A. COVER PAGE

Project Title: Epidemiologic and Genomic Evaluation of Influenza D Among Cattle Workers and Their Community	
Grant Number: 5K01OH011432-03	**Project/Grant Period:** 09/01/2018 - 08/31/2021
Reporting Period: 09/01/2020 - 08/31/2021	**Requested Budget Period:** 09/01/2020 - 08/31/2021
Report Term Frequency: Annual	**Date Submitted:** 03/18/2022
Program Director/Principal Investigator Information: JESSICA H LEIBLER , BA DPH MS **Phone Number:** 617-358-2725 **Email:** jleibler@bu.edu	**Recipient Organization:** BOSTON UNIVERSITY MEDICAL CAMPUS BOSTON UNIVERSITY MEDICAL CAMPUS 85 East Newton Street, M-921 BOSTON, MA 021182841 **DUNS:** 604483045 **EIN:** 1042103547A1 **RECIPIENT ID:**
Change of Contact PD/PI: NA	
Administrative Official: DIANE BALDWIN 25 Buick Street, Suite 200 Boston, MA 022151300 **Phone number:** 6173534365 **Email:** ospera@bu.edu	**Signing Official:** DIANE BALDWIN 25 Buick Street, Suite 200 Boston, MA 022151300 **Phone number:** 6173534365 **Email:** ospera@bu.edu
Human Subjects: NA	**Vertebrate Animals:** NA
hESC: No	**Inventions/Patents:** No

B. ACCOMPLISHMENTS

B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?

This is a K01 award with a focus on provide mentored training in genomics and bioinformatics techniques for Dr. Leibler in conjunction with a research study of influenza D virus among cattle workers. Dr. Leibler's training goals are: 1) developing content and methodological skills to perform genomic epidemiology research; 2) learning and applying bioinformatics approaches to analyzing genomic sequence data; and 3) establishing expertise in applied translational research in occupational health. The specific aims of the K01 research are: Characterize evidence for previous and recent IDV infection among cattle workers, their household contacts, and community residents in a cattle-dense region of the United States (Aim 1); depict the phylogenic lineage of publically available IDV sequences to assess genetic diversity of IDV and evidence of prior reassortment (Aim 2); and translate research findings regarding health effects and pandemic risks of IDV to key stakeholders to identify strategies for worker surveillance and protection (Aim 3).

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

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B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

For this reporting period, is there one or more Revision/Supplement associated with this award for which reporting is required?

No

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

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B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Research findings will be communicated back to dairy workers in the coming year, once the paper is peer reviewed and accepted for publication.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Not Applicable

B.2. What was accomplished under these goals?

In this K01 award, goals included specific training and mentorship for Dr. Leibler around methodologies in genomic epidemiology, including bioinformatics training and data interpretation. These goals were achieved, with Dr. Leibler gaining important analytic skills as proposed through trainings, 1:1 mentorship, and targeted coursework, and subsequently applying this learning towards her research. Her skills gained through this K01 period also support her other research, including an NIH/NIEHS R01 study for which she is the PI. In this R01, she will apply metabolomic and microbiome analyses and other skills gained during her K01 period.

The research supported by this award successfully addressed aims focused on characterizing evidence of influenza D virus (IDV) exposure among dairy cattle workers in the United States, with a publication on this topic currently under review. To accomplish her research aims during the pandemic, Dr. Leibler partnered with the NIOSH-sponsored High Plains Intermountain Center for Agricultural Health and Safety (HICHAS) at Colorado State University to conduct a secondary data analysis of cattle worker respiratory samples collected under a separate NIOSH R01 (PI: Stephen Reynolds). In this study, conducted in partnership with Colorado State University and Duke University, the team identified IDV respiratory carriage in more the 2/3 of study participants in a five-day study with repeated sampling. These findings indicate that IDV exposure is common among dairy workers and that this pathogen should be the focus of continued monitoring to reduce pandemic risks. This study is among the only to date to pair personal bioaerosol monitoring with respiratory sampling using a longitudinal design to comprehensively evaluate IDV carriage alongside exposure dynamics in this high-risk workforce.

