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Beyond the Post: Exploring Equine Operators' Understanding and Role in Conservation Best Management Practices

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Beyond the Post: Exploring Equine Operators' Understanding and Role in Conservation Best Management Practices

Abstract

The equine industry is an established part of Maryland agriculture with 79,100 equines valued at approximately $714 million in the state; approximately 10% of these animals are housed in one county. Equine operators are a unique demographic in the agricultural realm, because they are not managing land to produce food or fiber and often are employed in other professions unrelated to agriculture. These operators tend to be unaware of land conservation practices and can have a detrimental effect on areas, like the Chesapeake Bay economy and ecosystem, if shared resources are exploited. The purpose of this study was to explore equine operators' knowledge and connection of conservation best management practices (BMPs) and their role in being a caretaker of the land. The study was informed by the diffusion of innovations theory and gathered data through semi-structured, qualitative interviews. Equine operators in the study were found to use a variety of informational sources, had a high level of adoption of the BMPs they used, and overall, a majority of participants saw their role as caretakers of the land as an important aspect of their environmental actions. Recommendations from this research include improving communication processes to increase the spread of BMPs and adjusting specific infrastructure aspects to improve retention of equine operators practicing conservation efforts. Further research should investigate other niche areas of agriculture that could potentially be struggling with a knowledge deficit of BMPs and communication neglect between conservation offices and audiences.

Keywords

best management practices, conservation, diffusion of innovations, information sources, strategic communication

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Introduction/Purpose

The use of land by equine operators has increased, but conservation outreach and education targeting this group has been minimal (Perry-Hill & Prokopy, 2015; Prokopy et al., 2011; Weiner & Williams, 2018). Additionally, there has been an increase in people starting equine operations as a hobby, who do not have a background in agriculture or other livestock industries (Elgåker, 2012; Greene & Skelly, 2010; Newton, 2014). It is possible these new operators may not know what educational resources are available related to conservation practices and equine management. The purpose of this study was to explore equine operators' knowledge and connection of conservation best management practices (BMPs) and their role in being a caretaker of the land.

In agriculture, BMPs are known as a single practice or system of practices put into place to improve soil, water (Christensen & Miranowski, 1982), or air quality by reducing or inhibiting negative effects on the environment (Aneja et al., 2008) and its ecosystems (Boesch et al., 2001). Equine management BMPs can be, but are not limited to, using herbicide to control weeds, practicing rotational grazing, conducting consistent soil tests and applying recommendations, mowing to control weeds, using buffers between pastures and surface waters, preventing runoff from heavy use areas, sacrificing lots used, and managing roof runoff (Fiorellino et al., 2013). "Off-farm" issues can arise if BMPs are not followed in agricultural pursuits, resulting in nonpoint source pollution (Christensen & Miranowski, 1982). Nonpoint source pollution around Maryland, specifically in the Chesapeake Bay waters, has been front and center in the minds of policy makers, scientists, and the general public for centuries (Cestti et al., 2003; Davison et al., 1997). In addition to Maryland being located near the largest U.S. estuary (Phillips & McGee, 2016) that is filled with delicate ecosystems (Boesch et al., 2001) and economies (Phillips & McGee, 2016), the state is also home to 79,100 equines, with approximately 10% of those animals housed in Montgomery county (Maryland Department of Agriculture, 2010). Equines can have detrimental effects on rural land and waterways if not properly care for and conserved (Prokopy et al., 2011).

Researchers have previously investigated the knowledge and implementation of conservation BMPs (Marriott et al., 2012; Westendorf et al., 2010), and it was determined that most equine operators have not implemented conservation BMPs. Several studies have quantified the numbers of practices used and types of practices with which equine operators are familiar with (Prokopy et al., 2011; Singer et al., 2002; Trauger, et al., 2008). Research studies in other areas of agriculture have explored motivations for adopting BMPs and found reasons for participating in conservation efforts related to future generations, family (Rodriguez et al., 2018), visual observations, and past experiences (King & Baker, 2018) among others. In 2003, Nadeau and Meader researched the effect of a public awards program on levels of adoption and found that a combination of awards programs and workshops may be the most effective approach to encouraging improved management techniques among equine operators. Selinske et al. (2016) had similar suggestions when researching the financial aspect on conservation efforts in private land use and also recommended that a combination of incentives be used to attain long-term participation in proactive efforts. Fiscal incentives were found to draw caretakers into the programs, however, economic considerations were not the sole drivers of participation (Selinske et al., 2016). Although studies have focused on other areas of agriculture and incentives to implementation, few have specifically asked what motivates equine operators to adopt conservation BMPs. It is imperative to bridge this knowledge gap in order to move the

needle forward on stewardship and conservation efforts in Maryland, as motivations and perceptions can vary between industries and regions (Greiner et al., 2009).

