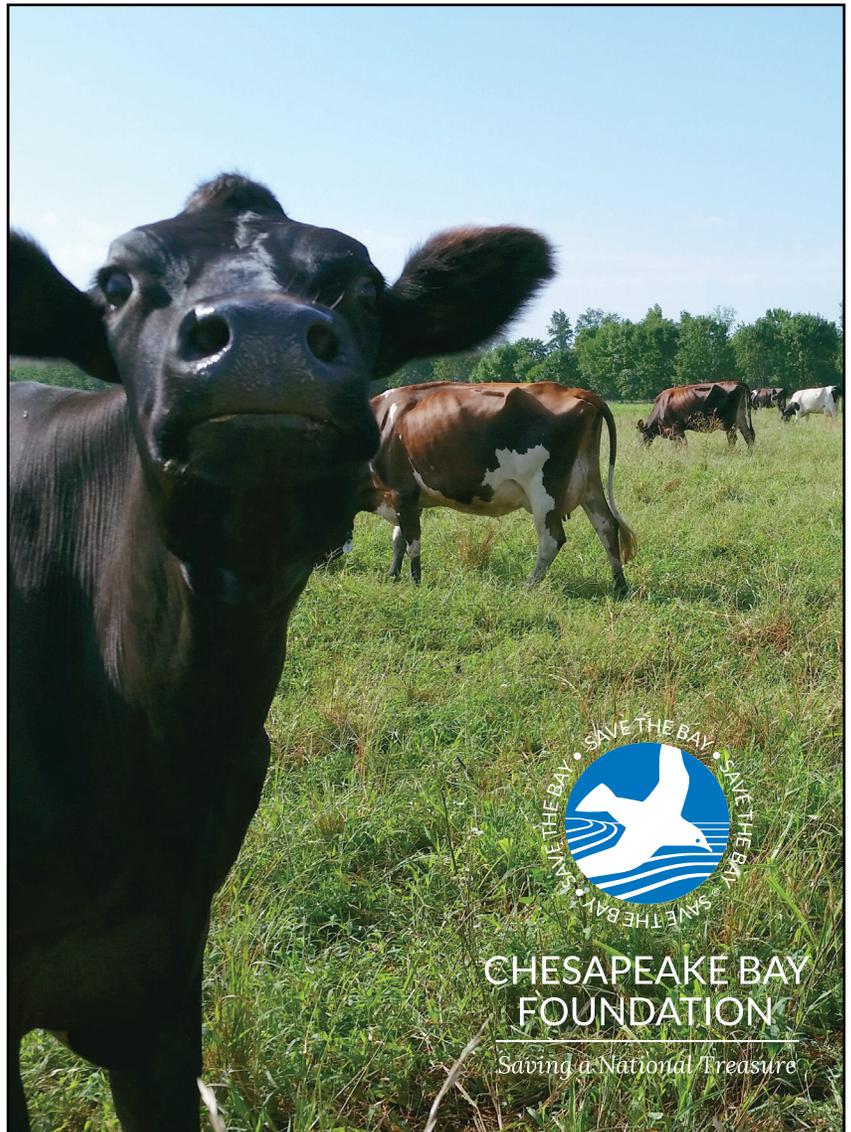


# Application of ADOPT (Adoption & Diffusion Outcome Prediction Tool) to Identify Factors Influencing Adoption of Rotational Grazing

## Report for Maryland



CHESAPEAKE BAY  
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*Saving a National Treasure*

# Introduction

As part of a USDA Natural Resource Conservation Service (NRCS) Conservation Innovation Grant to promote rotational grazing in the Chesapeake Bay watershed, the Chesapeake Bay Foundation (CBF) used ADOPT (Adoption and Diffusion Outcome Prediction Tool), a tool developed by social scientists in Australia to predict an agricultural practice's likely rate, and peak level, of adoption.<sup>1</sup> It's designed to be "quick and dirty," but also to provide insights on the importance of various factors influencing the adoption of a particular practice, in our case, rotational grazing. The first step in using ADOPT is to clearly define the population of farmers whose adoption behavior we are interested in influencing. This is a crucial step as responses are likely to be different for the same practice among different groups of farmers.

