

***Reproductive Ultrasound Revisted***  
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Over the last 5 years the use of ultrasound for routine reproductive management in the dairy industry has made major leaps forward. This progress is a result of (1) improvements in ultrasound technology, (2) the interest and expertise developed by reproduction specialists, and (3) the widespread adoption of intensive estrus synchronization programs which benefit from early pregnancy detection. This article will highlight some of these developments.

***Improvements in Ultrasound Technology***

Ultrasound has been widely adopted in the traditional dairy areas of the Northeast and Midwest United States, as well as in many European countries. Its adoption on dairies in the Western United States has lagged far behind, in part because of equipment limitations. In the West reproductive exams commonly take place in outdoor lockups, and ultrasound machines were initially not sufficiently portable or their screens clearly discernable in the sunshine. Several machines are now available that address these problems: The Easi-Scan, manufactured by BCF Technologies of Livingston, Scotland and the Bantam LM manufactured by E I Medical of Loveland, Colorado both use video monitor glasses for display. The Sonosite 180 Plus is considerably more expensive but has color doppler, a keyboard, broadband transducer and a 4 X 6 inch tiltable screen. All three of these units have been used very effectively on large Colorado dairies, solving the equipment problems that limited the routine use of ultrasound on large Western dairies. More information on these three machines are provided in the insert.

***Diagnostic Confirmation***

Traditionally, reproductive specialists develop a certain confidence that their rectal palpation skills can tell everything necessary about the reproductive tract of the cow. However, diagnostic use of ultrasound in the reproductive examination provides definitive information that previously was only an educated guess by those using rectal palpation. The following are illustrative of questions that can be answered using ultrasound.

1. *Is that a luteal or follicular cyst?* The thickness of the cyst wall can be measured using ultrasound.

2. *Is that a large CL or a cyst?* The appearance of a CL is easily distinguished from a cyst using ultrasound.

3. *Is that a pyometra or a pregnancy?* In the ultrasound image pus is often gray with floating flecks of hyperechoic (white-appearing) debris. In contrast, pregnancy fluid is totally anechoic (black), and membranes and/or embryonic tissues are clearly visible.

4. *Is that pregnancy a healthy one?* Ultrasound signs of a pregnancy in trouble include lack of heartbeat (visible as early as 30 days), disruption of membranes and the fetus itself, and appearance of gray flecks in the fluid. When these signs are recorded, the cow can be rechecked in a week, or prostaglandin can be given.

5. *Does this cow have twins?* Multiple fetuses are much easier to detect with

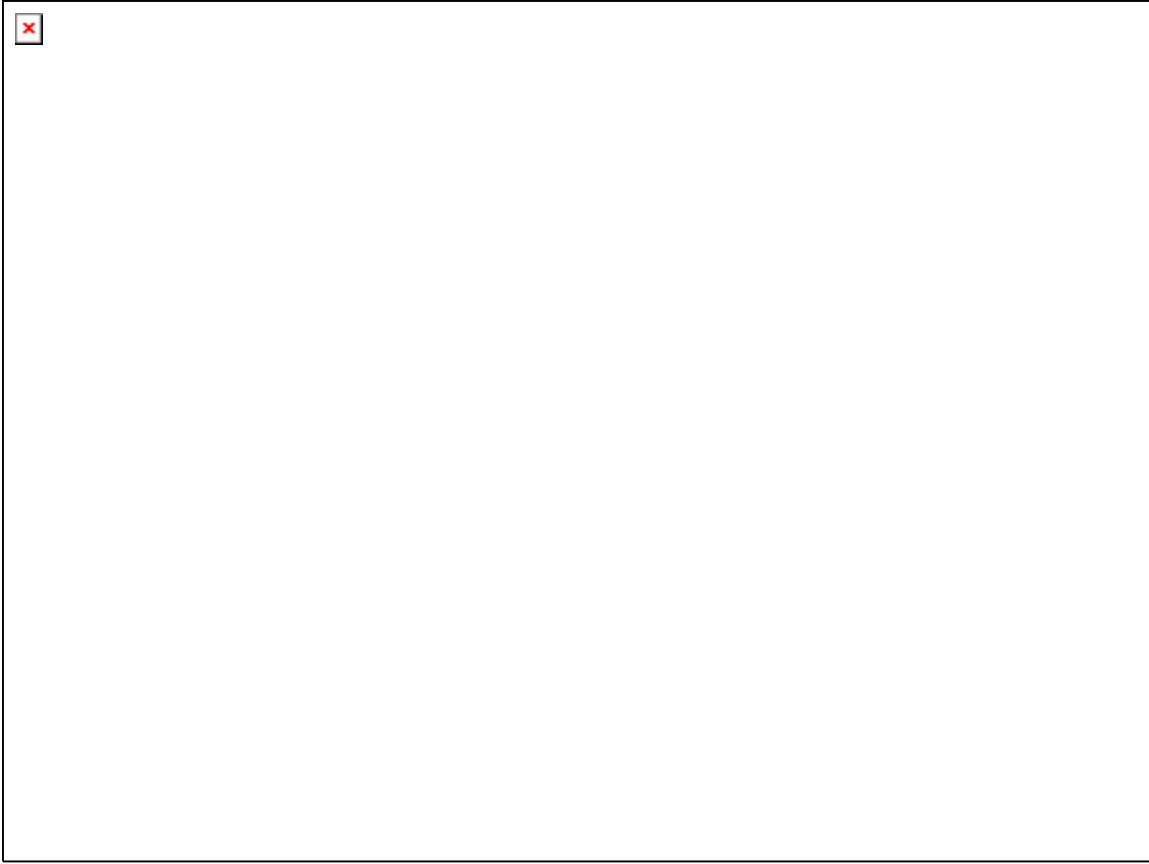
ultrasound than palpation. Theoretically, twin reduction can be performed at 30 days of gestation if the embryos are in different horns.

