PigVar Manual

(Version 2.0, May 15, 2016)

Contents

1 Browse and search tables

1.1 SNP tables

PigSPS database summarizes SNP number on chromosome, individual and non-redundant resolutions for 184 pig samples and 7 outgroups respectively. The whole SNP list is given for each chromosome.

Menu: Pig SNPs -- SNP Table

Pig SNP Statistics by Chromosome

Note:"RefSNP" refers to unique name of SNP in this database.

Individual	chr 1	chr 2	chr 3	chr 4	chr 5	chr 6	chr 7	chr 8	chr 9	chr 10	chr 11	chr 12	chr 13	chr 14	chr 15	chr 16	chr 17	chr 18	chr X
RefSNP	4575878	2979402	2730953	2664288	2162372	2861902	2648563	2648563	3026725	1990958	1915925	1432279	3643233	2875027	2691596	1834345	1524534	1367490	1633896
DU-1	4232896	2785922	2540176	2449280	2001559	2658228	2432539	2432539	2823392	1877656	1772672	1330813	3401403	2678434	2476698	1722703	1411593	1271252	1435372
DU-2	4175470	2729131	2462455	2409038	1954330	2583718	2375367	2375367	2779179	1860038	1760646	1286349	3374906	2644084	2455528	1701333	1381539	1232363	1412216
DU-3	4050746	2614521	2330018	2283299	1840100	2456942	2205968	2205968	2626902	1831118	1715767	1243152	3310069	2559792	2378254	1637408	1293018	1162867	817242
DU-4	4074939	2633953	2349742	2309147	1870258	2471614	2233551	2233551	2666525	1835255	1720775	1231181	3329031	2570383	2403058	1660566	1304805	1167617	890879

Menu: Outgroup SNPs -- SNP Table

Outgroup SNP Statistics by Chromosome

Note:"#RefSNP" refers to unique name of SNP in this database.

Individual	chr 1	chr 2	chr 3	chr 4	chr 5	chr 6	chr 7	chr 8	chr 9	chr 10	chr 11	chr 12	chr 13	chr 14	chr 15	chr 16	chr 17	chr 18	chr X
RefSNP	3952193	2376622	2062185	2049718	1610653	2237488	1900323	1900323	2313071	1181693	1371200	983753	3071975	2292711	2125250	1383666	1065865	966638	1685451
OG-1	3803904	2256868	1921894	1949649	1512848	2101883	1780012	1780012	2202658	1126532	1310329	903507	2981914	2194499	2047387	1328307	993330	894431	1599513
OG-2	3627711	2128157	1783295	1828481	1411984	1945808	1638354	1638354	2056092	1073008	1231436	822030	2871497	2078911	1954195	1253567	918459	819414	1100686

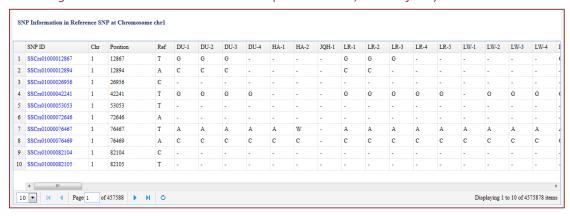*Chr #*: the chromosome of pig or outgroup.

#RefSNP: refers to the unique SNP number in this database.

The third to the last rows refers to the Individual SNP lists of all the samples.

1) Detailed information for each SNP

The #sample_id list represents individual SNP list which shows general information about SNPs of the individual.

