

Improving reproductive management with ultrasound

by **Natalia Cezon, BCF Technology Ltd.**

During this time of economic downturn leading practices and farmers will innovate to work smarter and become more profitable. Ultrasound is one such innovation for reproductive management. Ultrasound and manual palpation are the most popular tools for reproductive management. This article will discuss the advantages of ultrasound versus manual palpation to increase reproductive performance of the dairy farm.

How ultrasound works

Ultrasound imaging is a physical pressure wave with a frequency between 2-16MHz. The pressure wave travels by vibrating (compressing and expanding) the particles of the medium being travelled through. An echo is generated when the density changes from one medium to the next. The size of echo is dependent on relative density of each medium. Different grey scales are assigned to the returning echoes to build up the image of the object. Black objects with a few echoes are fluids. Dense areas, such as bones, appear white and organs have an intermediate appearance.

Ultrasound benefits

The main difference between ultrasound and manual palpation is that bovine practitioners can actually see what is going on inside the uterus and ovaries, rather than only feel with manual palpation. Ultrasound is the most effective diagnostic pregnancy tool to improve reproductive efficiency on the farm. The advantages of ultrasound are:

- Earlier, more accurate 'open' diagnosis.
- Confirmation of foetal viability.
- Accurate ovarian structure diagnosis.
- Accurate identification of twins and multiples.
- Gender determination.

Table 1 compares these two methods and summarises ultrasound advantages versus manual palpation.

Early pregnancy detection

Earlier determination of open cows means fewer missed oestrus cycles and an opportunity to rebreed the cow within the cycle if it is not pregnant. It has been proven that ultrasound has a seven day advantage over manual palpation in diagnosing pregnancy and, most importantly, identifying open cows after insemination. According to Rosenbaum and Warnick (2004) with ultrasound, pregnancy can be identified at 27 days and with manual palpation at 34 days. Research has shown that good oestrus detection for cows that have been inseminated 19-25 days previously lets bovine practitioners rebreed more cows sooner. Apart from early pregnancy detection, ultrasound offers many more benefits for clients of veterinarians. These include earlier identification of dead foetuses, detecting twins, ovarian pathology and foetal sexing.

Foetal mortality

It is important not only to confirm the cow is pregnant but later to recheck it. Following conception, a 13.5% rate of embryonic death is common in the industry. Embryonic death most commonly occurs between conception and 60-70 days gestation.



Easi-Scan image of pregnancy at 38 days.

Dead foetuses can be identified between 26-55 days by several indicators on the ultrasound image, such as lack of foetal heartbeat, flocculation in the amniotic or chorioallantoic fluid and separation of the chorioallantois from the uterine wall. Veterinarians can detect these signs with ultrasound much earlier than with manual palpation. DeMuth's experience has shown that some cows will not expel dead foetus for months. Late detection of dead embryos and foetuses with manual palpation will result in the cycle of the cow being missed and there is always a loss of profit.

Detecting twins

Detecting twins with ultrasound is another benefit that can help to improve reproductive performance of the farm. Identifying a pregnant cow with twins earlier is important for management of the cow and thus cost savings. Twinning rates continue to increase in the industry affecting milk yields and reproductive performance, especially in high milk production cows. Research by Jill Colloton shows that twinning in cows results in higher rates of embryonic death, late term abortion, early

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Table 1. Comparison of ultrasound versus manual palpation.

	Pregnancy check	Foetal age	Ovarian structure	Twins (%)	Foetal viability	Foetal gender
Ultrasound	27 days	Most accurate	Most accurate	95	Yes	60 days
Palpation	34 days	Low accuracy	Moderate accuracy	50	No	No

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and difficult calving, and can lead to different metabolic disease such as ketosis, displaced abomasums, and fatty liver. Ultrasound can be over 95% accurate for twin diagnosis.

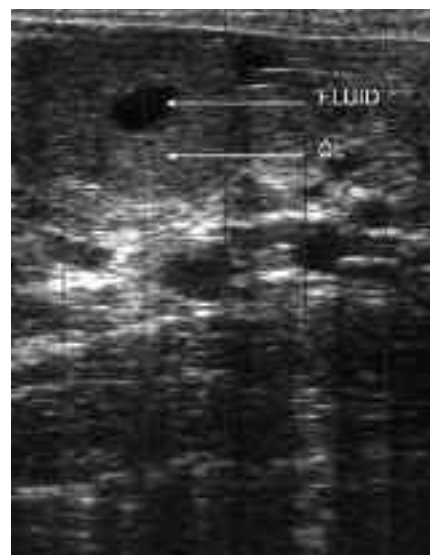
Foetal sexing

Bovine practitioners with ultrasound can define sex very accurately at 60 days of gestation. Producers might use this information differently. Knowing the gender of the embryo will help producers with advance sale contracts and allow them to sell the pregnant cow at a higher price. Jill Colloton confirms that producers want to know this

information because it is their biggest use of the data in cull decisions on marginal or sick cows and herd inventory planning and for deciding who gets the calving pen.

