpora lutea, is of primary importance. For these, the use of sound waves of a higher frequency is essential. The resolution of ultrasound at a frequency of 5.0 MHz is high enough to identify vesicular structures with a diameter of 3 to 5 mm.

OVARIAN STRUCTURES IN THE COW

Follicles

Sonographic images of follicles

The sonographic image of bovine ovarian follicles is characterized by the anechoic, circular area of the follicular lumen and their fluid content usually contains no reflections. Only in a few individual cases the lumina of follicles near ovulation will contain echoic spots close to the follicular wall. The shape of follicles is usually round. The dividing walls of two neighboring follicles of equal pressure often form a straight line. Smaller follicles often bulge into the lumen of a larger follicle. In contrast to the anechoic follicular fluid, however, the anechoic fluid content of the corpus luteum cavity is surrounded by a moderately echoic wall of luteal tissue, which is a few millimeters thick.



Folllicle

Sonographic image of corpora lutea

The sonographic section of luteal tissue appears as a roughly granular, gray-structured oval area on the monitor .It can be delineated from the remaining ovarian tissue or other functional structures that may be on


Cystic corpora lutea

be on the ovary. The relatively hypoechogenicity of the active corpus luteum is in distinct contrast to the brighter gray of the ovarian parenchyma. In a corpus luteum with a cavity, an echoic rim of tissue, a few millimeters thick, surrounds a central, anechoic fluid accumulation.

Ovarian cysts

In their sonograhic appearance ovarian cysts resemble large follicles. One distinguishing feature is their larger size. In the case of a luteinized follicular cyst its wall thickness can also assist in its identification. The sectional images of ovarian cysts are characterized by large anechoic areas. The dark fluid content of thecal follicular cysts hardly ever contains any reflections .The lumina of luteinized cysts occasionally contain a network of echoes.

Ovarian tumors

Ovarian tumors are rare in cattle. The sonographic image of tumor contains two distinct regions. Hypoechoic transverse sections through numerous vessels were seen in the dorsal section of the tumor. The remainder of the tumor contained a coarsely granular echogenicity, producing an image of mixed tissue, which was traversed by numerous cross sections of smaller vessels. The adjacent areas of brighter and less bright echoes reflected the compact nature of the tumor interspersed with islets of waxy tissue. The outline of the tumor could be seen and measured.

UTERINE STRUCTURES IN THE COW

NON-PREGNANT UTERUS

When the uterine tone is high, such as in estrus, it has, as with the larger curvature, a U-shaped, arched appearance. The dorsal and ventral sections of the same horn are at other times often so close to one another that they are separated by only a single, hyperechoic line, or diverge at a very acute angle.

PREGNANT UTERUS

Day 10 to 20 of pregnancy

If cows are examined sonographically every day after insemination a minute fluid accumulation may become apparent between days 10 and 17 of the cycle. The fluid will lie in the horn ipsilateral to the corpus luteum. It will appear as thin, anechoic areas that are round in shape in three quarters of all cows and measure 2 to 4 mm in size. Between Days 17 and 20 of gestation, sometimes even earlier, hypoechoic sections through the embryonic vesicle are visible in various sectors of the pregnant horn of the uterus. In most cases these minute fluid accumulations are sections through the chorionic vesicle. At this stage it lies thread like in the uterine lumen and contains very little fluid. Around day 19 the embryonic vesicle will form a slight distention usually near the middle of the pregnant horn, in the same area where the fluid first became visible. But Sonographic imaging of the embryonic vesicle at this early stage is difficult and thus unreliable.

Day 21 to 24 of pregnancy

Between Days 21 and 24 of gestation the amount of fluid inside the embryonic vesicle has usually increased to such an extent that it becomes easier to visualize by ultrasonography. A thin, hyperechoic and towards the tip of the horn bulging membrane can sometimes be seen inside the embryonic fluid at about this stage of pregnancy. During this earliest phase of the sonographic pregnancy diagnosis particular attention must be paid to confirm that the observed fluid accumulation is intrauterine.

Day 25 to 30 of pregnancy

On Day 25 of pregnancy the embryonic vesicle of the bovine reaches a diameter of 10 mm at the point of its largest expansion. The course of the pregnant uterine horn – with its dorsal segment, the ventral bend and the caudally directed portion. – is best demonstrated if the probe is positioned above the uterus with its sound plane oriented along the longitudinal axis of the cow's body and the beam directed dorsoventrally with a slight lateral deviation. This produces a sagittal section through the uterine horn which is characterized by the ehoic, curved uterine wall surrounding the anechoic embryonic vesicle.