Menu: Pig SNPs -- SNP Table – click "4575878 "(Column: chr 1, Row: RefSNP)

SNP Information in Reference SNP at Chromosome chr1

	SNP ID	Chr	Position	Ref	DU-1	DU-2	DU-3	DU-4	HA-1	HA-2	JQH-1	LR-1	LR-2	LR-3	LR-4	LR-5	LW-1	LW-2	LW-3	LW-4	
1	SSCrs01000012867	1	12867	T	G	G	G	-	-	-	-	G	G	G	-	-	-	-	-	-	
2	SSCrs01000012894	1	12894	A	C	C	C	-	-	-	-	C	C	-	-	-	-	-	-	-	
3	SSCrs01000026956	1	26956	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4	SSCrs01000042241	1	42241	T	G	G	G	G	-	-	-	G	G	G	G	G	-	G	G	G	
5	SSCrs01000053053	1	53053	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	SSCrs01000072646	1	72646	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	SSCrs01000076467	1	76467	T	A	A	A	A	A	W	-	A	A	A	A	A	A	A	A	A	
8	SSCrs01000076469	1	76469	A	C	C	C	C	C	C	-	C	C	C	C	C	C	C	C	C	
9	SSCrs01000082104	1	82104	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	SSCrs01000082105	1	82105	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

10 ▾ |◀ ◀ Page 1 of 457588 ▶ ▶| ↻   Displaying 1 to 10 of 4575878 items
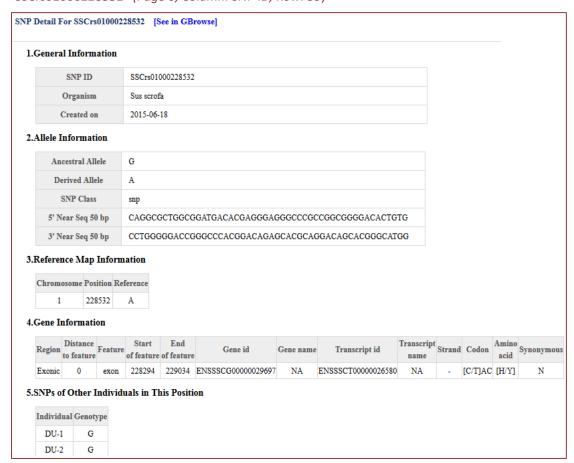
2) Click a SNP ID to go to the detail information page of this SNP.

Detailed information of a particular SNP is used to exhibit the detail SNP information of a given SNP in PigSPS. Detailed page mainly includes five parts that are general information, allele

information, reference map information, gene information and SNPs of other individuals in this position. General Information lists SNP ID, organism and created time. In allele information part, the ancestral allele, derived allele, 5'/3' Near Sequence 50 bp are listed. Reference map information lists the genome position and reference allele of a given SNP. The genome position related to the nearest gene, gene ID, transcript ID, protein ID, codon and amino acid mutation are listed in gene information part for a given SNP. In SNPs of other individuals part, the SNP of all samples at this position are listed.

Menu: Pig SNPs -- SNP Table – click "4575878 "(Column: chr 1, Row: RefSNP) – click "SSCrs01000228532" (Page 6, Column: SNP ID, Row: 59)

SNP Detail For SSCrs01000228532   [See in GBrowse]

1.General Information

SNP ID	SSCrs01000228532
Organism	Sus scrofa
Created on	2015-06-18

2.Allele Information

Ancestral Allele	G
Derived Allele	A
SNP Class	snp
5' Near Seq 50 bp	CAGGCGCTGGCGGATGACACGAGGGAGGGCCCGCCGGCGGGGACACTGTG
3' Near Seq 50 bp	CCTGGGGGACCGGGCCCACGGACAGAGCACGCAGGACAGCACGGGCATGG

3.Reference Map Information

Chromosome	Position	Reference
1	228532	A

4.Gene Information

Region	Distance to feature	Feature	Start of feature	End of feature	Gene id	Gene name	Transcript id	Transcript name	Strand	Codon	Amino acid	Synonymous
Exonic	0	exon	228294	229034	ENSSSCG00000029697	NA	ENSSSCT00000026580	NA	-	[C/T]AC	[H/Y]	N

5.SNPs of Other Individuals in This Position

Individual	Genotype
DU-1	G
DU-2	G

1.2 SNP in genes

SNP in Gene Statistics lists SNPs located in gene, coding regions and lincRNA regions. According to the protein sequence, we divided the SNP list into synonymous and non-synonymous ones. Click the number in the statistical column to see the whole SNP list.

