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Wild game processors' perceptions of chronic wasting disease risks in Michigan

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ABSTRACT

Chronic wasting disease (CWD) is a neurodegenerative disease that threatens deer population health and management. This qualitative study explored processors' perception of CWD risks, and the solutions or barriers they experience regarding managing these risks. Processors can play a critical role preventing consumption of CWD-positive venison by keeping CWD-positive deer out of facilities and implementing practices that minimize the risk of cross-contamination should CWD-positive deer enter facilities. Our analysis of semi-structured interviews of wild game processors found that they are concerned about CWD but have not altered processing practices, believing that most of the responsibilities for preventing CWD spread lie with hunters. Processors suggested several practices that state regulatory agencies can implement to aid in efforts to ensure that no CWD-positive deer enter facilities. This research may inform state agencies' CWD communication efforts and identify actionable policies that better ensure processors can help prevent the consumption of CWD-positive venison.

KEYWORDS

Chronic wasting disease; deer; risk; wild game processors; wildlife management

Introduction

Since the discovery of chronic wasting disease (CWD) in wild white-tailed deer populations in 1981, the disease has been a major concern for wildlife management agencies in the United States (Center for Disease Control and Prevention, 2021). CWD is a contagious, fatal neurodegenerative disease caused by prions that affect deer and other cervids. CWD prions spread through saliva and other bodily fluids (Schroeder et al., 2021). To date no vaccine or treatment has been developed, nor are live animal tests available, meaning CWD can only be confirmed after death by testing the brain or lymph nodes (Williams, 2005). Although no cases of CWD infection have been reported in humans, the Centers for Disease Control and Prevention (CDC) recommends keeping any meat from positive cervids out of the human food system (CDC, 2021).

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White-tailed deer is the most harvested species of cervids in the United States, and many white-tailed deer hunters have their deer processed commercially (Frawley, 2017; Slagle et al., 2022). In 2020, 44% of white-tailed deer harvested in Michigan were taken to a commercial meat processor (Frawley, 2021). Given the reliance hunters place on wild game processors (hereafter "processors") for handling venison, processors can play a critical role in upholding CDC guidelines by preventing the intake of CWD-positive deer into facilities, as well as avoiding cross-contamination of CWD-negative venison with CWD-positive venison within facilities (Angers et al., 2006; Kramm et al., 2017). Processors may also face increased CWD risk in comparison to other stakeholders (e.g., hunters), given the concentration of possibly infectious materials in the facilities where they work (Angers et al., 2006; Kramm et al., 2017).

To date there has been no research investigating processors' perceptions of CWD risk and the impacts these perceptions have on their business practices. Instead, research has focused primarily on hunters (Decker et al., 2012; Song et al., 2018, 2019). Given processors' potential role in managing CWD, understanding their perceptions of risk toward the disease and associated management practices within their facilities is critical for developing effective public health regulations. Processors' perceptions of CWD risks and how they respond to these risks may have significant impacts on hunters' ability to have deer processed by licensed facilities.

In Michigan, CWD was first detected in free-roaming white-tailed deer in 2015 and presents a serious management concern (Michigan Department of Agriculture and Rural Development, 2023). At the time of this study the Michigan Department of Natural Resources (MDNR) established a CWD core zone and management zone with increased surveillance for the disease in these areas (Figure 1). A total of 363,372 deer were harvested in 2018, and 50% were handled by processors (Frawley et al., 2019). Michigan has almost 500 licensed processors (Frawley, 2017), in addition to an unknown number of unlicensed processors. Although Michigan State University Extension (MSUE) has worked to convey to processors best practices for avoiding CWD-positive deer contamination (Schweihofer & Ockert, 2022), systematic inquiry to understand processor knowledge has not been conducted. The goal of this study was to explore processors' perception of CWD risks and identify solutions or barriers they experience toward managing these risks.

