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(54) Title: INVOLVEMENT OF A NOVEL NUCLEAR-ENCODED MITOCHONDRIAL POLY(A) POLYMERASE PAPD1 IN
EXTREME OBESITY-RELATED PHENOTYPES IN MAMMALS

(57) Abstract: Aspects of the present invention also provide novel compositions and methods based on novel *PAPD1* single nucleotide polymorphisms selected from the group consisting of AAFC02034082A:g.9224G>A, g.9330A>C, g.9367G>C, g.9419A>C, g.9435T>G, g.9409[(G)4]+[(G)5], g.10084T>C, g.10228G>T, c.10326C>T and c.10364A>G, which may provide novel markers for intramuscular fat deposition. Additional aspects provide for novel methods which may comprise marker-assisted selection or marker-assisted management to improve intramuscular fat deposition in cattle.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/68656

A. CLASSIFICATION OF SUBJECT MATTER
 IPC: C12Q 1/68(2006.01)

USPC: 435/6
 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)
 U.S. : 435/6

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

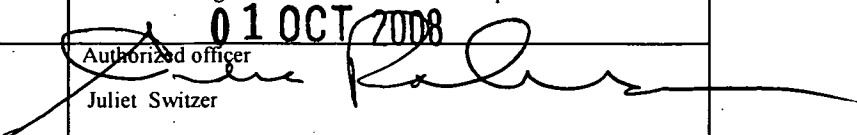
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 STN EAST, PAPER1, bovine, beef, cow, polymorphism, fat, IMF, BMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NCBI Entrez database nucleotide sequences, National Center for Biotechnology Information, National Library of Medicine, NIH (Bethesda, MD, USA) Accession number AAFC02034082, (GI: 67424310) 9 June 2005, pages 1-6.	1-5
X, P	XIAO et al. A novel nuclear-encoded mitochondrial poly(A) polymerase PAPER1 is a potential candidate gene for the extreme obesity related phenotypes in mammals. Int. J. Biol. Sci. May 2006, Vol. 2, No. 4, pages 171-178	1-5

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	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer  Juliet Switzer Telephone No. 571 272 1600

INTERNATIONAL SEARCH REPORT

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Box No. 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:

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 No. 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:
Please See Continuation 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 additional fees, this Authority did not invite payment of any additional fees.
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.: 1-5, species 9224 G>A

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
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BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group 1, claim(s) 1-5, drawn to a method for identifying an animal having desirable intramuscular fat deposition.

Group 2, claim(s) 6-12, drawn to an interactive computer-assisted method for tracking the rearing of livestock.

Group 3, claim(s) 13, drawn to a method of transmitting data.

Group 4, claim(s) 14-18, drawn to an interactive computer system and a method of using the system.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

SNP of interest is at g.9224 of PAPD1

SNP of interest is at g.9330 of PAPD1

SNP of interest is at g.9367 of PAPD1.

SNP of interest is at g.9419 of PAPD1.

SNP of interest is at g.9409 of PAPD1.

SNP of interest is at g.10084 of PAPD1.

SNP of interest is at g.10228 of PAPD1.

SNP of interest is at c.10326 of PAPD1.

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SNP of interest is at c.10364 of PAPP1.

The claims are deemed to correspond to the species listed above in the following manner:

Claims 3 and 12 recite the species in the alternative.

Claims 1-2, 3-11, 13-19 are generic to any polymorphism.

The inventions listed as Groups 1-4 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: There is no common feature required in all groups. Group 1 recites a single method step of determining the presence of one or more single nucleotide polymorphism in a PAPP1 gene of an animal. Toemcki et al. meet this single method step when they teach sequencing of the PAPP1 gene a method which determines the nucleotide present at every possible position within the gene, thus determines the allele at every polymorphic site. Further, the animal identification method of claim 1 is not required for the computer-assisted method for tracking and rearing of livestock bovines of group 2, the data transmission methods of group 3 nor the business method of group 5. Further, distinct methods are set forth which have differing goals, process steps and outcomes.

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: These traits have in common that they are traits of animals, but this is not a special technical feature because it was known that animals have traits in the prior art (see Choi et al., previously cited).

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: These represent variations and polymorphisms within the PAPP1 gene. However, such variations were known at the time the invention was filed, for example NCBI snp SS1520476 provides a SNP within the human PAPP1 gene. Further, Tomecki et al. teach isolation and sequencing of the human PAPP1 gene, and this reference provides a version (an allele) of the PAPP1 gene.

The first named invention, that is claims 1-5, polymorphism A SNP of interest is at g.9224 of PAPP1 will be considered without additional payment.