Motivation(s) to adopt a BMP can be a goal or an abstract concept and can vary dependent on the extent of adoption and the type of BMP chosen for adoption (Greiner et al., 2009). BMPs can be assessed through many different ways. A study done with agricultural producers qualitatively explored the process of BMPs through Elaboration Likelihood Model (King & Baker, 2018). Some studies have taken the approach of quantitatively assessing risk attitude toward BMPs (Akcoaz & Ozkan, 2005; Fausti & Gillespie, 2006; Meuwissen et al., 2001). Moreover, several studies have quantitively looked into three factors encompassing motivating items, which can ultimately affect BMPs and their adoption (Chouinard et al., 2008; Greiner et al., 2009; Mayberry et al., 2005). Those three factors are categorized into conservation and lifestyle motivations, economic and financial motivations, and social motivations. Research into these factors has found that operators carrying out BMPs often deem themselves risk takers, in terms of applying new practices (Greiner et al., 2009). The study at hand specifically focuses its research on the factor related to conservation and lifestyle motivations and the idea of stewardship. The term "steward" is a part of this factor and is described by Wunderlich (1991) as someone who cares for and is responsible for someone else's property. Prokopy et al. (2011) found equine farm operators viewed the environmental advantage of using BMPs to be the "immediate and localized benefits to their farm's environment" (p. 454) instead of affecting a wider area and pertaining to overall stewardship of natural resources.

Another aspect this study explores is where and how equine operators are obtaining information related to BMPs. A previous study shows that an equine property owner's likelihood to obtain information from Extension increased as the size of their operations increased in both acres (≥ 8.5 acres) and numbers of animals (≥ 21) (Singer et al., 2002). The smaller property owners were less likely to be aware of or use Extension services and had little or no knowledge of pasture management techniques. More detail was provided by a study utilizing media content analysis and in-person interviews, which showed that conservation issues are not widely addressed in horse trade magazines and the majority of equine owners in the study area had little practical knowledge of the application of a variety of BMPs (Prokopy et al., 2011). This study also noted the majority of respondents were women, and therefore the educational opportunities available to them may be more gender centric and not address "traditionally geared farm tasks" (Trauger et al., 2008, p. 432). In all, there are several factors that could influence an equine operators' access to BMP information, such as farm size, gender, varying industry subscriptions, and being a new hobby operator with no background in agriculture or livestock industries (Elgåker, 2012), which is why it is important to investigate all operators and the need for this research (Swinker et al., 2013). This study aims to fill the gaps related to both where and how equine operators obtain BMP information and how they view stewardship as a part of BMPs.

Theoretical Framework

This qualitative study was informed by the theory of diffusion of innovations. Diffusion of innovations theory (DOI) was developed by Rogers in 1962. It originated to explain how an idea or product gains momentum and diffuses, or spreads, through a specific population or social system (Rogers, 1995). In the present study, the idea being diffused through horse farms were BMPs for conservation. Diffusion is the "process by which an innovation is communicated through certain channels over a period of time among the members of a social system" (Rogers,

1995, p. 10). An innovation is "an idea, practice, or object that is perceived to be new by an individual or other unit of adoption" (Rogers, 1995, p. 10). Diffusion research centers on the conditions which increase or decrease the likelihood a new idea, product, or practice will be adopted by members of a given culture. It analyzes how media and interpersonal contacts provide information and influence opinion and judgment. Rogers (1995) argued that it consists of four stages: 1) invention, 2) diffusion through the social system, 3) time, and 4) consequences. The theory states that information flows through networks. The nature of networks and the roles opinion leaders play in these determine the likelihood the innovation will be adopted. Innovation diffusion research has attempted to explain the variables that influence how and why users adopt new ideas, such as conservation BMPs. Opinion leaders exert influence on audience behavior via their personal contact while barriers to adoption can halt or make diffusion of an innovation difficult (Rogers, 1995).

Communication channels and social systems also affect adoption decisions (Rogers, 1983), and adoption in a social context is dynamic and reciprocal interaction between an individual and his or her environment (Venkatesh et al., 2012). To understand the pressure of social groups and communication forces on behavior and decisions, normative issues are sectioned into media influence, training, peer influence, and social capital/social influence, following the social cognitive and diffusion of innovation theories. Media, friends, family, training, peers, and neighbors provide the knowledge that can make the users aware of an idea, like conservation BMPs, and persuade them by influencing them to form attitudes to evaluate the attributes of the practices. This leads to a reduction of uncertainty about the advantages and disadvantages of the practices formulating in a decision, to implement the practices and adopt and adapt the practices to their own equine operation, thereby reinforcing their decision and leading them to influence other groups (Rogers, 1983; Venkatesh et al., 2012). There are five adopter categories: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards (Rogers, 1995). These categories follow a standard deviation-curve; very few innovators, around 2.5%, adopt the innovation in the beginning, early adopters making up for 13.5 % a short time later, the early majority 34 %, the late majority 34%, and after some time, finally the laggards make up for 16 %. This theory is relevant in the present study, as identifying barriers is important in understanding how and why equine operators choose to adopt or not adopt conservation practices for their farm.

