



Description:

Chondrodysplasia is a form of dwarfism caused by the dominant allele of the ACAN gene. A Dexter with one chondrodysplasia allele is called a carrier. Carriers are typically shorter than non-carriers. A fetus that inherits two chondrodysplasia alleles will not live. These highly affected calves are called bulldog calves because of their “bulldog” appearance. It is not always possible, however, to distinguish a carrier from a non-carrier by visual inspection since a general characteristic of Dexter cattle is shorter stature. Therefore, a genetic test is necessary to be sure of a Dexter’s chondrodysplasia status if it comes from a non-tested pedigree.

Typical terms to describe a chondrodysplastic Dexter are short-legged, shorty, chondro-positive, and chondro-carrier. Typical terms to describe a non-carrier of chondrodysplasia are long-legged, chondro-free, non-chondro, and non-carrier. However, the only terms officially accepted for use by the ADCA are chondro-carrier or chondro non-carrier.

Some breeders of chondro-carriers have a special attachment to the carrier animals. Sometimes this is just because of an individual animal, but for some it’s due to the historical factor of the phenotype within the breed.

History:

The characteristics of chondrodysplasia seem to be described very early in the formation of the Dexter breed: short round bodies with a noticeable shortening of the leg bone from the knee and hock to the hooves. An early Kerry and Dexter herd book has some descriptions of the history of Dexter cattle that includes this type of description.

In the Royal Dublin Society Herd Book #1 Preface, September 1890, Richard J. Moss presents a discussion of the history of the special mountain cattle in the Kerry region of Ireland. He is disappointed that little care has been taken to preserve the exceptional milk and beef production of these hardy bovines. Mr. Moss did note, however, an exception:

“A few honourable exceptions, however, exist to this general neglect of the mountain dairy breed of Ireland. One attempt had succeeded to such a degree as to form a new breed, which partially exists with the characters communicated to it. It has been termed the Dexter Breed.

It was formed by the late Mr. Dexter, agent to the Maude Lord Hawarden. This gentleman is said to have produced this curious breed by selection from the best of the mountain cattle of the district. He communicated to it a remarkable roundness of form and shortness of legs.

The steps, however, by which this improvement was effected, have not been sufficiently recorded; and some doubt may exist whether the original was the pure Kerry, or some other breed proper to the central parts of Ireland now unknown, or whether some foreign blood, as the Dutch, was not mixed with the native race.

One character of the Dexter breed is frequently observed in certain cattle of Ireland, namely, short legs, and a small space from the knee and hock to the hoofs. This has probably given rise to the saying sometimes heard of, ‘Tipperary beef down to the heels.’

However the Dexter breed has been formed, it still retains its name, and the roundness and depth of carcass which distinguished it. When any individual of a Kerry drove appears remarkably round and short-legged, it is common for the country people to call it a Dexter.”

Genetics:

Chondrodysplasia is caused by the action of the mutated ACAN gene that is located on chromosome 21. There have been several different chondrodysplasia genes discovered in several different cattle breeds and two distinct chondrodysplasia mutations found in Dexter cattle. The most common mutation is BD1 and is the mutation found in Dexter cattle in the United States. The second mutation, BD2, has been traced to a single bull’s lineage in Australia.

The ACAN gene codes for the production of the aggrecan protein, a major protein in cartilage. Cartilage is a tough, flexible tissue that makes up most of an animal’s skeleton during early development. As an animal matures from fetus to adulthood, most of the cartilage is converted to bone. However, some cartilage remains in a mature animal’s body between bones and in flexible body parts like the nose, ears, and airways. The normal recessive ACAN allele provides the normal instructions for making the aggrecan protein to produce normal cartilage. The mutated dominant ACAN allele interrupts the typical function of aggrecan’s role in cartilage and bone production. This interruption results in animals with shorter limbs, especially noticeable in the cannon (lower leg) bone.



The degree to which the cartilage is affected varies among individual animals and can include lower legs, faces, noses, and airways. Scientists do not currently have an explanation for these differences. There is anecdotal evidence that some chondro-carriers develop arthritis at a younger age than non-carriers.

Because the chondrodysplasia allele is dominant, an animal that receives one copy of it is affected. So a chondrodysplastic Dexter has one normal allele and one mutated allele. This animal will be heterozygous for chondrodysplasia.

Responsible Breeding With Chondrodysplasia:

A calf that receives two copies of the chondrodysplasia allele, one from each of its heterozygous carrier parents, will not survive. This type of calf is typically called a bulldog calf because of its appearance. These calves are very often aborted short of full gestation. Breeding two carriers together affords a 25% chance of a bulldog calf, a 50% chance of a chondro-carrier, and 25% chance of a non-carrier. It is, therefore, considered **strongly inadvisable** to breed two chondro-carriers together due to the risk of producing a bulldog calf.

However, breeding a tested non-carrier with a tested chondro-carrier will never produce a bulldog calf, and this is responsible breeding practice. With this type of pairing, there is a 50% chance of producing a carrier, 50% chance of producing a non-carrier, and 0% chance of producing a non-viable bulldog calf. Breeding two tested chondro non-carrier animals will never result in a bulldog calf or a carrier offspring.

Genetic Testing:

Both ADCA-approved labs offer testing for chondrodysplasia. There have been two distinct chondrodysplasia mutations found in Dexter cattle. The most common mutation is BD1 and is the mutation found in Dexter cattle in the United States.