

Agency AGRICULTURAL RESEARCH SERVICE	Type of Instrument Material Transfer Research Agreement	Authority See Agreement
Title of Project Investigating the Feasibility of Genomic Selection for Heat Tolerance in US Holstein Cattle	Agreement Number/FAIN 58-8042-1-012	Type of Action New
	Correction N	CFDA No. 10.001
	Period of Performance Start 01/01/2021 End 12/31/2024 (Reserved)	
Agency Administrative Point of Contact/ADO BRIAN T NAKANISHI USDA, AGRICULTURAL RESEARCH SERVICE OFFICE OF TECHNOLOGY TRANSFER 5601 SUNNYSIDE AVE BELTSVILLE MD 20705-5131 Phone: 301-504-6905 Fax: E-mail: BRIAN.NAKANISHI@USDA.GOV	Total Amount \$0.00	Amount Obligated by This Action \$0.00
	Indirect Cost Rate 0.00%	
Agency Principal Investigator ASHA MARIE MILES ARS/NEA/BARC/AGIL BLDG. 306, RM. 217, BARC-EAST, 10300 BALTIMORE AVE BELTSVILLE MD 20705 Phone: 301-504-8964 Fax: E-mail: ASHA.MILES@USDA.GOV	Non-Federal Entity/Federal Agency (Legal Name and Address) UNIVERSITY OF CONNECTICUT 438 Whitney RD Extension Unit 1133 Storrs CT 6269-1133 USA POC: PAUL HUDOBENKO INTERIM DIRECTOR Phone: 860-679-3951 Fax: E-mail: ORSP@uchc.edu DUNS ID: 614209054	
Agency Finance Office JENNIFER C COURCHAINE USDA, ARS, NEA AO FINANCIAL MANAGEMENT, TRAVEL AND AGREEMENTS 10300 BALTIMORE AVE, BLDG 3 BELTSVILLE MD 20705-2325 Phone: 301-504-5978 Fax: E-mail: jennifer.courchaine@usda.gov	Non-Federal Entity/Federal Agency Principal Investigator BRENO FRAGOMENI ASSISTANT PROFESSOR, ANIMAL GENOMICS UNIVERSITY OF CONNECTICUT DEPARTMENT OF ANIMAL SCIENCE STORRS CT 06269 USA Phone: 860-486-1069 Fax: E-mail: BRENO.FRAGOMENI@UCONN.EDU	
	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 <https://www.afm.ars.usda.gov/agreements/partnership/>
- Conflict of Interest Policy
 - USDA Civil Rights Policy Statement USDA Civil Rights Poster (AD-475-C)
 - REE-157 - Research Support Agreement Management Report Template

Reporting Requirements:

- Submit to: Agency PI ADO Non-Federal Entity/Federal Agency
- | | | |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Performance Reports | Financial Reports | Management Reports |
| <input type="checkbox"/> Quarterly | <input type="checkbox"/> Quarterly | <input type="checkbox"/> Monthly |
| <input type="checkbox"/> Semi-Annual | <input type="checkbox"/> Semi-Annual | <input type="checkbox"/> Quarterly |
| <input type="checkbox"/> Annual | <input type="checkbox"/> Annual | <input type="checkbox"/> Semi-Annual |
| <input type="checkbox"/> Final | <input type="checkbox"/> Final | <input type="checkbox"/> Final |
- Intellectual Property Reports (www.iEdison.gov)
 - Form SF-428-B Tangible Personal Property Report - Final Report

Applicable Regulations, Terms and Conditions, and Required Certifications (available at <https://www.afm.ars.usda.gov/agreements/partnership/>)

- 2 CFR Part 200 and 2 CFR Part 400
- 7 CFR Part 550 - General Administrative Policy for Non-Assistance Cooperative Agreements, published 10/11/2016
- 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 BRIAN T NAKANISHI	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

Agreement Number/FAIN: 58-8042-1-012

Agency Control No.: 55425

Type of Action: New

BOC: 0250

Project Number: 0000068490

Log No.: 68490

FMMI Customer Code :

Agency Funds Chargeable - Agency Use Only

Account Code	FY	Amount	FMMI Fund Code	Cost Center	WBS Element
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Comments:

**U. S. Department of Agriculture
Agricultural Research Service
MTRA #68490**

DATA TRANSFER RESEARCH AGREEMENT - OUT

Research conducted under this Agreement is authorized and governed by the terms of Cooperative Research Projects; Agreements with & Receipt of Funds from State & other Agencies (7 U.S.C. 3318a) & Data used in this Agreement is governed by the terms of the Federal Technology Transfer Act (15 U.S.C. 3710a (b) (3) (A)).