Purpose & Research Questions

In an effort to explore where and how equine operators learn about conservation BMPs, whether they choose to adopt or not adopt the practices, and if they view their role as stewards or caretakers of the land, the following research questions guided this study:
RQ1: How do operators find information related to conservation BMPs and related programs?
RQ2: What part does the adoption of conservation BMPs play in equine operators' role as caretakers of the land?

Methods

To explore these research questions, 31 semi-structured, in-depth interviews were conducted. Qualitative research was selected because of its ability to understand multiple dimensions and

layers of reality within a social group (Johnson & Christensen, 2011). In person, in-depth interviews provided a focus on the individual that allowed for a detailed investigation of each participant's personal perspective and a deeper understanding of the personal context within the research phenomenon. It also allowed for detailed coverage of the specific research subject (Ritchie & Lewis, 2003). Semi-structured interviews allow a deeper understanding of the research questions because variations in participants' recounts can be noted and explored (Miles & Gilbert, 2005).

Sampling Procedure and Population

Equine operators within one specific conservation district in Maryland, Montgomery County (MSCD), were selected as the population for this study. This conservation district was chosen because of the researcher's access to members and the district's focus of equine conservation BMPs for horses. The 31 interviews in this study represented 33 separate farms identified from a list compiled by the MSCD, and the farms were classified by farm size: small 1-3 horses, medium 4-9 horses, medium-large 10-16 horses, large 17-30 horses and extra-large 31+ horses farms. Operators were further identified by number of years they had been operating, whether they were owners or managers, and whether the farm was their primary source of income. Interviews lasted between 10 and 45 minutes and were conducted between June 16, 2017 and concluded on July 24, 2017, at the time and location preferred by participants.

The initial sampling procedure was purposive in that all operators needed to be in Montgomery County, Maryland and be responsible for primary operations of the horse farm. This purposive technique was used because participants needed certain unique characteristics to understand the complexity of what is being studied and understand the research questions (Creswell, 2007). At the end of each interview, participants were asked if there were other operators in the area he or she might suggest being contacted, resulting in a secondary sampling method of snowball sampling. This secondary method was used to gather an even more robust list of potential participants that may not have been on MSCD's list. This form of snowball sampling is commonly used as a nonprobability approach to sampling hard-to-reach, or unknown, populations (Biernacki & Waldorf, 1981).

Interviews were audio recorded and transcribed by a professional transcription service. Pseudonyms were assigned to participants based upon the number of horses contained on their operation. Pseudonyms that begin with A were assigned to participants with small farms (1-3 horses), B for participants with medium farms (4-9 horses), C for participants with medium-large farms (10-16 horses), D for participants with large farms (17-30) horses, and E for participants with extra-large farms (31+) horses. These classifications were based on information provided by each operator.

Questioning Route and Interview Process

A questioning route guided the study and was based on principles identified as important in qualitative research (Creswell, 2007). The questioning route and consent form were approved by Kansas State University Institutional Review Board. Interviews began with open-ended questions, then as necessary probes were used to gather responses from participants concerning their equine operations, knowledge of regulations, management practices, attitudes, and beliefs toward BMPs. An opening question was used to introduce the subject of the interview and get

basic information about the operator. In this study, the interviewer began by asking a simple question, "Tell me about your operation." The transition question was more comprehensive, asking specifically about the operator's understanding of state and local regulations relating to equine operations or their use and knowledge of BMPs. The key questions referred to the level of knowledge operators had regarding state regulations for equine properties, use of BMPs, related conservation programs, and the reasoning behind why these practices were chosen or modified in their adoption process as caretakers of the land. The questioning route took the broad research questions and helped each individual understand how the question related to them (Rubin, 2005). Probes, asking for examples, more information or amplification of an idea were used to clarify and keep conversation flowing (Rubin, 2005). At the end of the interview, the interviewer summarized participant responses. This was used as a member check. An ending thank-you statement was used to demonstrate respect for the time the interviewee spent taking part (Johnson & Christensen, 2011).

