

Understanding the Scurred condition in Polled Cattle

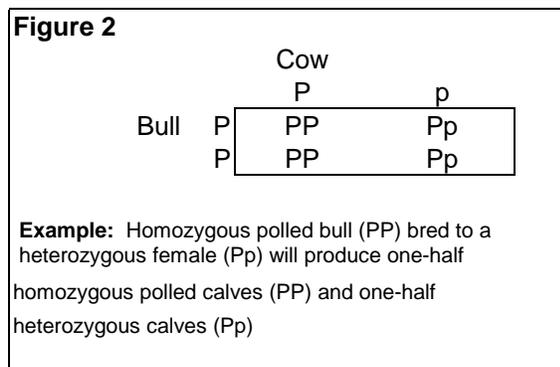
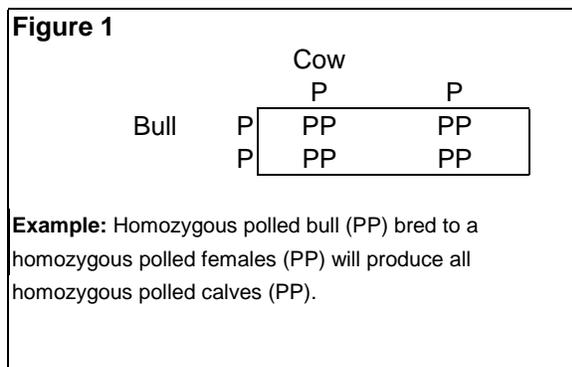
Most calves that are horned can be identified at birth or shortly after, and almost always by weaning time. Distinguishing between smooth-polled and scurred-polled is more difficult. Scurs, a rudimentary horn growth, are often not seen until cattle are nearly a year old or sometimes even older. Scurs are usually blunt and rounded at the end, short for their diameter, and attached only to the skin. Occasionally the scur will become solidly attached to the skull, particularly on bulls, when they are several years old. Scurred cattle should be classified as polled since they do have a polled gene. Only polled animals can express the scurred trait.

To understand the inheritance of the scurred trait, we must first take a look at the genetics involved in the inheritance of the horned/polled trait. The polled or horned condition in European cattle is determined by one set of genes. (A different type of inheritance occurs in cattle of Zebu breeding). The polled gene is dominant in expression to the horned gene. All cattle have two genes for the polled-horned trait. This allows three genetic combinations: animals with both genes for polled, called homozygous polled (PP); animals with one gene for polled and one for horned, called heterozygous (Pp); and those that have two genes for horns, also called homozygous (pp). Since polled is dominant to horned, the heterozygous animal (one gene for polled and one for horned) will be polled. The polled gene will dominate the horned gene and be expressed. Therefore, the homozygous polled and the heterozygous animals will both be polled. Only ones homozygous for horns (having two genes for horns) will be horned.

When a bull produces a sperm or a cow produces an egg, one gene from each pair of genes is passed on to the sperm or egg. At fertilization the pair of genes is re-established, one from the bull and one from the cow.

A homozygous animal has only one type of gene to pass on so all sperm or eggs will receive the same gene. A heterozygous animal has both a gene for polled and one for horned. Half of the time the polled gene will be passed on and half of the time the horned gene will be passed on.

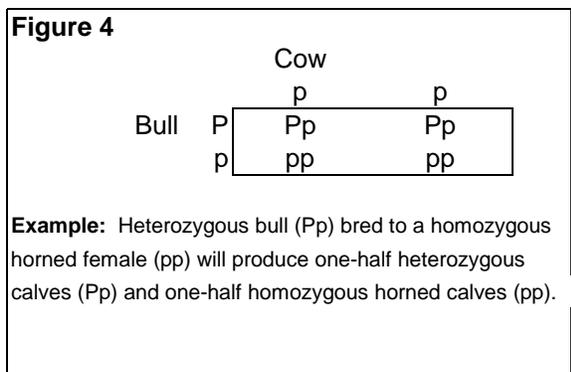
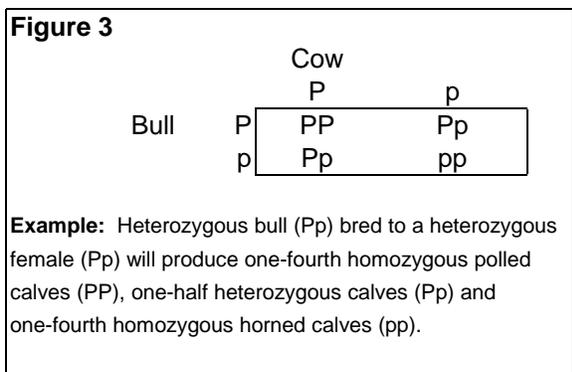
If both parents are homozygous polled the only genes the sperm and egg can receive are the polled gene so the offspring would always be homozygous polled (figure 1).



When one of the parents is homozygous polled and one is heterozygous, the homozygous parent will always pass on a gene for polled. But half of the calves will receive a gene for polled and half the gene for horned from the heterozygous parent. Therefore half of the calves would be homozygous polled and half would be heterozygous (figure 2).

