

American Angus Association®

Myostatin nt821 Gene Deletion (M1)

Fact Sheet

ANGUS
THE BUSINESS BREED

The following fact sheet was developed to respond to questions commonly asked by American Angus Association members. Additional information may be found online at www.angus.org.

What is Myostatin nt821 gene deletion (M1)?

M1 was recognized as a strain of double muscling on June 20, 2011. Animals are extremely heavily muscled in appearance, including abnormally large, wide and rounded rump and thighs with prominent creases between muscle groups. There is usually little covering fat, and bones are thin.



What causes M1?

M1 is caused by a recessive mutation on a single cattle chromosome. Cattle that are homozygous for the mutated gene will exhibit M1.

What is a M1 carrier?

For the purpose of this response, a M1 carrier is an Angus or Angus-cross cow, heifer, bull or steer that carries the recessive M1 mutation in their DNA.

Why are carriers of M1 important?

Carriers of M1 used in breeding programs (registered or commercial) are responsible for propagating the recessive mutation within the cattle population.

What does a M1 carrier look like?

A M1 carrier looks perfectly normal; there is nothing in the way an animal looks (its phenotype) that indicates that the animal is a carrier of the M1 mutation.

If a cow has a M1 calf, what does that mean?

If a cow has a M1 calf, and if it is the cow's natural calf, it means that the cow is a carrier of the M1 mutation and the sire of the calf is also a M1 carrier.

If a recipient cow has a M1 calf, what does that mean?

If a recipient cow has an M1 calf, it means only that both the donor cow and the sire of the calf are carriers of the M1 mutation. It doesn't tell you anything about the M1 carrier status of the recipient cow.

If a bull sires a M1 calf, what does that mean?

If a bull sires a M1 calf, it means that the bull is a carrier of the M1 mutation and that the dam of the calf is also a M1 carrier.

I have never had a M1 calf. Does that mean my cows are non-carriers?

Not necessarily.

What is the risk of having a M1 calf if I breed a M1 carrier cow to a M1 carrier bull?

Every time you breed a carrier to a carrier, there is:

- A 25% risk of having an affected M1 calf;
- A 50% risk of having an otherwise normal-appearing calf that carries the M1 mutation;
- A 25% chance that you will have a normal-appearing, non-carrier calf.

If I breed a M1 carrier cow to a M1 carrier bull and have three live calves, will the fourth calf have M1?

The risk is the same every time you breed a carrier to a carrier. There is always a 25% risk of having an affected M1 calf, a 50% risk of having a carrier calf, and a 25% chance of having a non-carrier calf.

If I breed a M1 carrier cow to a non-carrier bull, what is the chance of having a M1 affected calf?

Zero. You will never have a M1 affected calf if you breed a carrier cow to a non-carrier bull. (excluding the possibility of a spontaneous mutation)

If I breed a M1 carrier cow to a non-carrier bull, what is the risk of having a carrier calf?

Every time you breed a carrier cow to a non-carrier bull there is:

- A 50% risk of having a normal-appearing calf that carries the M1 mutation; and
- A 50% chance you will have a non-carrier calf.

Is there a test to identify M1 carriers?

Yes. A DNA test is available to determine if an animal carries the M1 mutation in their DNA. The type of DNA sample required to perform the test varies from lab to lab but includes; hair root samples, blood-spot or FTA cards, whole blood in "purple-top" tubes, tissue samples from ears and semen samples.

A video on www.angus.org explaining how to collect the sample can be found [here](#).

What do I do with the confirmed non-carrier females in my herd?

If the females are tested non-carriers and they are bred to non-carrier bulls, they will never produce affected M1 calves or carriers. These non-carrier females can be used throughout your breeding program with no risk of propagating the M1 mutation.

What do I do with confirmed female carriers in my herd?

You have several options:

- If you have a cow that carries the M1 mutation and you want to produce calves from her; you may want to test all offspring retained for breeding; (testing not a requirement for registration)
- If you have both a registered and a commercial herd, retain your carrier cows in the commercial herd, breed to a non-carrier bull, and test any calves retained for breeding purposes;
- If you always breed your carrier cows to a non-carrier bull, you will never have a M1 calf. Then, treat the resulting calves as market animals, not as breeding stock.
- Use your M1 carrier cows as ET recipients. As a recipient female, she has no genetic effect on the embryo calf she raises.

M1 potential carrier report & potential carrier management tool

AAA Login users can access interactive tools to generate a report of owned animals and their Myostatin nt821 gene deletion (M1) status based on the M1 test results received to date. From the AAA Login menu, go to the "interactive" section and click on "Potential Carrier Report AM/NH/CA/DD/M1/D2" or "Potential Carrier Management Tool (PCMT)." The PCMT can identify those animals in your herd that have the most descendants in your herd and would be the most logical animal to start a testing scheme should you decide to test for a particular genetic condition. If you are not a current AAA Login user, you can sign up to create an online profile at www.angusonline.org.

What is the AAA registration policy regarding M1?

	One or both parents test M1C (confirmed carriers)
Heifers	No test required.
Bulls	No test required.
E.T. Calves	No test required.
Steers	No test required.
A.I. Sires that are confirmed carriers	No restrictions.
Definitions	M1C - M1 Carrier, has been tested and carries the M1 mutation. M1F - M1 Free, has been tested and does not carry the M1 mutation. M1P – M1Potential Carrier, animal that traces to one or more confirmed tested carrier animals in its pedigree that have no intervening ancestors that have been tested free of M1.

Two Testing Options

1. Submit Samples through American Angus Association/AGI

Use [AAA Login](#) to order test. Samples are submitted to the American Angus Association and archived for future testing requests. Login at www.angusonline.org and use menu option: Order--Testing for AM/NH/CA/DD/D2/M1.



2. Additional Authorized Lab for Myostatin nt821 Gene Deletion (M1) Testing

Below is the lab currently authorized for M1 testing by the American Angus Association. Consult the lab web site for information on DNA preferred sample types, sample submission forms, pricing information and complete instructions on how and where to submit samples for testing. In choosing a lab, members of the Association are urged to read and carefully consider any language on a given lab's submission form (for the M1 test) or on its accompanying "Terms and Conditions" that relates to any lab's alternative use of the DNA samples being submitted.

The following lab is authorized for M1:

GeneSeek

4131 N. 48th St.
Lincoln NE 68504
402-435-0665
Fax: 402-435-0664
www.geneseek.com