Data Analysis

The researcher first reviewed the field notes, then listened to each interview to confirm the transcribing was done correctly by the professional transcription service. All identifying references were removed, additional edits made, and pseudonyms assigned. Comparative coding was done with NVivo 11 software to code each interview using Glaser's (1965) constant comparative method. Coding is the process of marking segments of data with symbols, words, or categories (Johnson & Christensen, 2011). The researcher compared the interview being coded with previously coded interviews to identify themes within the data. A master list of inductive codes was generated as the researcher directly examined the data. The master list was then separated into categories sorted by word or concept similarities (Johnson & Christensen, 2011). Those categories were then used to establish themes (Bhattacharya, 2007). If a theme was present within at least 16 interviews, it was considered a major theme, as done in previous work in this area (King et al., 2017).

Validity

Internal consistency was established by comparing the interviewer's notes and participants recorded and transcribed responses. These elements were also used to establish validity. The interviewer maintained both field notes and handwritten notes on hardcopies of the interviewer's guide for each interview. All data were collected from interviews via audio recorders and from the interviewer's notes, creating an audit trail. This audit trail traced the route of the research from beginning to end, establishing the dependability of the study (Flick, 2009). The level of detail obtained from this thick description of the field experience reinforced the transferability of the study (Holloway, 1997).

Researcher Subjectivity Statement

Subjectivity is an important aspect of qualitative research and provides important insight into an intimate understanding of the phenomenon being studied. While personal views may affect research, acknowledging subjectivity can also add strength to the depth of understanding of data and provide a more nuanced account of the subject matter (Hay & Singh, 2011). The lead

researcher was an agricultural education and communications graduate student; this research was completed as a component of her thesis research. She was a mixed race, middle class female who grew up in an affluent county close to a major city, where her father trained horses for a variety of socioeconomic classes of people. She worked as a horse training assistant, manager, and owner/operator of a horse farm at different points in her life. She had practical knowledge of conservation and equine management and a respect for those who care for their animals. She was employed as an equine resource conservationist for MSCD at the time of the data collection.

Other members of the research team did not directly analyze data, but their subjectivity may have affected the framing of the writing of the manuscript. All researchers were involved in agriculture through an academic setting, and therefore, may hold biases related to the positive outcomes for agriculture and the need for adoption of BMPs for the sustainability of agriculture, and specifically for horse farms.

Limitations and Assumptions

The limitations of this study are those generally associated with any qualitative research. This data cannot be generalized to the general population (Johnson & Christensen, 2011), but it may be transferable to other similar cases. The research and data relied on, as in all qualitative research, how participants perceive and explain experiences (Creswell, 2007).

Results

In this sample, small farm (1-3 horses) participants (n = 10) ranged from 3 to 16.46 acres, 1 to 38 years of operation, and all had other primary methods of income. Medium farm (4-9 horses) participants (n = 10) ranged from 5 to 90 acres, 2.5 to 37 years of operation, and 8 out of 10 had other primary methods of income. Medium-large farm (10-16 horses) participants (n = 4) ranged from 12 to 57 acres, 1 to 21 years of operation, and 2 out of 4 had other primary methods of communication. Large farm (17-30 horses) participants (n = 4) ranged from 13 to 100 acres, 1 to 49 years of operation, and 3 out of 4 had other primary methods of income. Extra-large farm (31+ horses) participants (n = 5) ranged from 40 to 200 acres, 13 to 42 years of operation, and 4 out of 5 had other primary methods of income.

RQ1: How do operators find information related to conservation BMPs and related programs?

To identify how operators find information related to conservation BMPs and related programs, questions were asked to better understand the ways in which operators obtained information about BMPs and what factors affected their decisions regarding the acceptance or rejection of the information provided. Participants were initially asked how they learned about extension, soil conservation, or best management practices.

Additional questions then defined the factors that made the information reliable and influenced them to adopt BMPs. The following channels were identified and outlined for how equine operators obtained information related to BMPs (Table 6). Participants said that the early information they received about BMPs and the related services came from word-of-mouth from a neighbor or other peer; 17 participants, in total, said they first heard of the services and practices available through their job (4) or from government staff (Extension staff: 3, Maryland

Department of Agriculture staff: 6, MSCD staff: 4). Although not a major cited channel, it is important to observe that 13 participants said that university connections, association contacts (Maryland Horse Industry Board or 4-H), or that they grew up on a farm was the reason they were aware of the practices and services. The results of how information was acquired can be seen in Table 6.

