

## UNITED STATES DEPARTMENT OF AGRICULTURE - RESEARCH, EDUCATION, AND ECONOMICS

## Award Face Sheet

Agency Control No. 44922

Agency <b>AGRICULTURAL RESEARCH SERVICE</b>	Type of Instrument Material Transfer Research Agreement		Authority
Title of Project Identification of Genomic Regions Associated with Host-Specific Variation in Rumen and Intestinal Microflora	Agreement Number/ FAIN 58-8042-7-039	Type of Action New	Correction N
	CFDA No. 10.001		
Agency Administrative Point of Contact/ ADO THOMAS W MORELAND USDA, AGRICULTURAL RESEARCH SERVICE OFFICE OF TECHNOLOGY TRANSFER 5601 SUNNYSIDE AVENUE, RM 4-1152 / MS 5131 Beltsville MD 20705-5131 Phone: 301-504-4838 Fax: 301-504-8334 E-mail: thomas.moreland@ars.usda.gov	Period of Performance Start 06/01/2017 End 05/31/2020		(Reserved)
	Total Amount \$0.00	Amount Obligated by This Action \$0.00	Indirect Cost Rate 0.00%
Agency Principal Investigator JOHN BRUCE COLE USDA, ARS, NEA, BARC, AGIL 10300 BALTIMORE AVE, BLDG. 005, RM. 306, B-W BELTSVILLE MD 20705 Phone: 301-504-8334 Fax: 301-504-8092 E-mail: john.cole@ars.usda.gov	Non-Federal Entity/ Federal Agency (Legal Name and Address) UNIVERSITY OF WISCONSIN SYSTEM 21 N PARK ST STE 6401 MADISON WI 53715-1218 US POC:  Phone: E-mail: nnovak2@rsp.wisc.edu DUNS ID: 161202122		
	Non-Federal Entity/ Federal Agency Principal Investigator GARRET SUEN Assistant Professor of Bacteriology Microbial Sciences Building 1550 Linden Drive, Room 5159 MADISON WI 53706 Phone: (608) 890-3971 Fax: E-mail: gsuen@wisc.edu		
Agency Finance Office JENNIFER C COURCHAINE USDA, ARS, AFM, EBSC BUDGET, TRAVEL, AND AGREEMENTS BRANCH 10300 BALTIMORE AVE, BLDG 3 Beltsville MD 20705 Phone: 301-504-5978 Fax: 301-504-5535 E-mail: jennifer.courchaine@ars.usda.gov	Method of Payment <input type="checkbox"/> HHS/ Payment Management System <input type="checkbox"/> Advance Payment Authorized <input type="checkbox"/> EFT/ Treasury Check <input type="checkbox"/> Pre-Award Costs Authorized <input checked="" type="checkbox"/> Agency Receives Funds <input type="checkbox"/> UES (for FAS awards only) <input type="checkbox"/> ASAP <input type="checkbox"/> IPAC		

## PROVISIONS

This Agreement incorporates the following:

- ☐ Statement/ Scope of Work
- ☐ Proposal
- ☒ Non-Federal Entity Proposal/ Award/ Agreement
- ☐ Research & Related Budget (Total Fed + Non-Fed) or REE-454
- ☐ Research & Related Budget or REE-455
- ☐ Prime Award attached (for subrecipients)
- ☐ Comments (REE-451, page 2)

These are available at <http://www.afm.ars.usda.gov/agreements/partnership.htm>:

- ☐ Conflict of Interest Policy
- ☐ USDA Civil Rights Policy Statement ☐ USDA Civil Rights Poster (AD-475-C)
- ☐ ARS-157 - Research Support Agreement Management Report Template

Reporting Requirements:

