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In-Service Education and the Provision of Educational Materials to Improve Awareness of Chronic Wasting Disease Management Efforts in Arkansas

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In-Service Education and the Provision of Educational Materials to Improve Awareness of
Chronic Wasting Disease Management Efforts in Arkansas

Mary Claire Stewart

University of Arkansas

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Abstract

Chronic Wasting Disease (CWD) is a disease caused by an accumulation of misfolded prions throughout the nervous system. This disease affects animals within the Cervidae Family, which includes deer, elk, moose, and caribou. This disease is fatal and physical symptoms often do not materialize until the animal is near death. CWD has become an increasing issue in Arkansas since an elk (*Cervus canadensis*) in Newton County tested positive for CWD in 2016. Since then, the Arkansas Game and Fish Commission (AGFC) has worked with the University of Arkansas Division of Agriculture (UADA) and others to develop management strategies to slow the transmission of this disease in the state. For this research project, three objectives were established. The objectives of this study included: 1) develop engaging and up-to-date CWD educational materials and analyze whether these benefit UADA County Extension Agents (CEAs) in public education, 2) create a ready-to-use packet of program materials and demonstrate those materials for CEAs in efforts to increase the annual number of extension programs in Arkansas about CWD, 3) determine how effective an in-service training is at improving CEAs' knowledge of CWD.

The methodology for this study included creating educational materials for a UADA CEA in-service training consisting of a PowerPoint® presentation providing an overview of information and current management strategies regarding CWD in Arkansas as well as 4 handouts discussing various topics related to CWD. These materials were presented to CEAs and made available to them following the presentation through a Box file. The study included a pre-assessment and post-assessment given to the CEAs prior to and following the training. These assessments utilized convenience sampling to gather quantitative and qualitative data. A statistically significant difference between pre-assessment and post-assessment responses to

questions was detected for objectives 1 and 3. Responses corresponding to objective 2 were analyzed qualitatively and indicated success of the objective's goals when comparing pre-assessment and post-assessment responses. These results indicate an overall positive response to the materials presented during the in-service training.

Introduction

Background and Need

Prions are misfolded infectious proteins involved in diseases affecting various animal species (Waddell et al., 2017). These diseases are known as transmissible spongiform encephalopathies (TSEs). Prions typically spread throughout the body's central nervous system and the lymphoid tissues of affected animals. Examples of this type of disease include Scrapie, which was the first transmissible spongiform encephalopathy to be identified, as well as transmissible mink encephalopathy (TME), bovine spongiform encephalopathy, commonly known as "Mad Cow Disease," and CWD (Williams, 2005). For this study, the focus is CWD specifically. This disease is degenerative and fatal, complete with a wide range of symptoms that vary from extreme behavioral changes to simply an increase in the frequency of urination. CWD is defined by the conversion of a normal protein (PrP^c) to a protease-resistant abnormal protein (PrP^{res}) and the accumulation of PrP^{cwd} (Hedman et al., 2020). PrP^{cwd} is the identifying prion associated with CWD. Animals infected with this disease may live for extended periods of time, some even living for multiple years before death. Physical symptoms of this disease are often not seen until the animal is near death, making this disease increasingly difficult to monitor.

There is a need to increase the accessibility of information on this disease to the public and spread awareness of the harm it causes to our wildlife. Many Arkansans are unaware of not

only the disease itself and its effect on cervid populations but also of opportunities to test harvested animals (Ballard et al., 2021). In Arkansas, over 100 drop-off locations are available for hunters to have a deer tested for CWD. Increased awareness of CWD could benefit CWD management through not only increasing testing across the state but also increasing public involvement in management strategies recommended by the Arkansas Game and Fish Commission.

Problem Statement

CWD is a fatal, neurological disease that affects multiple species including white-tailed deer, mule deer, elk, and moose. This disease is caused by an infectious protein (prion) and signs include dramatic weight loss, excessive salivation, a decrease in social interaction, and a change in general behavior (Williams, 2005). Knowledge of CWD is relatively new and information is still emerging. CWD causes a slow death in infected wildlife and is highly contagious among exposed cervids. Further research into CWD disease could benefit the development of future management strategies by providing better insight into the efficacy of currently recommended protocols and allowing strategies to improve and evolve as more information is collected. Public education regarding these management strategies as well as the increase in general awareness of CWD could be vital to the protection of cervid populations and the management of disease spread.

Purpose Statement

This study's purpose was to prepare and provide updated outreach materials to UADA CEAs who may then use them to promote public education about CWD and disease testing. This

increase in education may help agricultural organizations, like AGFC, better monitor CWD in Arkansas.

Research Objectives

The objectives of this study were as follows:

- 1) Compile engaging and up-to-date CWD educational materials and analyze whether these benefit UADA CEAs in public education.
- 2) Create a ready-to-use packet of program materials and demonstrate those materials for CEAs in an effort to increase the annual number of extension programs in Arkansas about CWD.
- 3) Determine how effectively the in-service training improved CEAs' knowledge of CWD.

Literature Review

This literature review aimed to explore previous research that showcases information pertaining to this study's objectives. Topics included the general progression of CWD and its expansion throughout Arkansas and the U.S., the availability of testing to determine whether animals have been infected, and the benefits of public education on CWD management strategies.

Progression of Chronic Wasting Disease

CWD affects multiple cervid species and is difficult to control as it is highly transmissible yet not easily detected (Henderson, et. al, 2020). CWD is a unique disease that spreads in free-ranging and captive cervid populations despite ongoing control efforts

(Henderson, et. al, 2020). Prions may be shed in saliva, urine, and feces, and can also be contracted from infected carcasses (Storm et al., 2013). Animals may be infected with this fatal disease an average of approximately two years before death (Lang and Blanchong, 2011). In recent studies, adult male deer had a greater risk of CWD infection than female deer (Samuel and Storm, 2016). This is thought to be attributed to the wider range and movement patterns of males compared to females.

Figure 1: Example of a white-tailed deer infected with CWD



Photo courtesy of Michael Hopper,

Kansas Department of Wildlife, Parks, and Transportation

History of Chronic Wasting Disease in Arkansas

Knowledge of CWD's presence in Arkansas is relatively new, with new data emerging continuously. CWD was first detected in the state in February 2016, in an elk harvested in the fall of 2015 near Pruitt in Newton County (Ballard et al., 2021). Arkansas now regulates a CWD management zone composed of two tiers, where the largest concentration of cases has been found in the state (Ballard et al., 2021). This management zone is mainly in the northwest region of Arkansas but has recently grown to include three counties in southeast Arkansas. CWD in Arkansas may have originated from natural migration as well as human-facilitated transportation of animals out of nearby states. The disease was first identified in Colorado in the late 1960s. It was then detected in Wyoming and Nebraska in the 1980s and the Midwest in the late 1990s and early 2000s (CWD-info.org, 2023).