Table 6

BMP information sources used by equine operators

information method	Small Farms: 1-3 Horses (*n*=10)	Medium Farms: 4-9 Horses (*n*=10)	Medium-Large: 10-16 Horses (*n*=4)	Large Farms: 17-30 Horses (*n*=4)	Extra-Large Farms: 31+ Horses (*n*=5)	Total (*n*=33)
4-H	-	2	-	-	-	2
college connection	2	3	-	1	-	6
email	1	1	-	1	-	3
fair	1	-	-	-	-	1
flyers	1	1	-	1	1	4
grew up on a farm	-	-	3	1	-	4
word of mouth	4	4	3	2	2	15
newsletter	1	-	-	1	1	3
seminars	4	2	-	1	-	7
MSCD staff	1	1	1	1	-	4
MDA staff	-	2	1	2	1	6
Extension staff	2	1	-	-	-	-
through work	1	3	-	1	3	8
TV/radio/media	-	-	-	1	-	1
equine/farm association	-	2	-	1	1	4
internet research	3	2	2	2	2	11

Peer-to-peer and word-of-mouth information

Themes were also developed for information participants perceived as credible and ultimately influenced them in the adoption of BMPs. Many participants (17) said they felt the information provided was good advice or was based on science, and 19 participants said the availability of a local contact, credibility of staff, and the dedication and ease of communication with staff were important influences on their decisions to implement BMPs. More participants (21) felt there were negative aspects specifically relating to the cost share process for the available programs. Specifically, the practicality of information, projects being over engineered, lack of follow through by staff, and misrepresentation of the actual cost-shared amounts. Operators also said they obtained information from seminars, newsletters, flyers, emails, TV/radio, county fair booth and internet research.

Many of the participants (n = 15) said their first knowledge of BMPs and sources of information came from other equine operators. Adelaide, a small farm operator who has been keeping her own horses for 17 years, said, "So it was kind of word-of-mouth I guess that told me about the programs existing. And then I told all my friends." Amy, a small farm operator who has been keeping her own horses for 21 years, elaborated on the same theme:

> Our neighbors, who's the people who used to live next door when we bought the property, they had horses. And in fact, the horses came to live with us after a bit. They were – they, you know, taught us a lot, and they learned a lot from the county over the years that they had their farm. So we are aware that if we, you know, the questions and, you know, if we need – that usually if I think, "Oh, what's this or what's that," you know, in terms of grass, pasture, whatever management, we would call.

Clyde, the operator of a medium-large farm where he has boarded horses for 21 years, said news of regulations further sparked his interest and research into BMPs, "Well, I am going to say word-of-mouth. As in pretty much word-of-mouth is what really gets you interested is when they say that you have to have this licensing."

Learning through work or from staff

Becky, who has boarded horses on her medium size farm for 2.5 years, learned about BMPs and the available programs through her work as an extension editor and a family affiliation with the University of Maryland:

> Well, I knew about the extension service because my husband was affiliate at the University of Maryland, so that was my first source of information. I think a lot of my sources are the county extension service, and then I read a lot of things that the university [produces] that's partly because I work for the university extension service editing their manuscripts. So, I, by no choice of my own, I read a lot of their information.

Bert, who has managed a privately-owned, medium size farm for 14 years, learned about the available programs through his contact with the local nutrient management advisor. He said:

> Yeah, and now Amanda had [the farm owner] setup with one nutrient management plan at [Farm 1], hooked me up with JG and then Eddie and Paul and that's how it really started, and Eddie started bugging me about horse stuff because mainly we do lots of field and waterways.

Learned through 4-H, university connection, or other industry association

Diane, the manager of a large size farm for 14 years, had several connections that provided her with information. One of which was being exposed to the industry for many years prior. She says:

> My grandfather was an ag educator for umpteen billion years like 40 years or something, and on my mom's side there are people still involved in production agriculture. So, I've been exposed to the concept of crop rotation and pasture rotation and [it] did make sense. I have a degree in ag business, so I had coursework that talked about the basics of most of these things. And then, frankly, like it makes sense; it saves money.

Beth, the operator of a medium size farm where she kept her own horses and also boarded some for friends for 37 years, also had prior farming connections. In her reflection, she stated:

> Well, when we bought this farm, my husband seemed to know to call the Soil Conservation Service. We grew up in Arkansas. We both did. And he seemed to know that. And so, he, that was the first thing he did, was he called either the Soil Conservation Service or the ag Extension service. I'm not sure which, but we worked with both of them. Right off the bat, they came out advised us about things and it was very helpful.

Edward, owner and manager for 42 years of an extra-large boarding stable, provided insight into the combination of methods he uses to gain information:

> I belong to an organization called the Montgomery Farm Club, which meets on a monthly basis … and farming is discussed in this area. I am a horseman, and I ride off the farm and with people who are knowledgeable about farm management. And I've gotten a lot of information from the soil district people and the conservation people.

