

This is the third in a series of articles designed to acquaint Angus breeders with genetic defects, problems which occur in every breed of every species.

OSTEOPETROSIS Marble Bone Disease

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Osteopetrosis is a lethal genetic disease that affects the bones of growing fetuses. Abnormally solid bones and lack of bone marrow cavity associated with the disease have led to the more common name "marble bone disease."

Marble bone has been reported in Angus and Hereford cattle. Many features of the cattle disease are similar to inherited osteopetrosis in human babies.

Marble bone is caused by a simple recessive gene that is present at a low level in U.S. Angus cattle today. Although genetic defects can't be eliminated, Angus breeders already have proven that marble bone can be easily controlled.

In the early 1970s, as many as 150 cases of marble bone per year were seen in Angus cattle. But by 1976, only two cases were reported. This shows that it can be easily controlled and kept at an insignificant level when cases are properly diagnosed and reported, breeders are informed and carrier bulls are eliminated from the industry.

Most Dynamic Tissue.

Bone is the most dynamic tissue in the body. Shape, size and maintenance of normal bone involve almost daily turnover of tissue—it's growing and changing constantly. A finely tuned balance of continuous formation and removal of bone tissue is maintained in normal animals. If this balance is disturbed, disease results.

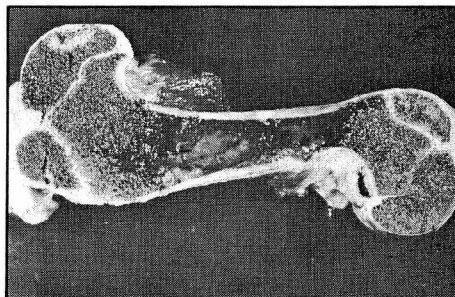
During normal fetal development, a cartilage precursor is laid down, then it's changed to bone. This bone is resorbed and remodeled, and the bone marrow cavity is formed in the center of the bone. (Bone marrow is a soft fatty substance involved in renewal of the blood supply.)

In marble bone cases, the first bone formed in the fetus is retained. New bone tissue is continually formed, but old tissue isn't removed. It isn't remodeled or strengthened, and cavities for bone marrow aren't carved out. Instead, the bone is solid. Contrary to expectations, these solid bones are weak and brittle, and they'll break easily

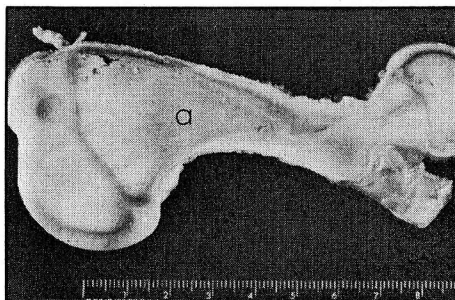
because they're filled with an immature mixture of cartilage and primitive bone. The disease may affect the entire skeletal system.

Subtle Killer

Marble bone disease is a subtle killer that often goes undetected and can pass unknown from generation to generation. In fact, it's probably been around for a long



TOP: Section of normal bone. BOTTOM: Bone affected by marble bone disease. Note the lack of bone marrow cavity (a) in the diseased portion. Photo courtesy of Kansas State University Pathology Dept.



time without being recognized as a genetic disorder.

"I think osteopetrosis is far more dangerous than mule foot, for instance, because it is more insidious," Dr. Horst Leipold, D.V.M., contends. That's because breeders usually see and recognize defects such as mule foot, while marble bone calves often are simply labeled abortions, and infectious disease or environmental problems (which are much more common)

are thought to be the cause.

Affected calves are born between 251-272 days of gestation and are born dead or die shortly after birth. The only outward signs of marble bone are small size (usually 30-70 lb.), a short lower jaw, a protruding tongue and impacted molar teeth. Also, since the remodeling process (which plays a role in changing the shape of bones) is deficient, the bones which house the brain are misshapen and small, and the brain is flattened and compressed, with abnormal mineral deposits that slow vital body functions and probably cause death. Calves may have a soft spot on their foreheads where the skull bones fail to unite.

However, these signs are hard to detect in small calves. Plus many aborted calves are not carefully examined and, in some cases, are never even found. A good share of marble bone cases probably go undetected.

Inspect All Aborted Calves

All aborted calves should be closely inspected and, if any of these signs are present, the calf should be sent to a diagnostic lab. Ideally, the whole calf should be sent, but the head and one leg will suffice. If there will be a delay in sending the calf, it should be frozen.

Even examination by a veterinarian or diagnostician hasn't proven 100% effective in pinpointing marble bone cases. Infectious diseases and environmental problems are so much more common that the doctor usually isn't looking for the genetic defect. A routine necropsy won't reveal marble bone affliction, because the outer part of affected bones appears normal. The genetic problem can be verified only by splitting a long bone (such as the leg bone), and that's not part of a standard necropsy.

To help assure correct diagnosis, breeders should alert the examining vet if marble bone is suspected. Sire and dam pedigree information also should be supplied to help determine whether the calf's ancestry involved any reported genetic defects. 