Figure 2: Tier I and Tier II of the 2022-2023 Arkansas CWD Management Zone

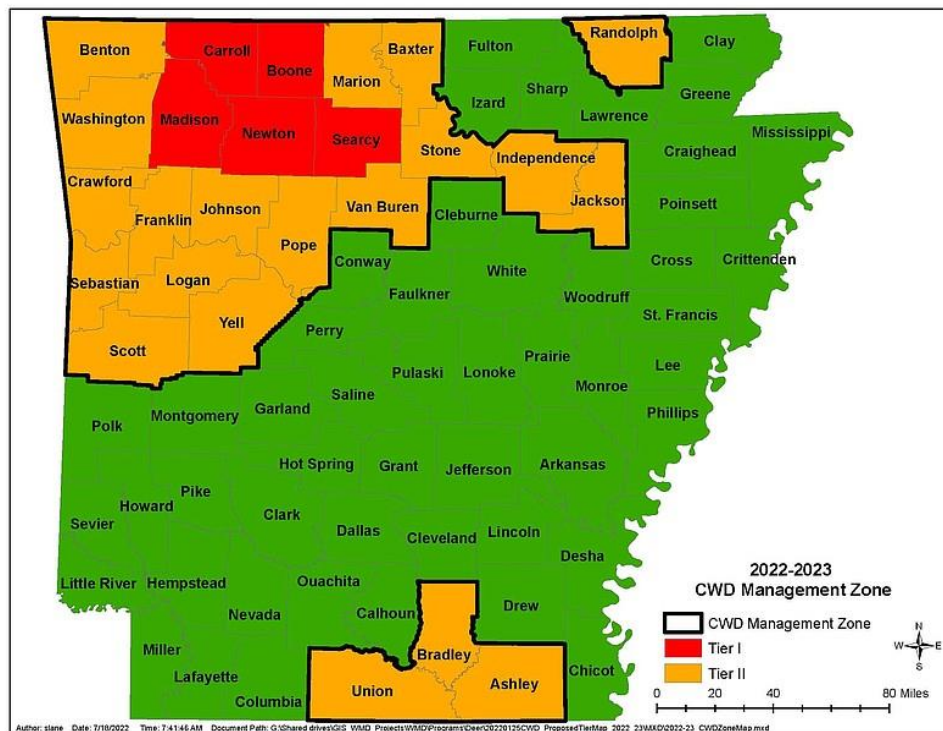
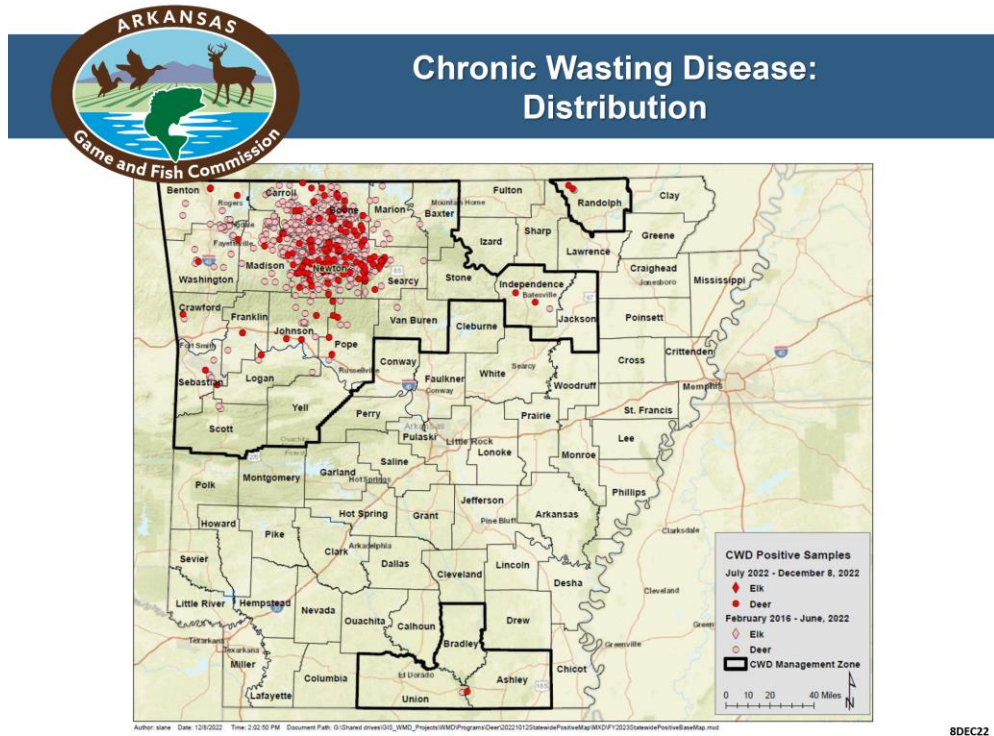
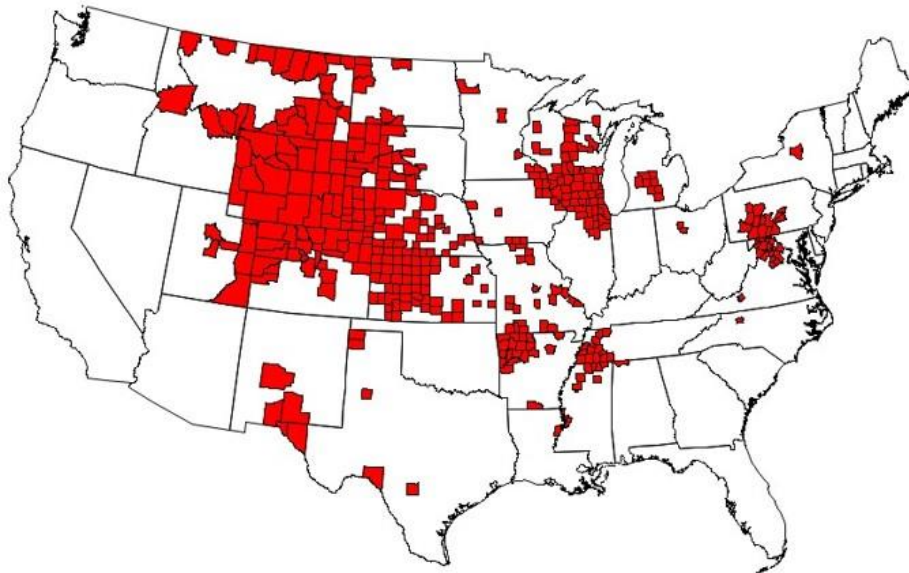


Figure 3: Distribution of 2022 CWD detections in Arkansas



8DEC22

Figure 4: CDC: Chronic Wasting Disease Among Free-Ranging Cervids by County, United States, June 2022



As of June 2022, there were 391 counties in 29 states with reported CWD in free-ranging cervids

Testing Availability for Chronic Wasting Disease

Testing for CWD is important for monitoring disease spread in Arkansas. Currently, postmortem testing of the brain and lymph nodes of a cervid can be done in every county in the state. Information regarding drop-off locations, testing instructions, and where to find results can all be found on the AGFC website. In the past, taxidermists have even partnered with biologists to increase testing resource availability (Ableman, et. al, 2019). Disease surveillance is a critical function in any wildlife health program. Knowing if a disease is present in an area allows wildlife managers to either declare the area at low risk for CWD (if not detected at a certain prevalence) or implement management actions in high-risk areas (Ableman, et. al, 2019). There is a significant need for live animal (i.e., antemortem) testing to identify infected animals for disease management and control purposes. Successful development of antemortem testing for CWD has been challenging as current immunohistochemistry (IHC) cannot detect prions in easy-to-collect samples such as biofluids or feces. A low concentration of CWD prion present in antemortem samples inhibits the ability to definitely detect whether or not a sample contains PrP_{cwd} (Ellis et. al, 2019).