Dr. Leibler’s partnership with HICHAS has provided tremendously valuable collaborations and new opportunities, and she continues to collaborate with this team at present on new projects. As the parent R01 is still ongoing, aims regarding translational research and participant communication remain unfulfilled, but Dr. Leibler intends to engage on these topics around IDV as the parent study concludes in the coming years.

B.4 (Section B4.pdf)

B.4 What opportunities for training and professional development has this project provided?

In the current reporting period, Dr. Leibler engaged in a series of online trainings to support her learning of metabolomics analyses and microbiome analyses. These skills will enhance her abilities to extend this K01 research into further analyses in collaboration with her colleagues at Colorado State, considering IDV carriage alongside microbiome characteristics of the respiratory pathways. Her learning around metabolomics methods has allowed her to conduct analyses using the MetaboAnalyst R pipeline to analyze data from her current R01 study. She also worked closely with a member of her K01 advisory group, Dr. Gregory Gray (currently at the University of Texas, although at Duke University during much of the reporting period), to establish a plan for laboratory analyses for her K01 research, analyze the data, and produce a final manuscript for peer review. These opportunities for training and mentored learning were very valuable.

While Dr. Leibler has not taught courses in this reporting period, she currently mentors a PhD student, whose work will involve many of the genomic methods that Dr. Leibler gained familiarity of due to her K01 research. These skills are advancing her R01 research in exciting directions. She also served on an NIEHS Study Section during this reporting period and will serve on a NIOSH Study section in the spring of 2022. During this reporting period, she served on her department's Diversity, Equity and Inclusion committee as well as the parallel school-wide committee has her department representative. All of these activities together constituted 10% of her effort during the reporting period.

C. PRODUCTS

C.1 PUBLICATIONS

Are there publications or manuscripts accepted for publication in a journal or other publication (e.g., book, one-time publication, monograph) during the reporting period resulting directly from this award?

No

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

Not Applicable

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Have inventions, patent applications and/or licenses resulted from the award during the reporting period? No

If yes, has this information been previously provided to the PHS or to the official responsible for patent matters at the grantee organization? No

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Data or Databases	The central manuscript from the field work associated with this award is currently under review at the journal Influenza and Other Respiratory Viruses. It includes Dr. Leibler as the first author as well as three of her mentors/advisors as co-authors (Drs. Gray, White and Johnson).

D. PARTICIPANTS

D.1 WHAT INDIVIDUALS HAVE WORKED ON THE PROJECT?

Commons ID	S/K	Name	Degree(s)	Role	Cal	Aca	Sum	Foreign Org	Country	SS
JLEIBLER	Y	Leibler, Jessica H	BA,MS,DPH	PD/PI	9.0	0.0	0.0			NA

Glossary of acronyms:

S/K - Senior/Key
DOB - Date of Birth
Cal - Person Months (Calendar)
Aca - Person Months (Academic)
Sum - Person Months (Summer)
Foreign Org - Foreign Organization Affiliation
SS - Supplement Support
RE - Reentry Supplement
DI - Diversity Supplement
OT - Other
NA - Not Applicable

D.2 PERSONNEL UPDATES

D.2.a Level of Effort

Not Applicable

D.2.b New Senior/Key Personnel

Not Applicable

D.2.c Changes in Other Support

Not Applicable

D.2.d New Other Significant Contributors

Not Applicable

D.2.e Multi-PI (MPI) Leadership Plan

Not Applicable

E. IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

Not Applicable

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

NOTHING TO REPORT

G. SPECIAL REPORTING REQUIREMENTS SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

NOTHING TO REPORT

G.2 RESPONSIBLE CONDUCT OF RESEARCH

NOTHING TO REPORT

G.3 SPONSOR COMMENTS [FELLOWSHIPS]

File uploaded: mentor letters RPPR 3.2022.pdf

G.4 HUMAN SUBJECTS

G.4.a Does the project involve human subjects?

NA

G.4.b Inclusion Enrollment Data

NOTHING TO REPORT

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Are there personnel on this project who are newly involved in the design or conduct of human subjects research?

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Does this project involve vertebrate animals?

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

No foreign component

G.10 ESTIMATED UNOBLIGATED BALANCE

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

Boston University School of Public Health

Department of Environmental Health

715 Albany Street
Boston, Massachusetts 02118-2526
T 617-638-4620 F 617 638-4857

March 10, 2022

RE: Dr. Jessica Leibler RPPR – mentor report

Dear Colleagues:

As a co-mentor for Dr. Jessica Leibler's K01 award from CDC/NIOSH, I am pleased to provide this report at the conclusion of Dr. Leibler's K01 grant period.

The last three years were ones of significant learning and professional growth for Dr. Leibler. In addition to fulfilling her research and training aims associated with this K01 award, she leveraged her skills to successfully compete for an NIEHS R01 as Principal Investigator. She is a productive researcher with an international team of investigators and an active grant portfolio, with plans to expand her research in the coming years. In particular, the mentorship opportunities provided by the K01 have granted Dr. Leibler valuable professional connections, specifically with the NIOSH Agricultural Health Center at Colorado State University, Dr. Gregory Gray and his "one health" team at the University of Texas, and Dr. Johnson's bioinformatics group at Boston University. These relationships will continue to support Dr. Leibler and her research career in the years to come.

Dr. Leibler has likewise expanded her network within our department at the Boston University School of Public Health, with new departmental research collaborations focused on COVID-19, occupational health, and kidney disease. She engages in school-wide and department committees, has participated on NIH Study Sections, and mentors our PhD students. With the support of our Chair, she will be nominated for promotion to Associate Professor this year.

It was my pleasure to support Dr. Leibler during her K01 award. She is an outstanding scholar, mentor, and colleague.

I extend my gratitude to NIOSH for granting her this opportunity.

Sincerely,

Roberta F. White, PhD, ABPP
Emeritus Professor, Department of Environmental Health

Boston University School of Medicine
Department of Medicine
Section of Computational Biomedicine

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72 East Concord Street, E-6
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March 17, 2022

RE: Mentor's Report, Dr. Jessica Leibler/NIOSH K01

Dear Colleagues:

I write to update you as to Dr. Jessica Leibler's progress during the final year of her 3-year K01 award from CDC/NIOSH. I serve as her co-mentor. This year was a highly successful one for Dr. Leibler, in large part because her research aims were conducted and completed. Through collaboration with Colorado State University and Duke University, Dr. Leibler acquired and analyzed a sample of respiratory samples from dairy workers in the United States for influenza D virus, as well as a panel of other zoonotic viruses, including coronaviruses. This work, in which her team identified notable prevalence of respiratory carriage of influenza D, is the capstone of her K01 research. This manuscript also reflects notable success in establishing new collaborations across multiple institutions and leading a multi-investigator research team. These skills will continue to be valuable to Dr. Leibler in the future.

During this project period, Dr. Leibler was awarded her first NIH R01 as PI (April 2021;NIEHS). In this role, she currently leads an evaluation of risk factors for kidney disease in a large, prospective cohort of children and adolescents in Nicaragua. She has also broadly expanded her roles as a Co-Investigator across other NIH projects, many specifically focused on COVID-19, and has plans for two additional R01 submissions in the coming year.

Dr. Leibler's K01 period granted her valuable protected time to focus on her training, learning and research, and was a very successful period for her. I have confidence that she will continue to engage at a high-level as an independent investigator in the years to come.

Sincerely,

W. Evan Johnson, PhD
Associate Professor of Medicine & Biostatistics
Associate Chief, Division of Computational Biomedicine
Boston University School of Medicine

I. OUTCOMES

I.1 What were the outcomes of the award?

In this study, we evaluated nasal carriage of influenza D virus among cattle workers employed at industrial dairies in the United States. Influenza D was first documented in cattle and pigs in 2015, and little is known about the ability of this novel and emerging virus to infect humans. To address this gap, we conducted prospective, cross-shift sampling of 31 workers employed at five large-herd dairy operations in two states to assess IDV nasal carriage over a five-day period. We found evidence of IDV in the nasal washes of 67% of participants at least once during the five day study period. IDV exposure was not associated with respiratory symptoms in these workers and the majority of carriage was transient. These findings underscore the need to study IDV spillover to humans through continued study of cattle workers, who are a frontline workforce in the context of emerging zoonotic respiratory diseases.

As a K01 award, this award also supported three years of valuable training and mentorship for Dr. Leibler. Due to this support, she successfully competed for an NIH R01 award during the K01 period and is engaged across multiple NIH-supported studies at the present time.