Methods

Participants

Processors were identified through personal contacts at the Michigan Department of Natural Resources and Michigan State University Extension. Our recruitment targeted wild game processors with the goal of a broad sample that captured a range of characteristics including number of customers per year; percentage of business that was venison processing; length of time in business; and location relative to CWD management zones. Potential interviewees were contacted through e-mail and phone calls. Interviews occurred from September 2019 through May 2020, and included processors within and outside of CWD zones. We attempted to contact 73 wild game processors through phone calls and

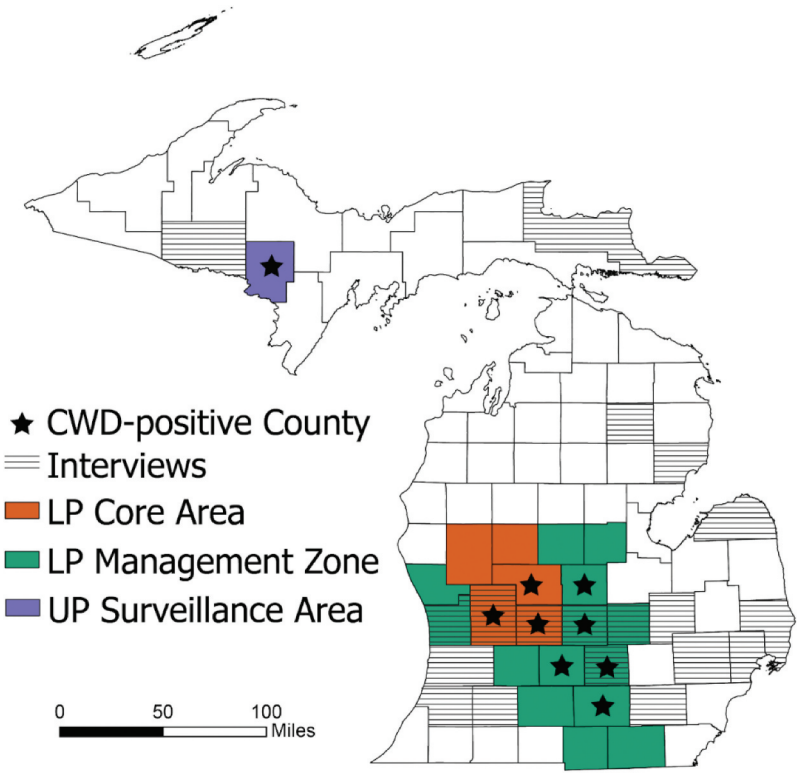

Figure 1. Michigan department of Natural Resources (MDNR) chronic wasting disease (CWD) management units shown by color-coded counties: orange for the Lower Peninsula (LP) core area; green, LP management zone (all core area is also part of this zone); and purple, Upper Peninsula (UP) surveillance area. Counties where CWD has been detected (2015–2019) are shown with a star and counties with lines are those in which we interviewed processors. Note that by the 2020 deer hunting season, the LP core/management zone approach was no longer used by MDNR.

e-mails, with 26 being reached and agreeing to participate in interviews. Of those who participated, 23 processors were male and three were female. Their ages ranged from 38–60 and had an average age of 50.

Data Collection

We used semi-structured interviews in which the conversation was guided by the interviewer, who could pursue relevant lines of questioning as they arose (Rubin & Rubin, 2005). We developed an interview guide, consisting of topics and associated prompts addressing: 1) respondent background; 2) knowledge of CWD; 3) perceived risks and associated business practices; and 4) preferred policy needs. The risk perception questions were adapted from Wilson et al. (2019) and covered the level of concern/emotion respondents had toward CWD, the perceived probability of interacting with a CWD-positive deer and the possible consequences associated with that interaction.

A total of 26 interviews were conducted between September 2019 and May 2020. Interviews lasted between 18 and 67 minutes and averaged 37 minutes. Given the

exploratory nature of this inquiry we used non-probabilistic, purposive sampling techniques to select participants from the core zone, management zone, and areas of the state not covered by either zone (Bernard, 2006). This method ensured that we captured a diversity of perspectives based on zone type.

Respondents were contacted by the researchers (2) as well MDNR wildlife professionals (1) and MSUE educators (2) who specialize in conducting interviews and who had trusted relationships with processors. All interviews were digitally audio recorded and transcribed verbatim using Rev software. Transcriptions were subsequently uploaded to Dedoose data analysis software.

Data Analysis

Data were analyzed using a combination of inductive and deductive coding through iterative review of the transcriptions (Bernard, 2006). In Dedoose, a codebook was created in an exploratory manner because there is no previous research into processors' thoughts about CWD management. We relied on inductive coding to identify conceptual categories that were then used to organize respondent's data into a logical structure. After transcripts were coded, intercoder reliability checks were conducted to create a final coding scheme.

