

Ultrasound and the corpus luteum – how it improves conception

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Getting the cow in calf is the most important event of the cow's life. With falling conception rates and infertility problems increasing, help from any angle to make sure reproductive events synchronise to culminate in conception need to be embraced and utilised to their full. Many forms of aid are available to help the detection of a cow's heat and ultimate time for insemination.

These can be as simple as observation. In a herd with a dedicated herdsman who has adequate time to deploy in the task of heat detection observation can work very well.

Observation can be aided by the use of chalk, coloured beacons, paint and other products applied to the top of the tail to help detection when the herdsman has to sleep.

High tech heat detection takes the form of motion detecting head collars or pedometers linked to a reader and computer system which tells you the cow is in heat. These can be very useful aids to heat detection but all heat detection methods have their drawbacks and need to embrace other links and systems in the chain for good conception.

Oestrus detection with insemination at the prescribed time leads to conception most of the time.

However, what do you do when heat is detected but conception fails or if heat

detection itself has failed? If ovarian dynamics are not perfect for ovulation and fertilisation, oestrus detection can be wasted.

Conception requires all of the sequence of hormonal and anatomical events on the ovaries to be synchronised. Accurate identification of ovarian structures can aid this process.

Accurately identifying the ovarian structures can lead to precise advice and hormonal therapies being administered to the cow resulting in a successful conception.

Ultrasound in the hands of an experienced operator is able to detect most of the ovarian anatomical detail required to then put in place the individual cow treatments.

The corpus luteum

One of the most important structures on the ovary is the corpus luteum. It commands the ovarian events and is often described as the structure of pregnancy. Its detection has been very successfully performed by hand for many years.

The development of prostaglandin 35 years ago made accurate detection of the corpus luteum even more important as it could then be hormonally manipulated. Its presence dominates events in the reproductive cycle and controls hormonal levels, troughs and peaks.

The corpus luteum produces progesterone

which is the hormone of the 'quiet cow'. This term is used to describe a cow that is not demonstrating heat behaviour or is in calf.

As one of the most dynamic ovarian anatomical structures it comes in many different variations which all signify a state of either normal cycling events or potential hormonal and pathological abnormalities.

Being conveniently palpable, manual manipulation can identify its presence in most cases but the subtleties of its variations can only be detected by the use of the ultrasound machine.

The many types of corpus luteum include:

- Mature corpus luteum (Fig. 1).
- Mature corpus luteum containing a lacuna, which can be anechoic (Fig. 3), hyperechoic (Fig. 4), or external (Fig. 5).
- Regressing corpus luteum (Fig. 6).
- Haemorrhagic corpus luteum.

Size does matter

The primary feature of the corpus luteum is its size. It can be too big and too small. The smallest size recognised for a good quality corpus luteum is 1.5cm. A corpus luteum which is larger than 1.5cm is producing adequate levels of progesterone for normal function.

Ones smaller than 1.5cm (Fig. 2) can be

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Fig. 1. Ultrasound image of an ovary with four mature corpora lutea (CL) which appear as grey circular structure (arrow). Image obtained using BCF Easi-Scan.

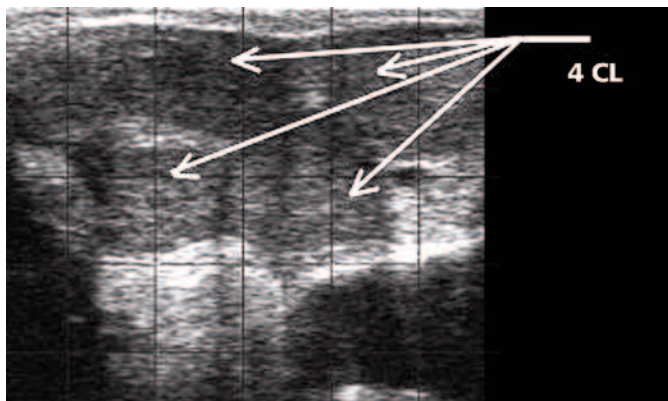
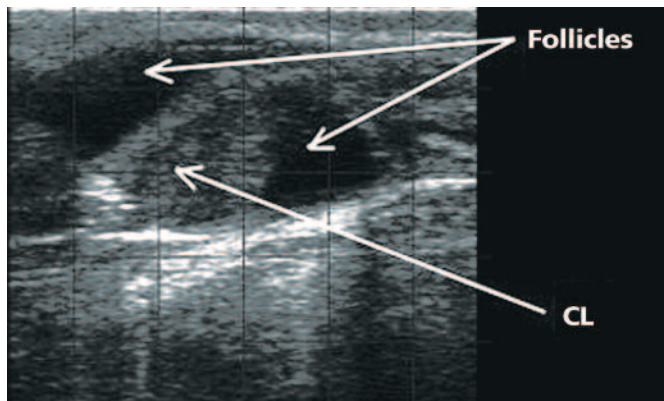


Fig. 2. Ultrasound image of a small corpus luteum (CL) sandwiched between two follicles. This is non palpable. The small CL is a grey, triangle structure and two follicles are black, circular structures (arrows). Image obtained using BCF Easi-Scan.