Figure 5: Testing and detection statistics in Arkansas from 2016-2023



Total Samples Tested by Fiscal Year*

	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	Total
Elk	75	78	81	86	82	61	47	28	538
White-Tailed Deer	1,637	3,550	6,271	7,412	6,622	7,836	8,343	5,792	47,463
Exotic Cervids	0	0	0	2	2	1	0	0	5
Total	1,712	3,628	6,352	7,500	6,706	7,898	8,390	5,820	48,006

Total CWD Detections by Fiscal Year*

	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	Total
Elk	5	2	7	5	5	8	9	7	48
White-Tailed Deer	96	114	147	241	222	267	200	139	1,426
Exotic Cervids	0	0	0	0	0	0	0	0	0
Total	101	116	154	246	227	275	209	146	1,474

AS OF 8DEC22
 * = FY or Fiscal Year = July 1st to June 30th
 FY2023 = Current Sampling Year In Progress

Benefit of Public Education in CWD Management

As new information emerges on this disease, management strategies may change and evolve. This evolution may create issues in the public’s involvement in management strategies due to uncertainty about currently recommended protocols. For example, management strategies often call for a reduction in deer populations to lower disease transmission. However, such reductions can create public distrust if management strategies are not understood and perceived as wasting a resource. Hunters may harvest fewer deer because of concerns about CWD transmission to humans. In a study on CWD based in western Tennessee, it was found that communication efforts in public education increased public support in management strategies (Meeks et al., 2022). The study also suggested that the acceptability of CWD management

actions could depend on how much hunters were concerned with the disease's overall risk to their cervid populations (Meeks et al., 2022). This indicates that an increase in awareness and understanding of CWD could prove beneficial to the success of CWD management strategies.

In conclusion, CWD has become prevalent in many states across the U.S., and in recent years concern about the disease has continued to rise in Arkansas specifically. This concern has gained further attention from agricultural organizations and the scientific community, resulting in the studies previously mentioned. CWD progression, its expansion through the U.S., the availability of testing, as well as potential benefits of public education are all topics important to this study and important to future advances in CWD management.

Methodology

For this study, CEAs were invited to attend an in-service training about CWD on January 18th, 2023, at 9-10 a.m. using Zoom as the meeting platform. CEAs were presented with a PowerPoint® presentation with in-depth information about CWD, which was later made available to them through a shared Box file. A shortened version of this full presentation was also made available for use with their public audiences, which includes farmers, landowners, hunters, and the general public. Additionally, CEAs were provided handouts describing steps for CWD testing, CWD “quick facts,” signs of CWD, as well as the CWD Management Zone. The CEAs were also provided with a recording of the training.

Educational Materials

During the in-service training, four handouts were provided to the CEAs, each handout was also provided in a white format to lower printing costs if needed.


Figure 6a: Steps for CWD Testing

For more information, visit www.agfc.com/cwd

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Steps for Chronic Wasting Disease Testing

1. Follow instructions at <https://www.agfc.com/en/hunting/big-game/deer/cwd/cwd-test/on how to properly harvest sample>
2. Drop off sample at the nearest testing location
Testing locations by county: <https://www.agfc.com/en/hunting/big-game/deer/cwd/cwd-test/#CWDTable>
3. Watch for results at <https://apps.agfc.com/cwd/>



Regular testing will better equip us in monitoring the spread of Chronic Wasting Disease.


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Figure 6b: CWD Quick Facts







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Chronic Wasting Disease Quick Facts

What is Chronic Wasting Disease?

Chronic Wasting Disease (CWD) is a fatal neurodegenerative disease affecting deer and elk.

Common signs of CWD:


-  Loss of Body Condition
-  Excessive salivation
-  Aimless movement
-  Wide base stance

Ways you can help:

- Watch for signs in your local herd
- Submit harvested animals for testing, especially in high risk areas

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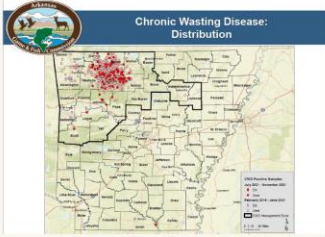

-  Loss of Body Condition
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For more information, visit www.agfc.com/cwd






Photo courtesy of CWD Alliance and the Wisconsin Department of Natural Resources.

Photo courtesy of CWD Alliance and the Wisconsin Department of Natural Resources.

Figure 6c: Signs of CWD



<p>U of A DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System</p> <p>SIGNS OF CHRONIC WASTING DISEASE</p> <p>Chronic Wasting Disease is a fatal neurodegenerative disease affecting multiple white-tailed deer populations in the Arkansas. It is important to identify those affected so that we can better monitor the spread of this disease.</p> <p>For more information, please visit: www.agfc.com/cwd</p> <ol style="list-style-type: none"> 1 Loss of body condition 2 Disoriented movement 3 Excessive drinking and urination 4 Excessive salivation/drooling 5 Wide base stance 6 Lowered head and ears <p><small>The University of Arkansas System Division of Agriculture offers all its Extension and Research programs and services without regard to race, color, sex, gender identity, sexual orientation, national origin, religion, age, disability, marital or veteran status, genetic information, or any other legally protected status, and is an Affirmative Action/Equal Opportunity Employer.</small></p>  <p><small>Photo courtesy of Terry Kraeger, Wyoming Game and Fish Department</small></p>	<p>U of A DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System</p> <p>SIGNS OF CHRONIC WASTING DISEASE</p> <p>Chronic Wasting Disease is a fatal neurodegenerative disease affecting multiple white-tailed deer populations in the state of Arkansas. It is important to identify those affected so that we can better monitor the spread of this disease.</p> <p>For more information, please visit: www.agfc.com/cwd</p> <ol style="list-style-type: none"> 1 Loss of body condition 2 Disoriented movement 3 Excessive drinking and urination 4 Excessive salivation/drooling 5 Wide base stance 6 Lowered head and ears <p><small>The University of Arkansas System Division of Agriculture offers all its Extension and Research programs and services without regard to race, color, sex, gender identity, sexual orientation, national origin, religion, age, disability, marital or veteran status, genetic information, or any other legally protected status, and is an Affirmative Action/Equal Opportunity Employer.</small></p>  <p><small>Photo courtesy of Terry Kraeger, Wyoming Game and Fish Department</small></p>
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Figure 6d: CWD Management Zone