Results

Knowledge, Location, and Risk Perceptions

Processors were asked to rank their level of concern about CWD on a scale of 1–5, with 1 being not at all concerned and 5 being very concerned. Processors generally described a moderate level of concern with an average of 3.2. Those who operated their business or resided within the management zone and core areas reported higher levels of concerns than those outside of these areas. Interviewees had similar knowledge of CWD despite varying levels of concern about the disease. Processors tended to discuss the fact that CWD is not known to affect human health, and describe their understanding of how the disease was transmitted within deer herds. Even with similar levels of knowledge, those who expressed few or no perceived risks associated with CWD tended to report little concern about the disease. Respondents' perceived risks generally fell into four major types: biological, recreational, human health, and economic. Biological risks referred to potential impacts CWD may have on deer herds. Recreational risks concern the effects CWD may have on hunting participation. Human health risk referred to the possibility that CWD may be transmitted to humans. Economic risks refer to concerns about effects of reduced hunting on local economies generally and on processors particularly.

Processors described concerns about collapse of the deer population in Michigan, pointing to impacts in other states as evidence: "... in other States it's pretty much wiped out entire herds ... populations of deer down to nothing." Concerns over changes in the deer population were related to concerns about impacts on hunter behavior. As one processor noted, "... there'll be a good majority of people that will not hunt anymore because of [CWD]." Many respondents fear that the combination of impacts to the deer herd and subsequent reductions in hunting would negatively impact their livelihoods. This

was the primary risk expressed by respondents. Some expressed fear that declines in hunting would put them out of business entirely. As one processor noted, "[Hunters] are probably not going to hunt, which will affect my business. And if they don't go hunting, then that portion of my business is going to die and then I'll find something else to do."

Not only were processors concerned about effects on their own economic stability, but many expressed concerns about impacts to Michigan's economy overall: "If we start to lose deer numbers, we're going to lose our hunters. And that will have a major impact on the state economy and funding available for management activities." Finally, processors with a high level of concern over CWD acknowledged fears about impacts to human health generally, and the health and economic risks their profession faces given the unknowns associated with processing untested deer. As described by one interviewee: "I'm fairly concerned because it's our family's health that we're talking about here. . . . If we know a deer has CWD of course we're not going to process it. But if a deer is not tested, we don't know it has CWD and I may cut it up and I come in contact with it."

Managing CWD Risks

Many processors believed that the rules surrounding CWD place the burden of compliance on hunters, while processors were already responsible for following standard, existing sanitation practices. As one explained, "We don't struggle to comply with CWD rules because they are just normal sanitation practices. We use separate equipment on saws and so on, and only use them on one deer. We clean everything in between deer."

However, processors described three ways that CWD testing could be improved: faster results, cheaper tests, and ensuring that there are no test shortages. Processors described how they had experienced holding deer for up to several weeks as they awaited hunters' test results before processing a deer. This situation was problematic as delays take up limited freezer space. As one processor noted, "[Test delays] was a big issue this year. We were just overrun with delays getting results back and so getting hunters their venison took a lot longer."

Cheaper tests, some processors argued, would help to increase testing rates and reduce the risk of processing CWD-positive deer (tests in Michigan currently cost between $30–$45). Testing could also be improved if the MDNR ensured that there were no test shortages, which contributed to delays in processing. According to one processor, "[The DNR] expects it to take 15 days to get a deer tested. That's far too long. Our DNR biologists need to find ways to get faster results, cheaper tests, and enough test kits for people who want them."

Processors also suggested ways MDNR could facilitate risk reduction for processors. Examples included distributing larger maps that could be displayed in their stores showing the zones in Michigan so that hunters could clearly see which zone they are in and minimize reporting error. Processors also expressed concerns with relying on hunters' honesty in reporting from which zone a deer was harvested and suggested that MDNR could color code deer tags according to the zone of harvest. In Michigan, hunters are required to purchase a deer tag so that the MDNR can track how many deer are harvested and use this information to make regulatory adjustments as needed.

One participant described the benefit of color-coded tags as follows, "I think the DNR could issue different colored licenses. Instead of just having a generic green tag, you could have a yellow or red tag so that processors know that a deer was harvested in core or management zones."

Risk Perceptions and Processor Behavior

Processors were asked whether they have changed their behaviors since the discovery of CWD and if they intended to change processing behaviors in the future. Most processors had not changed their intake or processing protocols, as doing so would negatively impact their business. As one processor described their rationale for not requiring a CWD test, "We can take in as many 200 plus deer a day . . . if I'm going to require them to be tested" the amount of time it takes to receive results would ruin "my whole season."

