

Overview

Laboratory tests for pregnancy diagnosis in dairy cows

What is the technology?

A range of milk and blood tests are commercially available in Australia for pregnancy diagnosis in dairy cows. These tests can detect pregnancy at varying intervals after joining.

How does it work?

The tests target proteins or hormones that are produced in blood and/or milk during pregnancy. **Table 2** outlines the different tests available. At present, all commercial tests require milk or blood samples to be sent away to a laboratory for analysis.

An individually-identified blood or milk sample (collected by the farmer or a contractor from the testing organisation) is sent to the testing centre for analysis. Results are generally available within a few days.

What data does it provide?

The test results classify cows as either pregnant or non-pregnant (or undecided and require rechecking at a later date). Depending upon the type of test being used, non-pregnant cows can be detected as early as 28 days after joining (the same timescale as early ultrasound scanning).

The accuracy of a test is defined as the percentage of cows correctly identified as either pregnant or non-pregnant and depends on:

- › the ability of the test to detect pregnant animals (sensitivity)
- › the ability of the test to detect non-pregnant animals (specificity), and
- › the proportion of the group being tested that are truly pregnant

The combined effects on accuracy, of test sensitivity, test specificity and the proportion of cows in the herd that are truly pregnant at testing is explained further in **Table 1**.



Table 1 Accuracy of laboratory test results if true pregnancy rate is 90% or 10%

True Pregnancy rate	Test 1 (98% sensitivity, 99% specificity)		Test 2 (96% sensitivity, 94% specificity)	
	Positive tests	Negative tests	Positive tests	Negative tests
90%	99.9%	84.6%	99.3%	72.3%
10%	91.6%	99.8%	64.0%	99.5%

The results of the exercise in **Table 1** show that negative results may be less accurate than expected where a high percentage of the cows are truly pregnant (90% in the example above). However, positive results may be less accurate than expected where a high percentage of the cows are empty (10% true pregnancy rate in the example above) – particularly for Test 2 where the test has only 96% sensitivity and 94% specificity.

How can you use this information?

A yes/no pregnancy diagnosis provided by the laboratory test allows you to:

- › identify non-pregnant and pregnant cows. This can assist with some culling decisions and basic feed budget planning
- › identify non-pregnant cows and rejoin them sooner than may otherwise occur

In contrast, a pregnancy diagnosis combined with fetal aging allows you to:

- › identify non-pregnant and pregnant cows
- › identify non-pregnant cows and rejoin them sooner than may otherwise occur
- › determine key herd reproductive measures such as six-week in-calf rate, 100-day in-calf rate, etc
- › predict calving dates for individual cows
- › develop accurate feed budgets, plan dry-off and transition cow management programs, predict subsequent calving pattern and milk production and guide culling decisions

Potential issues

The predicted calving date for cows identified as pregnant using one of these tests can be inferred for cows with complete mating records by assuming the cow became pregnant to the last mating recorded. However, few farmers record bull matings and as a result, some pregnant cows may be falsely assigned to an earlier AI mating when the cow actually became pregnant to a later (and unrecorded) bull mating. False positive heats are also common (that is, cows are inseminated when they are already pregnant) and this will further compromise accurate identification of conception dates.

Most early embryonic loss occurs before six weeks of pregnancy. A proportion of cows diagnosed pregnant within four to six weeks of insemination may lose the pregnancy, so a later recheck should be considered to identify any cows that may have lost their pregnancy.

Reproductive tract abnormalities are not detected by laboratory tests. Veterinary pregnancy testing can provide this service, allowing individual cows to be better managed and possibly culled, based on veterinary findings.

Tests cannot be reliably applied to cows within 60-80 days of calving as the test may falsely react to residual agents from the previous pregnancy (i.e. identify a non-pregnant cow as being pregnant).

Whilst animal identification errors can occur with any form of pregnancy testing, the use of laboratory tests increases risks of these errors. Samples have to be collected, labelled, shipped and processed,

and results recorded and returned, increasing the possibility of errors over a cow-side test such as a rectal examination.

Results are not available cow-side. Cows may have to be re-drafted to manage them according to their pregnancy test results.

Logistics of laboratory testing

The cost of sample analysis is from \$3.50 – \$6.00 per cow. Actual costs will vary depending on the number of samples submitted, whether blood or milk, or if sample collection is included and postage required. Shipping time and expenses must also be considered if the tests are not processed locally. Turnaround for results is usually one to three days.

Laboratory tests may offer a cost-effective way to confirm pregnancy for small batches of cows prior to drying off. The tests also provide access to pregnancy diagnosis services in some areas of Australia where veterinary support may be limited. Other questions to consider are the collection service and technical support.

Future developments

There is still a lot of work being done in this field and a number of exciting new developments are likely in the next couple of years. For example, there is significant research and development into the in-line monitoring of progesterone, development of cow-side tests and the prediction of future pregnancy losses. The information in Table 2 represents the current situation for laboratory testing services as of May 2015.

Acknowledgement

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Table 2 Details of the main laboratory tests for pregnancy diagnosis in dairy cows (current as of May 2015)

Commercial test/technology	Factor tested for	Detection window	Availability in Australia	Contact for further information	Comments
IDEXX (sold as PregCheck50 in Tasmania)	Pregnancy-associated glycoprotein (PAG)*	60 days after calving 28 days after joining (50 days after joining for PregCheck50)	There are nine labs in Australia offering this test (including herd improvement labs) in all dairying states except SA and NSW. All vets and producers can submit samples to these labs.	IDEXX 1300 44 33 99 idexx.com.au/livestock-poultry/ruminant/lpd-bovine-pregnancy-test.html VIC Herd Improvement Co-operative (HICO) - hico.com.au National Herd Development - nationalherd.com.au Nugenes Herd Improvement - nu-genes.com.au WA Farm West - farmwest.com.au Swans Veterinary Service - swansvet.com <i>samples submitted through veterinarians Australia-wide</i> TAS Alta Genetics Australia - web.altagenetics.com/australia TasHerd (PregCheck50) - tasherd.com.au QLD IDEXX Laboratories - <i>samples submitted through veterinarians Australia-wide</i> <i>*Please note: Farmers in SA and NSW can submit their samples through their veterinarian or their local herd improvement company.</i>	Not to be confused with early conception factor (below). Tested in blood or milk.
BioPRYN™	Pregnancy serum protein B (PSP-B)*	73 days after calving 28 days after joining	Exclusively through Pregtest Australia using an online store.	Pregtest Australia pregtest.com.au/about-us	Only tested in blood.
Confirm Plus	Oestrone sulphate	120 days after joining	Through Pacific Biotech Pty Ltd using an online store.	Pacific BioTech (Tel 0418 503 515) confirmplus.wordpress.com	Only tested in milk.
Herd Navigator	Progesterone	Continuous	None currently, although there are plans to introduce this technology to Australia in the next few years.	De Laval 1800 817 199 delaval.com.au	
ECF™	Early conception factor (ECF)*	48 hours to 20 days after joining	None currently	EDP BioTech Corporation, Knoxville, Tennessee edpbiootech.com/ecf-test	Cow-side serum (blood) or milk dipstick test. Currently cannot identify non-pregnant cows with enough accuracy.

* PAG, PSP-B and ECF are all members of a large family of pregnancy-associated glycoproteins which may be expressed at different stages of pregnancy.

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