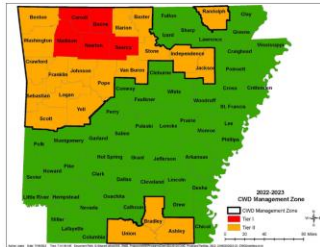
Chronic Wasting Disease Management Zone

Tier 1:

- Carroll
- Boone
- Madison
- Newton
- Searcy

Tier 2:

- Benton
- Washington
- Crawford
- Franklin
- Johnson
- Pope
- Van Buren
- Stone
- Marion
- Baxter
- Independence
- Jackson
- Randolph
- Sebastian
- Logan
- Yell
- Scott
- Bradley
- Union
- Ashley



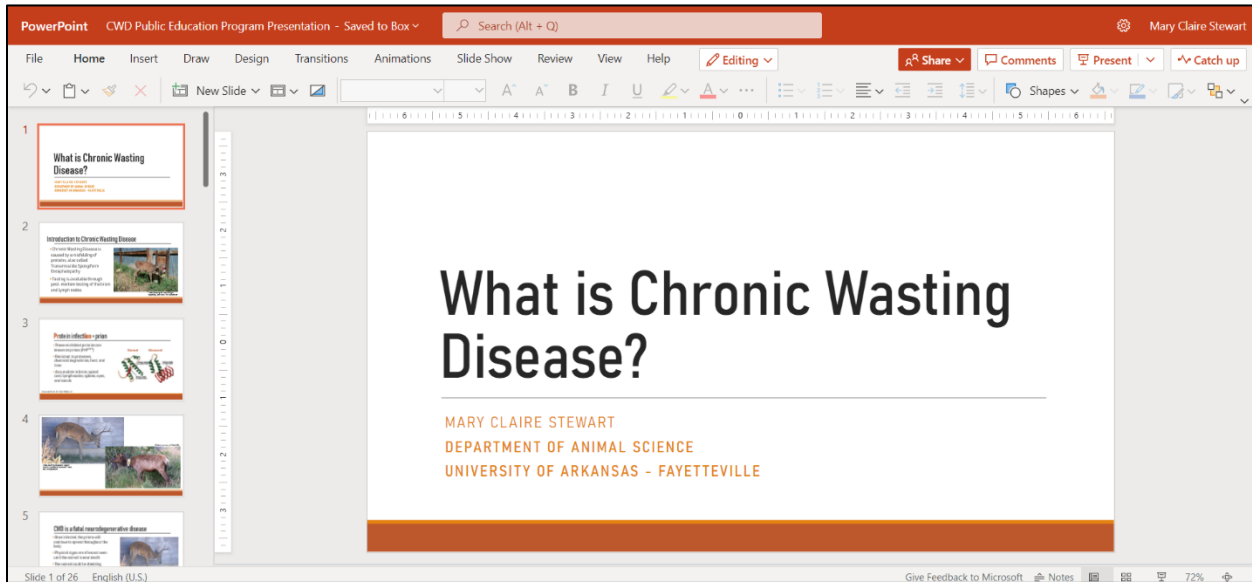
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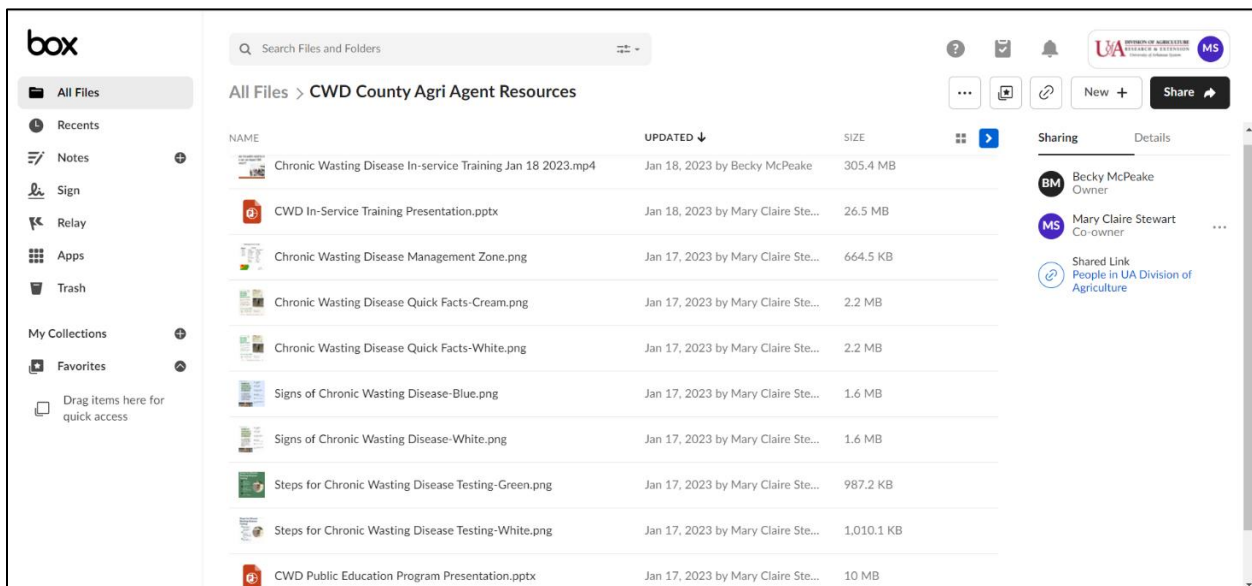
The in-service training materials also included a shortened version of the full presentation. This was intended for public use by the CEAs.

Figure 7: Public Education Presentation



Below is a complete view of the Box file contents:

Figure 8: Box file contents



Research Design

A pre-assessment and post-assessment survey, which can be found in the Appendix section, were administered before and after the in-service training to analyze the success of the three research objectives previously specified. CEAs who signed up for the training received an email linking them to a *Qualtrics* survey before and after the training concluded. The pre-assessment and post-assessment consisted of a list of carefully constructed questions that aid in data collection by studying the chosen population's responses to these questions (Antona et al., 2018). Data originated from responses given by a population of UADA CEAs to gauge the potential benefit of the educational materials and the need for updated educational materials discussing CWD. This research design was chosen to provide a method that could effectively produce data functional in discussing the research objectives of this study by providing information on the demographics of the participants as well as their experiences with CWD education (Antona et al., 2018).

Rigor

In quantitative scientific research, the term rigor addresses the level of sound data collection and analyses within a research project (Marquart, 2017). A high-quality research project can achieve a satisfactory level of rigor by providing valid and reliable measurements and reporting the collected data (Marquart, 2017). This research aimed for adequate rigor by collecting data consistently throughout the study. More specifically, each participant received the same assessment questions, and the sampling used in the study remained consistent throughout the data collection process. A main threat to the internal validity of this study was attrition or the loss of subjects, this was combatted by using convenience sampling in the methodology rather than utilizing a pre-determined list or including missing results from chosen participants who did

not complete the survey. A threat to the external validity of this study included situational factors, such as the time of year the survey was conducted in. This was combatted by conducting the survey immediately following deer season for the topic to be currently relevant for participants.