Day 31 to 40 of pregnancy

The crown-rump-length (CRL) of the embryo reaches 12 mm around Day 30, 15 mm by Day 35 and 20 mm by Day 40. The placentomes also become visible for the first time between Days 30 and 40. The first signs of placentomes are usually noticeable in the area near the embryo.

Day 41 to 90 of pregnancy

Around Day 40 a stage is reached when the sonographic examination of the pregnancy can be extended to include the demonstration of

embryonic or fetal structures, respectively the only organ that is available at this stage of pregnancy is the beating heart. In contrast, after Day 40 the outline of the fetus with its head, extremities and umbilical cord become visible.

2nd and 3rd trimester of pregnancy

In advanced pregnancy the sonographic examination of the fetus gains importance. During the second and third trimesters of pregnancy they are frequently surrounded by a 1 to 2 mm thick, very hyperechoic border. In many cases the placentomes lie so close to each other that many of them can be seen on a single sonographic image whereas the amniotic fluid remains anechoic during the first trimester of pregnancy, it may contain increasingly more reflections from the second trimester on wards As the pregnancy progresses these reflections may assume a snow-storm-like appearance and turbulences within the amniotic fluid may become very obvious. The very prominent, thin echo line of the amnion can nearly always be recognized as a floating membrane drifting within the dark placental fluids. The cases in which the fetuses cannot be reached by transrectal sonography occur during the last trimester of pregnancy. During this time diagnostic conclusions can be drawn by imaging the uterus filled with placental fluids, the placentomes, or the amnion and allantois. In addition, transcutaneous sonographic examination can be considered.

TWIN AND MULTIPLE PREGNANCIES

The sonographic diagnosis of a twin or multiple pregnancy can be justified if two or more embryos or fetuses were clearly visible. To diagnose a twin pregnancy the fetuses then have to be found one after the other, This can lead to diagnostic uncertainties, because it is not always clear during the course of an examination whether the second fetus that is found is not perhaps another view of the first one which has migrated back into the picture. The second month of pregnancy appears to be the most suitable period for diagnosing twins.

UTERINE PATHOLOGY

Embryonic death

First signs of an impending embryonic death are an undersized embryo and a reduced amount of embryonic fluid. The death of a conceptus can be reliably diagnosed once the embryonic heartbeat has stopped. As the resorption progresses the amount of embryonic fluid will decrease, while its echogenicity will increase. The embryo then looses its typical outline and becomes very indistinct.

Fetal mummification

In cases of pregnancy failure in the form of fetal mummification the uterine ultrasonograms usually contain very little conclusive information. Immediately below the uterine wall hyperechoic foci can be detected between the surface of the mummified fetus and the uterine wall were no hypoechoic areas that could be seen as accumulations of fetal fluid.

Fetal maceration

Apart from the well known clinical features some sonographic signs of fetal maceration will be seen in a case of this form of a pathological pregnancy. There is a very distinct difference between the echogenicity of the allantoic fluid and that of the amnion. Due to its lack of reflections the allantoic fluid appeared virtually black, while hyperechoic, regularly distributed echoes whirled around inside the amniotic fluid. These were interpreted to have been caused by the increased cellular content of the amniotic fluid resulting from the disintegration of the fetal tissues.

Postpartum uterus

After birth the most obvious sonographic structures in the uterine lumen are the caruncles. Areas of differing echogenicity can be seen on the round or oval cross sections of caruncles. In many cases, however, lochial secretions can be seen inside the uterine lumen (Fig. 2.109). They show the floccular echogenicities which are typical of fluids that contain cellular components. In such cases the caruncles protrude like mushrooms into the relatively hypoechoic uterine secretions. Certain sonographic features of the postpartum uterus are also detectable in pathological situations such as endometritis. ❑

First confirmed report of Rabies in Elephants in India

A Tusker belonging to Minnathottil temple, chavara aged 26 was reported to have paralysis in the hind leg on 14th March 2005 and was under treatment. Inspite of the treatment, animal showed ascending paralysis and died on 19th March. The animal was subjected to Post mortem by Dr. B. Aravind, and Dr. Anil Kumar of SPCA Elephant care unit, Kollam. No gross lesions were detected leading to a definite diagnosis. A cerebro spinal infection by an agent with de myelinating property was suspected and the organs were send for laboratory investigation. Definite evidence of Rabies was detected by Fluorescent Antibody technique conducted at Rabies Diagnostic Lab, DVC, Kollam by Dr. S. Raju. There was no history of dog bite.