

POLLED, HORNED, SCURRED REVISITED
By Sally Buxkemper

Two long term breeding projects at Texas A&M University, the Angleton Project, which was the basis for the NCBA sponsored Carcass Merit Project, now completed, and the ongoing McGregor Genomics Project (<http://animalscience.tamu.edu/ansc/Genetics/mcgregor/mcgregor.htm>) have given animal scientists the ability to collect phenotypes and genotypes for many important production traits. Since Angus and Brahman or Nellore cattle were used in both projects and they are divergent in the Polled trait, studies of the inheritance of Polled, Horned, and Scurred are also being done.

The Polled gene has been located to an area close to the centromere of bovine chromosome 1. Dr. Clare Gill has sequenced this whole area without discovering a specific protein encoding gene that could be "Polled". However there are good polymorphic markers in the area that make it possible to DNA test animals to see if they are homozygous or heterozygous polled. This Polled gene makes animals polled whether they are *Bos taurus*, or *Bos indicus*. It is dominant to the Horned condition so an animal only needs to be heterozygous to express the phenotype (be polled).

It has been known for a long time that there is another gene operating separately that causes a polled animal to have scurs. It was theorized that still another gene only present in animals with some *Bos indicus* breeding caused a condition called African Horn. Both Scur and "African Horn" have a special component in that it only takes one copy of the gene to produce scurs or "African Horn" in males but two copies (homozygous) are necessary for a female to have scurs or "African Horn."

With the physical and DNA data, including dissection of the horn or scur at slaughter, the McGregor research team now think that the Scur and African Horn are the same gene and it is located somewhere else in the genome (not chromosome 1 or 19) and that it may be influenced by a gene or control mechanism on the Y chromosome. Scurs come in different shapes and sizes just like horns do so there are some modifying genes affecting the expression. Horns always have a cavity or sinus both in the horn and the skull. Scurs are solid and do not have this sinus or it is very small. Sometimes it is difficult in a live animal to distinguish between true horns and large scurs but usually there is a difference in the shape of the head and scurs are usually not firmly attached to the skull especially in a young animal.

A useful observance is that if you get a smooth polled bull from a scurred cow and a polled (smooth or scurred) sire, that bull progeny is homozygous polled. In other words, homozygous polled masks the scur.

The F2 generation at McGregor is also producing many other interesting phenotypes including color, and disposition. Even though the primary interest is in identifying genes that affect economically important traits that may be hard to measure, the understanding of Polled could lead to a better understanding of how genes operate.