Population and Sampling

The theoretical population focused on in this study was UADA CEAs, of which there are about 80 statewide. The accessible population that participated in this study were CEAs accessed through an in-service training session and through communication with an extension specialist serving on the advisory committee for the study. The accessible population received the pre-assessment through email by being provided a link to the assessment on an online survey research platform called *Qualtrics*. The sampling population represented a convenience sample according to responses received from the survey. Convenience sampling is a form of research sampling that uses all responses received from a pre-determined pool (Edgar and Manz, 2016).

Instrumentation

This study utilized quantitative and qualitative research methodology by disseminating a pre-assessment and post-assessment containing multiple-choice, Likert-type, and open-ended questions prior to and following an educational presentation given to the population. This research methodology was chosen for this study due to its ability to collect the opinions of a population while providing data that can be studied on a quantitative basis (Antona et al., 2018). The assessments were constructed on *Qualtrics* and sent to the chosen population for data collection. The pre-assessment and post-assessment were composed of 12-13 questions (one additional question in the post-assessment asking for further comments) each to efficiently gather

data while also aiming to improve participation rates by retaining a short length. For data collection purposes, many questions had a set pool of answers to choose from. Questions included “What management strategies are thought to slow the spread of CWD in deer and elk?” and “How many CWD educational programs do you plan to conduct in 2023?” and were accompanied by either multiple choice, Likert-type, or open-ended response options to efficiently analyze statistics gathered from the survey responses. A few open-ended questions were available in the surveys to gather responses from the population to be analyzed qualitatively.

Data Collection and Analysis

The assessments formulated for this study were digitally sent to all CEAs who enrolled in the in-service training (n=39) by an extension employee advising the study. The pre-assessment was open for responses for approximately one week prior to the in-service training, and the post-assessment was open for a similar time frame following the in-service training. One reminder regarding the pre-assessment was sent to the population prior to the in-service training, and two reminders were sent regarding the post-assessment following the in-service training. Data from the assessment responses were recorded through *Qualtrics* and converted to Excel[®] for manual data analysis. Pre-assessment and post-assessment questions and responses were organized by their correlation with each objective (full questions can be found in the appendix section):

Objective 1: Questions 6, 7, and 10

Objective 2: Questions 2, 11, 12, and 13 (Q.13 was found on the post-assessment only)

Objective 3: Questions 1, 3-5, 8, and 9

The pre-assessment and post-assessment mean scores were then found for objectives 1 and 3. An F-test was performed to qualify for equal variance. An F-test is used to compare two variances to determine whether they are equal or unequal (Glen, 2023). Following the F-test, a two-tailed T-test with equal variance was performed to calculate the statistical difference between pre-assessment and post-assessment scores for each objective. A two-tailed T-test is a statistical, parametric test used to determine whether a treatment has a significant effect on a population, or if two populations are different from each other (Bevans, 2020). Objective 2 was calculated qualitatively. Ratios and percentages were used to depict differences between pre-assessment and post-assessment responses for this objective.

To conclude, this study utilized both quantitative and qualitative research methods by distributing digital assessments formulated on *Qualtrics* software prior to and following an educational presentation to CEAs during January 2023. This period was chosen to protect rigor by distributing the survey at a time when it would be relevant for the chosen population.

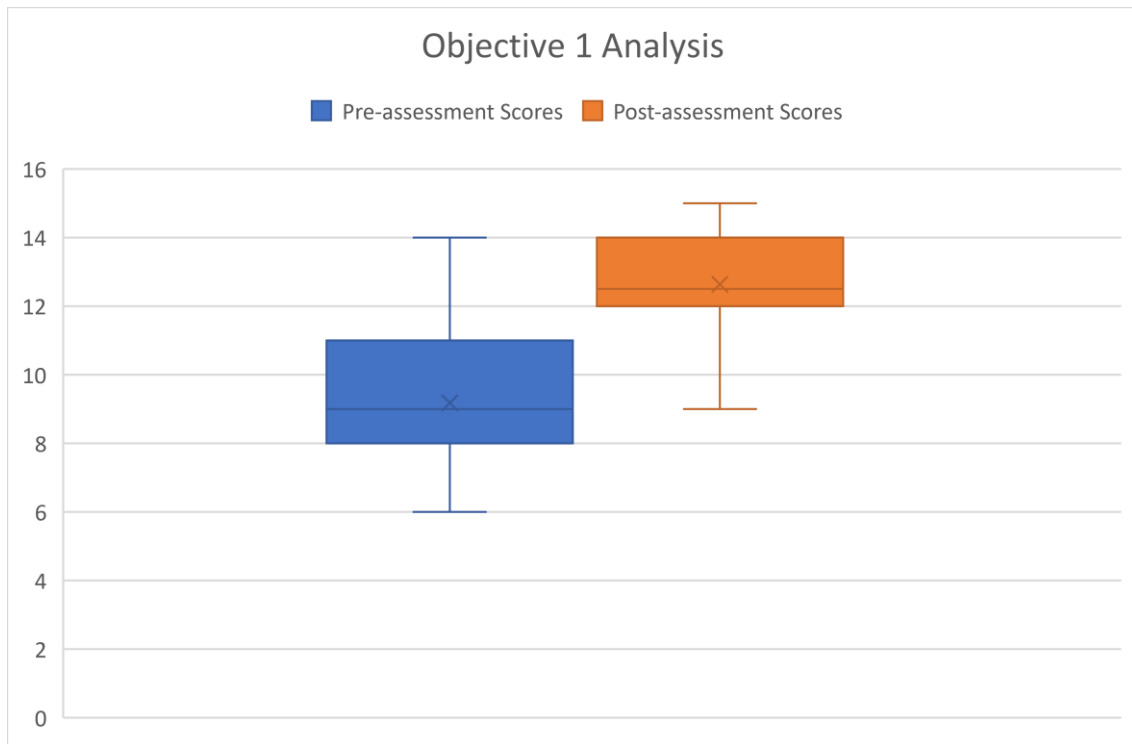
Results

This section illustrates various analyses of data collected from both the post-assessment and pre-assessment following the in-service training. The population sampling used in these findings consisted of 39 CEAs in the pre-assessment, representing approximately 52% of all counties and 49% of all agricultural CEAs in Arkansas. Following the in-service training, only 22 CEAs provided responses to the post-assessment. This attrition created a 44% loss in sample size.

Quantitative results

The quantitative results of this study included an analysis of objectives 1 and 3 previously stated in the Introduction section. Objective 1 aimed to compile engaging and up-to-date CWD educational materials and analyze whether these benefit CEAs in public education. Objective 3 aimed to determine how effectively the in-service training improved CEAs' knowledge of CWD.

Figure 9: Comparison of Objective 1 Pre-assessment and Post-assessment scores



The mean pre-assessment score was calculated to be 9.179. The mean post-assessment score was calculated to be 12.636.