Menu: Pig SNPs -- SNP Hit on Gene – click " 1051280 "(Column: chr 2, Row: DU-1)

3

SNP Information in DU-1 at Chromosome chr2

	SNP id	Chromosome	Position	SNP class	Ref	Gene id	Gene name	Transcript id	Region	DU23M01_Duroc
1	SSCrs01000228494	1	228494	snp	C	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	G
2	SSCrs01000228521	1	228521	snp	A	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	G
3	SSCrs01000228532	1	228532	snp	A	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	G
4	SSCrs01000228575	1	228575	snp	T	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	Y
5	SSCrs01000228576	1	228576	snp	A	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	G
6	SSCrs01000228591	1	228591	snp	C	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	T
7	SSCrs01000228638	1	228638	snp	G	ENSSSCG00000029697	NA	ENSSSCT00000026580	Exonic	A
8	SSCrs01000229100	1	229100	snp	T	ENSSSCG00000029697	NA	ENSSSCT00000026580	Intronic	C
9	SSCrs01000229212	1	229212	snp	G	ENSSSCG00000029697	NA	ENSSSCT00000026580	Intronic	A
10	SSCrs01000233460	1	233460	snp	T	ENSSSCG00000029697	NA	ENSSSCT00000026580	Intronic	C

10 ▾ ⏮ ◀ Page 1 of 105128 ▶ ⏭ ↻

Click SNP ID will go to the detail information page of this SNP as above.

1.3 GBrowse usage

PigSPS database use GBrowse to visualize several data types, including the SNP, gene, transcript and the density information of SNP. At first, users need to choose the interested tracks in the Select Tracks page, and a region, then you can see what you choose in the GBrowse page.

Menu: Pig SNPs – Browse on Chromosome

1.4 Search SNP by region

Menu: Pig SNPs – Search SNPs by Region

General Information:

Chromosome: Chr1 ▾ Location: start 10000 end 100000 Search Example: chr1:10000..100000

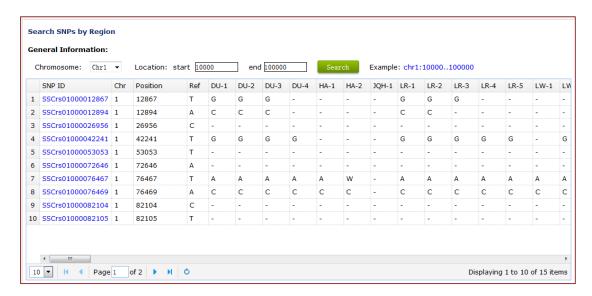|	SNP ID	Chr	Position	Ref	DU-1	DU-2	DU-3	DU-4	HA-1	HA-2	JQH-1	LR-1	LR-2	LR-3	LR-4	LR-5	LW-1	LW
1	SSCrs01000012867	1	12867	T	G	G	G	-	-	-	-	G	G	G	-	-	-	-
2	SSCrs01000012894	1	12894	A	C	C	C	-	-	-	-	C	C	-	-	-	-	-
3	SSCrs01000026956	1	26956	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	SSCrs01000042241	1	42241	T	G	G	G	G	-	-	-	G	G	G	G	G	-	G
5	SSCrs01000053053	1	53053	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	SSCrs01000072646	1	72646	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	SSCrs01000076467	1	76467	T	A	A	A	A	A	W	-	A	A	A	A	A	A	A
8	SSCrs01000076469	1	76469	A	C	C	C	C	C	C	-	C	C	C	C	C	C	C
9	SSCrs01000082104	1	82104	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	SSCrs01000082105	1	82105	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-

10 ▾ |◀ ◀ Page 1 of 2 ▶ ▶| ↻   Displaying 1 to 10 of 15 items

1.5 Single individual search

Using this search, user can view SNP data of each individual. To do this, user must choose the "Show SNP information in individuals" in the toolbar. In single search result page, users can see the search condition set in the search page, and the total number of SNP is also returned.