PARTIES:

ARS: USDA, ARS, NEA
Animal Genomics & Improvement Laboratory
10300 Baltimore Ave, Bldg. 005,
Rm 313, BARC-West,
Beltsville, MD 20705
asha.miles@usda.gov
Tel: (301) 504-8665

RECIPIENT UNIVERSITY OF CONNECTICUT
438 Whitney RD Extension Unit 1133
Storrs CT 6269-1133

RECIPIENT's Scientist: BRENO FRAGOMENI
Tel: 860-486-1069
E-mail: BRENO.FRAGOMENI@UCONN.EDU

PREAMBLE:

It is understood under this Agreement that ARS will provide Data to the RECIPIENT. It is understood that under this Agreement both parties will be engaged in collaborative research on the exchanged Data.

PURPOSE:

ARS will provide RECIPIENT with data pertaining to US dairy herds including pedigrees, genotypes, and cow production records and associate knowhow, hereinafter DATA. The DATA has been collected from dairy herds across the US who participate in our national genetic and genomic evaluation program. The research conducted with the DATA is described in Appendix 1: Statement of Work.

The DATA is released by ARS to the RECIPIENT under the following conditions:

1. The above DATA is the property of the ARS.
2. The DATA will not be further distributed to others without ARS'S written consent. The RECIPIENT shall refer any request for the DATA to ARS.

3. THIS DATA SHALL NOT BE USED FOR COMMERCIAL OR OTHER PROFIT-MAKING PURPOSES. Any and all commercial or profit-making uses of this DATA require the RECIPIENT to obtain in advance an appropriate license or other written permission from the ARS. Some examples of prohibited commercial or other profit-making uses that are not permitted include, but are not limited to, developing algorithms, the creation of proprietary genomic evaluations, etc.
4. Subject to Section 12, the RECIPIENT cannot present the DATA or use the DATA for any public purpose including teaching or publication without the express written consent of ARS. The RECIPIENT agrees to acknowledge the contribution of ARS in all written or oral public disclosures concerning RECIPIENT's research using the DATA. RECIPIENT agrees to supply ARS with copies of public materials based on the use of the DATA. RECIPIENT grants ARS a royalty-free, nonexclusive and irrevocable right to reproduce, publish, or otherwise use the public materials for Federal purposes, and to authorize others to do so.
5. Neither Party shall in any way state or imply that this Agreement or the results of this Agreement is an endorsement by the Other Party's organizational units, employees, products, or services except to the extent permission is specifically granted by an authorized representatives of the Parties.
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 GIVES NO WARRANTIES OR GUARANTEES, EXPRESSED OR IMPLIED, FOR THE MATERIAL/DATA, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Unless prohibited by law, RECIPIENT assumes all liability for claims for damages against it by third parties which may arise from the use, storage or disposal of the DATA.
9. DATA in all forms shall be returned, destroyed, or otherwise disposed of or stored, as instructed by ARS, no later than the expiration of this Agreement.
10. Recipient shall meet with ARS'S representatives to determine inventorship if an invention should arise from RECIPIENT'S work with the DATA. All rights, title, and interest in inventions made under this Agreement solely by employees of ARS shall be owned by ARS. Any invention made jointly under this Agreement by at least one employee of the RECIPIENT and at least one employee of ARS shall be jointly owned. Any invention made under this Agreement solely by individuals employed by the RECIPIENT shall be owned by the RECIPIENT, provided ARS is granted a royalty-free, nonexclusive, irrevocable license to use the invention for U.S. Government purposes.

11. 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.
12. Confidentiality provisions restricted to the DATA:
 - a. The RECIPIENT shall not disclose DATA marked “Confidential” or “Proprietary” to any third party nor use such Confidential Information for any other purpose than that given above without the written permission of ARS.
 - b. RECIPIENT 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. Confidential Information shall be excluded from confidentiality if the receiving Party 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 RECIPIENT; or (c) RECIPIENT receives the information from a third party having the right to the information and who does not impose confidentiality obligations on the RECIPIENT.
 - d. It shall not be a breach of this Agreement if the RECIPIENT 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 the RECIPIENT shall provide prompt prior notice thereof to ARS to enable ARS 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.
 - f. These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive Order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive Orders and statutory provisions are incorporated into this agreement and are controlling.