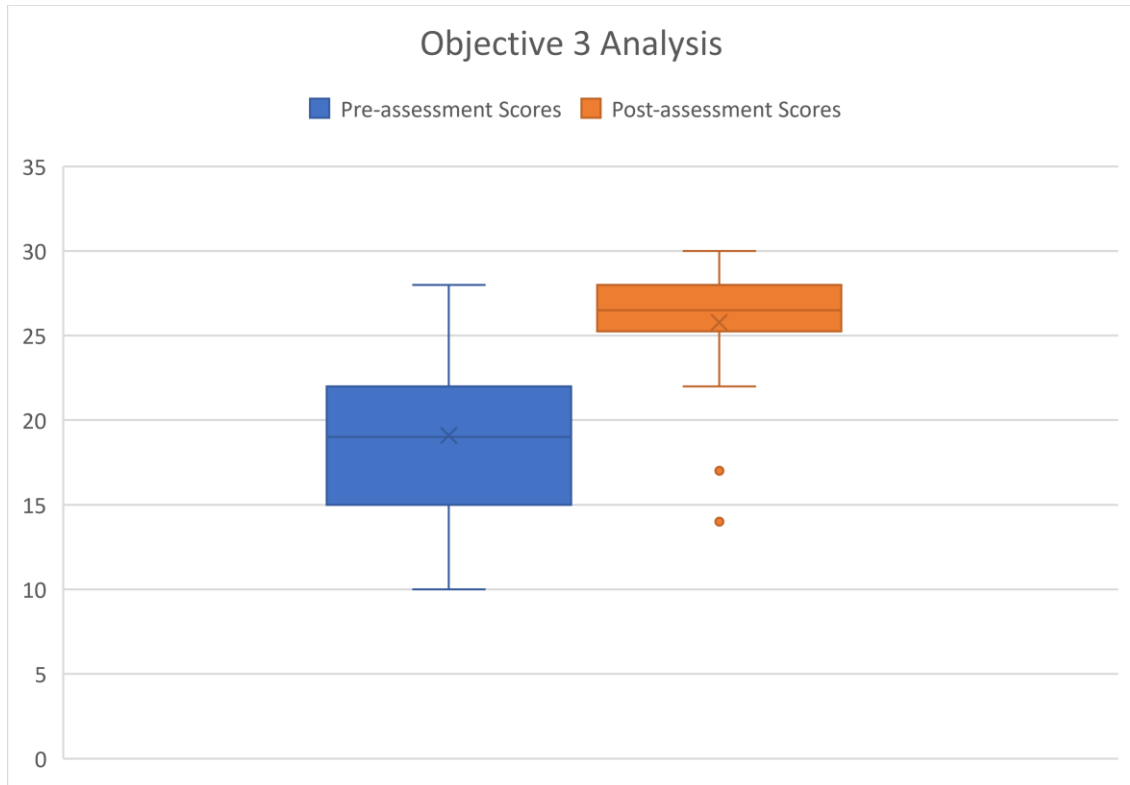
Figure 9 shows an increase in score average between the pre-assessment and post-assessment for questions correlating with objective 1. This would suggest that most participants felt the presented educational materials would be beneficial in their public education efforts. Assessment questions correlating with objective 1 include: “I have sufficient up-to-date materials

to educate the public about CWD.”, “I would benefit from a set of updated CWD educational materials.”, and “I am confident in my ability to educate the public about CWD.”

This hypothesis was tested using a two-tailed T-test assuming equal variance. An equal variance assumption was reached using an F-test. The F-test calculated a value of 0.402248, which is above the assumed significance level of 0.05. This indicates that the null hypothesis assuming equal variance must be retained.

When the two-tailed T-test assuming equal variance was performed, a value of 1.03313E-9 was calculated, which is below the assumed significance level of 0.05. This indicates that the null hypothesis assuming no significant difference between the pre-assessment and post-assessment must be rejected. These calculations indicate that there is a significant difference between the pre-assessment and post-assessment scores such that many participants felt that the presented educational materials would be beneficial in their public education efforts.

Figure 10: Comparison of Objective 3 Pre-assessment and Post-assessment scores



The mean of the pre-assessment score was calculated to be 19.1026. The mean of the post-assessment score was calculated to be 25.7727.

Figure 10 shows an increase in score average between the pre-assessment and post-assessment. This would suggest that the in-service training was effective at improving CEAs' knowledge of CWD. Assessment questions correlating with objective 3 include: "How familiar are you with Chronic Wasting Disease, also called CWD?", "What management strategies are thought to slow the spread of CWD in deer and elk?", "What signs do deer or elk present when they have CWD?", "What portion of a deer or elk is tested when testing for CWD?", "I am confident in my knowledge of the basic biology of CWD.", and "I am confident in my knowledge of the current distribution of CWD in Arkansas."

This hypothesis was tested using a two-tailed T-test assuming equal variance. An equal variance assumption was reached using an F-test. The F-test calculated a value of 0.80937, which is above the assumed significance level of 0.05. This indicates that the null hypothesis assuming equal variance must be retained.

When the two-tailed T-test assuming equal variance was performed, a value of $1.4746E-9$ was calculated, which is below the assumed significance level of 0.05. This indicates that the null hypothesis assuming no significance between the pre-assessment and post-assessment must be rejected. These calculations indicate a significant difference between the pre-assessment and post-assessment scores. This result supports the suggestion that the in-service training was effective at improving CEAs' knowledge of CWD.

Analysis of questions correlated with objectives 1 and 3 showed an overall statistically significant difference between pre-assessment and post-assessment score averages.

Qualitative results

Objective 2 asked open-ended questions about the ready-to-use packet of program materials and CEAs' intention to host programs on CWD. Two open-ended questions in the pre-assessment were "How many CWD educational programs do you plan to conduct in 2023?" and "What kind of support do you need as you teach the public about CWD?" Another open-ended question was added to the post-assessment only. This third open-ended question read "Do you have other comments about CWD or this training?" This question was included in the post-assessment to further engage with the participants and gain their thoughts and opinions on the training.

According to feedback, the number of CEAs who plan to hold 1 or more educational programs on CWD in 2023 increased from 23% to 32% when comparing the two assessments administered before and after the training presentation. When asked what support the participants would need to teach the public about CWD, 59% prioritized educational materials such as handouts, presentations, and other educational tools. In the post-assessment, 50% of respondents again mentioned the benefit of handouts and presentation materials, while 45% of those respondents explicitly suggested that the materials presented in the training presentation would support them in their public education endeavors. Other avenues of support mentioned by respondents included further personal education through specialist-led trainings, as well as increased collaboration efforts with the Arkansas Game and Fish Commission. One respondent also emphasized a desire for a larger amount of scientifically proven management strategies, as the disease is still considered new in this state and therefore new data is continually emerging.

When asked in the post-assessment if the respondents had any further comments on the training, 11 out of 22 participants provided positive feedback on the training, while 10 of those participants did not provide further commentary.

For objective 2, respondents were also asked if their county is in the CWD zone. Analysis of results from the pre-assessment and post-assessment shows a decrease in uncertainty from 21% to only 5%. This suggests that the CEAs gained awareness of the CWD Management Zone due to attending the in-service training.

Figure 11a: “Is your county in the CWD zone?”