Submit to: ☐ Agency PI ☐ ADO ☐ Non-Federal Entity/ Federal Agency

Performance Reports

- ☐ Quarterly
- ☐ Semi-Annual
- ☐ Annual
- ☐ Final

Financial Reports

- ☐ Quarterly
- ☐ Semi-Annual
- ☐ Annual
- ☐ Final

Management Reports

- ☐ Monthly
- ☐ Quarterly
- ☐ Semi-Annual
- ☐ Final

☐ Intellectual Property Reports ([www.iEdison.gov](http://www.iEdison.gov))☐ Form SF-428-B Tangible Personal Property Report - Final ReportApplicable Regulations, Terms and Conditions, and Required Certifications (available at <http://www.afm.ars.usda.gov/agreements/partnership.htm>)

- ☐ 2 CFR Part 200 and 2 CFR Part 400
- ☐ 7 CFR Part 550 - General Administrative Policy for Non-Assistance Cooperative Agreements
- ☐ General Provisions, Research Support Agreement (REE-452R)
- ☐ General Provisions, Trust Fund and Reimbursable Cooperative Agreements (REE-22)
- ☐ AD-1047 - Certification Regarding Debarment, Suspension and other Responsibility Matters - Primary Covered Transactions
- ☐ AD-1048 - Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions
- ☐ AD-1049 - Certification Regarding Drug-Free Workplace Requirements (Grants) - Alt I - For Grantees Other Than Individuals
- ☐ AD-1050 - Certification Regarding Drug-Free Workplace Requirements (Grants) - Alt II - For Grantees Who Are Individuals
- ☐ AD-1052 - Certification Regarding Drug-Free Workplace State and State Agencies
- ☐ AD-3031 - Assurance Regarding Felony Conviction or Tax Delinquent Status for Corporate Applicants
- ☐ Certification Regarding Lobbying
- ☐ REE-26 - Organization Information, Representations, Assurances & Certifications

This agreement, subject to the provisions above, is executed by the United States Department of Agriculture:

Signature	ADO Name THOMAS W MORELAND	Date
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By signing this agreement, the signor certifies that they are vested with the authority to enter into this agreement.

Non-Federal Entity/ Federal Agency Signature	Name and Title	Date
Non-Federal Entity/ Federal Agency Signature	Name and Title	Date

U.S. DEPARTMENT OF AGRICULTURE - RESEARCH, EDUCATION, AND ECONOMICS  
Award Face Sheet  
REE-451, Page 2

Agreement Number/ FAIN: 58-8042-7-039  
Type of Action: New  
Project Number: 0000060856  
Log No.: 60856

Agency Control No.: 44922  
BOC: 0250

FMMI Customer Code :

Agency Funds Chargeable - Agency Use Only

Account Code	FY	Amount	FMMI Fund Code	Cost Center	WBS Element
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**U.S. Department of Agriculture  
Agricultural Research Service**

Log # 60856

**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  
10300 Baltimore Avenue  
Room 306, Bldg 005, BARC-West  
Beltsville, MD 20705-2350  
Tel: 301-504-8665  
FAX: 301-504-8092  
E-mail: [john.cole@ars.usda.gov](mailto:john.cole@ars.usda.gov)  
The Board of Regents of the University of Wisconsin System  
Office of Industrial Partnerships  
**Provider:** Department of Bacteriology  
University of Wisconsin-Madison  
1550 Linden Drive, Room 5159  
Madison, WI 53706  
  
Provider's Scientist: Garret Suen  
Tel: (608) 890-3971  
FAX: (608) 262-9865  
E-mail: [gsuen@wisc.edu](mailto:gsuen@wisc.edu)

**PURPOSE:**

To provide ARS with data describing the phenotypes (production, fertility, and growth), genotypes (single nucleotide polymorphism genotypes), and ruminal and intestinal microflora of Holstein dairy cattle that differ in production efficiency, 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: identification of genomic regions associated with variation in rumen volatile fatty acid production and microbial diversity.
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, collaborate with Provider to prepare 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.