The actual tool is an Excel spreadsheet and users are asked to respond to 22 questions related to: a) characteristics of the practice that influence its relative advantage, b) characteristics of the population influencing their perceptions of the relative advantage of the practice, c) characteristics of the practice influencing the ease and speed of learning about it, and d) characteristics of the potential adopters that influence their ability to learn about the practice. Most questions have five possible responses with a gradation of options (i.e., highly likely, likely, no effect, unlikely, very unlikely).

According to the developers of the tool, answers to the questions are best acquired in a workshop setting. To that end, CBF hosted three workshops, one each in Maryland, Pennsylvania, and Virginia, to run ADOPT. Workshop participants are local experts, staff from local soil conservation districts, extension, and/or NRCS who work with producers on grazing and other practices as well. We want participants who can give relatively objective answers to the questions based on their experience working with producers.

This report presents the results of our second workshop held at the Common Market Co-op in Frederick, Maryland on Monday, May 7, 2018. Beth McGee (CBF) facilitated the workshop that was attended by six participants (we had two people drop out at the last minute) including CBF, NRCS, and University of Maryland (UMD) Extension personnel who work with producers in the "northern tier" of Maryland (i.e., Washington, Frederick, Carroll, Harford, and Baltimore counties). The workshop participants and their affiliations are listed below.

Workshop Participants: Rob Schnabel (CBF), Brian Campbell (NRCS), Brent Cammauf (NRCS), Eric Hines (NRCS), Jeff Semler (UMD Extension) and Ginger Myers (UMD Extension).

Description of the Population: As noted above, identifying the target population is important as it will dictate the answers to the questions. Some participants said they focused outreach efforts to beginning farmers and those who direct market to consumers. Ultimately, the group decided to focus on more conventional producers, growing meat products such as beef, lamb, etc., as they were more representative of the population in the area. The target population could include those who are currently raising animals mostly on pasture (continuous grazing) to those who are primarily bringing the food (for example, hay or grains) to their animals. Participants noted that many of these producers were ex-dairy farmers.

## Information Entered into ADOPT

The predictions about time to peak adoption and the percentage of the target population likely to adopt are based on the following information entered into the Adoptability and Diffusion Outcome Prediction Tool. **Highlighted questions** were found, in the resulting sensitivity analysis, to be in the top four, in terms of the effect on the level of adoption.

### Relative Advantage to the Population

#### Question 1: Profit Orientation

Potential answers range from 1—almost none have maximizing profit as a strong motivation, to 5—almost all have profit as a strong motivation.

Response:

4—A majority have maximizing profit as a strong motivation.

In the initial voting, three votes for 3 and three votes for 4. End vote: two votes for 3 and four votes for 4.

Reasoning:

Those who voted for 3 ("some are motivated by profit") cited a lack of awareness among producers of what profit really is. Since roughly 80-90 percent have off-farm income, they may not be keenly aware of the profit margin on the beef aspect part of their operation. Also, many are not likely to sell the family farm, it is way of life. One participant noted that producers want to make a profit, but that isn't always what happens—there is a disconnect between perception and reality.

<sup>1</sup> Kuehne, G, Llewellyn, R, Pannell, DJ, Wilkinson, R, Dolling, P, Ouzmana, J, Ewing, M. 2017. Predicting farmer uptake of new agricultural practices: A tool for research, extension and policy. *Agricultural Systems* 156: 115-125. Attached as an Appendix.

### **Question 2: Environmental Orientation**

Potential answers range from 1—almost none have protection of the environment as a strong motivation, to 5—almost all have protection of the environment as a strong motivation.

Response:

2—A minority have protection of the environment as a strong motivation.

All participants voted for 2.

Reasoning:

Participants noted that the strongest motivator for farmers is usually something they want done to improve their operation's effectiveness/convenience/profitability—environmental benefits are tertiary. One participant noted that farmers are tired of hearing about the environment, feel like they have done their share, and the focus should be on reducing pollution from other sectors.

### **Question 3: Risk Orientation**

Potential answers range from 1—almost none have risk minimization as a strong motivation, to 5—almost all have risk minimization as a strong motivation.

