

Test for Homozygous Belting

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Belting is generally considered to be caused by a single, autosomal, dominant gene. Thus any individual belted animal could be either homozygous belted (i.e. have two belted genes) or heterozygous belted (i.e. have one belted gene). However, only homozygous belted animals will 'breed true' and produce only belted progeny. Homozygosity and heterozygosity can not be differentiated by pedigree, visual inspection, or laboratory test. Only a breeding test to non-belted mates can indicate whether the animal is homozygous or heterozygous belted.

A breeding test can never 100% prove that an animal is homozygous for a dominant characteristic. It is always possible for an animal to be heterozygous but for the recessive allele not to have been inherited by, and thus expressed in, any test animals. (All genetic information is paired. The allele is the second gene of the pair.) Nevertheless, two recessive genes will, when paired, produce the recessive characteristic- In this case that would be non-belted animals. It is, however, possible to be fairly certain of homozygosity and to assign a relative value to that certainty.

On the other hand, it is usually possible to prove heterozygosity for a dominant characteristic. The birth of even one offspring without the dominant characteristic usually indicates heterozygosity in the test parent. This is not the case, however, with belting. Belting appears to be influenced by modifying factors that cause 'incomplete belts'. The number of factors involved, their mode of action, and their inheritance are unknown. There is some evidence that it is possible for an animal that appears not to have a belt to actually be genetically belted but have extreme modification. Such animals could be said to have extremely incomplete belts. Thus, even homozygous belted animals can produce some offspring that appear not to be belted because of modifying factors.

Belt modifiers could be more readily expressed when there is only one belting gene, i.e. when an animal is heterozygous belted. All test progeny produced in a homozygosity test will at best be heterozygous belted. Thus it is possible for there to be a high percentage of progeny 'with 'incomplete-belts' in a homozygosity test.

Note that the birth of only 'complete-belts' in a test for belted homozygosity does not indicate that the test animal is 'modifier-free'. The modifiers are probably recessive. Thus the modifier probably has to be present in both the sire and dam to be expressed in any offspring. The modifiers might be present in the Belted Galloway tested but not present in the non-belted mates of a homozygosity test.

Only the birth of only belted progeny in the following test indicates anything. And the birth of only belted progeny only indicates the probability of homozygosity for the belting gene:

1.) The test shall be open to all cattle registered in the herd book or an appendix to the herd book of any participating Belted Galloway registry.

2.) All costs involved in a test shall be the responsibility of the owner(s) of the animal(s) tested.

3.) The owner(s) of animal(s) to be officially tested shall notify the appropriate Belted Galloway registry of their intention to test before any official test calves are born. In the event that a test should take more than one season to complete, the appropriate registry shall be notified before the birth of each calf crop.

4.) Notification of intention to test shall identify the Belted Galloway(s) to be tested and the individual test mates, and shall specify the exposure or breeding dates.

5.) All matings used in a test must involve one parent with no belted ancestry. (Note that Belted Galloways are not the only source of the belted characteristic.)

6.) All sires and dams involved in a test must be of known parentage and must be permanently, individual identified.

7.) The use of artificial insemination and embryo transplant is permitted.

8.) The results of all matings in a test must be accounted for and verified by an accredited veterinarian, or other persons sanctioned by the participating Belted Galloway registry, before the test progeny are weaned.

9.) The birth of one or more 'non-belted' progeny in a test shall not be considered proof of heterozygosity for the belting factor and shall not effect the registration status of the animal tested. However, the birth of any 'non-belted' progeny shall disqualify the animal tested from being recognized by any registry as homozygous.

10.) Initiation of a test, failure to complete a test, and/or failure to attain recognition levels of verification shall not be publicized by the registry without the express written permission of the owner(s) of the animal(s) tested. However, such information shall not be considered to be privileged and will be available to any member-in-good-standing on written request.

11.) The Belted Galloway registry reserves the right to request the verification of parentage of any test progeny.

12.) The Belted Galloway registry reserves the right to refuse to sanction a test for homozygosity planned by any owner who is not a member-in-good-

standing or who has failed to account for the results of all matings in a previous test.

13.) Every Belted Galloway achieving a greater than specified percentage verification shall be recognized by the registry with an appropriate certificate denoting the exact percentage verification of homozygosity.

14.) Verification of homozygosity shall be expressed as a percentage to two decimal places and shall not be rounded off upward.

15.) The birth of only belted progeny in a test shall be considered evidence of homozygosity in the following manner:

Number of progeny (all of which are belted) from 'belt' X 'no-belt' matings	Percentage verification for homozygosity of the belted characteristic
1	50.00%
2	75.00%
3	87.50%
4	93.75%
5	96.87%
6	98.43%
7	99.21%
8	98.60%
9	99.80%
10	99.90%
11	99.95%
12	99.97%
13	99.98%
14	99.99%
15	99.99%
16	99.99%
17	99.99%
18	99.99%
19	99.99%
20	99.99%
<i>ad infinitum</i>	<i>ad infinitum</i>

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