(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 December 2005 (01.12.2005)

PCT

(10) International Publication Number
WO 2005/112544 A3

(51) International Patent Classification:
C12Q 1/68 (2006.01) *C07H 21/04* (2006.01)

(21) International Application Number:
PCT/IB2005/002000

(22) International Filing Date:
19 February 2005 (19.02.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/546,456 19 February 2004 (19.02.2004) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
27 April 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/112544 A3

(54) Title: LEPTIN PROMOTER POLYMORPHISMS AND USES THEREOF

(57) Abstract: The present invention relates to single nucleotide polymorphisms (SNPs) in the leptin promoter, and to methods for the identification of animals carrying specific alleles of these SNPs that are associated with circulating leptin levels, feed intake, growth rate, body weight, carcass merit and carcass composition. The present invention provides oligonucleotides that can be used as primers and/or probes to amplify and/or detect these SNPs, and provides methods for selecting and grouping animals, in particular bovines, according to genotype.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2005/002000

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***C12Q 1/68*** (2006.01) , ***C07H 21/04*** (2006.01)
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)
IPC: C12Q 1/68 (2006.01) , C07H 21/04 (2006.01)

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

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search CANADIAN PATENT DATABASE, DELPHION, USPTO, ESPACENET, STN / BIOSIS, PUBMED, Keywoeds: Bovine, cow, *Bos taurus*, cattle, leptin, *ob*, single nucleotide polymorphism, SNP, trait, feed intake, growth rate, body weight, carcass merit/composition, T207C, T528C, G1759C, T305C;
GENOMEQUEST, Sequences: SEQ ID NOs: 1-22.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant	Relevant to claim No.
X	BUCHANAN, F.C. et al. Association of a missense mutation in the bovine leptin gene with carcass fat content and leptin mRNA levels. Genet. Sel. Evol. January-February 2002, Vol.34, No. 1, Pages 105-116, ISSN: 0999-193X. See abstract; figure 1; page 107, lines 23-32; page 109, lines 5-10; and page 111, line 2 to page 112, line 12.	1, 5, 7 and 8.
X	TANIGUCHI, Y. et al. Genomic structure and promoter analysis of the bovine leptin gene. IUBMB Life. February 2002, Vol. 53, No. 2, Pages 131-135, ISSN: 1521-6543. See abstract; figure 1; and page 133, right column, line 10 to page 134, left column, line 3.	7

[X] Further documents are listed in the continuation of [X] See patent family annex.

*	Special categories of cited documents :	"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
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier application or patent but published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"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		

Date of the actual completion of the international search	Date of mailing of the international search report
10 January 2006 (10-01-2006)	30 January 2006 (30-01-2006)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001(819)953-2476	Authorized officer Qianfa Chen (819) 994-1374

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the	Relevant to claim No.
X	LIEFERS, S.C. et al. Association of leptin gene polymorphisms with serum leptin concentration in dairy cows. Mamm. Genome. September 2003, Vol. 14, No. 9, Pages 657-663, ISSN: 0938-8990. See abstract; Table 1; and page 658, left column, lines 24-37, and right column, lines 19-23 and 30-37.	7 and 8
X	LAGONIGRO, R. et al. A new mutation in the coding region of the bovine leptin gene associated with feed intake. Anim. Genet. October 2003, Vol. 34, No. 5, Pages 371-374, ISSN: 0268-9146. See the entire document	8
A		1, 5 and 7
X,P	NKRUMAH, J.D. et al. Association of a single nucleotide polymorphism in the bovine leptin gene with feed intake, feed efficiency, growth, feeding behaviour, carcass quality and body composition. Canadian Journal of Animal Science. June 2004, Vol. 84, Pages 211-219. See the entire document.	1, 5, 7 and 8
Y,P	WO 2004/083456 A1 (MARQUESS, F.L.S. et al.), 30 September 2004. See the entire document.	1, 5, 7 and 8
A	BUCHANAN, F.C. et al. Hot topic: an association between a leptin single nucleotide polymorphism and milk and protein yield. J Dairy Sci. October 2003, Vol. 86, No. 10, Pages 3164-3166, ISSN: 0022-0302. See the entire document.	1, 5, 7 and 8
A, P	VAN DER LENDE, T. et al. Leptin gene polymorphisms and their phenotypic associations. Vitamins and Hormones. 2005, Vol. 71, Pages 373-404, ISSN: 0083-6729. See the entire document.	1-8

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the	Relevant to claim No.
A	LIEFERS, S.C. et al. Associations between leptin gene polymorphisms and production, live weight, energy balance, feed intake, and fertility in Holstein heifers. J Dairy Sci. June 2002, Vol. 85, No. 6, Pages 1633-1638, ISSN: 0022-0302. See the entire document.	1-8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2005/002000

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the 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. [ ] Claim Nos.
because they relate to subject matter not required to be searched by this Authority, namely :

2. [X] Claim Nos. 7
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 :

Claim 7 does not comply with Article 6 of the PCT. The expression "f) 10 or more contiguous nucleotides of SEQ ID NO: 6 including the nucleotide position 305 of SEQ ID NO: 4" causes a lack of clarity. It is not a common practice in the field to define an oligonucleotide fragment by referring to a contiguous region of one sequence including a nucleotide position of a different sequence. In the present case, the nucleotide at position 305 of SEQ ID NO: 4 is adenine (A) while the nucleotide at position 305 of exon 2 (SEQ ID NO: 6) is cytosine, rendering the scope of the claim obscure. Nevertheless, the expression "f) 10 or more contiguous nucleotides of SEQ ID NO: 6 including the nucleotide position 305 of SEQ ID NO: 4" has been construed as "f) 10 or more contiguous nucleotides of SEQ ID NO: 6 including the nucleotide position 305 of SEQ ID NO: 6", and a search has been carried out accordingly.

3. [ ] Claim Nos.
because they are dependant 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 :

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying additional fees, this Authority did not payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international covers only those claims for which fees were paid, specifically

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international restricted to the invention first mentioned in the claims; it is covered by claim

Remark on Protest [ ] The additional search fees were accompanied by the applicant's protest and, where the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO2004083456 A1	30-09-2004	CA2422437 A1	18-09-2004
		EP1606419 A1	21-12-2005
		US2004241723 A1	02-12-2004
		US2005065736 A1	24-03-2005
		US2005142560 A1	30-06-2005
		WO2004097038 A1	11-11-2004
		WO2005035725 A2	21-04-2005
		WO2005101230 A1	27-10-2005