



technical brief

“Horns, Polls and Genes”

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Hornless cattle are more industry friendly than horned cattle. They are easier to handle, take up less room at the feed bunk, and are less prone to bruising and hide damage during transport.

Since hornless cattle are increasingly preferred by backgrounders, feeders and processors, and are mandatory for CattleCare accreditation, breeders must accept the work and expense involved in dehorning if they are to meet industry requirements.

The other option is to let the cattle do the dehorning for you by breeding polled (genetically hornless) cattle. As the Shorthorn breed has both polled and horned animals within its gene pool, breeders have an easy option to breed the horns off if they choose to do so, however it helps to understand the genetics behind the practice.

How an animal looks and performs is influenced by its genetic blueprint carried as pairs of genes on the chromosomes of each cell. The inheritance of gene pairs is based on receiving one gene from each parent.

Some traits, such as growth, are controlled by a number of gene pairs and are known as multi-gene traits, whilst some traits such as horns, are controlled by a single gene pair that determines whether an animal is horned or hornless (polled).

For the horn/poll trait, each gene of the pair could either be a polled gene (P) or a horned gene (h).

Note - The poll gene is dominant to the horn gene, so wherever the P and h gene occur together in a gene pair (Ph), the animal will be polled even though it carries, and can pass on, the recessive horn gene.

There are only three possible gene pair combinations for horned/polled outcomes.

- 1 – (PP) Homozygous **polled** - homozygous means the two genes are similar, ie, two P genes.
- 2 – (Ph) Heterozygous **polled** - heterozygous means the two genes are not similar, ie, one P gene and one h gene.
- 3 – (hh) Homozygous **horned** - the animal is horned, ie, it carries two h genes

If the poll gene is dominant, how can a polled bull produce horned progeny ?

Because of the inheritance pattern described above, a percentage of horned progeny can result from the mating of a polled bull with horned (*hh*) or heterozygous polled (*Ph*) cows. In this instance, the polled bull would have been heterozygous polled (*Ph*) carrying the horned gene - if the bull was homozygous polled (*PP*), all the progeny would be polled. See Table 1.

Can you tell if a bull is homozygous polled ?

Unfortunately you can't tell by looking at a polled animal if it is homozygous polled (*PP*) or heterozygous polled (*Ph*), nor are there any DNA tests available at present for this purpose.

If *PP*, it will pass only the polled gene (*P*) to all its progeny. If *Ph*, it may pass on either a polled gene (*P*) or a horned gene (*h*). Studying a sire's pedigree will often indicate its likely *P/h* status.

Table 1 ; The following table illustrates the physical horn/poll status of calves expected from different gene pair matings – even though the progeny might be polled, they may still carry the recessive horn gene if it is carried by one of the parents.

	BULL	X	COW	=	CALVES	
					<u>% poll</u>	<u>% horn</u>
1	Polled (<i>PP</i>)		Horned (<i>hh</i>)		100	0
2	Polled (<i>Ph</i>)		Horned (<i>hh</i>)		50	50
3	Polled (<i>Ph</i>)		Polled (<i>Ph</i>)		75	25
4	Polled (<i>PP</i>)		Polled (<i>PP</i>)		100	0
5	Polled (<i>PP</i>)		Polled (<i>Ph</i>)		100	0

Breeding Polled Shorthorns from Horned Cows

The first step to breeding polled Shorthorns from horned cows is by joining them to polled Shorthorn bulls. If the polled sire is homozygous (*PP*) then all the first generation progeny will be heterozygous polled (*Ph*) – naturally polled, but carrying the recessive horned gene - example 1 above.

If the polled bull is heterozygous polled (*Ph*), 50% of the progeny will be polled (25% *PP*, 25% *Ph*) and 50% horned (*hh*) - example 2 above.

At the next generation when heterozygous polled (*Ph*) heifer progeny are joined, if the joining bull is homozygous polled bull (*PP*), then 100% of the progeny will be polled (example 5 above). If the bull is heterozygous polled (*Ph*), then 75% of the resultant progeny will be polled (25% *PP*, 50% *Ph*) and 25% horned (*hh*) - example 3 above.