Polling in Galloways-Understanding Scurs

In order to implement a successful breeding program, it needs to be known whether a bull carries one or two copies of the polling gene.

The original wild strains of cattle were horned. Polledness is a genetic mutation that causes animals within a horned cattle breed to not develop horns. The level of mutation is low. This means that it takes a very long time for polled genetics to naturally arise and progress through a breed.

The Genetics of Polling

The presence or absence of horns is controlled by a major gene and there are two forms of the gene that control horn development. Each animal has two copies of the gene, which are inherited from their parents. Offspring receive one copy from their Sire and one from their Dam. The two forms of the gene are:

(P) – This form causes polling and the capitalisation of the letter (P) indicates it is dominant over the other form.

(p) – This form causes horns and the lower case indicates that it is a recessive gene which can therefore be masked by a dominant gene.

When the two copies, (one from the Sire and one from the Dam) are combined together in their offspring, we refer to the resulting combination, as the Genotype, of the progeny.

The observed physical appearance of the animal is called, the Phenotype. With the Genes for Polling, there are three possible Genotypes that can be created, but only two Phenotypes. Horned or Polled.

Genotype	Phenotype	Appearance of offspring had they been mated to horned cattle
(PP)	No Horns (Polled)	Will not produce horned offspring
(Pp)	No Horns (Polled)	On average 50% of offspring will be horned and 50% polled
(pp)	Horns	100% of offspring will be horned

Example 1: If a Polled Bull with two copies of the Dominate Polling Gene (PP) is bred with a horned cow with two copies of the recessive Genetype (pp) for horns. Their offspring would all have the Genotype (Pp).

The calves would appear polled, though some may display Scurs, but they would still have the potential to produce up to 50% polled offspring if mated to a horned animal because they are carriers for both (P) Polled and (p) Horned Gene. (Pp).

Example 2: If a Sire and Dam are Bred together who both contain one of each type of the Gene, both Polled and Horns Genotype (Pp).

Resulting offspring 75% of the calves will be Polled and 25% will have Horns. Only 25% will have two copies of the Dominate Polling Gene (PP) therefore produce only Polled offspring. Half the progeny that carry one copy of each Gene (Pp) will still have the potential to produce both Polled and Horned offspring.

SCURRING

An added complication when breeding for polling is the issue of Scurring which can occur. Scurs are small growths of material very similar to Horns that can develop in Polled cattle.

Scurs are often shown to be more common in Bulls than Cows.

Similarly, to Polling there are two forms of the Gene that control whether an animal has Scurs. These are inherited from the Parents with the offspring receiving one copy from the Sire and one copy from the Dam.

The Two Forms are:

(SC) - This form causes Scurring and the Capitalisation indicates it is Dominant over the other form.

(Sc) – This form causes smoothness and the lower case indicates that it is Recessive to the Dominant form.

There is an added complication because the Genes controlling Scurs are also affected by the presence of the Genes for Polling. For a Bull to develop Scurs they must have a copy of the Recessive form of the Polling Gene (p) and one copy of the Dominant form of the Scurring Gene (SC). Cows however must have two copies of the Dominant form of the (SC) Gene to have Scurs along with a copy of the Recessive form of the Polling

Gene (p).

The outcomes of the different Genotypes in the different sexes are outlined below.

Genotype	Phenotype-Bulls	Phenotype-Cows
(PP) SC/SC	Smooth Polled	Smooth Polled
(PP) SC/sc	Smooth Polled	Smooth Polled
(PP) sc/sc	Smooth Polled	Smooth Polled

In all the above cattle the Genes for Polling (PP) appear to be Dominant so the cattle are Smooth Polled

(Pp) SC/SC	Scurs	Scurs

The presence of two copies of the (SC/SC) Gene and a copy of the (p) Gene causes Scurs in both Bulls and Cows

(Pp) SC/sc	Scurs	Smooth Polled

The single copy of the (SC) and (p) Genes lead to Scurs in Bulls but not in the cows where a further Scurring Gene (SC/SC) would be needed

(Pp) sc/sc	Smooth Polled	Smooth Polled

Both Bulls and Cows appear Smooth Polled as only the Recessive forms of the Scurring Genes are present.