Menu: Pig SNPs – Search SNPs in Individuals

Search Pig SNPs in Individuals

General Information:

Chromosome: Chr1 ▾ Location: start _____ end _____

SNP information

Individual:

DU-1
DU-2
DU-3
DU-4
HA-1
HA-2
JQH-1
LR-1
LR-2

Note : Choose individuals you wanted to see SNP information from the following list:

SNP Attributes

SNP Location:

All
Exonic
Intronic
Intergenic

Genotype:

All
A
C
G
T
U
R
Y
M
K

IUPAC code	Meaning	IUPAC code	Meaning	IUPAC code	Meaning
A	A	M	A or C	V	A or C or G
C	C	R	A or G	H	A or C or T
G	G	W	A or T	D	A or G or T
T	T	S	C or G	B	C or G or T
U	U	Y	C or T	N	G or A or T or C
		K	G or T		

Associated Gene Information:

Gene id: _____

Other Properties:

☐ only synonymous snp should be showed

Search Reset

Result

Search Result

Your Search Conditions:

Chromosome:	Chr1	**Position:**	- to -	**SNP Function:**	Exonic	**Individuals Selected:** DU-1
SNP Class:	snp	**Gene Id:**		**Genotype:**	A	

	SNP id	Chromosome	Position	Gene id	Gene name	Region	Genotype	Synonymous	flank_5	flank_3
1	SSCrs01000228638	1	228638	ENSSSCG00000029697	NA	Exonic	A	Y	TGCACAGACAGCTACCTTTTCCTAAAGTTA	TAAGGCTTACAAAGGAGCAAATAAGCTGTT
2	SSCrs01000257314	1	257314	ENSSSCG00000029697	NA	Exonic	A	Y	CAAACCCCTGTAAGCCTCTCACACCCATAA	TGAACTCCTGAGAAGGATCTGGAAAGGAAA
3	SSCrs01000281564	1	281564	ENSSSCG00000027726	DLL1	Exonic	A	Y	TTTCCTGCGAAGAAGCTTAAGACAAAACCA	GAAGCAGACGACCCCTACCTACTGGTGGCT
4	SSCrs01000281767	1	281767	ENSSSCG00000027726	DLL1	Exonic	A	N	GGACCCTCGAGGAGAGAAGCCCGGATTTTA	CAGCCGGAGGCAAAGCGGCCGCTCTCTCCC
5	SSCrs01000283382	1	283382	ENSSSCG00000027726	DLL1	Exonic	A	Y	AACCAATAGGCATCCTCTCCCCACAGAAAA	CCAGAGAGACTCATCAGCCGCCTGGCCACA
6	SSCrs01000547671	1	547671	linc-sscg0214	linc-sscg0214	Exonic	A	N	AGAAAAAACCAAAACCAAACAAAAAAACCA	ATGCTCAATATCACTAATCATGAGGAAAAT
7	SSCrs01000547671	1	547671	linc-sscg0214	linc-sscg0214	Exonic	A	N	AGAAAAAACCAAAACCAAACAAAAAAACCA	ATGCTCAATATCACTAATCATGAGGAAAAT
8	SSCrs01000548917	1	548917	linc-sscg0214	linc-sscg0214	Exonic	A	Y	CTTGCCTTCAAGGAACACACCACCTAAAAA	GTACCTGCTTCCAAGAGAGGCCCATCCTGC
9	SSCrs01000548917	1	548917	linc-sscg0214	linc-sscg0214	Exonic	A	Y	CTTGCCTTCAAGGAACACACCACCTAAAAA	GTACCTGCTTCCAAGAGAGGCCCATCCTGC
10	SSCrs01001068296	1	1068296	ENSSSCG00000004010	C6orf70	Exonic	A	N	CAGGGTGCCACCTGGAGACATGGACAGGCA	CAGCACAGTCCCTGGGGCTCTGGGACAAAG

