

RECESSIVE GENETIC CONDITIONS

INFORMATION FOR BULL BUYERS

This is information for bull buyers about the undesirable genetic conditions, Arthrogryposis Multiplex (AM), Neuropathic Hydrocephalus (NH) and Contractural Arachnodactyly (CA).

PUTTING UNDESIRABLE GENETIC RECESSIVE CONDITIONS IN PERSPECTIVE

All breeds of cattle, in fact all mammals including humans, have undesirable genetic conditions. Fortunately, advances in molecular genetics have facilitated the development of DNA tests for their management. Angus Australia is at the forefront of development of strategies to manage undesirable genetic conditions and Angus members are leading the industry with their uptake of this technology.

KEY POINT:

With today's DNA tools undesirable genetic conditions can be managed!

WHAT ARE AM, NH AND CA?

Arthrogryposis means 'curved or hooked joints'. Multiplex indicates there are multiple abnormalities associated with the condition. Animals with the NH condition have a large head. Both AM and NH affected calves are not born alive. Whilst; calves affected by CA are born alive and can reproduce, muscle contractures restrict the movement of joints, particularly in the hind legs. Abnormal muscle contracture decreases dramatically as a calf ages, while muscle development always remains poor.

KEY POINT:

The number of reported observations of AM, NH and CA calves is very low and there is certainly no need for panic.

HOW ARE THE CONDITIONS INHERITED?

Research in the U.S. and Australia indicates that AM, NH and CA are simply inherited recessive conditions. This means that a single pair of genes controls the condition. For this mode of inheritance two copies of the undesirable gene need to be present before the condition is seen; in which case you may get an abnormal calf. A more common example of a trait with a simple recessive pattern of inheritance is black and red coat colour.

Animals with only one copy of the undesirable gene (and one copy of the normal form of the gene) appear normal and are known as "carriers".

WHAT HAPPENS WHEN CARRIERS ARE MATED TO OTHER ANIMALS?

Carriers, will on average, pass the undesirable gene form to a random half (50 %) of their progeny.

When a carrier bull and carrier cow is mated, there should be a 25% chance that the progeny produced will have two normal genes. There should be a 50% chance that the mating will produce a carrier. However, there could be a 25% chance that the progeny have two copies of the undesirable gene.

If animals tested free of the undesirable gene are mated to carrier animals the condition will not be expressed at all. All calves will appear normal, but approximately half (50%) could be expected to be carriers.

KEY POINT:

For the condition to be expressed the undesirable gene needs to be present on both sides of the pedigree and both the sire and dam need to be a carrier.





HOW IS THE GENETIC STATUS OF ANIMALS REPORTED?

A DNA-based test has been developed that can be used to determine whether an animal is a carrier or free of the AM, NH or CA gene.

Angus Australia uses advanced software to calculate the probability of (untested) animals to being carriers of AM, NH or CA. The software uses the test results of any relatives in the calculations and the probabilities may change as new results for additional animals become available.

The genetic status of animals is being reported using five categories:

AMF	Tested AM free
AMFU	Based on pedigree AM free – Animal has not been tested
AM_%	_% probability the animal is an AM carrier
AMC	Tested AM-Carrier
AMA	AM-Affected

For NH and CA, simply replace AM in the above table with NH or CA.

Registration certificates and the Angus Australia web-database display these codes. This information is displayed on the animal details page and can be accessed by conducting an "Animal Search" from the Angus website or looking up individual animals listed for sale in a sale catalogue.

KEY POINT:

The genetic status of an animal is subject to change and will be reanalysed and adjusted each week as DNA test results of relatives are received.

IMPLICATIONS FOR COMMERCIAL PRODUCERS

Your decision on what genetic condition statuses are acceptable will depend on the genetics of your cow herd (which bulls you previously used), whether you have a straightbreeding or crossbreeding enterprise and whether some female progeny will be retained or sold as breeders.

Angus Australia seedstock breeders are being proactive and transparent in managing these genetic conditions, endeavouring to provide the best information available. The greatest risk to the commercial sector from undesirable genetic recessive conditions comes from unregistered bulls with unknown genetic background. The DNA testing that Angus Australia seedstock producers are investing in provides buyers of registered Angus bulls with unmatched quality assurance.

FURTHER INFORMATION

For further information contact our Breed Development Manager at Angus Australia.

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