(pp) SC/SC	Horned	Horned
(pp) SC/sc	Horned	Horned
(pp) sc/sc	Horned	Horned

All above three lots of cattle, the Genes for Horns mask the effect of Genes that would cause Scurs.

The selection for the Polled Trait is made complicated however, by the inability to Visually distinguish between a Polled animal Carrying Two Polled copies (PP)

And a Polled individual carrying one Polled copy (Pp)

HornPoll is a DNA test Done by Zoetis Genetics that is used to identify the probability of an animal carrying zero, one or two copies of the Poll variant of the Gene.

The HornPoll test is used to determine whether an animal is "True Polled" (Homozygous-PP-) or is a carrier of Horned Genetics (Heterozygous -Ph-)

The polled variant of the Gene (P) is usually Dominant to the Horned variant of the Gene (h), which means Polled animals may be either (PP) or (Ph).

(PP) animals are always Polled.

(Ph) animals can be Polled, Scurred and sometimes Horned.

There are several different theories about Scurs in cattle, some have hypothesized that Scurs is a separate Gene to the Horn/Poll Gene while others have theorized that Scurs are simply a condition of the Horn/Poll Gene that is gender influenced. What has been shown is regardless of the exact cause of Scurs. The Scur condition can only happen in Heterozygous Polled cattle of either sex. Therefore, currently the most practical solution to breeding Scurs out of a herd is to breed for Homozygous Polled cattle.

There is no test globally yet for directly identifying a Scur carrier.

Horn/Poll testing can be carried out at:

Zoetis

Level 4

8 Mahuhu Crescent

Auckland 1010

Cost is $35 + GST per sample, takes 5 weeks.

Please "Fast Courier" hair samples during the week.

(Scurs has cropped up within my herd from bought in Bulls in the past. My Vet suggested this HornPoll test to me, to take the worry out of breeding from unknown stock I carry on my farm. Thankfully the first testing of fifteen animals has all come back as Homozygous for Polled. That is a big relief. I can now freely breed from those animals without concern. I intend to test the rest of my breeding herd to inform myself of their Genotype.)

Compiled by Linda van Eyk

			Genetic Defect Testing	
		Test	Status	Explanation
Animal ID/Tag: 26 **Registration No.:** **Sex:** F **Sample type:** Hair	**Name:** AWANUI KANDIE **Barcode:** 13379022 **Breed:** Belted Galloway	HP	PP	Homozygous Polled
Animal ID/Tag: 78 **Registration No.:** **Sex:** F **Sample type:** Hair	**Name:** DUNOLLIE ELLA **Barcode:** 13379024 **Breed:** Belted Galloway	HP	PP	Homozygous Polled
Animal ID/Tag: 117 **Registration No.:** **Sex:** F **Sample type:** Hair	**Name:** DUNOLLIE HANNAH **Barcode:** 13379025 **Breed:** Belted Galloway	HP	PP	Homozygous Polled
Animal ID/Tag: 208 **Registration No.:** **Sex:** F **Sample type:** Hair	**Name:** DICKEY FLAT FIA **Barcode:** 13379026 **Breed:** Belted Galloway	HP	PP	Homozygous Polled
Animal ID/Tag: 121 **Registration No.:** **Sex:** F **Sample type:** Hair	**Name:** DUNOLLIE HELENE **Barcode:** 13379027 **Breed:** Belted Galloway	HP	PP	Homozygous Polled
Animal ID/Tag: 33 **Registration No.:** **Sex:** M **Sample type:** Hair	**Name:** AWANUI LYNX **Barcode:** 13379028 **Breed:** Belted Galloway	HP	PP	Homozygous Polled
Animal ID/Tag: 126 **Registration No.:** **Sex:** F **Sample type:** Hair	**Name:** DUNOLLIE HESTER **Barcode:** 13379029 **Breed:** Belted Galloway	HP	PP	Homozygous Polled

Continued...

Reported Date: 07/10/2023