10 ▼ |◄ ◄ Page 1 of 1077 ► ►| ↻   Displaying 1 to 10 of 10768 items

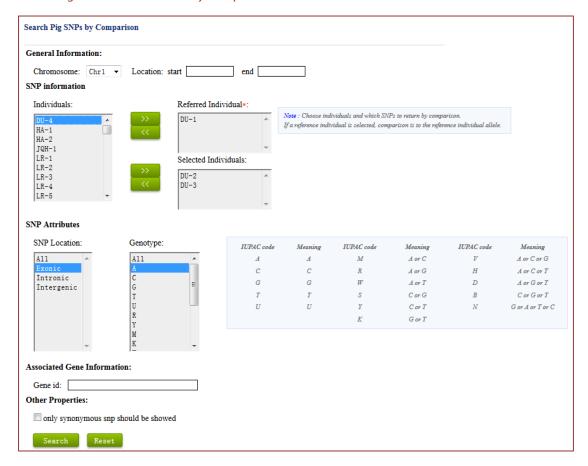## 1.6 Comparison of SNPs between individuals

Using this search, users can view SNP information of two or more individuals. To do this, users must choose "Search SNPs by Comparison" in the toolbar. In the result page, the SNP list shows SNP in selected individuals according to SNP location of referred individual.

Menu: Pig SNPs – Search SNPs by Comparison

Search Pig SNPs by Comparison

General Information:

Chromosome: Chr1 ▼   Location: start [   ] end [   ]

SNP information

Individuals:
```
DU-4
HA-1
HA-2
JQH-1
LR-1
LR-2
LR-3
LR-4
LR-5
```
>>
<<

Referred Individual*:
```
DU-1
```

Note : Choose individuals and which SNPs to return by comparison.
If a reference individual is selected, comparison is to the reference individual allele.

>>
<<

Selected Individuals:
```
DU-2
DU-3
```

SNP Attributes

SNP Location:
```
All
Exonic
Intronic
Intergenic
```

Genotype:
```
All
A
C
G
T
U
R
Y
M
K
```

IUPAC code	Meaning	IUPAC code	Meaning	IUPAC code	Meaning
A	A	M	A or C	V	A or C or G
C	C	R	A or G	H	A or C or T
G	G	W	A or T	D	A or G or T
T	T	S	C or G	B	C or G or T
U	U	Y	C or T	N	G or A or T or C
		K	G or T		

Associated Gene Information:

Gene id: [   ]

Other Properties:

☐ only synonymous snp should be showed

[Search] [Reset]

Result

Search Result

Your Search Conditions:

Chromosome:	Chr1	**SNP Class:**	snp	**SNP Function:**	Exonic	**Selected Individuals:**	DU-2,DU-3
Position:	- to -	**Gene id:**		**Genotype:**	A	**Referenced individuals:**	DU-1

	SNP id	Chr	Position	Gene id	Gene name	Region	Synonymous	DU-1	DU-3	DU-2
1	SSCrs01000228638	1	228638	ENSSSCG00000029697	NA	Exonic	Y	A	A	A
2	SSCrs01000257314	1	257314	ENSSSCG00000029697	NA	Exonic	Y	A	A	A
3	SSCrs01000281564	1	281564	ENSSSCG00000027726	DLL1	Exonic	Y	A	-	A
4	SSCrs01000281767	1	281767	ENSSSCG00000027726	DLL1	Exonic	N	A	M	A
5	SSCrs01000283382	1	283382	ENSSSCG00000027726	DLL1	Exonic	Y	A	A	A
6	SSCrs01000547671	1	547671	linc-sscg0214	linc-sscg0214	Exonic	N	A	A	A
7	SSCrs01000547671	1	547671	linc-sscg0214	linc-sscg0214	Exonic	N	A	A	A
8	SSCrs01000548917	1	548917	linc-sscg0214	linc-sscg0214	Exonic	Y	A	-	A
9	SSCrs01000548917	1	548917	linc-sscg0214	linc-sscg0214	Exonic	Y	A	-	A
10	SSCrs01001068296	1	1068296	ENSSSCG00000004010	C6orf70	Exonic	N	A	A	A