13. Exchange and release of data or information collected (hereinafter results) from the use of the DATA under the Statement of Work found in Appendix 1:
 - a. Results will be released by the Party performing the research according to uniform procedures such that the other Party receives such results not later than other interested parties and that there is no subsequent restriction on release by either Party to this agreement.
 - b. Any public information released concerning work carried out under this Agreement will describe the contributions of both Parties to the work effort.
 - c. Results which are compiled from the DATA under this Agreement shall be shared and mutually interchanged by both Parties and the results are Results. Results of the undertaking will be made available to both Parties. The Party performing the research has the right to publish in scientific literature the results of this project. The Party performing the research will make available to the other Party manuscript copies of any publication for review and comment. In case of disagreement, the Party performing the research has the right to publish giving acknowledgment of this cooperative effort. Requests for confidentiality will be considered pursuant to and in accordance with the provisions of the Freedom of Information Act.
 - d. Any publication developed as a result of this Agreement shall be submitted by the performing party to the other party to the other for advice and comment. In the event of a dispute, a separate publication may be made with effective statements of acknowledgment and disclaimer.
14. 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.
15. 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 an "transfer."
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. Sections 2, 3 and 13 of this AGREEMENT survive and is enforceable after termination of this Agreement.

This Material Transfer 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 a receiving Party, regarding the maintenance of confidentiality, under this Agreement shall remain in effect for two (2) years from the expiration of this Agreement.

Appendix 1 Statement of Work

Title: Investigating the Feasibility of Genomic Selection for Heat Tolerance in US Holstein Cattle

Objective: This project will: (1) determine if it is feasible to include heat stress information in the US Holstein evaluation, (2) identify a feasible and straightforward model for a reaction norm that accounts for heat stress robustness in a reaction norm to generate useful breeding values.

Approach:

We will first evaluate different methods for calculating heat loads, including identifying geographic regions representing different climates, critical threshold temperatures, temperature humidity index ranges, length of heat exposure, and seasons in which the robustness breeding value may reduce production losses. Milk yield, fat, protein, and somatic cell count from regions with contrasting climates will be analyzed by two reaction norm-based approaches: i. two-trait analysis and ii. random regression. Both reaction norms will be under a single-step genomic best linear unbiased prediction analysis and models will be compared using the likelihood ratio method with cross-validation. The model which is best able to account for robustness to heat stress without dramatically increasing the computational burden of the analysis, and which is useful for the industry, will be chosen. Gene networks underlying the adaptation traits will be studied using a single-step genome-wide association study. Finally, the genotype-by-environment interaction will be calculated as the genetic correlation of milk yields among states from contrasting regions.

Statement of Mutual Interest:

Climate change is a variable that requires consideration in animal product production. Both parties are interested in modeling heat stress in dairy cows. This is consistent with Objective 2: Evaluate new traits that can all be predicted at birth from the same inexpensive DNA sample, of Project plan 8042 31000 002 000 d.

RECIPIENT Agrees To: (This information will be entered in to AIMS)

1. Conduct these portions of the research project or perform the following tasks:
 - a. Calculate heat load for selected regions using weather data, including critical threshold temperatures and the length of heat exposure.
 - b. Model the genetics underlying the decline of production associated with heat stress, and
 - c. Calculate the genotype by environment interaction for heat stress

ARS Agrees To: (This information will be entered in to AIMS)

MTRA# 68490

1. Provide RECIPIENT with data pertaining to US dairy herds including pedigrees, genotypes, and cow production records, and associated know how, hereinafter collectively referred to as the Material

ARS & RECIPIENT Joint Responsibilities:

1. Jointly conduct these portions research project or jointly perform the following tasks:
 - a. Collaborate by participating in research planning, interpretation of results;
 - b. Participate in selection of best model and
 - c. Prepare peer-reviewed publications.

Estimated Budget charts next page

Estimated Budget Total Years (3 years)

	ARS Receive Funds for	ARS In-House	COOPERATOR In-House
A. Salaries and Wages 1 GS-12, 3 years (5% of time) 1 grad student, 3 years (100% time) 1 Assistant Professor, 3 years (15% time)	0.00 0.00 0.00	\$13,080	\$106,470 \$57,825
B. Equipment	0.00	0.00	0.00
C. Materials and Supplies	0.00	0.00	0.00
D. Travel 1. Domestic 2. Foreign	0.00 0.00	0.00 0.00	\$19,260 0.00
E. Facilities	0.00	0.00	0.00
F. Other Direct Costs 1. Publication Costs	0.00	0.00	\$5,250
G. TOTAL DIRECT COSTS	0.00	\$13,080	\$188,805
H. Indirect Costs (11.1%)			
I. TOTAL COSTS \$	0.00	\$13,080	\$188,805