When both parents are heterozygous polled you would expect a fourth of the calves to receive a gene for polled from both parents and be homozygous polled. Half of the calves will receive one gene for polled and one gene for horned and be heterozygous, and a fourth of the calves would receive a gene for horned from both parents and would be horned (figure 3).

When a heterozygous animal is mated to a horned animal you expect half of the calves to be heterozygous and half to be homozygous horned (figure 4).



The story on scurs

Some polled cattle have scurs. Scurs are incompletely developed horns that are generally attached only to the skin. They range in size from tiny scab-like growths to large protrusions almost as large as horns. Therefore, polled cattle can be smooth-polled or scurred-polled (polled but expressing scurs). Many breeders have the mistaken idea that scurs represent an error in transmitting the horned characteristic. That's not the case.

Scurs are genetically transmitted, but the mode of transmission is different from the polled gene. In males, the gene for scurs is dominant. So if a bull has scurs, he might be either heterozygous (Ss) or homozygous (SS) for the scurred condition. In females the genes for scurs is recessive. Only SS cows will be scurred. Ss and Ss cows will be smooth polled.

Scurs can only be seen in polled cattle. In horned cattle, the horn hides the scurred condition. So you can't evaluate the scurred condition in horned cattle. Not all polled cattle are free of scurs, it appears that only cattle that are heterozygous for the polled/horned genes (Pp) will express the scurred trait. Which means that both homozygous horned and polled animals will be free of scurs.

If a scurred cow (she would be heterozygous for the horned/polled gene (Pp) and homozygous for the scurred gene (SS) is mated to a homozygous smooth polled bull (PPss) all of the heterozygous polled

bull calves (PpSs) should be scurred. The bull calves that are not scurred should be homozygous polled. All females in this example would be smooth-polled but would carry one dominant gene for the scurred trait. All the calves of both sexes would be either smooth polled or scurred/ polled because they would all receive a dominant gene for polled from the bull (figure 5).

Figure 5

		Cow			
		PS	PS	pS	pS
Bull	Ps	Smooth Bull Smooth Female PPSs	PPSs	Scurred Bull Smooth Female PpSs	PpSs

Example: Homozygous smooth-polled bull (PPss) bred to a heterozygous scurred female (PsSS). Heterozygous polled bull calves will be scurred, homozygous polled bull calves will not be scurred. All females will be smooth-polled.

Note: Because the bull is homozygous smooth-polled he will only pass on one genetic combination.

If a heterozygous scurred female (PpSs) is bred to a heterozygous scurred bull (PpSs), all homozygous polled calves will not have scurs. All homozygous horned calves will not have scurs. The only scurred female will be heterozygous for the polled/horned trait and homozygous for scurs (PPSS) (figure 6).

Figure 6

		Cow			
		PS	P _s	pS	p _s
Bull	PS	Smooth Bull Smooth Female PPSS	Smooth Bull Smooth Female PPSs	Scurred Bull Scurred Female PpSS	Scurred Bull Smooth Female PpSs
	P _s		Smooth Bull Smooth Female PPss		Smooth Bull Smooth Female Ppss
	pS			Horned Bull Horned Female ppSS	Horned Bull Horned Female ppSs
	p _s				Horned Bull Horned Female ppss

Example: Heterozygous scurred bull (PpSs) bred to a heterozygous scurred female (PpSs). All homozygous polled calves will not have scurs. All homozygous horned calves will not have scurs. The only scurred female will be heterozygous for the polled/horned trait and homozygous for scurs (pPSS).

Note: All empty boxes represent genetic combinations already listed.

To emphasize the difference between scurs and horns, cattle should be classified as smooth-polled, scurred-polled or horned. Remember that all smooth-polled and scurred polled cattle have at least one gene for the polled condition. However, horned cattle can never carry a polled gene.

It is probably easiest for breeders interested in polled cattle to ignore the scur trait except that this is an indicator that the animal is heterozygous for the horned-polled gene. Efforts should be concentrated on the polled gene. When the herd becomes homozygous polled there should no longer be scurred animals.

Polled bulls or cows can be tested through matings to determine if they are heterozygous or homozygous polled. Only animals that have two polled parents (often called double polled) can be homozygous polled, if one parent is horned you know the animal is heterozygous. Mating the polled animal to horned individuals requires the least number of matings. If the polled animal ever produces ten or more polled calves with the other parents being horned there is a 99.9 per cent probability that the polled animal is homozygous polled and will never produce a horned calf.

When distinguishing between animals that express the scurred trait it is important to remember the following rules:

1. Only cattle heterozygous for the polled trait (Pp) will express scurs.
2. The scurred gene is sex-linked and is dominant in bulls and recessive in females.
3. Only homozygous horned and polled bulls will express scurs.
4. Only females carrying two dominant genes for scurred (SS) will express scurs.
5. Animals may not express the scurred gene but they may carry the gene and pass it on to their offspring.
6. A homozygous polled herd will be free of scurs.

Source: Dr RR Schalles, Kansas State University, from Limousin World October 1995