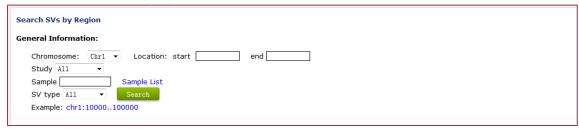| 10 ▼	|◄ ◄ Page 1 of 1077 ► ►| ↻		Displaying 1 to 10 of 10768 items

2. Structural variation search

Users can view structural variations (INV, DUL, DEL, BND) within a specific region or gene.
For more information about SV types(INV, DUL, DEL, BND), please see
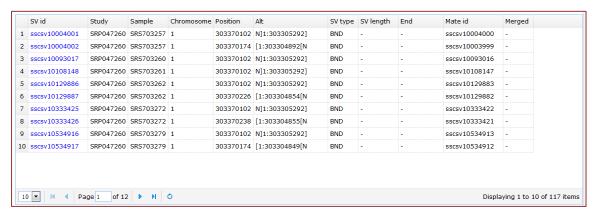http://samtools.github.io/hts-specs/VCFv4.2.pdf.

Menu: SV – Search SVs by Region

Search SVs by Region

General Information:

Chromosome: Chr1 ▼   Location: start [   ]   end [   ]
Study All ▼
Sample [   ]   Sample List
SV type All ▼   [Search]
Example: chr1:10000..100000

Result

	SV id	Study	Sample	Chromosome	Position	Alt	SV type	SV length	End	Mate id	Merged
1	sscsv10010424	SRP047260	SRS703257	1	90984	[18:296345[N	BND	-	-	sscsv10010015	-
2	sscsv10010430	SRP047260	SRS703257	1	91365	N[15:155558533[	BND	-	-	sscsv10007713	-
3	sscsv10010436	SRP047260	SRS703257	1	92705	[15:155378343[N	BND	-	-	sscsv10007686	-
4	sscsv10010465	SRP047260	SRS703257	1	97293	[18:290371[N	BND	-	-	sscsv10010009	-
5	sscsv10010475	SRP047260	SRS703257	1	97498	N[15:155564565[	BND	-	-	sscsv10007716	-
6	sscsv10010500	SRP047260	SRS703257	1	99538	[18:287915[N	BND	-	-	sscsv10010007	-
7	sscsv10010501	SRP047260	SRS703257	1	99552	]15:155566488]N	BND	-	-	sscsv10007717	-
8	sscsv10039601	SRP047260	SRS703258	1	70207	N]15:155441978]	BND	-	-	sscsv10037724	-
9	sscsv10041222	SRP047260	SRS703258	1	88073	N]15:155372946]	BND	-	-	sscsv10037709	-
10	sscsv10041298	SRP047260	SRS703258	1	91277	[18:296324[N	BND	-	-	sscsv10040774	-

10 ▼	|◄ ◄ Page 1 of 223 ► ►| ↻		Displaying 1 to 10 of 2223 items

Menu: SV – Search SVs by Gene

Search SVs by Gene

General Information:

Gene Name [FAM73B]   Study All ▼   Sample [   ]   SV type All ▼   [Search]
Example: FAM73B   NR5A1   linc-sscg1391

