GEPHE SUMMARY

Gephebase Gene
CAST (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CAST^#gephebase-summary-title)

GepheID
GP00000170

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Meat tenderness (https://www.gephebase.org/search-criteria?/and+Trait=^Meat tenderness^#gephebase-summary-title)

Trait State in Taxon A
Sus scrofa

Trait State in Taxon B
Sus scrofa

Ancestral State
Data not curated

Taxonomic Status
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name
Sus scrofa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Sus scrofa^#gephebase-summary-title)

Common Name
pig

Synonyms
pig; pigs; swine; wild boar; Sus scrofa Linnaeus, 1758; Sus scrofus

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; Cetartiodactyla; Suina; Suidae; Sus

Parent
Sus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9822)

NCBI Taxonomy ID
9823 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9823)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Sus scrofa domesticus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Sus scrofa domesticus^#gephebase-summary-title)

Common Name
domestic pig

Synonyms
Sus domestica; Sus domesticus; Sus scrofa domestica; domestic pig

Rank
subspecies

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Cetartiodactyla; Suina; Suidae; Sus; Sus scrofa

Parent
Sus scrofa (pig) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9823)

NCBI Taxonomy ID
9825 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9825)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
CAST

Synonyms
BS-17; PLACK

String
-

Sequence Similarities
Belongs to the protease inhibitor I27 (calpastatin) family.

GO - Molecular Function
GO:0003723 : RNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003723)
GO:0045296 : cadherin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0045296)
GO:0010859 : calcium-dependent cysteine-type endopeptidase inhibitor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0010859)
GO:0004866 : endopeptidase inhibitor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004866)
GO:0002020 : protease binding (https://www.ebi.ac.uk/QuickGO/term/GO:0002020)

GO - Biological Process
GO:0097340 : inhibition of cysteine-type endopeptidase activity

UniProtKB Homo sapiens
P20810 (http://www.uniprot.org/uniprot/P20810)

GenebankID or UniProtKB
NP_999232 (https://www.ncbi.nlm.nih.gov/nuccore/NP_999232)

(https://www.ebi.ac.uk/QuickGO/term/GO:0097340)
GO:2000675 : negative regulation of type B pancreatic cell apoptotic process
(https://www.ebi.ac.uk/QuickGO/term/GO:2000675)
GO:1990709 : presynaptic active zone organization
(https://www.ebi.ac.uk/QuickGO/term/GO:1990709)

GO - Cellular Component

GO:0005829 : cytosol (https://www.ebi.ac.uk/QuickGO/term/GO:0005829)
GO:0016020 : membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016020)
GO:0005783 : endoplasmic reticulum
(https://www.ebi.ac.uk/QuickGO/term/GO:0005783)

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

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

Molecular Details of the Mutation

4 candidate SNPs in putative enhancers with nuclear factor-binding properties

Experimental Evidence

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

Main Reference

Predictive markers in calpastatin for tenderness in commercial pig populations. (2011) (https://pubmed.ncbi.nlm.nih.gov/21454860)

Authors

Nonneman D; Lindholm-Perry AK; Shackelford SD; King DA; Wheeler TL; Rohrer GA; Bierman CD; Schneider JF; Miller RK; Zerby H; Moeller SJ

Abstract

The identification of predictive DNA markers for pork quality would allow US pork producers and breeders to select genetically superior animals more quickly and efficiently for the production of consistent, high-quality meat. Genome scans have identified QTL for tenderness on SSC 2, which have been fine-mapped to the calpastatin locus. The objectives of this study were to identify the sequence variation in calpastatin that likely affects tenderness in commercial-level pig populations and to develop definitive DNA markers that are predictive of pork tenderness for use in marker-assisted selection programs. We resequenced the calpastatin regulatory and transcribed regions in pigs with divergently extreme shear force values to identify possible mutations that could affect tenderness. A total of 194 SNP were identified in this sequence, and 31 SNP were found in predicted transcription factor binding sites. We tested 131 polymorphisms in our research population and a subset (40) of these in samples of industry pigs for their association with objective measures of tenderness. We identified 4 SNP that were consistently associated with pork tenderness in all the populations studied, representing 2,826 pigs from 4 distinct populations. Gel shift assays were designed for these SNP and 12 other polymorphic sites. Six sites demonstrated a gel shift when probes were incubated with nuclear extract from muscle, heart, or testis. Four of these sites, a specificity protein 1 (Sp1) site around nucleotides 12978 and 12979, a potential thyrotroph embryonic factor (Tef) site at nucleotide 25587, an unknown site at nucleotide 48699, and myocyte enhancer factor-2 (Mef-2)/TATA sites with SNP at positions 49223 and 49228 were allele specific in binding nuclear proteins. The allele frequencies for the tender alleles were similar (0.11 to 0.36) in the 4 different commercial populations. These 4 SNP were not in complete linkage disequilibrium with each other and may independently affect calpastatin expression, tenderness, or both. These markers should be predictive of pork tenderness in industry populations.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS