Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Farmed Cervid Chronic Wasting Disease Management and Response Activities 2021 Cooperative Agreements

2021 Project Executive Summaries

October 2021

Project Summaries for the Farmed Cervid Chronic Wasting Disease Management and Response Activities 2021 Cooperative Agreements

USDA APHIS VS awarded $2.775 million through Cooperative Agreements to twelve entities in eleven states. These projects will allow recipients to further develop and implement CWD management, response, and research activities in farmed cervids, including surveillance and testing. The Executive Summaries provided by the cooperators are below.

Farmed Cervid Management Projects

***Farmed Cervid Chronic Wasting Disease Management and Education: Online Continuing Education Courses for Cervid Producers and Veterinarians*,** Iowa Department of Agriculture (Brick, T.)

IDALS has concerns with misunderstanding of the CWD Program Standards and how information is interpreted. It is imperative that Iowa continues to educate and assist practitioners and producers with educational resources to instruct on testing requirements, animal escapes, fencing, control and management of CWD. The Iowa Farmed Cervid Chronic Wasting Disease Management and Education project is being implemented to plan and facilitate interactive ways to educate Iowa producers, veterinary practitioners and other states if they so choose.

To assist IDALS efforts, we will work with the Center for Food Security and Public Health to plan, develop and deliver educational materials to producers and veterinarians. The educational material will include, but not be limited to:

- Control and Prevention of CWD
- Overview of requirements of Iowa's CWD program
- Initial Inventory requirements, Annual inventory reports and Physical Herd Inventory.
- Testing Protocol(s)
- Protocol for producers with more than 1 herd
- Animal Escapes procedures and reporting
- IDALS/Federal Program Standards

By combining the expertise of IDALS staff and veterinary specialists at the CFSPH, the materials to be developed will educate Iowa's producers and veterinarians on CWD protocols and how they align with national. CWD program Standards. In addition, the two CE courses will be available to producers and veterinarians nationally, at no cost, through the well-established CFSPH learning management system.

***Farmed Cervid Unmanned Aircraft System (UAS) Surveillance*,** Kansas Department of Agriculture (Nelson, J.)

The Kansas Department of Agriculture Division of Animal Health is eager to use an Unmanned Aircraft System (UAS), also called a drone, for surveillance of farmed cervid operations in the state of Kansas. The Division of Animal Health has regulatory authority over all farmed cervid operations in Kansas and this technology platform will enhance our regulatory oversight and response capabilities. Herd counts are challenging for cervid producers; especially those that utilize large, native range acreages rather than pens or lots to manage their herd. Despite being classified as domesticated, these cervids display behavior similar to wild cervids, always maintaining distance between themselves and any perceived threats (i.e. producers, veterinarians, regulatory staff). During the past year, Kansas

experienced two positive CWD animals in farmed cervid operations. One of the positive herds exemplified the challenges often encountered when dealing with cervid operations; this 160-acre hunting preserve highlighted the difficulty in surveillance and herd inventorying in a large facility. These challenges will undoubtedly continue during the duration of the Official Quarantine. Another challenge for our agency is our responsibility to declare to the Kansas Department of Wildlife, Parks, and Tourism that all wild cervids have been cleared from a newly fenced farmed cervid facility. Cervids instinctually tend to hide from humans and blend in well with their natural surroundings making it challenging to identify and remove cervids prior to final completion of the perimeter fence.

The UAS, equipped with both a high definition color camera and a thermal imaging camera, will be utilized for the project. Despite large acreage, dense foliage, or rugged terrain that may be inaccessible on foot, this system will allow us to survey and access an entire facility in a short period of time. Data collected will assist in determining herd inventory and provide an indication of current herd health. In the case of new facilities, use of the system will ensure no wild cervids are located within the boundaries of the facility prior to populating with farmed cervids.
The UAS project is poised to have a profound impact on the Kansas domestic cervid industry: improvements in animal welfare, increases in efficiency, allowing for safer working environments for agency personnel and cervid producers, and enhancing animal disease response capabilities. No other state-of-the-art application is as all-encompassing as the UAS technology potential.

Development and Evaluation of CWD Biosecurity Practices using a Risk Assessment Approach by Farmed Cervid Producers and CWD Disease Response Strategies**,** Minnesota Board of Animal Health (Glaser, L.)

Chronic wasting disease (CWD) poses an existential threat to cervid farms due to continued disease spread. Once identified as infected, CWD-positive cervid farms are quarantined and most will be depopulated, as there are no treatments or vaccinations available, and no proven method to eliminate infection from exposed herds short of herd depopulation. Infected farms also pose a threat to susceptible wild cervids in the local area. Primary CWD preventive practices at this time are focused on preventing transmission through exposure of farmed cervids to infective prion protein using regulatory policies and farm biosecurity practices. However, transmission is possible through multiple exposure pathways to susceptible farms, and use of biosecurity practices varies markedly across cervid farms.

The objectives of this study are to 1) Develop on-farm CWD risk assessment tool for cervid producers and their veterinarians to assess risk of CWD introduction to the operation, including both direct and indirect contact transmission exposures; 2) Develop CWD biosecurity educational resources to support implementation of biosecurity on cervid operations; and 3) Evaluate impact of implementing biosecurity program on cervid operations that implement the biosecurity risk assessment program.

These objectives of the project address the funding priority of the Farmed Cervid Chronic Wasting Disease Management and Response Activities 2021 Cooperative Agreements titled 'Develop and/or deliver educational outreach materials or programs to farmed cervid stakeholders.' Development and evaluation of farmed cervid biosecurity practices has the potential to improve producer understanding of disease transmission pathways and will be critical to inform improved disease prevention strategies.

Whole-herd depopulation and post-mortem testing of all cervids on the premises is often the preferred response to control the spread of CWD within and from CWD-positive herds. Carcasses from CWD-positive herds should be disposed of in compliance with all Federal, State and local regulations. Because prions are highly persistent and can remain a source of CWD exposure, it is prudent to attempt to decontaminate objects and equipment that may have become contaminated. The recommended decontamination procedures outlined in Appendix IV of the CWD Program Standards will be implemented following the depopulation of the herd to reduce the overall CWD burden on objects and equipment on the premises.

Aid in the development of RT-QuIC Testing as a Method for Antemortem Detection of CWD by Depopulation of an Infected Elk Herd**,** Nebraska Department of Agriculture (Meier, B.)

Our assumption is that based upon having three (3) positives out of a herd of 52 elk since introduction of the disease in 2018 – we have disease at various stages of development. By using this herd we can collect and deliver valuable data which we will be able to correlate and perform statistical analysis in tandem with the official regulatory IHC testing from Obex and Medial Retropharyngeal Lymph Nodes. The data delivered and collected will consist of utilizing blood, rectal tissue, and feces for early detection of CWD through the University of Minnesota's Center for Prion Research and Outreach (MNPRO). This project serves to utilize a significantly infected elk herd as a means to support and continue the progress of antemortem testing using the RT-QuIC assay for early detection of CWD. Genotyping will be conducted at Gene Check, Inc. (Greeley, Colorado) as additional information for data analysis. The University of Minnesota has a permit to possess infectious prion material and an existing MRTA (Materials Transfer Agreement) with USDA. This MRTA will be amended to include materials from this project to continue to support their ongoing research and development. MNPRO has aggressively invested time, expertise, and research using the RT-QuIC assay as indicated by the attached documents of support. Our goal is to use this herd and its infection as a valuable opportunity to support the ongoing research while at the same time benefiting the entire farmed cervid industry in every state to provide USDA further information on the development of antemortem testing which can be used for interstate and intrastate movements. Additionally, by using the procedures and collection techniques from this herd we can develop and distribute educational and promotional materials to train CWD collectors not only in Nebraska but can provide an opportunity to share our findings and resources with other regulatory agencies, USDA, and interest groups such as the North American Elk Breeders Association, and the Elk Research Foundation.

Ohio CWD Epidemiologist and Herd Certification Program (HCP) Improvement and Disease Outreach**,** Ohio Department of Agriculture (Summers, D.)

ODA has a critical need for a veterinary epidemiologist to further enhance and support our state HCP program. This project specially addresses the void within our department of a veterinary epidemiologist who can provide CWD training and expertise to deer farmers. The vision of this project would be to hire a veterinary epidemiologist to 1) improve compliance verification, management, and enforcement of the states HCP program, 2) promote and education on the need for ADDL sample submission compliance, 3) support ODNR on the use of BioRad testing at ADDL for wild cervids, 4) educate the public on CWD and ensure consumer confident in farmed cervids, and 5) further develop educational access to materials via websites, podcasts, webinars, and trainings. This vision will be accomplished through development of various SOP's, training seminars, outreach events, and coordinated meetings with producers and other agencies. Our target audience is the deer farming industry and captive cervid health, while also education the public on CWD. Additionally, we plan to

target deer hunters who submit wild deer samples, in a campaign to add surveillance data and support to ODA's HCP via sample submission to ADDL. This will provide valuable epidemiological information to manage CWD in Ohio. This project will allow internal administrative staff to be more efficient with time management and tasks, by providing appropriate duties to the veterinary epidemiologist. All of these goals support ODA's mission to promote and protect Ohio's livestock and deer farming industries.

Evaluation of RT QuIC for testing Pen Feces to estimate herd infection and on farm surveillance of non-cervid animals to assess their role in transmission, Pennsylvania Department of Agriculture (Brightbill, K.)

Chronic wasting disease (CWD) is an infectious prion disease and affects cervid populations including white tailed deer (Odocoileus virginianus). Disease surveillance in the United States is conducted primarily through the submission of retropharyngeal lymph nodes (RLN) from hunter harvested animals although new tissues types such as rectal mucosa associated lymphoid tissues are now being incorporated in captive disease management programs.

Currently, detection of prions relies on the detection of proteinase K resistant PrPSc, either by ELISA or immunohistochemistry (IHC) in neural or lymphoid tissue, the two official methods approved for use in the National Animal Health Lab Network responsible for carrying out the surveillance for CWD in the United States.

Real time quaking-induced conversion (RT-QuIC) assay has shown promise for sensitive detection of abnormal CWD prions but is not yet in use pending multi-lab validation verification and acceptance as a tool to be used for CWD diagnostics. This request focuses on 1) improving CWD detection using RT-QuIC for antemortem testing with feces, 2) assess use of pen collected fecal samples as a part of on farm risk assessment for CWD infection and 3) monitoring of animal and birds collected from the infected farms.

Development and Evaluation of CWD Biosecurity Practices using a Risk Assessment Approach by Farmed Cervid Producers, Pennsylvania Department of Agriculture (Hamberg, A.)

Chronic wasting disease (CWD) poses an existential threat to cervid farms due to continued disease spread. Once identified as infected, CWD-positive cervid farms are quarantined and most will be depopulated, as there are no treatments or vaccinations available, and no proven method to eliminate infection from exposed herds short of herd depopulation. Infected farms also pose a threat to susceptible wild cervids in the local area. Primary CWD preventive practices at this time are focused on preventing transmission through exposure of farmed cervids to infective prion protein using regulatory policies and farm biosecurity practices. However, transmission is possible through multiple exposure pathways to susceptible farms, and use of biosecurity practices varies markedly across cervid farms.

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***Improved Information Management and Sample Collection on Utah Domestic Elk Facilities*,** Utah Department of Agriculture and Food Domesticated Elk Program (Price, A.)

UDAF proposes to increase animal traceability, improve CWD surveillance, increase compliance with state and federal regulations, and reduce data entry time and costs for producers, UDAF, and the Utah Veterinary Diagnostic Laboratory (UVDL) through the purchase and distribution of RFID tag readers, training on electronic data collection and submission, provision of sample labels, and hands-on training on CWD sample collection. The current system of paper-based records for elk births, deaths, movements, and sample submission is prone to data entry and legibility errors, reducing the accuracy of farm inventories and possibly leading to severe consequences for positive test results attributed to the wrong animal. By providing RFID tag readers and sample labels to our domestic elk facilities and training the facilities on the use of the readers, the Allflex eList app, and the USALIMS Vet Portal at UVDL, data entry errors, time, and cost can be reduced. In addition, all individuals collecting samples for CWD surveillance are required to be approved by the Utah State Veterinarian.

In the past, some facilities have been unable to meet the state requirement to test a minimum of 90% of all elk over 12 months old that are hunt killed or die because of lack of sampling or sampling errors. Hands-on training using cattle heads as a proxy for elk will ensure that individuals collecting samples are trained and approved to collect samples and should reduce the number of sampling errors. There are currently 34 licensed domestic elk facilities in Utah. Because of their geographic distribution, five training sessions will be scheduled around the state to cover both data collection/submission and CWD sample collection. Utah USDA Veterinary Services staff will be invited to assist in the hands-on training sessions.

A successful project will result in increased electronic data submissions to UDAF and UVDL from domestic elk facilities, more complete and accurate data submissions, increased adoption of RFID technology by facilities for their own use, and a reduction in the percent of untestable samples submitted to UVDL.

***Enhancement of Farmed Cervid CWD Educational Outreach*,** West Virginia Department of Agriculture (Alt, E.)

The West Virginia Department of Agriculture (WVDA) has been responsible for managing and regulating the state's farmed cervid industry and preventing the spread of disease in farmed cervids since 2015. West Virginia has been a Federal Herd Certification Program participant for six years. Approximately 85 CWD samples are collected yearly, and CWD has not been detected. Several WV farmed cervid herds[1] are located within the wild cervid CWD containment area established by WV Division of Natural Resources (WVDNR) in 2005. [2] In addition, CWD has been detected in wild cervid populations in several border states. CWD educational outreach is critical to strengthen WV stakeholders buy-in and commitment to reduce the risk and spread in farmed cervids.

The overall goal of this project is to enhance educational outreach to farmed cervid stakeholders, policy-makers, and state and federal agency partners through CWD preparedness and response activities.

The desired outcomes for this proposal include: 1) Enhance CWD management, preparedness, and response capabilities. 2) Strengthen farmed cervid stakeholder acceptance of CWD management and outcomes. 3) Improve communication and interaction among farmed cervid stakeholders, policy-makers, and state and federal agency partners.

The proposed solution is to utilize the development of a state farmed cervid CWD management and detection response plan in conjunction with a CWD tabletop exercise. The plan and tabletop exercise are intended to prepare and guide both WVDA and the farmed cervid industry as CWD relates to WV's farmed cervid population and ensure that, if CWD is detected in our farmed cervid population, key stakeholders in the farmed cervid industry are fully informed and prepared to engage.

***Enhancing Chronic Wasting Disease Surveillance and Management through Improving Herd Inventories*,** Wisconsin Department of Agriculture, Trade and Consumer Protection (Horn-Delzer, A.)

Accurate and timely herd inventories are critical to the prevention, management and response to CWD. The current model sees producers being mailed inventories for review which are solely copies of last years' inventories. The specific problem this project solves is streamlining for producers the reconciliation of inventories. There are many transactions during the year which the Department of Agriculture already knows about but which aren't reflected in the supplied inventory; for example, any animals moved out of the herd to another state would already be known about because of their inclusion on a CVI. The proposed work would change this so that the generated inventory for review would be based upon the current known inventory at the time the census is generated. This will greatly minimize the time it takes for the producer to perform the review and contribute towards the timeliness and accuracy of the returned census. The capture of any laboratory data for CWD testing will create a death record that will also be reflected in the herd inventory sent to the producer. Specific census features will be developed and incorporated into the CoreOne/SCS system that will a) assist producers in the reconciliation of herd inventory records b) streamline the entry of inventory data into the CoreOne/SCS system c) receive electronic messages from laboratories related to CWD testing d) create a death record from the laboratory data that will be reflected in the CoreOne/SCS record for that herd. The target audience or beneficiaries of this project will be farmed cervid producers, State animal health officials and animal health officials with the USDA.

***Burial Disposal of CWD-Infected Carcasses: Migration of Prions through Porous Media and Detection in Landfill Leachate*,** Wisconsin Department of Natural Resources (Storm, D.)

Landfill disposal of CWD-infected carcasses is a topic of extreme concern for state agencies, captive cervid facilities, landfill operators, and the general public. Previous studies have found that prion transport through porous media was slow, and generally regard the risk associated with prion transport to be low. Nevertheless, doubt remains as to the risk associated with landfill disposal of CWD-infected carcasses. Many private and public landfill operators refuse to accept any deer carcass materials for fear of liability in the event that prions leach from their properties. This leads to complex problems where state agencies are responsible for disposal of CWD-infected carcasses but are unable to do so for lack of a disposal site. To better articulate any risks associated with deer carcass disposal

in landfills, we propose the following study. Our study aims to address knowledge gaps which exist in our understanding of prion transport using quantitative measurement of prion migration in landfill materials. New ultra-sensitive prion detection assays, such as RT-QuIC, are capable of detection of prions at far lower concentrations than older technologies and are amenable for use with a variety of sample types. Our multi-pronged approach involves optimization of RT-QuIC to detect CWD prions in landfill leachate, experimental investigation of prion transport through materials relevant for carcass burial, mathematical modeling of prion transport in the same materials, and analysis of leachate from several landfills for the presence of CWD prions. We first propose to adapt RT-QuIC for detecting CWD prions in solid waste leachate. We then plan to conduct column experiments to simulate prion movement through a variety of porous materials, including fresh and aged municipal solid waste. Using RT-QuIC, we expect to be able to detect prion movement in these materials at far greater resolution than was previously possible. A particularly important aspect of the proposed research is the investigation of the role of preferential flow paths (macropores) on prion migration in soil and municipal solid waste. From these results, we intend to develop quantitative models which describe prion transport in each of these materials. Our experimental and modeling results will inform decisions about CWD disposal in extant landfills, and properly inform the public about any risk associated with landfill disposal of prion-infected materials. Finally, we plan to use our RT-QuIC protocol to analyze current landfill leachate for the presence of CWD prions, using leachate from three operational landfills. One of these landfills has never received CWD-infected materials; another formerly accepted deer carcasses, but no longer does so; and the third one actively receives deer carcasses. Focus on these landfills will allow a first assessment of the long- and short-term risk posed by prions in landfills. Our project represents the most thorough risk assessment of prion transport in solid porous media and leachate to date. This work will provide valuable information to the numerous stakeholders interested in effective CWD material disposal and expand the use of RT-QuIC as a tool for assessment of the environmental hazard posed by prions.

Farmed Cervid Research Projects

Genomic Predictions for Selective Breeding to Reduce Susceptibility to Chronic Wasting Disease (CWD) in Farmed White-tailed Deer (Odocoileus virginianus) in Michigan and CWD Disease Response Strategies, Michigan Department of Agriculture and Rural Development (Calogero, J.)

Dr. Seabury and his colleagues recently demonstrated that differential susceptibility to chronic wasting disease (CWD), and variation in natural disease progression, are both highly heritable polygenic traits in farmed U.S. white-tailed deer (Odocoileus virginianus)[1-2]. Moreover, using machine learning and cross validation, Dr. Seabury and his colleagues also demonstrated that genomic prediction accuracies for differential susceptibility to CWD were high [1-2], thereby providing robust evidence that the implementation of genomic selection (i.e., genome-assisted selected breeding) can be expected to reduce the prevalence of CWD in farmed U.S. white-tailed deer. To further demonstrate the utility of genomic predictions with respect to differential susceptibility to CWD, Dr. Seabury has since performed a blind validation study (2021) with USDA APHIS (VS) using more than 480 samples; the results of which clearly show that genomic predictions for selective breeding can potentially reduce the prevalence of CWD by ≥ 85% in farmed white-tailed deer [2]. Therefore, we propose to comprehensively define the genetic landscape of farmed white-tailed deer in Michigan with respect to differences in CWD susceptibility using the same whole-genome methods recently described [1-3]; for the purpose of genetic improvement (i.e., reduced susceptibility) via selective breeding. The proposed project generates all the resources necessary to stimulate

stakeholder changes in action, which will directly facilitate a reduction in CWD susceptibility among farmed white-tailed deer; and the potential for reducing the overall prevalence of CWD.

Whole-herd depopulation and post-mortem testing of all cervids on the premises is often the preferred response to control the spread of CWD within and from CWD-positive herds. Carcasses from CWD-positive herds should be disposed of in compliance with all Federal, State and local regulations. Because prions are highly persistent and can remain a source of CWD exposure, it is prudent to attempt to decontaminate objects and equipment that may have become contaminated. The recommended decontamination procedures outlined in Appendix IV of the CWD Program Standards will be implemented following the depopulation of the herd to reduce the overall CWD burden on objects and equipment on the premises.

***Genomic Predictions for Selective Breeding to Reduce Susceptibility to Chronic Wasting Disease (CWD) in Farmed White-tailed Deer (Odocoileus virginianus)*,** Pennsylvania Department of Agriculture (Hamberg, A.)

Dr. Seabury and his colleagues recently demonstrated that differential susceptibility to chronic wasting disease (CWD), and variation in natural disease progression, are both highly heritable polygenic traits in farmed U.S. white-tailed deer (Odocoileus virginianus)[1-2]. Moreover, using machine learning and cross validation, Dr. Seabury and his colleagues also demonstrated that genomic prediction accuracies for differential susceptibility to CWD were high [1-2], thereby providing robust evidence that the implementation of genomic selection (i.e., genome-assisted selected breeding) can be expected to reduce the prevalence of CWD in farmed U.S. white-tailed deer. To further demonstrate the utility of genomic predictions with respect to differential susceptibility to CWD, Dr. Seabury has since performed a blind validation study (2021) with USDA APHIS (VS) using more than 480 samples; the results of which clearly show that genomic predictions for selective breeding can potentially reduce the prevalence of CWD by ≥ 85% in farmed white-tailed deer [2]. Moreover, until recently, no impactful management, veterinary, or predictive interventions existed for mitigating risk of CWD in Pennsylvania white-tailed deer farms [1-3]. Therefore, we propose to comprehensively define the genetic landscape of farmed white-tailed deer in Pennsylvania with respect to differences in CWD susceptibility using the same whole-genome methods recently described [1-3]; for the purpose of genetic improvement (i.e., reduced susceptibility) via selective breeding. The proposed project generates all the resources necessary to stimulate stakeholder changes in action, which will directly facilitate a reduction in CWD susceptibility among farmed white-tailed deer; and the potential for reducing the overall prevalence of CWD.

***A Genomic Approach for Reducing Susceptibility to CWD in North American Farmed Elk (Cervus canadensis) and CWD Disease Response Strategies*,** Texas Animal Health Commission (Schwartz, A.)

Dr. Seabury and his colleagues recently demonstrated that differential susceptibility to chronic wasting disease (CWD), and variation in natural disease progression, are both highly heritable polygenic traits in farmed U.S. white-tailed deer (Odocoileus virginianus)[1-2]. Moreover, using machine learning and cross validation, Dr. Seabury and his colleagues also demonstrated that genomic prediction accuracies for differential susceptibility to CWD were high [1-2], thereby providing robust evidence that the implementation of genomic selection (i.e., genome-assisted selected breeding) can be expected to reduce the prevalence of CWD in farmed U.S. white-tailed deer. To further demonstrate the utility of genomic predictions with respect to differential susceptibility to CWD, Dr. Seabury has since performed a blind validation study (2021) with USDA APHIS (VS) using

more than 480 samples; the results of which clearly show that genomic predictions for selective breeding can potentially reduce the prevalence of CWD by ≥ 85% in farmed white-tailed deer [2]. Moreover, until recently, no impactful management, veterinary, or predictive interventions existed for mitigating risk of CWD in white-tailed deer farms [1-3]. However, despite the risk posed by CWD to North American farmed elk (Cervus canadensis) [4-7], no similar genomic information is currently available for application to this species. Therefore, a need exists to develop a genome-wide technology to estimate the heritability of differential susceptibility to CWD in farmed elk, and to estimate the accuracy of genomic predictions for selective breeding aimed at reducing overall susceptibility. Therefore, we propose to extend changes in knowledge and action resulting from previous USDA APHIS VS funding [1-3] to North American farmed elk. Herein, we will test the hypothesis that differential susceptibility to CWD in farmed elk is at least moderate, perform genome-wide association analyses, and evaluate the potential impact of genomic predictions for potentially reducing the overall prevalence of CWD via genetic improvement. The deliverables of this study will inform and enable U.S. and Canadian stakeholders (elk farmers) as well as regulators (state or province; federal) tasked with reducing the prevalence of CWD in farmed North American elk.

Whole-herd depopulation and post-mortem testing of all cervids on the premises is often the preferred response to control the spread of CWD within and from CWD-positive herds. Carcasses from CWD-positive herds should be disposed of in compliance with all Federal, State and local regulations. Because prions are highly persistent and can remain a source of CWD exposure, it is prudent to attempt to decontaminate objects and equipment that may have become contaminated. The recommended decontamination procedures outlined in Appendix IV of the CWD Program Standards will be implemented following the depopulation of the herd to reduce the overall CWD burden on objects and equipment on the premises.

Genomic Predictions for Selective Breeding to Reduce Susceptibility to Chronic Wasting Disease (CWD) in Farmed White-tailed Deer (Odocoileus virginianus), Wisconsin Department of Agriculture, Trade and Consumer Protection (Horn-Delzer, A.)

Dr. Seabury and his colleagues recently demonstrated that differential susceptibility to chronic wasting disease (CWD), and variation in natural disease progression, are both highly heritable polygenic traits in farmed U.S. white-tailed deer (Odocoileus virginianus)[1-2]. Moreover, using machine learning and cross validation, Dr. Seabury and his colleagues also demonstrated that genomic prediction accuracies for differential susceptibility to CWD were high [1-2], thereby providing robust evidence that the implementation of genomic selection (i.e., genome-assisted selected breeding) can be expected to reduce the prevalence of CWD in farmed U.S. white-tailed deer. To further demonstrate the utility of genomic predictions with respect to differential susceptibility to CWD, Dr. Seabury has since performed a blind validation study (2021) with USDA APHIS (VS) using more than 480 samples; the results of which clearly show that genomic predictions for selective breeding can potentially reduce the prevalence of CWD by ≥ 85% in farmed white-tailed deer [2]. Moreover, until recently, no impactful management, veterinary, or predictive interventions existed for mitigating risk of CWD in Wisconsin white-tailed deer farms [1-3]. Therefore, we propose to comprehensively define the genetic landscape of farmed white-tailed deer in Wisconsin with respect to differences in CWD susceptibility using the same whole-genome methods recently described [1-3]; for the purpose of genetic improvement (i.e., reduced susceptibility) via selective breeding. The proposed project generates all the resources necessary to stimulate stakeholder changes in action, which will directly facilitate a reduction in CWD susceptibility among farmed white-tailed deer; and the potential for reducing the overall prevalence of CWD.