Having a local contact or staff member dedication

Erle, the manager of an extra-large facility for 34 years gained some extra insight when his tardiness during the reporting process necessitated a visit from a regulatory officer that he initially regarded with apprehension. He stated:

> I've been late on that a few times, and at one point they sent someone out to go over my nutrient management plan and make sure I know what's going on. That was really wonderful, that was the most I learned about this whole process. But he came out and sat down for what seemed like a couple of hours and went over all the paperwork, explained why this field needs lime and why this one needs this. And he also said, if your fields are this you're going to spend this much in hay in the winter, and if you get your fields growing better, it's better for your wallet. And he just he really made sense, but I guess kind of being forced to sit down and go through that I did learn a lot. That was very helpful.

On a similar note, Becky, who has boarded horses on her medium size farm for 2.5 years, said:

> I feel like I've gotten so much good advice and guidance that I wouldn't have been able to do myself. Even with all the reading there is just practical day-to-day things like having

> help putting up an electric fence. I knew I wanted to do it, but how to do it was an issue, so that help from you was critical.

Amelia, owner of a small farm where she has kept her own horse for just under a year said knowing there was a safety net for her was important. She reflected:

> That was invaluable. That was invaluable, not only with information, but to also, I think, psychologically it was very helpful. Because I know that I have a net and I that if I needed something or if I needed a point in the right direction for resources, I could call you or I could email you. And just that was very important to understand that that resource exists for this county.

Breanna, who had previously operated a large commercial stable, but for the past six years had operated a medium size farm where she kept only her own horses, noted that all the people she's dealt with were "knowledgeable, sincere, and dedicated."

Dissent

Within all sizes of farms, there were also 21 negative comments regarding the staff, process, and programs. Themes included were no follow through with programs and the processes, such as reimbursement or taking too long; over-engineered and too expensive projects; impractical processes, funds, and library of information; and preferential treatment to certain operations.

RQ2: What part does the adoption of conservation BMPs play in equine operators' role as caretakers of the land?

To address what part the adoption of conservation BMPs plays in operators' role as caretakers of the land, broad questions related to the reasoning behind why these practices were chosen or modified were asked. The responsibility for caretakers of the land was something many of the participants were concerned with and clearly saw the connection between adoption of BMPs and their role as caretakers. A major theme developed with 24 participants who recognized BMPs play a part in their roles as caretakers of the land and doing the right thing. Only one participant said that land stewardship or environmental concerns were not important aspects of their farm management. For many, it was a primary concern; for others, it was part of a combination of doing the right thing and other supplemental factors. Many participants also based their choices on and were concerned with supplemental influencing factors like other "green" environmental practices, horse and human health, aesthetics, operator education, customer and peer perceptions, and information science and source.

Caretaking and doing the right thing

Becky, the operator of a small farm who has owned her boarding facility for just over two years, said her desire was to leave a "small farming footprint." She elaborated by saying:

> For me, again, it's knowing that I'm contributing to preserving resources, doing the best that I can to practice farming and farm management the best way I can … not negatively affecting the environment is important to me, so those are the kinds of things that I'm looking at and I just want to do a good job… [I try to leave a] small footprint I guess if you will, farming footprint.

Arthur, a small farm operator who currently had no horses on his property, but had kept his own horses for 30 years said, "I think that managing the property is a matter of doing what's right for the environment, and we just love this piece of property so much that we'd likely do anything that we can to keep it going."

Becky, who has boarded horses on her medium size farm for 2.5 years, said:

> I think for me it was this idea that I wanted to do it correctly. Because I didn't grow up on a farm, I wanted to live on a farm, so I rented an apartment and what I saw were the not-best practices. I knew what I shouldn't do but I didn't know exactly what I needed to do, so that was sort of my starting point. My drive, as it were, was to find out about best management practices and to do the best that I could.

Beth, the operator of a medium size farm where she kept her own horses and also boarded some for friends for 37 years reflected and said:

> Oh, my word, I consider farmland precious and when you ruin it, which I saw in the 30 acres that I bought, it was ruined. It was washed down the rocks. It's a sad thing, and it's expensive and labor intensive to bring it back. I really, I have a, I just have a sense of high value for land.

Supplemental influencing factors

Several operators mentioned they practiced BMPs on their operation because it worked well combined with other environmentally-sound practices. Alan, a small farm operator who had kept his own horses for 22 years, said:

> I'd like to believe I'm environmentally conscious, and I'm always in favor of doing the better thing for the environment. I've got solar panels on the roof and geothermal heating in the house. I would like to get an electric car if I could afford one.

