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Alabama agricultural producers' experiences with wild pigs (*Sus scrofa*) and their preferences concerning wild pig management

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ABSTRACT

Government agencies and landowners use a variety of lethal methods to reduce invasive wild pig populations and resulting agricultural damages. To provide decision-makers with information regarding Alabama farmers' experiences with wild pigs and their preferences for management actions, we surveyed Alabama Farmers Federation members in 2020. We found that wild pigs were commonly present on livestock, timber, and crop production acreage, but wild pig damages and costs were much more common among crop producers. Respondents' wildlife acceptance capacity for wild pigs was low and all lethal control methods were considered acceptable by most respondents, particularly those performed by landowners. While there is likely a consensus among Alabama farmers that wild pig numbers need to be reduced within the state, managers should continue to build support by working closely with crop producers and by addressing potential concerns regarding the implementation of methods by government agencies in future initiatives and outreach.

KEYWORDS

Farmers, human dimensions, human perceptions, wildlife management, invasive species, feral swine

Wild pigs are an invasive species in the United States that damage property, ecosystems, and agricultural resources (McKee et al., 2020; Fern et al., 2021). In Alabama, wild pigs can be found in 64 out of 67 counties (Fern et al., 2021), and they have caused considerable losses for the state's \$70 billion-a-year agriculture industry (Alabama Farmers Federation, 2019; McKee et al., 2020). A variety of methods are used by government agencies and landowners to control wild pig populations in Alabama, including aerial and ground shooting as well as trapping followed by lethal removal. In addition, wild pig-specific toxicants have been developed, though none are presently registered for use in any U.S. state. The success of efforts to eliminate wild pig populations in Alabama depends in part on agricultural producers' acceptance and use of these methods as well as their support for wild pig eradication. Despite the importance of producer cooperation and support, we found no peer-reviewed studies examining Alabama producers' acceptance of presently available wild pig control methods or their preferred wild pig population size in the state. The most relevant study was more narrowly focused on Alabama producers' acceptance of a wild pig

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toxicant, a method not presently available in the state (Tucker Williams et al., 2021). To address this gap, we surveyed Alabama Farmers Federation (AFF) members to measure (1) the presence of wild pigs on respondents' agricultural operations in 2020; (2) respondents' economic losses to wild pigs in 2020; (3) respondents' preferred wild pig population size in Alabama (i.e., wildlife acceptance capacity); and (4) respondents' degree of acceptability of several wild pig lethal control methods, including methods administered by agency personnel. We chose AFF members as our study population because AFF is the state's largest, most active, and most diversified farm organization, and AFF's cooperation afforded us access to many of the state's producers and the benefit of the organization's imprimatur.

We collected data using an online survey (Appendix A) administered under the auspice of AFF via Qualtrics (Provo, Utah). Our sample comprised active members of AFF who produced crops, timber, or livestock, and who registered an e-mail address with AFF ($n = 8,791$). The questionnaire was pretested by AFF personnel responsible for the relevant commodities before finalization. AFF sent an e-mail to the sample on November 2, 2021, with information about the survey and a link to complete the questionnaire. Two reminder e-mails were sent by AFF to the sample on November 16 and November 30, 2021, and the survey closed on December 28, 2021. The research protocol for the study was approved by the Auburn University Institutional Review Board (reference number: 21-418 EX 2109).

The presence of wild pigs in 2020 and various categories of losses to wild pigs in 2020 were measured with items having yes/no/unsure responses. Wildlife acceptance capacity was measured with an item that asked respondents to indicate what change in the population of wild pigs they would like to see in Alabama on a six-point response scale ranging from (1) "completely removed" and (2) "decreased greatly" to (6) "increased greatly." Finally, acceptability of control methods was measured through items that asked respondents to rate the acceptability of the following six control methods on a five-point scale, ranging from (1) "completely unacceptable" to (5) "completely acceptable": (i) trap and kill by a landowner, (ii) trap and kill by government agency personnel with landowner permission, (iii) aerial gunning by government agency personnel with landowner permission, (iv) ground shooting by a landowner, (v) ground shooting by government agency personnel with landowner permission, and (vi) use of a wild pig-specific toxic bait by government agency personnel with landowner permission.