Result

	SV id	Study	Sample	Chromosome	Position	Alt	SV type	SV length	End	Mate id	Merged
1	sscsv10004001	SRP047260	SRS703257	1	303370102	N]1:303305292]	BND	-	-	sscsv10004000	-
2	sscsv10004002	SRP047260	SRS703257	1	303370174	[1:303304892[N	BND	-	-	sscsv10003999	-
3	sscsv10093017	SRP047260	SRS703260	1	303370102	N]1:303305292]	BND	-	-	sscsv10093016	-
4	sscsv10108148	SRP047260	SRS703261	1	303370102	N]1:303305292]	BND	-	-	sscsv10108147	-
5	sscsv10129886	SRP047260	SRS703262	1	303370102	N]1:303305292]	BND	-	-	sscsv10129883	-
6	sscsv10129887	SRP047260	SRS703262	1	303370226	[1:303304854[N	BND	-	-	sscsv10129882	-
7	sscsv10333425	SRP047260	SRS703272	1	303370102	N]1:303305292]	BND	-	-	sscsv10333422	-
8	sscsv10333426	SRP047260	SRS703272	1	303370238	[1:303304855[N	BND	-	-	sscsv10333421	-
9	sscsv10534916	SRP047260	SRS703279	1	303370102	N]1:303305292]	BND	-	-	sscsv10534913	-
10	sscsv10534917	SRP047260	SRS703279	1	303370174	[1:303304849[N	BND	-	-	sscsv10534912	-

10 ⯆ |◀ ◀ Page 1 of 12 ▶ ▶| ⟳   Displaying 1 to 10 of 117 items
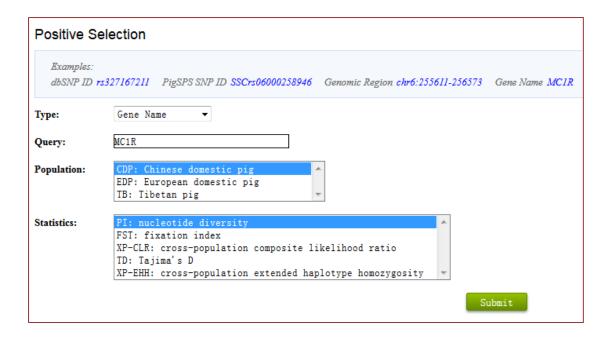
3. Positive selection search

1) Specify your Input Format. PigSPS now supports four types of format including "dbSNP ID", "PigSPS SNP ID" "Genomic region" and "Gene Name". You can also click the example label for direct query.

2)   Input your query as example format.

3)   Choose a population. PigSPS now support three populations including Chinese domestic pigs, European domestic pigs and Tibetan pigs.

4)   PigSPS now provide four selection score for each SNP, including PI, FST, XP-CLR, Tajima D and XP-EHH.

5)   Result Interpretation

PigSPS provides a graphical plot to represent the distribution of selective score in query region. The red line represent top 99% quantile of the whole genome in the given selection statistic terms. The green line represents the top 90% quantile.

Menu: Pig SNPs – Positive Selection

Positive Selection

Type: Gene Name ▼

Query: MC1R

Population:
CDP: Chinese domestic pig
EDP: European domestic pig
TB: Tibetan pig

Statistics:
PI: nucleotide diversity
FST: fixation index
XP-CLR: cross-population composite likelihood ratio
TD: Tajima's D
XP-EHH: cross-population extended haplotype homozygosity

Submit

Result

PI: nucleotide diversity

Population: CDP: Chinese domestic pig   Current Variant: SSCrs06000251033 | Chr: 6 | Pos: 251033

PigSPS SNP ID	Chr	Position	Derived allele	Ancestral allele	PI	FST	TD	XP-CLR	XP-EHH
SSCrs06000250688	6	250688	T	C	0.229336	-0.037160	0.237954	46.955345	-
SSCrs06000250796	6	250796	C	A	0.342476	0.625793	0.237954	46.955345	-
SSCrs06000250899	6	250899	-	-	0.000000	0.230351	0.237954	38.714348	-
SSCrs06000250940	6	250940	-	-	0.031996	0.848890	0.237954	38.714348	-
SSCrs06000251033	6	251033	-	-	0.266788	-0.101356	0.017377	38.714348	-
SSCrs06000251072	6	251072	-	-	0.261538	-0.002457	0.017377	38.714348	-
SSCrs06000251374	6	251374	-	-	0.138279	0.877901	0.017377	38.714348	-
SSCrs06000251400	6	251400	T	A	0.063784	0.642346	0.017377	65.016563	-