Speed of diagnosis

Another significant advantage of ultrasound is the increased speed of diagnosis. Two veterinarians, Dr Kory Bigalk of Diamond K Genetics in Zumbrota, Minnesota, and Dr Andy Borrowman of VetLogic Inc in Nampa, Idaho, co-authored a paper that was presented at the Dairy Cattle Reproduction Council's regional meeting in 2009 in the USA.



Easi-Scan image showing CL with fluid in the middle.

In this paper Dr Bigalk and Dr Borrowman confirmed that they have experienced a 20% increase in speed of pregnancy detection.

The use of ultrasound allows for a very quick and accurate diagnosis of ovarian function, including detecting the presence or absence of a corpus luteum (CL), differential diagnosis of luteal and follicular cysts and diagnosis of anovular cows.

Fertility & ovarian structure

Timed AI programs are becoming more and more prevalent in today's dairy herds, however the use of ultrasound in combination with a timed AI program can dramatically improve a herd's conception rate.

K. McSweeney (2009) has found ultrasound to be far superior to rectal palpation in predicting an active CL. By using ultrasound, cows can be assessed and synchronisation programs can be modified when cows fail to respond. Taking the non-responders out of the program you will save all the semen, drug, and labour costs that otherwise would have been wasted on those non-responding cows.

When you are only breeding the cows that are responding to your synchronisation program you will greatly improve your conception rates, and ultimately your herd's pregnancy rate. Ultrasound is the only way to accurately identify active CLs, and completely assess ovarian structures.

According to Paul Fricke the limiting factor of most reproductive programs is getting semen into cows at the right time. Between 5-30% of all artificial insemination services are conducted at the wrong stage of the oestrus cycle. Fertility examination with ultrasound will also help to identify problem cows at an early stage and improve accuracy of insemination. With ultrasound a bovine practitioner can see the ovarian structure and diagnose specific ovarian complications, ensuring more effective disease control and

minimising days open or missed oestrus cycles.

As an example, 12-14% of all problem breeders have cystic ovaries. Furthermore, between 10-40% of all dairy cows develop cystic ovaries during their lifetime, and 35-45% of dairy cows with ovarian cysts are repeat offenders.

Using ultrasound the bovine practitioner can detect if it is a cyst or CL. This can then determine the best treatment for the cyst. The identification of a cyst can help avoid wasting semen on a cow with complications and, in turn, save money and reduce costs.

Economics of ultrasound

Veterinarians and producers can justify the capital expense of ultrasound because of fast return on investment, usually within two years. The most significant savings are coming from early detection of open cows and opportunity to rebreed them within the cycle. Errors in early pregnancy detection are costly. Fewer opportunities to get re-inseminated and longer days open increase the cost per extra day open. Typical costs vary approximately from \$1-5 per extra day open. Once the cost per extra day open reached \$4, the ultrasound machine could be paid back in as few as two years even in a herd of 1,000 cows or less.

Ultrasound can be used in conjunction with a timed AI program in several ways. With the Ovsynch program you can use ultrasound on day seven in conjunction with the prostaglandin shot. All cows found to have an active CL will continue on the program and be given a prostaglandin shot, all cows without an active CL can be taken out of the current group and resynchronised.

Then all cows that are bred can be checked for pregnancy with an ultrasound at 30 days post breeding and all cows found open can be resynchronised. The recent data has shown that with resynchronised cows you will get better results starting them on an Ovsynch program with the

presence of a CL, so if no CL at pregnancy check day, then you may do the alternative CIDR synchronisation program.

All cows that are checked as pregnant at 32 days can then be rechecked at or around 60 days when the gender of the calf can also be determined.

Choosing the ultrasound

Ultrasound is a significant investment for a farm or veterinary practice and a good quality ultrasound should serve you for at least five years. The speed and effectiveness of the scanning process depends on the unit and training available to the operator.

When you buy a system make sure that you buy a scanner specifically developed for farm conditions and it should be lightweight, portable, ergonomic, water resistant and very durable.

These are the qualities you should be looking at when purchasing an ultrasound machine. You should choose your provider of the ultrasound machine carefully. It should be a reputable company which can provide you with ongoing, quick, reliable service and training. ■

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Easi-Scan image of pregnancy at 64 days. Male genital tubercle visible.

