

# How Does the Polled Trait Work?

I want to here explain how the polled trait is inherited. I will then go into some technical detail with some diagrams for those who are interested in what is behind it.

“Polled” means naturally hornless. (Some polled animals may have scurs, which are small, harmless growths in the horn area.) Many farmers prefer polled because it saves the trouble and expense of dehorning. Animal welfare issues are also a factor.

Polled animals can be either heterozygous or homozygous, and you can't tell by looking at them which they are, though if you know that one parent was horned, they must be heterozygous. However, if one or both polled parents are heterozygous, only a DNA test or checking a large number of offspring will tell you if the animal is homozygous or heterozygous. This is why we have our polled bulls tested if there is a chance they are homozygous.

A heterozygous polled bull will transmit the polled gene half the time, so if you use him on horned cows, on the average half of the calves will be polled. (See Figure 1.) If you use him on heterozygous polled cows, on the average  $\frac{3}{4}$  of the calves will be polled. (See Figure 4.)

A homozygous polled parent will have all polled calves, regardless of whether the other parent is polled or horned. (See Figures 2 and 3.)

We now have two homozygous polled Milking Shorthorn bulls, Blizzard -PP and Outer Star-PP. We also have 5 heterozygous polled MS sires: Lancer-P, Milk More-P, King Oscar-P, Outstanding-P, and Matchmaker-P.

The Jersey bull we're offering now, Akhenaton of Netherhall-PP is also homozygous polled.

We will continue to test promising young polled bulls to develop more homozygous polled sires, while still selecting for the other important traits.

On the facing page we show several Punnett squares, such as you may have seen in high school biology class, to visualize the inheritance of horned/polled. In preparing this discussion, I referred to the textbook *Biology, God's Living Creation*, c1997 Pensacola Christian College.

Genes come in pairs, and the parent transmits one gene for each trait to the offspring. If both genes are the same for a certain trait, we say the parent is homozygous. If one gene is different from the other, the parent is heterozygous.

We represent dominant traits with capital letters (such as P for polled), and recessive traits are shown with lower case letters (such as h for horned). Dominant traits such as polled show up in the offspring even if the different trait is also genetically present.

In the Punnett square, we show the possible contributions from one parent across the top, and the possible contributions from the other parent along the side. By filling in each box with the trait from the corresponding column and row, we can visualize all the possible combinations that offspring of that mating may receive.

When we say  $\frac{1}{2}$  of the offspring will be polled, we mean each offspring has a 50% chance of being polled, just like the chance of being one gender or the other. Of course in real life, there will be

instances where more or less than half are polled, but over a large number on the average it would be 50%.

In our next newsletter we can discuss the inheritance of red in the Dutch Belted breed.

Even such a brief survey of genetic principles clearly demonstrates the complexity and order of Creation, thus the awesome wisdom of our Maker.

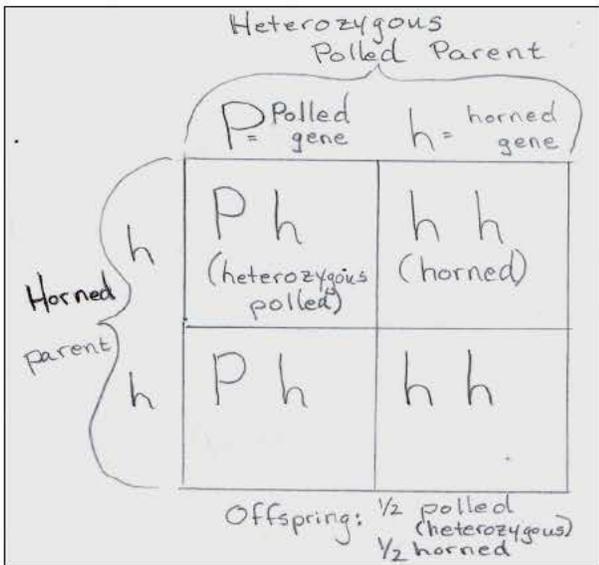


Figure 1: Mating a heterozygous polled parent with a horned parent. Each calf has a 50% chance of being heterozygous polled, 50%