Of the 8,791 questionnaires administered, 236 were undeliverable, 454 were returned, and 41 were excluded for incompleteness, yielding an overall response rate of 4.8%. Most respondents were male (83%) and white/Caucasian (97%), and the average respondent age was 63 years. Because AFF does not collect demographic data concerning its members, we were unable to assess how representative our respondents were of the study population. However, the most recent census of Alabama producers published by the United States Department of Agriculture National Agricultural Statistics Service (2017) indicates that they are majority male (66%) and white/Caucasian (91%), which is broadly similar to our respondents. We tested for indications of nonresponse bias using an extrapolation method (Lindner et al., 2001) in which respondents were divided into two equal groups of early and late responders ($n = 227$ and 227 , respectively) and their responses to two key questions (wildlife acceptance capacity and acceptability of trap and kill by landowner) were compared using paired t -tests. We found no statistical differences ($p < .05$) between the responses of early and late responders. While we cannot conclude there was no nonresponse bias, there was no evidence of nonresponse bias using the extrapolation method.

Table 1. Descriptive statistics of agricultural producers' preferred change in the wild pig population in Alabama.

Mean (St. Dev.)	Completely removed (1)	Decreased greatly (2)	Decreased slightly (3)	Stay the same (4)	Increased slightly (5)	Increased greatly (6)
1.55 (.823)	59% (<i>n</i> = 232)	32% (<i>n</i> = 126)	5% (<i>n</i> = 19)	3% (<i>n</i> = 12)	<1% (<i>n</i> = 2)	<1% (<i>n</i> = 2)

In terms of agricultural production among respondents, 38% (*n* = 157) produced crops, including soybeans, cotton, peanuts, wheat/feed grains, sod, hay/forage, and other specialty crops; 42% (*n* = 170) produced timber; and 29% (*n* = 115) produced livestock, including beef cattle, dairy cattle, sheep/goats, domestic pigs, poultry, and horses. These producer categories were not mutually exclusive, as 116 respondents produced multiple commodity types and fell into more than one category. In addition, 121 respondents did not identify the resource(s) they produced in 2020; they were, however, registered with AFF as producers of at least one of the commodities of interest. Regarding wild pig presence, crop producers were most likely to report wild pig presence on their acreage in 2020 (52%, *n* = 80), followed by timber producers (49%, *n* = 82), and livestock producers (39%, *n* = 44). Crop producers were also much more likely to report experiencing wild pig-related costs and damages in 2020 (44%, *n* = 69) than were livestock producers (16%, *n* = 28) or timber producers (18%, *n* = 31). Peanut and soybean-producing respondents, in particular, were impacted by wild pigs at a high rate, with 93% of peanut producers (*n* = 13) and 83% of soybean producers (*n* = 10) reporting wild pig damages. Overall, respondents' wildlife acceptance capacity for wild pigs was low, with 59% (*n* = 232) reporting that they wanted wild pig populations to be completely removed and 32% (*n* = 126), reporting that they wanted them greatly reduced in the state, with an overall mean score of 1.55 (roughly the midpoint between "completely removed" and "greatly reduced," *SD* = .832) (Table 1). In addition, all the lethal control methods were considered acceptable by most respondents, though methods carried out by agency personnel were less acceptable than those carried out by the landowner (Figure 1). The most acceptable lethal control method was ground shooting by a landowner (92%; *n* = 322), followed by trap and kill by a landowner (91%; *n* = 320). The least acceptable lethal control method was the use of a toxic bait, with 59% (*n* = 205) of respondents rating it somewhat or completely acceptable.

We found that wild pigs were commonly present on livestock, timber, and crop production acreage in 2020, but wild pig damages and costs were much more common among crop producers. In addition, respondents' overall wildlife acceptance capacity for wild pigs was generally low, with a majority preferring that they be completely eliminated. Given the invasive status of wild pigs and the risks they pose to agriculture, however, we expected respondents' wildlife acceptance capacity for wild pigs to be even lower. In this regard, 37% of respondents preferred that wild pig populations not be completely eliminated in Alabama. These findings suggest that respondents found some value in having at least a small population of wild pigs in the state, notwithstanding the risks they pose. Additional research is needed to understand the benefits perceived by agricultural producers of having wild pigs in Alabama could help to explain this finding. Relatively few respondents wanted to see wild pig populations remain the same or increase, however, and this could be interpreted as an indication that most agricultural producers would support efforts to control wild pig populations in Alabama. Indeed, we found