6. *Is it a boy or a girl?* At 60 days of gestation, an experienced ultrasound operator can accurately determine the sex of the fetus.

7. *Is this cow open 27 days after insemination?* This is by far the most important question, since we have a significant ability to intervene via resynchronization. Uterine fluid is clearly visible in a 27-day pregnancy, and with a little practice the embryo is easily found.

### ***Decreasing Days Open***

Limiting the days the cow remains open is the goal of every progressive dairy, and ultrasound can help achieve that goal. Ultrasound must be used to identify the *open* cow as soon as possible after breeding (27-30 days) so that she may be re-inseminated immediately. The insert to this issue illustrates a timed insemination protocol using early ultrasound pregnancy detection. The following graph indicates the potential savings per cow theoretically achievable using ultrasound and rebreeding open cows soon after diagnosis. This analysis only includes the economic effects of days open saved by early rebreeding of open cows, and represents the savings achievable in herds using traditional visual heat detection.



Large dairies have always had difficulty in performing visual heat detection, and have thus relied on using secondary signs of estrous such as tail chalk. Many studies have shown the inaccuracy of this method of heat detection because cows that are not in heat or already pregnant may be inseminated. Sturman (2000) showed that using tail chinks as heat detectors, 19% of inseminations were performed on cows not in heat or in the early stages of pregnancy. Insemination of pregnant cows led to 17% embryonic loss.

It is possible to eliminate the need for estrous detection. A breeding program which eliminates estrus detection has 3 essential components: a) first breeding using a systematic timed insemination program (OvSynch or PreSynch) in which ALL cows are bred within a month of the end of the voluntary waiting period; b) accurate pregnancy detection at 27-33 days after AI (using ultrasound); c) systematic re-synchronization program for ALL cows found open. By utilizing such a breeding and pregnancy diagnosis program, you can improve your overall pregnancy rate and spend less money doing so.

Dr. Ray Nebel of Virginia Tech implemented a reproductive plan in which cows were all bred to timed breeding protocols and employees ignored all heats. Pregnancy diagnosis was performed with ultrasound around day 28; non-pregnant cows were enrolled in a resynchronization program. Dr. Nebel reported a pregnancy rate of over 20% using this program (the national pregnancy rate is around 14%).

He also compared the economics of traditional heat detection programs with timed insemination programs in a theoretical herd model. This comparison is illustrated in this issue's insert and shows that a timed insemination program using ultrasound pregnancy detection can save the producer over \$100 per pregnancy. Application of this breeding program in your dairy herd may not have the exact same results, but it is worth knowing there are options out there to deal with poor heat detection and the results can be quite exceptional.

*Nebel RL, McGilliard ML, French PD, Saltman RL. Economic impact of systemic breeding programs and factors to consider in program selection for the reproductive management of dairy cattle. Proc Ann Conf Society for Therio, Columbus, Ohio, pp 371-379, 2003.*

*Sturman H, Oltenacu EA, Foote RH. Importance of inseminating only cows in estrus. Theriogenology 53:1657-1667, 2000.*