

GEPHE SUMMARY

<p>BMP15 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=BMP15#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00000150</p> <p>Martin</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=Physiology#gephebase-summary-title)</p> <p>Fertility (increased ovulation rate) (https://www.gephebase.org/search-criteria?/and+Trait=Fertility+increased+ovulation+rate#gephebase-summary-title)</p> <p>Ovis aries</p> <p>Ovis aries - Polish Olkusa</p> <p>Taxon A</p> <p>Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=Domesticated#gephebase-summary-title)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Ovis aries</p> <p>(https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Ovis+aries#gephebase-summary-title)</p> <p>sheep</p> <p>Ovis ammon aries; Ovis orientalis aries; Ovis ovis; sheep; domestic sheep; lambs; wild sheep; Ovis aries Linnaeus, 1758</p> <p>species</p> <p>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; Caprinae; Ovis</p> <p>Ovis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9935)</p> <p>9940 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9940)</p> <p>No</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon A an Intraspecies?</p>	<p>Ovis aries</p> <p>(https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Ovis+aries#gephebase-summary-title)</p> <p>sheep</p> <p>Ovis ammon aries; Ovis orientalis aries; Ovis ovis; sheep; domestic sheep; lambs; wild sheep; Ovis aries Linnaeus, 1758</p> <p>species</p> <p>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; Caprinae; Ovis</p> <p>Ovis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9935)</p> <p>9940 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9940)</p> <p>Yes</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon B an Intraspecies?</p> <p>Taxon B Description</p>
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GENOTYPIC CHANGE

<p>Bmp15</p> <p>Bmp-15; C86824; C87336; GDF-9B; AU015375; AU018861; AU021453; Gdf9b</p> <p>10090.ENSMUSP00000024049 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000024049)</p> <p>Belongs to the TGF-beta family.</p> <p>GO:0005125 : cytokine activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005125)</p> <p>GO:0008083 : growth factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008083)</p> <p>GO:0005160 : transforming growth factor beta receptor binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005160)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>Q9Z0L4 (http://www.uniprot.org/uniprot/Q9Z0L4)</p> <p>AHB23439 (https://www.ncbi.nlm.nih.gov/nuccore/AHB23439)</p>	<p>UniProtKB Mus musculus</p> <p>GenebankID or UniProtKB</p>
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GO - Biological Process

- GO:0045893 : positive regulation of transcription, DNA-templated
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045893>)
- GO:0001541 : ovarian follicle development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001541>)
- GO:0030509 : BMP signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0030509>)
- GO:0048468 : cell development (<https://www.ebi.ac.uk/QuickGO/term/GO:0048468>)
- GO:0060016 : granulosa cell development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0060016>)
- GO:0010862 : positive regulation of pathway-restricted SMAD protein phosphorylation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010862>)
- GO:0042981 : regulation of apoptotic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042981>)
- GO:0043408 : regulation of MAPK cascade
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043408>)
- GO:0060395 : SMAD protein signal transduction
(<https://www.ebi.ac.uk/QuickGO/term/GO:0060395>)

GO - Cellular Component

- GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
- GO:0005615 : extracellular space (<https://www.ebi.ac.uk/QuickGO/term/GO:0005615>)

- No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title>) Presumptive Null
- Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding^#gephebase-summary-title>) Molecular Type
- SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP^#gephebase-summary-title>) Aberration Type
- Nonsynonymous SNP Coding Change
- c.1009A>C p.N337H Molecular Details of the Mutation
- Association Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Association Mapping^#gephebase-summary-title>) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Asn	His	337

- Genome-wide association studies identify two novel BMP15 mutations responsible for an atypical hyperprolificacy phenotype in sheep. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23637641>) Main Reference
- Demars J; Fabre S; Sarry J; Rossetti R; Gilbert H; Persani L; Tosser-Klopp G; Mulsant P; Nowak Z; Drobik W; Martyniuk E; Bodin L Authors
- Some sheep breeds are naturally prolific, and they are very informative for the studies of reproductive genetics and physiology. Major genes increasing litter size (LS) and ovulation rate (OR) were suspected in the French Grivette and the Polish Olskuska sheep populations, respectively. To identify genetic variants responsible for the highly prolific phenotype in these two breeds, genome-wide association studies (GWAS) followed by complementary genetic and functional analyses were performed. Highly prolific ewes (cases) and normal prolific ewes (controls) from each breed were genotyped using the Illumina OvineSNP50 Genotyping Beadchip. In both populations, an X chromosome region, close to the BMP15 gene, harbored clusters of markers with suggestive evidence of association at significance levels between 1E(-05) and 1E(-07). The BMP15 candidate gene was then sequenced, and two novel non-conservative mutations called FecX(Gr) and FecX(O) were identified in the Grivette and Olskuska breeds, respectively. The two mutations were associated with the highly prolific phenotype (p FecX (Gr) = 5.98E(-06) and p FecX(O) = 2.55E(-08)). Homozygous ewes for the mutated allele showed a significantly increased prolificacy (FecX(Gr)/FecX(Gr), LS = 2.50 Å± 0.65 versus FecX(+)/FecX(Gr), LS = 1.93 Å± 0.42, p<1E(-03) and FecX(O)/FecX(O), OR = 3.28 Å± 0.85 versus FecX(+)/FecX(O), OR = 2.02 Å± 0.47, p<1E(-03)). Both mutations are located in very well conserved motifs of the protein and altered the BMP15 signaling activity in vitro using a BMP-responsive luciferase test in COV434 granulosa cells. Thus, we have identified two novel mutations in the BMP15 gene associated with increased LS and OR. Notably, homozygous FecX(Gr)/FecX(Gr) Grivette and homozygous FecX(O)/FecX(O) Olskuska ewes are hyperprolific in striking contrast with the sterility exhibited by all other known homozygous BMP15 mutations. Our results bring new insights into the key role played by the BMP15 protein in ovarian function and could contribute to a better understanding of the pathogenesis of women's fertility disorders. Abstract

Additional References

RELATED GEPHE

- 3 (B4GALNT2, BMP receptor IB (BMPRIB), GDF9) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~9940^/and+Trait=Fertility/and+groupHaplotypes=true#gephebase-summary-title>) Related Genes
- 9 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~BMP15^/and+Taxon ID=~9940^/or+Gene Gephebase=~BMP15^/and+Taxon ID=~9940^#gephebase-summary-title>) Related Haplotypes

EXTERNAL LINKS

COMMENTS

Heterozygote shows phenotype; homozygote results in ovarian failure ; <https://omia.org/OMIA001799/9940/> ; @SexualTrait @HeterozygoteAdvantage