Edward, owner and manager for 42 years of an extra-large boarding stable, talked about how his use of "green" practices complemented the use of BMPs on the farm. He said:

> I want to protect the farm, the soil, the environment. I want to, one thing that we do here never mentioned both from farm and from household, is recycling. We recycle everything we possibly can and reasonably can. So, as a result, the amount of weight of our recycled materials far exceeds any trash that we throw out.

Adrian, the owner of a small private farm, said his role in caretaking of the land was tied to his role as a caretaker for his horses, and both were dependent on BMPs. He said, "Well, they're better for the horses, they're better for the environment, especially if there's water somewhere on the property, and they're better for grass quality, but that's the same as saying it's better for the horses."

Camille, an operator with a medium size farm who had been in business for just over a year, talked about her philosophy of benefiting the environment and her horses simultaneously:

> I think a little bit, it's becoming more aware environmentally of being more careful with some of these things. These facilities are pretty progressive on a variety of levels … improving the land management, ultimately ends up benefiting the horses.

Constance, who for 14 years has operated a large private farm, said stewardship was important to her for aesthetic and health reasons.

> I do think that these practices helped not only keep paddocks healthy for your horses, but they help keep them looking beautiful and your farm looking beautiful. But it's also healthy for your own health. And it helps the planet. I have all kinds of wildlife, and I'm happy that I have it.

In addition to other environmentally friendly practices and horse health being influencing factors on BMP adoption, one participant felt education level played a role in stewardship choices. Breanna had previously operated a large commercial stable, but for the past six years had operated of a medium size farm where she kept only her own horses. She said:

> Well, I think that Montgomery County is, you know, a little bit atypical, in that it tends to be, especially horses not everybody, but a lot of the horse property owners are fairly well educated. And so, I think environmental impact is a big driver [for the adoption of BMPs].

Aliza, owner of a small farm that had recently downsized from a boarding facility to keeping her own horses, said her peers' opinions were important to her. She said, "It was my conscience, and it is being among people who could afford horses, it is usually a consideration that they want to know that you are not ruining the ground that they are keeping the horses on."

Arthur, a small farm operator, who currently had no horses on his property but had kept his own horses for 30 years thought the science behind the practice is important in his consideration of adoption. He said "Well, the science behind something would be a compelling factor for me." This was echoed by Alan, another small farm operator who had kept his own horses for 22 years and had attended a land grant college in Ohio. He said, "I know it's legitimate and well-informed."

Along the same lines, Eve, who had been manager of extra-large boarding farm for 36 years said she felt the value of the services was in the available expertise and the source, which left her free to concentrate on her job:

> Well, it's like what I do is I train horses, I ride them, I teach people how to ride … I'm not accredited to what [conservationist] do. This is why we need professionals to do this. It's totally a partnership, totally a partnership.

Dissent

Dissenting opinions were that operators were more concerned with financial aspects of incorporating BMPs. Additional dissenting thoughts were the increased conflict between horse health and the environment that incorporating BMPs could add. Additional dissenting concerns were related to overwhelming amount of information related to BMPs in online sources.

Conclusions and Discussions

A major theme of this study was that operators received the majority of their information about BMPs and the associated programs through word-of-mouth from peers and/or affiliation with industry associations or educational groups. This contradicts a 2013 study which identified industry publications and the internet as the main sources of information for the majority of equine operators (79%); however, that same study did identify "knowledgeable acquaintances" as the information source for 65% of participants (Swinker et al., 2013 p. 4).

Through the comments of participants, it was easy to see how the attitudes or the perceived usefulness, easiness, and compatibility of BMPs were tempered by the results operators were able to produce with variable financial ability. The ways in which those efforts were perceived among peers and/or reflected in the media was also prevalent in participant

comments. Media, friends, family, training, peers, and neighbors can make the users aware of BMPs to form attitudes to evaluate the attributes of the practices, to reduce uncertainty about the advantages and disadvantages of the practices, to adapt the practices to their own equine operation, and to reinforce their decision and influence other groups (Rogers, 1995; Venkatesh et al., 2012).

Moreover, this recognition of potentially negative effects directly relates to the DOI theory by explaining how, over time, an idea or product gains momentum and diffuses, or spreads, through a specific population or social system (Rogers, 1995). Results of this research indicate equine operators have become more aware of conservation practices and the environmental benefits of using BMPs because the information has been diffused over several decades by peers and equine and farming associations. This process is known as communication in Rogers's (1995) DOI theory.

The majority of participants in this study clearly recognize the connection between their concern over being good caretakers of the land and the role that using BMPs can play in helping them to achieve of their goal of good stewardship. This contradicted a previous study that concluded equine operators are generally unaware of the environmental benefits of BMPs (Prokopy et al., 2011). Data from this research supports Wunderlich's (1991) definition of "steward" as someone who cares for and is responsible for someone else's property and the conservation and lifestyle factor as motivations for practicing stewardship (Greiner et al., 2009). Most participants in this study related to and were driven by a "stewardship ethic" to "look after the environment" (Greiner et al., 2009, p. 89).