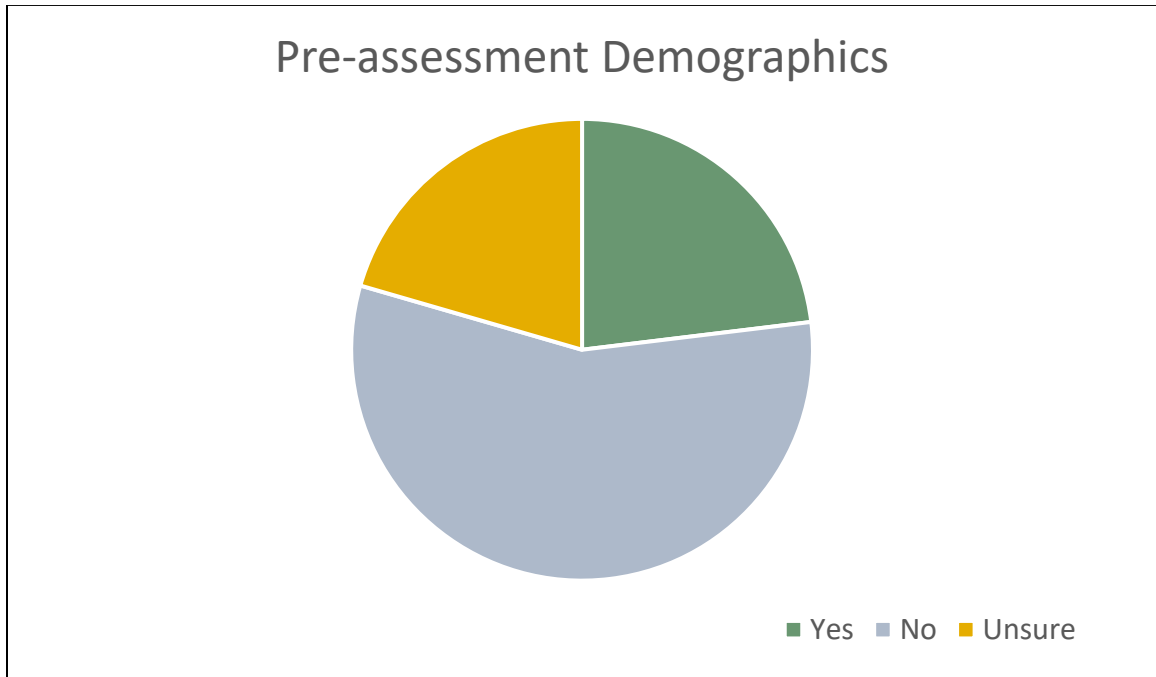
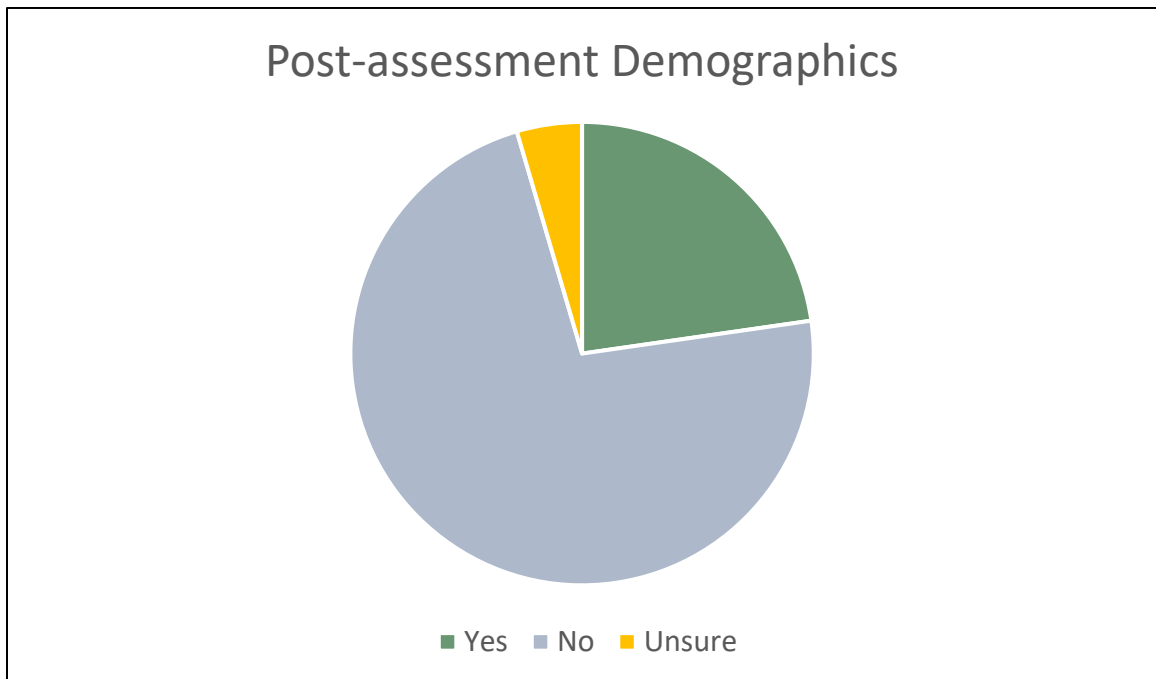


Figure 11b: “Is your county in the CWD zone?”



Conclusions and Discussion

The results of this study reflect a positive impact of the materials presented to CEAs and their ability to educate the public about CWD. There was an increase in the number of CEAs interested in conducting a CWD educational program in 2023, increasing from 23% to 32% when comparing pre-assessment and post-assessment responses. A statistically significant difference between pre-assessment and post-assessment responses when comparing knowledge-based questions suggests that the in-service training did improve CEAs' knowledge of CWD. The overall results of this study indicate that an increase in up-to-date and easily accessible materials may benefit UADA CEAs in their efforts to spread awareness of CWD and its management strategies. This increase in public awareness could improve the success of management strategies and slow transmission rates for this disease.

Slowing this disease's transmission is vital in maintaining the health of cervid populations in the state and thus aids in decreasing any risk of human transmission. This disease is not yet fully understood, and more research will be needed to definitively answer questions regarding its management. This study gains insight into a small part of an extremely complex issue yet supports the idea that continual education on the disease may help gain advances in fully understanding CWD. Results of this study showed a statistically significant difference between pre-assessment and post-assessment responses for objectives 1 and 3, and an overall positive response to the in-service training materials when analyzing assessment questions correlating with objective 2. A 44% loss of subjects, also known as attrition, between participants in the pre-assessment and post-assessment could have potentially affected the accuracy of results. To combat this, averages of pre-assessment and post-assessment scores were taken independently of one another to minimize the statistical effects of this attrition. Another limitation of this study

could be identified in the low sample size (i.e., 39 and 22 participants from the pre-assessment and post-assessment respectively). If this study were to be conducted again, a larger sample size could be beneficial in producing the most accurate results possible. Overall, the study suggested success in all three objectives. If CEAs' access to up-to-date, easily employable materials continues to increase, this study suggests that this will have an overall beneficial effect on their ability to educate the public on CWD and its management strategies.