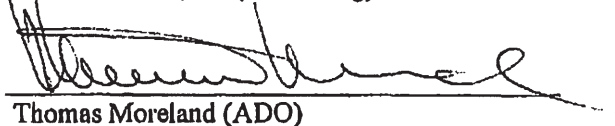
- d. It shall not be a breach of this Agreement if ARS is required to disclose the Confidential Information by a valid order of a court or other government body, or as otherwise required by law, or as necessary to establish the rights of either party under this Agreement; PROVIDED THAT ARS shall provide 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.
  - e. 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 three (3) years; 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. Poulos III (Technology Transfer Coordinator)

21 April 2017  
Date

  
Thomas Moreland (ADO)

4/21/2017  
Date

ACCEPTED FOR THE COOPERATOR:




Signature

 5-1-17  
Richelle Martin, Asst. Director, Office of Industrial Partnerships  
04/24/2017

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.

  
Research Geneticist (Animals) and Acting Research Leader

03/28/2017  
Date



Agricultural Research Service  
Agreements Information Management System  
Statement of Work

**Title:**

Identification of Genomic Regions Associated with Host-Specific Variation in Rumen and Intestinal Microflora

**Objective:**

The objective of this project is to conduct a genome-wide association study to identify chromosomal regions associated with host-level variation in the production of volatile fatty acids (VFA) by rumen microbial populations. VFA production can be used as a proxy for efficiency because the VFA produced by rumen microflora from nutrients in the diet are converted into fat and other milk components in the mammary gland. The Cooperator has extensive phenotypic data from a group of dairy animals for which they also have rumen and fecal samples that can be used to construct a diversity metric summarizing the composition of the microbial populations in those animals. Previous research has established that there are differences in microbial populations of animals identified as more or less efficient, and the current analysis will determine to what extent that is dependent on the genetics of the host animal.

**Approach:**

The material will be used to conduct a statistical analysis in which volatile fatty acid (VFA) production is the principal phenotype (response) variable and the microbial diversity of rumen and fecal microflora are the principal explanatory variables (additional phenotypes include production, fertility, and average daily gain). Haplotype blocks of ~75 contiguous SNP will be used in a random Bayesian regression model to identify genomic regions that have large effects on VFA production, and a SNP-at-a-time fixed-effects regression model in which the effect of each SNP in the haplotype is computed conditionally on the other SNP in the block (analogous to Henderson's Type III method) will be used to identify statistically significant effects among the markers in each important haplotype block. Any statistically significant effects will be subjected to bioinformatics and network analysis to identify genes and groups of genes for further research. Intestinal microflora results will be compared to rumen microflora results to determine if there are differential host effects based on the physiological system under study. Results will be shared with Cooperator.

**Statement of Mutual Interest:**

Both parties are actively engaged in research to improve efficiency in dairy, and are interested in

host effects on ruminal and intestinal microbial populations associated with more- and less-efficient animals. ARS has an interest in identification of genomic regions associated with regulation of efficiency in dairy cattle. NEA has research expertise in genetic and genomic evaluation, interest in genetic improvement of dairy cow fertility, and experience with DNA marker data and bioinformatics, while the Cooperator has expertise in characterization of microbial populations and an interest in identifying differences in those populations associated with production efficiency and fertility in dairy cattle.

#### **The Cooperator Agrees To:**

- Provide dairy animal records, including measures of production and growth efficiency and fertility and diversity profiles characterizing ruminal and interstinal microbial populations.
- Collaborate with ARS to prepare any manuscript that describes the work with the Material prior to submission for publication.

#### **ARS Agrees To:**

- Conduct statistical analysis in which volatile fatty acid (VFA) production is the principal phenotype (response) variable and the microbial diversity of rumen and fecal microflora are the principal explanatory variables (additional phenotypes include production, fertility, and average daily gain
- Provide a list of genes and genomic regions associated with variation involatile fatty acid production in the rumen.
- Collaborate with Provider to prepare any manuscript that describes the work with the Material prior to submission for publication