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(54) Title: GENETIC MARKERS FOR BOAR TAINT

(57) Abstract: Genetic markers are disclosed with a useful association with boar taint that can be used for screening and selection of pigs for those with more favorable boar taint characteristics associated with androstenone/skatoles metabolism. Specific polymorphic alleles of the 3aHSD, 3bHSD, CYP17A1, CYP2A, CYP2E1, CYTB5, BAC-CT and/or SULT1A1 genes are disclosed for tests to screen pigs to determine those more likely to produce desired boar taint traits.



WO 2007/084855 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/060490A. CLASSIFICATION OF SUBJECT MATTER
INV. C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, BIOSIS, EMBASE, Sequence Search

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NAKAJIN SHIZUO ET AL: "Purification and characterization of 3-alpha/beta-hydroxysteroid dehydrogenase from mature porcine testicular cytosol" JOURNAL OF STEROID BIOCHEMISTRY AND MOLECULAR BIOLOGY, vol. 48, no. 2-3, 1994, pages 249-256, XP002447196 ISSN: 0960-0760 ----- -/--	

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

24 August 2007

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22/11/2007

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>LIN ZHIHONG ET AL: "Molecular cloning and functional analysis of porcine SULT1A1 gene and its variant: A single mutation SULT1A1 causes a significant decrease in sulfation activity." MAMMALIAN GENOME, vol. 15, no. 3, March 2004 (2004-03), pages 218-226, XP002447197 ISSN: 0938-8990</p>	
A	<p>SKINNER T M ET AL: "Cloning and mapping of the porcine cytochrome-p450 2E1 gene and its association with skatole levels in the domestic pig" ANIMAL GENETICS, vol. 36, no. 5, October 2005 (2005-10), pages 417-422, XP002447198 ISSN: 0268-9146</p>	
A	<p>ZHIHONG LIN ET AL: "A novel polymorphism in the 5' untranslated region of the porcine cytochrome b5 (CYB5) gene is associated with decreased fat androstenone level" MAMMALIAN GENOME, SPRINGER-VERLAG, NE, vol. 16, no. 5, 1 May 2005 (2005-05-01), pages 367-373, XP019365825 ISSN: 1432-1777</p>	
A	<p>WO 2005/074483 A (UNIV GUELPH [CA]; SQUIRES E JAMES [CA]; LIN ZHIHONG [US]; LOU YAMPING) 18 August 2005 (2005-08-18)</p>	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/060490

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

Although claims 1-20, 23, 31 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23, 28-31 partially and 24 completely

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23, 28-31 partially and 24 completely

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at position 144 relative to the first nucleotide of the start codon of a 3alphaHSD gene, a method for identifying a marker correlated with favorable boar taint traits in the 3alphaHSD gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at position 144 relative to the first nucleotide of the start codon of a 3alphaHSD gene, an isolated nucleotide sequence which encodes porcine 3alphaHSD

2. claims: 1-23, 28-31 partially

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at position -15 or 830 relative to the first nucleotide of the start codon of a 3betaHSD gene, a method for identifying a marker correlated with favorable boar taint traits in the 3betaHSD gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at position -15 or 830 relative to the first nucleotide of the start codon of a 3betaHSD gene.

3. claims: 1-23, 28-31 partially

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype in intron 4 of a CYP17A1 gene, a method for identifying a marker correlated with favorable boar taint traits in the CYP17A1 gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism in intron 4 of a CYP17A1 gene.

4. claims: 1-23, 28-31 partially and 25 completely

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at positions -1596, -1019 or -968 relative to the first nucleotide of the start codon of a CYP2A gene, a method for identifying a marker correlated with favorable boar taint traits in the CYP2A gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at positions -1596, -1019 or -968 relative to the first nucleotide of the start codon of a CYP2A gene, an isolated nucleotide sequence which encodes porcine CYP2A .

5. claims: 1-23, 28-31 partially

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at position 1422, 1423 or 1502 relative to the first nucleotide of the start codon of a CYP2E1 gene or at position 2412 relative to Genebank accession number AJ697882 (CYP2E1 gene), a method for identifying a marker correlated with favorable boar taint traits in the CYP2E1 gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at position 1422, 1423 or 1502 relative to the first nucleotide of the start codon of a CYP2E1 gene or at position 2412 relative to Genebank accession number AJ697882 (CYP2E1 gene).

6. claims: 1-23, 28-31 partially

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at position -8 or 1500 relative to the first nucleotide of the start codon of a CYTB5 gene, a method for identifying a marker correlated with favorable boar taint traits in the CYTB5 gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at position -8 or 1500 relative to the first nucleotide of the start codon of a CYTB5 gene.

7. claims: 1-23, 28-31 partially and 26, 27 completely

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at position 166, 523, 707 or 745 relative to the first nucleotide of the start codon of a BAC-CT gene or identified within the Genebank accession number CT171681 (BAC-CT), a method for identifying a marker correlated with favorable boar taint traits in the BAC-CT gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at position 166, 523, 707 or 745 relative to the first nucleotide of the start codon of a BAC-CT gene or identified within the Genebank accession number CT171681 (BAC-CT).

8. claims: 1-23, 28-31 partially

a method for identifying a pig which possesses a genotype indicative of a boar taint by assaying the presence of a genotype characterized by a polymorphism or haplotype at position -12, 120, 334 relative to the first nucleotide of the start codon of a SULT1A1 gene or in intron 1 of the SULT1A1 gene, a method for identifying a marker correlated with favorable boar taint traits in the SULT1A1 gene, an isolated nucleotide sequence or allele sequence comprising a polymorphism at position -12 relative to the first nucleotide of the start codon of a SULT1A1 gene or in intron 1 of the SULT1A1 gene.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/060490

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005074483 A	18-08-2005	AU 2005211317 A1	18-08-2005
		CA 2554431 A1	18-08-2005
		EP 1737976 A2	03-01-2007