Most processors would not quit processing venison given the status of CWD, although some would stop if it was proven that CWD posed a risk to human health. As one put it, "The only way that I would stop processing wild game is if there were findings that showed CWD could harm humans."

Discussion

Knowledge, Location and Risk Perception

Overall, processors had a moderate level of concern about CWD, with the highest levels of concern occurring among those residing in or having their businesses located in the management zones. We are unaware of research analyzing the relationship between processors' level of concern about CWD as a function of their proximity to known CWD locations. However, other research found that hunters in CWD-positive counties perceived less risk to humans and deer than those hunting in non-CWD counties (Vaske et al., 2018). Our results were similar, in that the highest perceived risks of CWD among Michigan processors were in the management zone rather than the core where CWD was most prevalent. When evaluating the relationship between level of concern about CWD and knowledge of the disease, we found that processors reported similar knowledge regardless of concern level. This finding contradicts previous studies showing that greater CWD knowledge tends to be associated with lower levels of risk perception (Needham & Vaske, 2006; Vaske, 2010; Vaske & Lyon, 2011).

For some processors, concern about CWD has caused them to stop accepting venison or to require negative tests before accepting deer. This finding corroborates previous research focused on the relationship between perceptions of health risks associated with CWD and alterations in behaviors to minimize risks (Needham & Vaske, 2008; Needham et al., 2017). The processors who reported these changes were more likely to report being worried about the risk of CWD potentially affecting human health. This may suggest that processors who are more worried about potential human health impacts of CWD are also more likely to alter behaviors to minimize the risk of processing CWD-positive venison.

Management Responsibility and Policy Recommendations

Processors thought that the responsibility for managing CWD lies with the state and hunters. Participants claimed that all processors can do is continue implementing best sanitary practices that are already in place at their facilities and can do little else to influence how CWD is managed. However, processors suggested several policy recommendations that could be implemented by the state, and which would improve processors' ability to ensure that they do not accept nor process CWD-positive deer. Policy recommendations included improved testing, increasing hunters' awareness of where CWD is known to exist in deer herds across the state, and decreasing processors' uncertainty about where deer are harvested by adopting color-coded deer tags that correspond to core zones, management zones, and areas of the state not covered by either zone.

Communicating CWD Risks

We also identified an important gap between MDNR's testing strategy and the desired testing strategy for processors. MDNR is responsible for monitoring CWD to understand its changing distribution across the state and implementing rules, specifically related to core zones, aimed at containing the spread of the disease. Thus, the agency monitors the edge to track the spread of the disease, whereas processors want testing to focus on the safety of consuming venison (i.e., negative test results for harvested deer). How to reconcile this difference is an unanswered question. Locations with highest prevalence (core zones) are of less interest for the MDNR because they already know that the disease is there, yet it is precisely in these locations that processors believe testing should be focused to prevent CWD-positive deer entering processing facilities.

Conclusion

Wild game processors can play a key role in protecting human health by improving their ability to identify and avoid processing CWD-positive deer. Although Michigan processors were concerned about the disease, this concern was not translated into similar behavioral changes for all processors. While some processors have altered practices to reduce the risk of CWD in their facilities, most have not and believe the burden of regulatory compliance lies with hunters. Processors suggested several methods for increasing their confidence that CWD-positive deer are not entering their facilities, including implementing color-coded tags that indicate the zone-type from which deer are harvested. This would allow processors to know whether deer were harvested in locations where the risk of CWD is higher without relying on the word of hunters.

This research explored Michigan processors' perceived risks associated with CWD in white-tailed deer, changes in business practices in response to the presence of CWD, and their ideas about how state regulatory agencies, hunters, and processors can decrease their exposure to CWD risks. Future inquires can expand on this work by focusing on how these actors can work together to create a management regime that satisfies the state's obligation

for monitoring the disease and hunters' and processors' desire to avoid exposure to and handling of CWD-positive deer carcasses.

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Disclosure Statement

No potential conflict of interest was reported by the author(s).

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Ethical Statement

Participation in this research was completely voluntary. Participants were informed of data privacy protocols in place ensuring that the information they provided could not be linked to them personally. Participants also signed a consent form before the interview acknowledgment their choice and willingness to participate.

Data Availability Statement

The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research, supporting data is not available.

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