

GEPHE SUMMARY

Gephebase Gene		GepheID
Prolactin receptor (#gephebase-summary-title)		GP00000927
Entry Status		Main curator
Published		

PHENOTYPIC CHANGE

Trait Category	
Physiology (#gephebase-summary-title)	
Trait	
Milk yield (#gephebase-summary-title)	
Trait State in Taxon A	
Bos bovis	
Trait State in Taxon B	
Bos bovis	
Ancestral State	
Data not curated	
Taxonomic Status	
Domesticated (#gephebase-summary-title)	
Taxon A	
Latin Name	
Bos taurus (#gephebase-summary-title)	
Common Name	
cattle	
Synonyms	
Bos bovis; Bos primigenius taurus; cattle; bovine; cow; dairy cow; domestic cattle; domestic cow; Bos taurus Linnaeus, 1758; Bos Taurus	
Rank	
species	
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	
Parent	
Bos (oxen, cattle) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9903)	
NCBI Taxonomy ID	
9913 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9913)	
is Taxon A an Intraspecies?	
No	

Taxon B	
Latin Name	
Bos taurus (#gephebase-summary-title)	
Common Name	
cattle	
Synonyms	
Bos bovis; Bos primigenius taurus; cattle; bovine; cow; dairy cow; domestic cattle; domestic cow; Bos taurus Linnaeus, 1758; Bos Taurus	
Rank	
species	
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	
Parent	
Bos (oxen, cattle) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9903)	
NCBI Taxonomy ID	
9913 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9913)	
is Taxon B an Intraspecies?	
No	

GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Homo sapiens
PRLR		P16471 (http://www.uniprot.org/uniprot/P16471)
Synonyms		GenebankID or UniProtKB
HPRL; MFAB; hPRLr; RI-PRLR		AAA51417 (https://www.ncbi.nlm.nih.gov/nucleotide/AAA51417)
String		
9606.ENSP00000371432 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000371432)		
Sequence Similarities		
Belongs to the type I cytokine receptor family. Type 1 subfamily.		
GO - Molecular Function		
GO:0042803 : protein homodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0042803)		
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)		
GO:0017046 : peptide hormone binding (https://www.ebi.ac.uk/QuickGO/term/GO:0017046)		
GO:0019955 : cytokine binding (https://www.ebi.ac.uk/QuickGO/term/GO:0019955)		

GO:0004896 : cytokine receptor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004896>)
GO:0042978 : ornithine decarboxylase activator activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042978>)
GO:0004925 : prolactin receptor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004925>)

GO - Biological Process

GO:0043066 : negative regulation of apoptotic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043066>)
GO:0007171 : activation of transmembrane receptor protein tyrosine kinase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007171>)
GO:0007166 : cell surface receptor signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007166>)
GO:0120162 : positive regulation of cold-induced thermogenesis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0120162>)
GO:0042976 : activation of Janus kinase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042976>)
GO:0060397 : JAK-STAT cascade involved in growth hormone signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0060397>)
GO:0042110 : T cell activation (<https://www.ebi.ac.uk/QuickGO/term/GO:0042110>)
GO:0007566 : embryo implantation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007566>)
GO:0007595 : lactation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007595>)
GO:0006694 : steroid biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006694>)

GO - Cellular Component

GO:0016021 : integral component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)
GO:0043235 : receptor complex (<https://www.ebi.ac.uk/QuickGO/term/GO:0043235>)
GO:0005576 : extracellular region (<https://www.ebi.ac.uk/QuickGO/term/GO:0005576>)
GO:0009986 : cell surface (<https://www.ebi.ac.uk/QuickGO/term/GO:0009986>)
GO:0009897 : external side of plasma membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009897>)
GO:0031904 : endosome lumen (<https://www.ebi.ac.uk/QuickGO/term/GO:0031904>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Ser18Asn

Experimental Evidence

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Candidate Gene~#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

The role of the bovine growth hormone receptor and prolactin receptor genes in milk, fat and protein production in Finnish Ayrshire dairy cattle. (2006)
(<https://pubmed.ncbi.nlm.nih.gov/16751675>)

Authors

Viitala S; Szyda J; Blott S; Schulman N; Lidauer M; Mäntä-Tanila A; Georges M; Vilkki J

Abstract

We herein report new evidence that the QTL effect on chromosome 20 in Finnish Ayrshire can be explained by variation in two distinct genes, growth hormone receptor (GHR) and prolactin receptor (PRLR). In a previous study in Holstein-Friesian dairy cattle an F279Y polymorphism in the transmembrane domain of GHR was found to be associated with an effect on milk yield and composition. The result of our multimarker regression analysis suggests that in Finnish Ayrshire two QTL segregate on the chromosomal region including GHR and PRLR. By sequencing the coding sequences of GHR and PRLR and the sequence of three GHR promoters from the pooled samples of individuals of known QTL genotype, we identified two substitutions that were associated with milk production traits: the previously reported F-to-Y substitution in the transmembrane domain of GHR and an S-to-N substitution in the signal peptide of PRLR. The results provide strong evidence that the effect of PRLR S18N polymorphism is distinct from the GHR F279Y effect. In particular, the GHR F279Y has the highest influence on protein percentage and fat percentage while PRLR S18N markedly influences protein and fat yield. Furthermore, an interaction between the two loci is suggested.

Additional References

RELATED GEPHE

Related Genes

2 (ABCG2, Growth Hormone Receptor) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~9913~/and+Trait=Milk yield/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

3 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~Prolactin receptor~/and+Taxon ID=~9913~/or+Gene Gephebase=~Prolactin receptor~/and+Taxon>)

EXTERNAL LINKS

COMMENTS