

# FACT SHEET

## The Australian Poll Gene Marker test



### FAST FACTS

- **The Australian Poll Gene Marker test reports on the likelihood (%) of an animal being 'true polled', or heterozygous poll meaning the animal may appear polled but generate progeny that are horned**
- **The test was developed in Brahmans, and on average 89% of tests in polled Brahman will return an informative result**
- **There is significant potential for breeders of British and European cattle to use the test**
- **Further validation work is needed in some breeds**

**With the recent release of the Australian Poll Gene Marker test, producers have a tool to identify breeding animals which will consistently produce polled progeny as well as carriers of horned genes. The test has been developed in tropically adapted breeds, though results suggest that producers of some *Bos taurus* breeds may also be able to take advantage of the test.**

The Australian Poll Gene Marker test was developed by the Beef CRC in partnership with CSIRO, MLA the Animal Genetics and Breeding Unit and the University of Queensland Animal Genetics Laboratory. This factsheet describes the tests accuracy and how results from the Australian Poll Gene Marker test can be interpreted.

#### Which breeds can use the test?

The test can be most accurately applied to Brahman where 89% of animals tested will return an informative or non-ambiguous result. In British and European breeds higher percentages of animals can return an ambiguous result. The Australian Poll Gene Marker test is based on a marker linked to the polled gene. While some marker results are nearly always associated with polled and some marker results are nearly always associated with horned, there are also some ambiguous marker results for which the association between polled and horned cannot be determined.

Table 1 provides an estimate of the frequency of non-ambiguous results expected for the 10 breeds involved in industry testing.

Breed	Number Tested	% Non Ambiguous
Brahman	207	89%
Brangus	36	38%
Charolais	36	72%
Droughtmaster	99	73%
Hereford	205	72%
Limousin	250	39%
Santa Gertrudis	99	77%
Shorthorn	105	34%
Simmental	36	56%
Tropical Composite	84	74%

**Table 1.** Number of polled animals tested and proportion of genotypes assigned with confidence (% non-ambiguous) for 10 breeds assessed during polled marker field testing.

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*Dr John Henshall, CSIRO Livestock Industries,  
Beef CRC poll gene research leader*



## Who performs the test?

The Australian Poll Gene Marker test will be available as a standalone test by the Animal Genetics Laboratory based at the University of Queensland's Gatton campus. Other companies, including Pfizer Animal Genetics have also been granted rights to commercialise the product and are expected to make the test available soon.

## Some Definitions

Before describing the results which will be available to producers, some definition of relevant terms are presented below.

**The DNA marker test for polled genes** identifies multiple allele DNA fragments which are not directly responsible for polled status. These are called markers and are closely associated with the actual polled gene. In different breeds the strength of this association varies, giving rise to ambiguous alleles.

**Allele** describes the smallest unit of the genetic code. In this discussion, alleles will be described as P, coding for polled status or H for horned.

**Genes** contain 2 alleles, and are the smallest unit which determines phenotype. Here genes will be described as PP: carrying 2 copies of the polled allele, PH: carrying 1 copy each of the polled and horned allele, and HH: carrying 2 copies of the horned allele.

**Genotype** is a description of the 2 alleles which make up a gene. PP, PH and HH will be the 3 possible genotypes for polled status discussed.

**Phenotype** describes the trait as observed in the animal. Phenotype is affected by both genetics and environment.

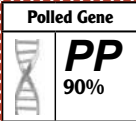
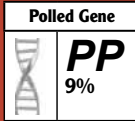
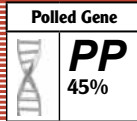
**Homozygous** describes genes which contain 2 copies of the same allele. PP and HH are homozygous genotypes for polled and horned status respectively. For homozygous animals there is only one possible allele which can be passed on to their progeny.


**Heterozygous** describe genes which contain 1 copy of each allele (ie. genotype PH). Heterozygous animals can pass either a P or an H allele on to their progeny.

**Ambiguous** describe markers which are related to both polled and horned status. These occur at different frequencies in different breeds and are reflected in the % non-ambiguous results presented in Table 1.

## Interpreting polled gene test results

Results released by the University of Queensland will describe the percentage chance that the animals are homozygous polled (genotype PP). Table 2 is an example of results provided by the UQ lab.

Bull 1	Bull 2	Bull 3
		



**Table 2.** Example of polled gene marker test results released by University of Queensland Animal Genetics Laboratory.

The animals with higher "likelihood of homozygous PP" (e.g. Bull 1) have the greater expectation of being polled themselves, and passing polled genes on to their progeny. Bull 2 has a lower likelihood of being homozygous polled and an increased likelihood of carrying at least one copy of the horned allele. Intermediate results (e.g. Bull 3) describe animals which carry one or more copies of ambiguous alleles, and can display any phenotype themselves, and produce progeny which may be horned, scurred or polled depending on the genotype of their other parent.

## Conclusion

The DNA marker test for polled genes provides producers with a powerful new tool for making selection decisions. Producers weighing up the value of DNA marker tests for polled genes in their herds need to weigh the cost of testing against the expected proportion of ambiguous results for their breed.

## Further information

### Full Technical Report:

<http://www.beefcrc.com.au/Assets/785/1/PollGeneTechnicalReport27-6-11.pdf>

### Beef CRC website:

<http://www.beefcrc.com.au/PolledGeneMarkerTest>

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