This is the second in a series of articles designed to acquaint Angus breeders with genetic defects, problems which occur in every breed of every species. The better we understand genetic defects, the better we can control them.

Inherited hydrocephalus has caused substantial losses in some cattle breeds. Although the genetic form of the disease hasn't been reported in Angus cattle, hydrocephalus has occurred in the breed because of environmental factors and in association with other diseases.

HYDROCEPHALUS

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Hydrocephalus is the most common and best documented central nervous system defect of cattle. The disease affects virtually all major breeds of beef and dairy cattle as well as humans and other animals.

Hydrocephalus involves the build-up of excess fluid in the brain. This fluid causes the ventricles (cavities) of the brain to swell, reduces or thins the brain tissue and sometimes causes the bones of the head to separate. (See photo.)

Inherited hydrocephalus has not been documented in Angus cattle. It is a problem in some other major breeds, though, and has caused substantial losses in some Hereford herds. The defective gene is passed along as a simple autosomal recessive trait, causing the brain to develop wrong during gestation. This is called primary hydrocephalus.

Genetics is only part of the story, however. Hydrocephalus also occurs as a secondary result of environmental factors, other abnormalities or other inherited defects. Angus calves have had the disease as a result of cysts, tumors or other blockages in various parts of the central nervous system (CNS), associated with meningitis (inflammation of the membranes of the brain and spinal cord) and as a secondary problem to the inherited defect mannosidosis.

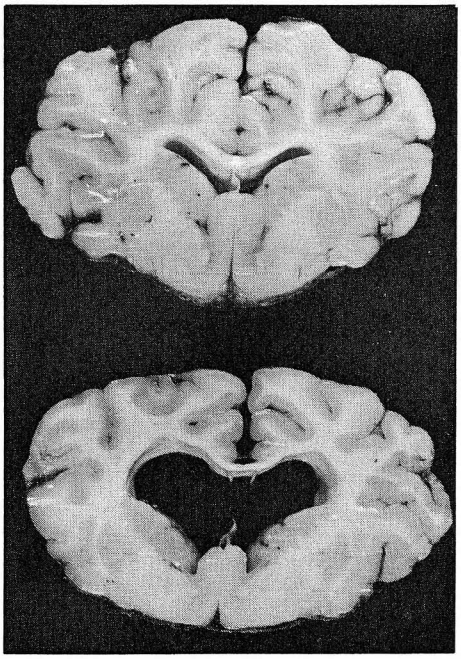
Fluid Build-Up

The CNS includes the brain and spinal cord. A network of blood vessels in the brain secretes a clear fluid called CSF (central nervous system fluid) which surrounds and permeates the entire CNS, supporting, protecting and nourishing it. By secretion and absorption of CSF, these vessels regulate the pressure in the brain. In normal animals, the CSF flows from inside of the brain (ventricles) and is resorbed outside of the brain into the venous system.

Most hydrocephalus cases result from obstruction of the fluid flow somewhere along its pathway—the fluid can't excape from the brain and accumulates there. Also, over-production of CSF or inadequate resorption can lead to hydrocephalus.

The excess fluid occupies space normally taken up by brain tissue, causing the brain to be under-developed. The cerebellum often is reduced to nearly half of its normal size.

Hydrocephalus varies considerably in how much and what parts of the brain are affected. It may be external, with the fluid accumulating in the space around the brain; internal, with the fluid contained in the ventricular system; or it may be present in both locations.



This photo provided by Kansas State University's College of Veterinary Medicine illustrates the difference between a normal brain (top) and an abnormal brain (bottom) affected with hydrocephalus.

Enlarged Heads

Hydrocephalic calves usually are aborted during later gestation, are stillborn or die shortly after birth. They're generally small, with enlarged and sometimes dome-shaped heads, and swollen protruding tongues.

Facial muscles are small and irregular in size, and facial features are refined and narrow. Eyes and optic nerves are small. Most major skeletal muscles are affected—especially the thigh muscles—and they're soft, pale and spongy. Other abnormalities associated with hydrocephalus include cleft palate, eye problems and heart defects.

Some calves may live a short time, but they're usually weak and retarded. They often elicit a characteristic bawl and have been labeled "bawlers."

If hydrocephalus is acquired later in life, an animal may exhibit depression, incoordination, abnormal responses, paralysis, prostration and sometimes convulsions. They frequently lose their vision.

But even with these characteristic signs, hydrocephalic calves aren't always easily recognized. Calves that exhibit any of the symptoms listed should be taken to a vet, who should remove the brain and send it to a diagnostic lab for further study. It's important to get a careful necropsy to accurately diagnose and determine the cause of the condition.

Discovered Long Ago

Hydrocephalus is not a new disease. It was originally documented in man in 1514. It was first described as a lethal defect of cattle in 1959 when an outcross bull was introduced into a previously closed herd at the New Mexico Agricultural Experiment Station.

Figures indicated that 15.4 per 10,000 calves born in the United States in 1970 were affected with this disease. In 1973, one researcher reported that slightly more than 12% of 1,275 congenital defects (defects present at birth) of calves born in 588 herds over a 2-year period involved the CNS, and 63% of those were hydrocephalic. Most of the affected calves in that study were Herefords.

These figures compare to a 1974 report of 14-17 humans affected per 10,000 births.

Causes of hydrocephalus other than genetics aren't fully defined or understood. Viral agents may well play an important role in causing the disease, but the only virus confirmed as a culprit is BVD-MD (bovine viral diarrhea-mucosal disease).

Current research at Kansas State University involves studies to classify, understand and develop guidelines for diagnosis of the various types and causes of hydrocephalus.