

**U.S. Department of Agriculture
Agricultural Research Service**

MATERIAL TRANSFER RESEARCH AGREEMENT

This Agreement is authorized by the Federal Technology Transfer Act and is governed by its terms.

PARTIES:

ARS: USDA, ARS, Northeast Area
 Animal Genomics and Improvement Laboratory
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 Beltsville, MD 20705-2350
 Tel: +1-301-504-8665
 FAX: +1-301-504-8092
 E-mail: john.cole@ars.usda.gov

Provider: University of Helsinki
 Faculty of Veterinary Medicine
 Department of Clinical Veterinary Sciences
 Saari Unit
 Pohjoinen pikatie 800
 FIN-04920 Saarentaus, Finland

Provider's Scientist: Dr. Magnus Andersson, Professor in Animal
 Reproduction
 Tel: +358-40514-2964
 E-mail: magnus.andersson@helsinki.fi

PURPOSE:

To provide ARS with high-density single nucleotide polymorphism (SNP) genotypes for three (3) Ayrshire heifers affected with infertility, and associated know how, hereinafter collectively referred to as the Material.

The Material is released to ARS under the following conditions:

1. The Material shall only be used for: Conducting a genomewide association study (GWAS) using high-density SNP genotypes from the US National Dairy database and the three affected animals to identify candidate genomic regions that may explain this infertility.
2. ARS shall not transfer the Material, in whole or in part, to a third party without the express written consent of Provider. Any third party requesting a sample shall be referred to Provider.

3. The Material shall remain the property of Provider and shall not be used for commercial or profit making purposes.
4. ARS shall keep Provider informed of the results obtained through use of the Material, provide Provider with a copy of any manuscript that describes the work with the Material prior to submission for publication, and acknowledge Provider's contribution to the work reported.
5. Provider shall not in any way state or imply that this Agreement or the results of this Agreement is an endorsement by ARS of its organizational units, employees, products, or services; except to the extent permission is specifically granted by an authorized representative of ARS.
6. The Parties acknowledge and agree to comply with all applicable laws and regulations of the Animal Plant Health and Inspection Service, the Center for Disease Control, and/or Export Control Administration pertaining to possession or transference of technical information, biological materials, pathogens, toxins, genetic elements, genetically engineered microorganisms, vaccines, and the like.
7. ARS shall assume sole responsibility for any claims or liabilities that may arise as a result of ARS' use of the Material.
8. Material shall be returned, destroyed, or otherwise disposed of, as instructed by Provider, no later than the expiration of this Agreement.
9. ARS shall meet with Provider's representative(s) to determine inventorship if an invention should arise during ARS' work with the Material.
10. The provisions of this Agreement are to be deemed severable and the invalidity, illegality or unenforceability of one or more of such provisions shall not affect the validity, legality or enforceability of the remaining provisions.
11. Confidentiality:
 - a. ARS shall not disclose Material marked "Confidential" or "Proprietary" to anyone third party nor use such Confidential Information for any purpose other than that given above without Provider's written permission.
 - b. ARS shall use the same degree of care to protect Confidential Information received under this Agreement as it uses to protect its own information of a similar nature, but in any event not less than reasonable care under the circumstances.
 - c. The Confidential Information shall be excluded from confidentiality if ARS can demonstrate that (a) it had possession of the information prior to disclosure, or (b) the information generally is available to the public at the time of disclosure, or

becomes generally available, after disclosure, through no fault of ARS; or (c) ARS receives the information from a third party having the right to the information and who does not impose confidentiality, or (d) ARS developed the material/information independently.

- d. It shall not be a breach of this Agreement if ARS is required to disclose the Confidential Information by a valid order of a court or other government body, or as otherwise required by law, or as necessary to establish the rights of either party under this Agreement; PROVIDED THAT ARS shall provide prompt prior notice thereof to Provider to enable Provider to seek a protective order or otherwise prevent such disclosure, and PROVIDED FURTHER THAT the Confidential Information otherwise shall continue to be confidential.
 - c. ARS will treat all information generated or gathered under this agreement in accordance with the Freedom of Information Act.
12. This Agreement may be executed in any number of counterparts, each of which when so executed shall be deemed to be an original and all of which taken together shall constitute one and the same agreement. Signature by facsimile shall also bind each of the parties to this Agreement.
 13. ARS is an agency of the U.S. Government and any rights or obligations created under this Agreement are freely transferable within the U.S. Government and shall not be deemed a "transfer."
 14. If the Parties hereto decide, at some future date, to engage in a cooperative research project or program using the Material, a formal Cooperative Research and Development Agreement, or other research Agreement, must be negotiated and entered into between the Parties.
 15. This Material Transfer Agreement shall be construed in accordance with United States of America Federal Law as interpreted by the Federal Courts in the District of Columbia.
 16. Either party may unilaterally terminate this entire Agreement at any time by giving the other party written notice not less than sixty (60) calendar days prior to the desired termination date.