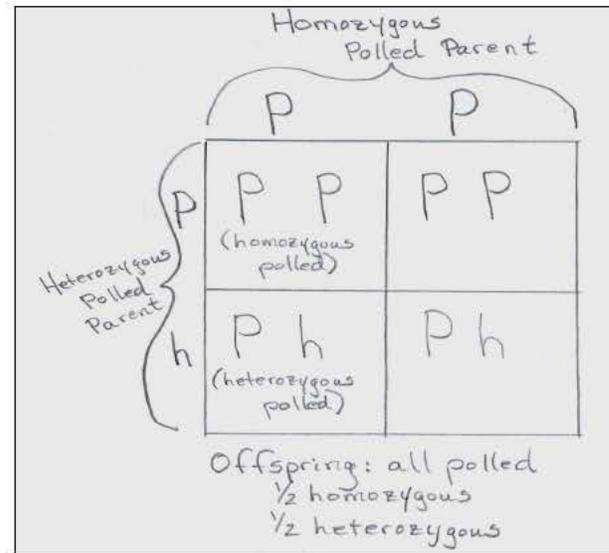


Figure 2: Mating a homozygous polled parent with a heterozygous polled parent. All offspring are polled,  $\frac{1}{2}$  of them homozygous,  $\frac{1}{2}$  heterozygous

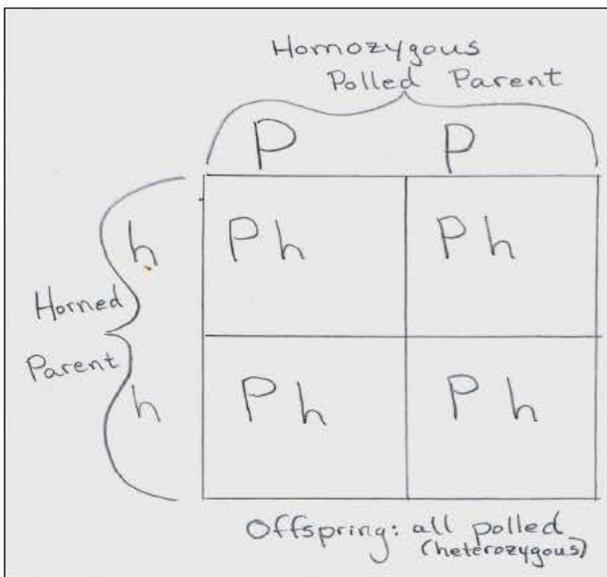


Figure 3: Mating a homozygous polled parent with a horned parent. All offspring are heterozygous

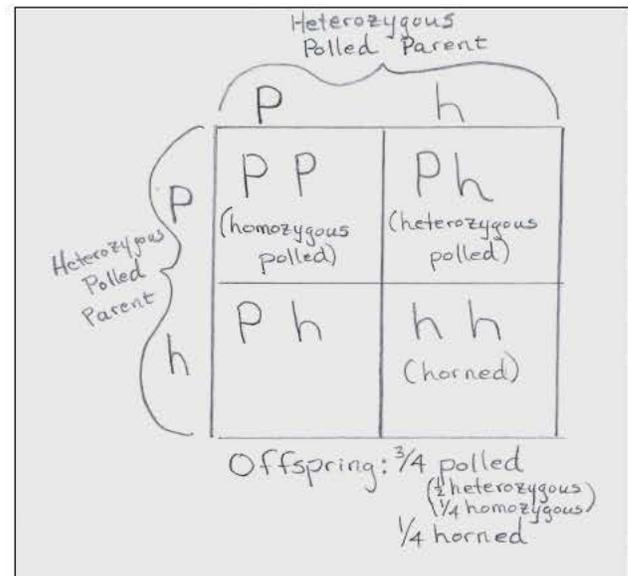


Figure 4: Mating two heterozygous polled parents.  $\frac{3}{4}$  of offspring are polled,  $\frac{1}{4}$  are horned. A polled offspring of this mating has a one in three chance of being homozygous, and a two in three chance of being heterozygous, hence we DNA-test promising polled bulls like this.