

GEPHE SUMMARY

	Gephebase Gene		GepheID
POLLED locus (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="POLLED locus" #gephebase-summary-title)		GP00000916	
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category="Morphology" #gephebase-summary-title)			
	Trait		
Horns absence (<a horns"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="Horns absence" #gephebase-summary-title)			
	Trait State in Taxon A		
Bos bovis - horns			
	Trait State in Taxon B		
Bos bovis - hornless - Celtic allele P _{[sub]C} OR P _{[sub]2021D} - various cattle breeds from Scandinavia; Scotland; England; the Channel Islands and France down to the Alpine region (thus also referred to as the Celtic allele Pc)			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Domesticated" #gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Bos taurus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Bos taurus" #gephebase-summary-title)		Bos taurus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Bos taurus" #gephebase-summary-title)	
	Common Name		Common Name
cattle		cattle	
	Synonyms		Synonyms
Bos bovis; Bos primigenius taurus; cattle; bovine; cow; dairy cow; domestic cattle; domestic cow; Bos taurus Linnaeus, 1758; Bos Taurus		Bos bovis; Bos primigenius taurus; cattle; bovine; cow; dairy cow; domestic cattle; domestic cow; Bos taurus Linnaeus, 1758; Bos Taurus	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Artiodactyla; Ruminantia; Pecora; Bovidae; Bovinae; Bos		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Artiodactyla; Ruminantia; Pecora; Bovidae; Bovinae; Bos	
	Parent		Parent
Bos (oxen, cattle) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9903)		Bos (oxen, cattle) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9903)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
9913 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9913)		9913 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9913)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB
-		0	
	Synonyms		GenebankID or UniProtKB
-		0	
	String		
-			
	Sequence Similarities		
-			
	GO - Molecular Function		
-			
	GO - Biological Process		
-			
	GO - Cellular Component		
-			
			Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>)

Molecular Type

Cis-regulatory (<https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title>)

Aberration Type

Indel (<https://www.gephebase.org/search-criteria?/and+Aberration Type=^Indel^#gephebase-summary-title>)

Indel Size

100-999 bp

Molecular Details of the Mutation

complex 202-bp insertion-deletion in a non-coding region resulting in a long non-coding RNA (lncRNA) ectopic expression

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title>)

Main Reference

Bovine polledness--an autosomal dominant trait with allelic heterogeneity. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22737241>)

Authors

Medugorac I; Seichter D; Graf A; Russ I; Blum H; GÄ¶pel KH; Rothhammer S; FÄ¶rster M; Krebs S

Abstract

The persistent horns are an important trait of speciation for the family Bovidae with complex morphogenesis taking place briefly after birth. The polledness is highly favourable in modern cattle breeding systems but serious animal welfare issues urge for a solution in the production of hornless cattle other than dehorning. Although the dominant inhibition of horn morphogenesis was discovered more than 70 years ago, and the causative mutation was mapped almost 20 years ago, its molecular nature remained unknown. Here, we report allelic heterogeneity of the POLLED locus. First, we mapped the POLLED locus to a 4381-kb interval in a multi-breed case-control design. Targeted re-sequencing of an enlarged candidate interval (547 kb) in 16 sires with known POLLED genotype did not detect a common allele associated with polled status. In eight sires of Alpine and Scottish origin (four polled versus four horned), we identified a single candidate mutation, a complex 202 bp insertion-deletion event that showed perfect association to the polled phenotype in various European cattle breeds, except Holstein-Friesian. The analysis of the same candidate interval in eight Holsteins identified five candidate variants which segregate as a 260 kb haplotype also perfectly associated with the POLLED gene without recombination or interference with the 202 bp insertion-deletion. We further identified bulls which are progeny tested as homozygous polled but bearing both, 202 bp insertion-deletion and Friesian haplotype. The distribution of genotypes of the two putative POLLED alleles in large semi-random sample (1,261 animals) supports the hypothesis of two independent mutations.

Additional References

Novel insights into the bovine polled phenotype and horn ontogenesis in Bovidae. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23717440>)

Independent polled mutations leading to complex gene expression differences in cattle. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24671182>)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

3 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^POLLED locus^/and+Taxon ID=^9913^/or+Gene Gephebase=^POLLED locus^/and+Taxon ID=^9913^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS

Associated gene still not identified - @Parallelism - Functionally validated by a CRISPR experiment - <https://omia.org/OMIA000483/9913/>