This Material Transfer Research Agreement shall become effective upon date of final signature and shall continue in effect for a period of one (1) year; provided, however, that the obligations assumed by ARS, regarding the maintenance of confidentiality, under this Agreement shall remain in effect for two (2) years from the expiration of this Agreement.

ACCEPTED FOR THE AGRICULTURAL RESEARCH SERVICE

James A. Poulo, III (Technology Transfer Coordinator)

Date

Tom Moreland (ADO)

Date

ACCEPTED FOR THE COOPERATOR:

Magnus Andersson
Signature

MAGNUS ANDERSSON

13th of May 2015
Date

By signing below, the ARS Scientist and ARS Research Leader acknowledge that they have read, understood, and agreed to the terms and conditions of this Agreement.

John Cole
John Cole (ARS Scientist)

6/1/15
Date

Erin Connor
Erin Connor (ARS Research Leader)

6/2/15
Date

**Agricultural Research Service
Agreements Information Management System
Statement of Work**

Title: Identification of a novel recessive haplotype affecting female fertility in Ayrshire cattle

Objective: Three full-sib Ayrshire cows from the same flush of embryos reared in a Finnish dairy herd have all failed to become pregnant following use of both artificial insemination and natural service to a bull. The objective of this project is to conduct a genomewide association study (GWAS) using high-density SNP genotypes from the US National Dairy Database and the three affected animals to identify candidate genomic regions that may explain this infertility.

Approach: Previous research by ARS has identified several genomic regions associated with reduced fertility and embryonic losses in four breeds of dairy cow, including the so-called AH1 haplotype in Ayrshire cattle. A novel defect associated with female infertility has recently been observed in Finnish Ayrshire cows sired by a Canadian Ayrshire bull. Preliminary analysis by the COOPERATOR has identified several genomic regions that are associated with the problem, but their dataset (n=45) lacks sufficient statistical power to definitively identify the causal variant. The ARS database includes phenotypes related to fertility and SNP genotypes for 4,024 Ayrshire bulls and cows. The COOPERATOR and ARS will jointly design the experiment. The methods will be applied by the ARS to the data provided by COOPERATOR. Results will be interpreted and prepared for publication by ARS and the COOPERATOR.

Statement of Mutual Interest: Both parties are actively engaged in independent research projects to identify causal mechanisms associated with fertility in Ayrshire cattle. The parties agree that meeting the objectives of this project will strengthen and enhance ongoing research within the scope of this Agreement. ARS has research expertise in genetic evaluation of fertility, as well as a national database of predicted transmitting abilities and SNP genotypes for US Ayrshire bulls and cows. COOPERATOR has extensive research experience in cow fertility, as well as high-density SNP genotypes for the affected animals.

The Cooperator Agrees To:

1. Provide HD SNP genotypes for three (3) Ayrshire heifers affected with infertility ("the Data").
2. Collaborate with ARS to identify the statistical tools that will be applied to the Data in order to identify genomic regions associated with infertility ("the Methods").
3. With ARS, interpret the results of the procedure and prepare the results for publication.

ARS Agrees To:

1. Carry out a GWAS for female infertility using Ayrshire genotypes in the National Dairy Database and the Data provided by the COOPERATOR.
2. With COOPERATOR, develop the procedure for analyzing the Data.
3. Transmit to COOPERATOR a list of genomic regions associated with infertility.
4. With COOPERATOR, interpret the results of the procedure and prepare the results for publication.

**Estimated Budget
Total Years (1 year)**

	ARS Receive Funds for	ARS In-House	COOPERATOR In-House
A. Salaries and Wages (list # FTEs hired, GS level and # years as footnote, e.g. 2 GS 3 Students, 2 years each)	0	5,000	5,000
B. Equipment	0	0	0
C. Materials and Supplies	0	0	0
D. Travel	0	0	0
1. Domestic	0	0	0
2. Foreign	0	0	0
E. Facilities	0	0	0
F. Other Direct Costs	0	0	0
G. TOTAL DIRECT COSTS	0	5,000	5,000
H. Indirect Costs (11.1%)	0	0	0
I. TOTAL COSTS.....\$	0	5,000	5,000