Appendix

Document 1: Pre-assessment



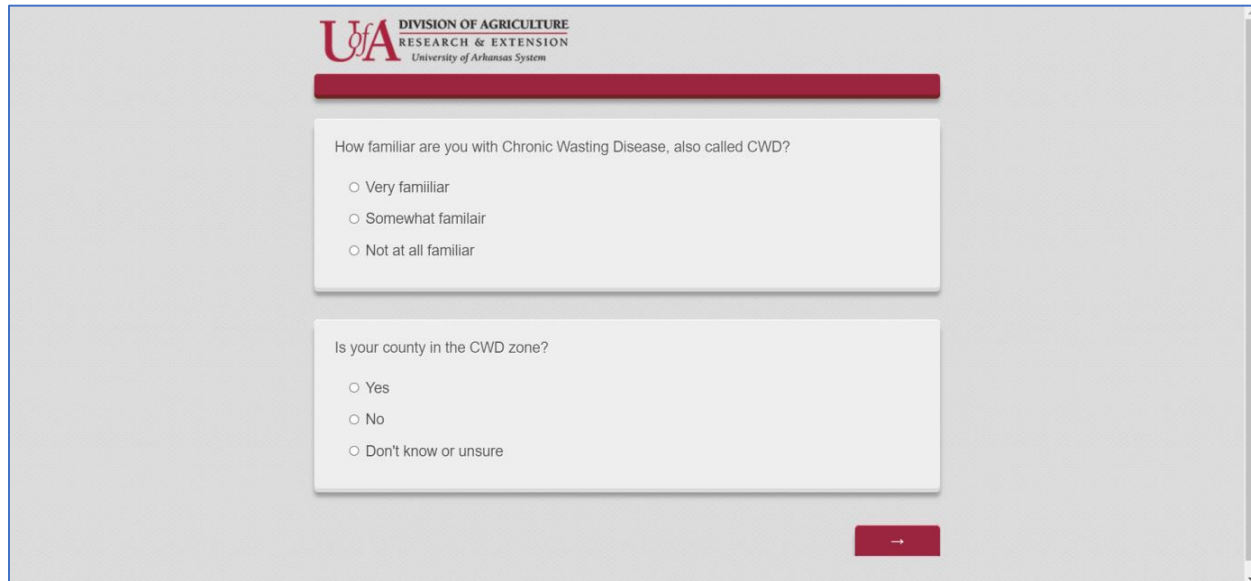
U of A DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

The University of Arkansas is conducting a study about Chronic Wasting Disease (CWD) education in Arkansas. This study aims to benefit extension agents by providing a set of educational materials to be used in public CWD programs.

- Your participation is completely voluntary and anonymous.
- Your responses will be grouped with other responses, and your name will not be collected.
- The information we collect will be reported to University of Arkansas faculty, researchers, and others interested in Chronic Wasting Disease. This information will be presented to University of Arkansas faculty orally and as a visual presentation in Spring 2023.
- A report will be available to the public. It will be posted at the University of Arkansas Library system at <https://libraries.uark.edu>.
- The survey may take about 5 to 10 minutes to complete.
- If you have questions or concerns about this survey, or confidentiality of responses, contact Mary Claire Stewart, University of Arkansas, at 870-995-5971 or mclairestewart@hotmail.com.
- If you have questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University's IRB Compliance Coordinator, at 479-575-2208 or irb@uark.edu Thank you for participating in the training.

Now we would like to understand how the training has benefitted you. Please answer the following questions, most of which are repeated from the pre- assessment.

Click the arrow to continue.



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University of Arkansas System

How familiar are you with Chronic Wasting Disease, also called CWD?

- Very familiar
- Somewhat familiar
- Not at all familiar

Is your county in the CWD zone?

- Yes
- No
- Don't know or unsure

→

What management strategies are thought to slow the spread of CWD in deer and elk?

- Increasing baiting tactics
- Decreasing baiting tactics
- Decreasing animal density
- Increasing baiting tactics and decreasing animal density
- Decreasing baiting tactics and decreasing animal density

What signs do deer or elk present when they have CWD?

- Weight gain
- Decreased salivation

What signs do deer or elk present when they have CWD?

- Weight gain
- Decreased salivation
- Increased urination
- Change in behavior
- Increased urination and change in behavior

What portion of a deer or elk is tested when testing for CWD?

- Head
- Head and portion of the neck
- Abdomen
- None of the above



Please indicate which best matches your response.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I have sufficient up-to-date materials to educate the public about CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would benefit from a set of updated CWD educational materials.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my knowledge of the basic biology of CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my knowledge of the current distribution of CWD in Arkansas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my ability to educate the public about CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



How many CWD educational programs do you plan to conduct in 2023?

What kind of support do you need as you teach the public about CWD?



Document 2: Post-assessment

U of A DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

The University of Arkansas is conducting a study about Chronic Wasting Disease (CWD) education in Arkansas. This study aims to benefit extension agents by providing a set of educational materials to be used in public CWD programs.

- Your participation is completely voluntary and anonymous.
- Your responses will be grouped with other responses, and your name will not be collected.
- The information we collect will be reported to University of Arkansas faculty, researchers, and others interested in Chronic Wasting Disease. This information will be presented to University of Arkansas faculty orally and as a visual presentation in Spring 2023.
- A report will be available to the public. It will be posted at the University of Arkansas Library system at <https://libraries.uark.edu>.
- The survey may take about 5 to 10 minutes to complete.
- If you have questions or concerns about this survey, or confidentiality of responses, contact Mary Claire Stewart, University of Arkansas, at 870-995-5971 or mclairstewart@hotmail.com.
- If you have questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University's IRB Compliance Coordinator, at 479-575-2208 or irb@uark.edu Thank you for participating in the training.

Now we would like to understand how the training has benefitted you. Please answer the following questions, most of which are repeated from the pre- assessment.

Click the arrow to continue.

U of A DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

How familiar are you with Chronic Wasting Disease, also called CWD?

- Very familiar
- Somewhat familiar
- Not at all familiar

Is your county in the CWD zone?

- Yes
- No
- Don't know or unsure

→

What management strategies are thought to slow the spread of CWD in deer and elk?

- Increasing baiting tactics
- Decreasing baiting tactics
- Decreasing animal density
- Increasing baiting tactics and decreasing animal density
- Decreasing baiting tactics and decreasing animal density

What signs do deer or elk present when they have CWD?

- Weight gain
- Decreased salivation

What signs do deer or elk present when they have CWD?

- Weight gain
- Decreased salivation
- Increased urination
- Change in behavior
- Increased urination and change in behavior

What portion of a deer or elk is tested when testing for CWD?

- Head
- Head and portion of the neck
- Abdomen
- None of the above



Please indicate which best matches your response.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I have sufficient up-to-date materials to educate the public about CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would benefit from a set of updated CWD educational materials.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my knowledge of the basic biology of CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my knowledge of the current distribution of CWD in Arkansas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident in my ability to educate the public about CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



How many CWD educational programs do you plan to conduct in 2023?

What kind of support do you need as you teach the public about CWD?

Do you have other comments about CWD or this training?



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