Year 1	ARS Receive Funds for	ARS In-House	COOPERATOR In-House
A. Salaries and Wages 1 GS-12, 3 years (5% of time) 1 grad student, 3 years (100% time) 1 Assistant Professor, 3 years (15% time)	0.00 0.00 0.00	\$4,360	\$35,490 \$19,275
B. Equipment	0.00	0.00	0.00
C. Materials and Supplies	0.00	0.00	0.00
D. Travel 1. Domestic 2. Foreign	0.00 0.00	0.00 0.00	\$6,420 0.00
E. Facilities	0.00	0.00	0.00
F. Other Direct Costs 1. Publication Costs	0.00	0.00	\$1,750
G. TOTAL DIRECT COSTS	0.00	\$4,360	\$62,935
H. Indirect Costs (11.1%)			
I. TOTAL COSTS \$	0.00	\$4,360	\$62,935

Year 2	ARS Receive Funds for	ARS In-House	COOPERATOR In-House
A. Salaries and Wages 1 GS-12, 3 years (5% of time) 1 grad student, 3 years (100% time) 1 Assistant Professor, 3 years (15% time)	0.00 0.00 0.00	\$4,360	\$35,490 \$19,275
B. Equipment	0.00	0.00	0.00
C. Materials and Supplies	0.00	0.00	0.00
D. Travel 1. Domestic 2. Foreign	0.00 0.00	0.00 0.00	\$6,420 0.00
E. Facilities	0.00	0.00	0.00
F. Other Direct Costs 1. Publication Costs	0.00	0.00	\$1,750
G. TOTAL DIRECT COSTS	0.00	\$4,360	\$62,935
H. Indirect Costs (11.1%)			
I. TOTAL COSTS \$	0.00	\$4,360	\$62,935

Year 3	ARS Receive Funds for	ARS In-House	COOPERATOR In-House
A. Salaries and Wages 1 GS-12, 3 years (5% of time) 1 grad student, 3 years (100% time) 1 Assistant Professor, 3 years (15% time)	0.00 0.00 0.00	\$4,360	\$35,490 \$19,275
B. Equipment	0.00	0.00	0.00
C. Materials and Supplies	0.00	0.00	0.00
D. Travel 1. Domestic 2. Foreign	0.00 0.00	0.00 0.00	\$6,420 0.00
E. Facilities	0.00	0.00	0.00
F. Other Direct Costs 1. Publication Costs	0.00	0.00	\$1,750
G. TOTAL DIRECT COSTS	0.00	\$4,360	\$62,935
H. Indirect Costs			

MTRA# 68490

(11.1%)			
I. TOTAL COSTS \$	0.00	\$4,360	\$62,935

ACCEPTED FOR THE AGRICULTURAL RESEARCH SERVICE

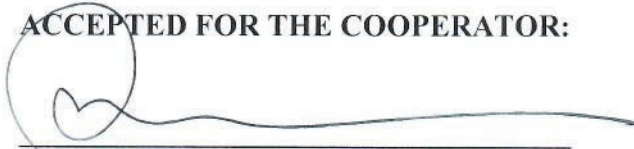
JAMES POULOS Digitally signed by JAMES POULOS
Date: 2021.08.18 10:30:47 -04'00'

James A. Poulos, III (Technology Transfer Coordinator) _____ Date

BRIAN NAKANISHI Digitally signed by BRIAN NAKANISHI
Date: 2021.08.16 11:04:56 -04'00'

Brian T. Nakanishi (Authorized Departmental Officer) _____ Date

ACCEPTED FOR THE COOPERATOR:



Mark Reeves (Director) _____ Date

8/17/21

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.

ASHA MILES Digitally signed by ASHA MILES
Date: 2021.08.18 10:06:28 -04'00'

Asha Marie Miles (ARS Scientist) _____ Date

RANSOM BALDWIN Digitally signed by RANSOM BALDWIN
Date: 2021.08.18 10:18:12 -04'00'

Ransom Baldwin (ARS Research Leader) _____ Date

By signing below, the Cooperator Scientist acknowledges that they have read, understood, and agree to the terms and conditions of this Agreement.

Breno Fragomeni Digitally signed by Breno Fragomeni
Date: 2021.08.17 17:51:11 -04'00'

Breno Fragomeni (Cooperator Scientist) _____ Date