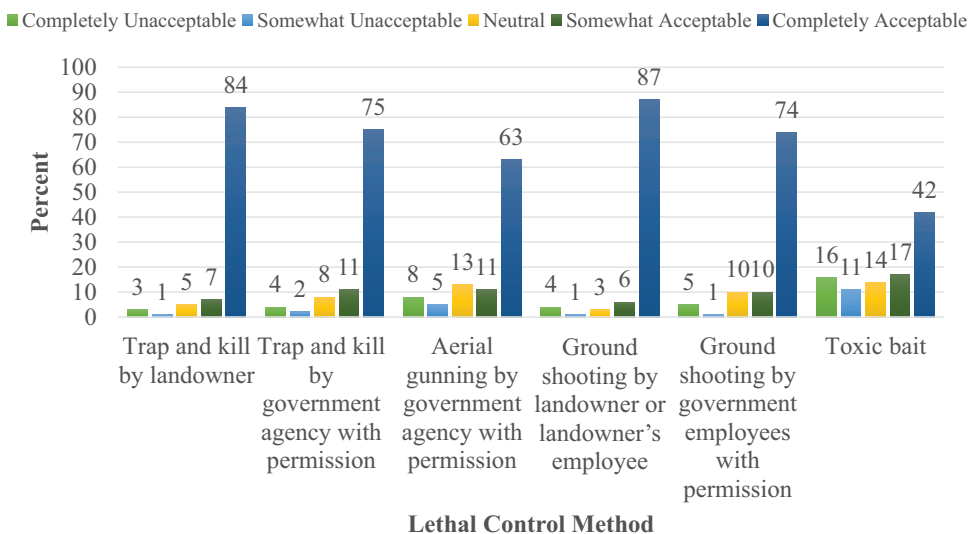


Figure 1. Alabama agricultural producers' acceptability of lethal control methods to reduce the wild pig population in the state.

that all lethal control methods included in our survey – including sometimes controversial methods, like toxicants (Carlisle et al., 2020) – were acceptable to most respondents, as similarly reported by Tucker Williams et al. (2021). Insofar as AFF members are typical of other crop, timber, and livestock producers in Alabama, these findings suggest that wild pig damages are likely widespread in the state and that most producers would be receptive to the use of all conventional wild pig control methods.

The results and limitations found in this study should guide future research. Despite our efforts to increase the number of responses through additional follow-ups, pursuant to the Total Design Method (Dillman, 1978), the main points of weakness in this study included our low response rate and small sample size. With this, we urge caution in generalizing these findings more broadly and suggest additional research be done to better understand Alabama farmers' experiences with and perceptions of wild pigs and their management. Moreover, given that our study population comprised AFF members, it could be beneficial to study members of other farming organizations or groups in Alabama (e.g., Alabama Farmers Cooperative, Alabama Department of Agriculture & Industries) and/or resample this study's population in an effort to gain greater participation.

Regarding management implications, given that wild pig-related damages and costs were much more common among crop producers, this suggests a need to prioritize management efforts on crop producer operations. This is particularly important for those producing peanuts and soybeans, which were especially susceptible to damage. Additionally, the fact that more than one-third of respondents wanted wild pig populations to be decreased but not eliminated underlines the importance of communication and outreach efforts that highlight the negative impacts of wild pigs and the necessity of greatly reducing or eliminating (where possible) their numbers to mitigate these impacts. Lastly, while most respondents found lethal methods acceptable, methods deployed by government personnel and

the use of a toxicant were less acceptable. To reduce the potential for stakeholder conflict, decision-makers and government agencies should engage in outreach well before any wild pig management plans are initiated to understand and address concerns. This will be imperative if a toxicant is made available for use in Alabama, as we found less acceptance of this method among respondents. Ultimately, the success of efforts to manage wild pig populations may require acceptance, and in some cases cooperation (e.g., by private landowners), by stakeholders of the strategies and methods employed by wildlife managers. Gaining such acceptance and cooperation depends in part on the recognition by farmers and other stakeholders that the reduction of wild pig populations in the state is necessary and ultimately beneficial to their interests and/or the interests of the many other Alabamians who experience wild pig damage.

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Disclosure statement

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