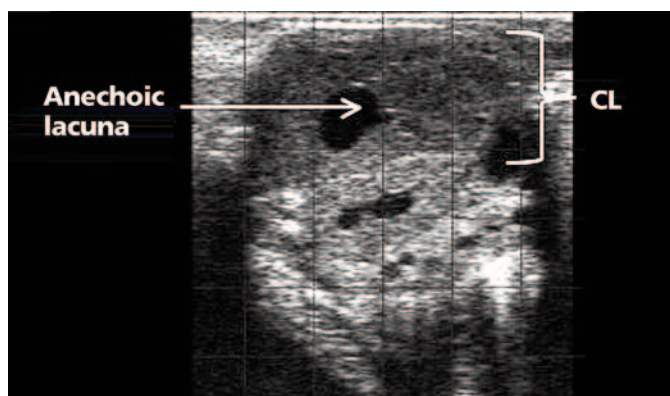


Fig. 3. Ultrasound image of a corpus luteum (CL) with anechoic lacuna. CL appears as a grey, circular structure (brackets) and anechoic lacuna as a black, circular structure in the middle (arrow). Image obtained using BCF Easi-Scan.

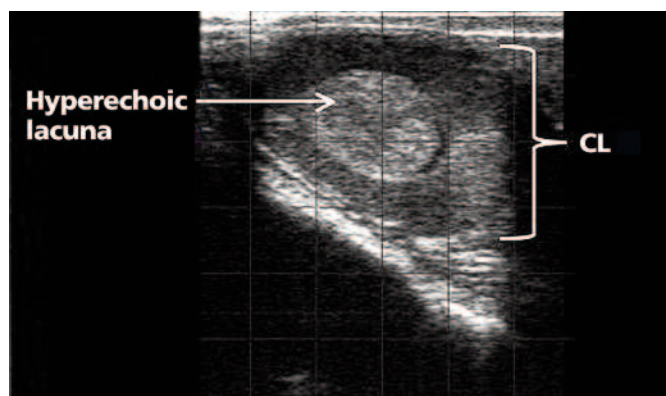


Fig. 4. Ultrasound image of a corpus luteum (CL) with a haemorrhagic lacuna. CL appears as a grey, circular structure (brackets) and hyperechoic lacuna as a light grey, circular structure in the middle (arrow). Image obtained using BCF Easi-Scan.

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producing lower levels of progesterone which abnormally influence the hormonal cycle and lead to infertility. These can be treated in a specific way to ensure response within a good timescale.

The smaller corpus luteum is quite often missed by palpation alone due to its encasement within the ovarian border and therefore ultrasound is the only means of detecting it to help deliver a better outcome for the cow. The state of true anoestrus in the multiparous cow is very rare and once the cow enters the post calving period when cycling resumes there is a level of activity within the ovary.

This hormonal activity influences the development of the corpus luteum and therefore a corpus luteum is usually present in one of its forms when the cow is examined. The smaller corpus luteum is a common one found in the early post partum period.

Mature corpus luteum

The mature solid corpus luteum is easily identified by both palpation and ultrasound. It has a very distinct echogenicity which allows easy identification. These signify a

normal cycling cow. If the normal mature corpus luteum is diagnosed on the ovary of a cow which has not been observed in heat the cow is having silent heats.

These are easily treated with a variety of hormonal treatments which are most successful when synchronised insemination is included in the hormonal program.

The most common mature corpus luteum is composed of solid luteal tissue, however there are variations in the anatomical shape which are normal manifestations.

These variations include the anechoic lacuna, the hyperechoic lacuna and the external lacuna. However, these variations can also signify abnormal hormonal events which are a cause of failure of conception.

Haemorrhagic corpus luteum

The haemorrhagic corpus luteum is formed immediately after ovulation and it is formed from blood which is released when ovulation occurs. In the majority of normal cycling cows very little or no bleeding occurs and therefore in the majority of cows there is no haemorrhagic corpus luteum present on the ovary.

If bleeding occurs the haemorrhagic corpus luteum is best identified with ultrasound

as it can be very small and is very soft and can easily be displaced by palpation.

Regressing corpus luteum

The regressing corpus luteum is present on the ovary after prostaglandin release. Prostaglandin is released from the uterus at around day 17 of the cycle and this is the starting point of the cow's oestrus.

The regressing corpus luteum has a distinctive echogenic make up and is smaller than the mature corpus luteum shrinking into the ovary. It can be missed by palpation alone but its detection helps identify the reproductive state of the cow and its point in the reproductive cycle. The importance of the corpus luteum and the role it plays in ensuring that perfect hormonal sequences for conception occur should not be underestimated. Its absence signifies a key time in the cow's cycle or can indicate fertility problems. Its presence usually signifies the cycling cow but some of its many variations can identify cycling problems not conducive to conception. The experienced ultrasonic eye identifies more detail than palpation detects.

Accurate diagnosis with the use of ultrasound enables good treatments and advice which maximises conception. ■

Fig. 5. Ultrasound image of a corpus luteum (CL) with external lacuna. CL appears as a grey, circular structure (brackets) and external lacuna as a black, circular structure on the edge of CL (arrow). Image obtained using BCF Easi-Scan.

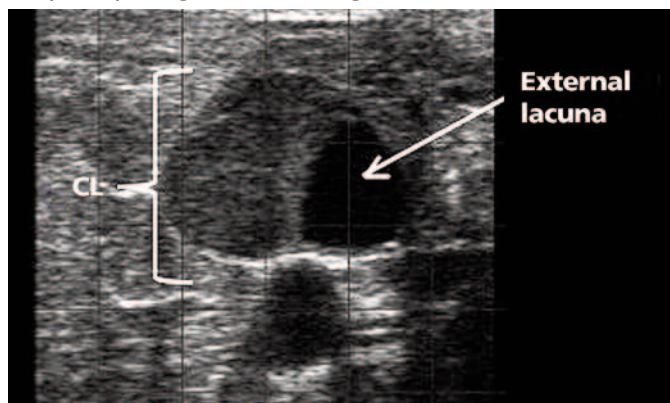


Fig. 6. Ultrasound image of a regressing corpus luteum (CL). CL appears as an out of focus grey circular structure (arrow). Image obtained using BCF Easi-Scan.