This study supported a 2013 study that showed many horse operations are utilizing BMPs to reduce environmental impact (Swinker, 2013). Many of the participants found their roles as equine operators largely related to being caretakers of the land, and it was an important aspect in their selection of BMPs. Participants in this study had a high level of adoption of equine conservation BMPs, and many said the BMPs were incorporated as a part of a larger plan based on environmental awareness. Specific to equine operators, this contradicts a previous study that concluded operators viewed the environmental advantage of using BMPs to be the "immediate and localized benefits to their farm's environment" (Prokopy et al., 2011, p. 454). Instead, participants in the present study saw their practices affecting a wider area and pertaining to overall stewardship of natural resource. In a more general sense, these high levels of BMP adoption among operators could indicate this population considers themselves risk takers or innovators, in regard to implementing new BMPs similar to Greiner et al. (2009).

Additionally, many of the participants cited their concern, not only for the aesthetics and sustainability of their own property, but also the effect their actions would have on tourism of the local estuary. This could be attributed to the long standing and extensive outreach in the area associating gardening and agricultural practices with the levels of pollution in the state's most famous estuary. Nonpoint source pollution involving the Chesapeake Bay has been a focal point of all audiences and outreach efforts in the Maryland and surrounding area for many years due to the high-stakes ecosystems and economies attached to the waters (Davison et al., 1997).

While the focus of this study was not on barriers to adoption, barriers were identified in the equine operators' interpretation and implementation of BMPs in this study. Because barriers can stop or slow down the diffusion of BMPs (Rogers, 1995), it is important to consider these in the development of future programming. Specifically, financial constraints and unfamiliarity with BMPs were major identified barriers to adoption that came out in interviews with equine operators in this study.

Finally, data from this research contradicted a previous study that identified unfamiliarity and non-applicability of BMPs as the most cited reason for non-adoption (Gillespie et al., 2007). While some of the operators in this study did say the BMPs did not directly translate to their operations, many of them adapted the practices and used them in some form. Several of the participants said that they had not used the available cost share programs for a variety of other reasons including lack of follow through from staff, over-engineering of structural practices, impracticality due to design or ease of work, or most commonly, expense. It should also be noted that many of the participants said they could not afford to complete a project involving a recognized BMP, but they adapted the practice to their operation using a more economically viable solution. For example, some operators recalled situations where they used one strand of electric wire, as opposed to the three strands required for reimbursement through a cost share program; limited the number of horses in a field, instead of installing a roof runoff system; or piled manure on compacted earth, instead of installing a cement-sided manure storage facility.

Recommendations

Practical recommendations from this study related specifically to agricultural communications are to increase peer-to-peer communication among equine operators, so knowledge surrounding conservation BMPs and caretaker mindsets can spread among the individuals from opinion leaders. The results of this study indicate an interdisciplinary need for increased collaboration between agricultural communicators and the equine industry. This could look like equine associations hiring dedicated agricultural communicators or collaboration between academic agricultural communication programs and equine associations to develop training opportunities or partner in future research to increase the understanding of the communication needs of equine operators. Agricultural communicators could serve as a communication facilitator to the diffusion of this innovation and as an opinion leader in the industry's trade magazines and outreach. It is also recommended that staff in local conservation participate in communications training to improve conversations with traditional and non-traditional audiences, since characteristics of equine operators are becoming more diversified. Perhaps there is an opportunity for staff to work on additional degrees like a master of science in agricultural communication to increase their understanding and application of theory in agricultural communication.

Communication networks for equine operators in this study were extremely important in operators' decision to implement BMPs. Thus, word of mouth marketing and the use of communication networks are major tools that staff working with equine operators should develop initiatives around to increase BMP adoption. All BMPs content shared by conservation staff should be credible and science-based information to capture audiences' trust and increase possibility of adoption. Furthermore, conservation and outreach offices should improve internal infrastructure to encompass a consistent local contact for operators, implement enforceable policies to produce follow through, and adjust cost sharing programs to ensure achievable successes.

Further research should explore equine conservation practices through the lens of other theories, such as knowledge gap and community-based social marketing. In addition, there should be continued exploration of BMPs in non-traditional agricultural industries. This communication neglect could be occurring with other audience sectors in niche areas of agriculture, such as organic farming, specialty crops, and new markets like hemp production.

Research in these areas could contribute to the breadth of knowledge related to BMPs and how, or if, stewardship is a part of the adoption process.

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