Response:

4—A majority have risk minimization as a strong motivation.

In the initial voting, three votes for 3; two votes for 4; and one vote for 5. End vote was the same, so we used an average.

Reasoning:

Those who voted 5 (almost all have risk minimization as a strong motivation) noted that one concern is fear of running out of feed for grazing animals. One who voted 3 noted that farming is an inherently risky business (due to vagaries of weather) so producers will do what they can to minimize risk.

### **Question 4: Enterprise Scale**

Potential answers range from 1—almost none of the target farms have a major enterprise that could benefit, to 5—almost all the target farms have a major enterprise that could benefit.

Response:

5—Almost all of the target farms have a major enterprise that could benefit.

All voted for 5.

Reasoning:

This is an outcome of defining the target population in the way we did.

### **Question 5: Management Horizon**

Potential answers range from 1—almost none have a long-term (greater than 10 years) management horizon, to 5—almost all have a long-term management horizon.

Response:

3—About half have a long-term management horizon.

In the initial vote, four votes for 3 and two votes for 4.

Reasoning:

Participants noted that producers have an interest in passing along their farms to the next generation. It was noted that farmland easements are common, especially in Carroll and Baltimore counties, and also zoning restricts development and protects farmland, so risk of development is low. It was also noted, that for some, who work a second career, they will “retire” to do farming full time. Many farmers, including beginning farmers, want to invest in the future of their farm.

### **Question 6: Short-term Constraints**

Potential answers range from 1—almost all currently have a severe short-term financial constraint, to 5—almost none have a severe short-term financial constraint.

Response:

4—A minority have a severe short-term financial constraint.

In the initial voting, two votes for 3 and four votes for 4.

Reasoning:

Currently, there are no acute weather conditions, for example, that are financially stressing producers. The discussion instead revolved around the limitations of the infrastructure needed to support the sale of meat such as processing facilities and decreased sales at farmers markets, to name a few.

### **Learnability Characteristics of the Innovation**

#### **Question 7: Trial Ease**

Potential answers range from 1—not easy to trial, to 5—very easy to trial.

Response:

4—Easy to trial.

In the initial voting, three votes for 3 and three votes for 4. End vote: five votes for 4 and one vote for 3.

Reasoning:

Participants noted that it is fairly easy to try on a small scale and fencing supplies can be inexpensive; however, access to water is limiting. In addition, if one doesn't already have pasture, then it would be more difficult to trial.

#### **Question 8: Innovation Complexity**

Potential answers range from 1—very difficult to evaluate effects of use due to complexity, to 5—not at all difficult to evaluate effects due to complexity.

Response:

5—Not at all difficult to evaluate effects due to complexity.

Initial vote: one voted for 2, 3, and 4; and three voted for 5. End vote: two votes for 4 and four votes for 5.

Reasoning:

Participants noted that it is easy to see grass height and pasture health changes, but healthier animals are more difficult to assess. Also, it was noted, grazing can reduce labor. For example, one participant noted a producer was “selling his corn planter because he could buy corn, if needed.” The alternative view, however, is that some producers like to “make hay,” are attached to their old way of farming, and reluctant to change.

#### **Question 9: Observability**

Potential answers range from 1—not observable at all, to 5—very easily observable.

Response:

5—Very easily observable.

In the initial vote, one voted for 3 and five voted for 5.

Reasoning:

It was noted that visually, rotational grazing is easy to see with fenced paddocks and tall grass, but some participants noted that in some instances, it might be a practice that farmers “do in the back of their farm” e.g., they may want to hide the fact they are experimenting with rotational grazing.

### **Learnability of Population**

### **Question 10: Advisory Support**

Potential answers range from 1—almost none use a relevant advisor, to 5—almost all use a relevant advisor.

Response:

3—About half use a relevant advisor.

Initial vote: one vote for 1, two votes for 2, one vote for 4, and two votes for 5. End Vote: one vote for 2, two votes for 3, and three votes for 4.

Took an average.

Reasoning:

The votes basically broke across employer lines, with Extension folks voting 4 and 5 (some or all using an advisor) because they have producers seeking their services, versus NRCS staff (who voted 1 and 2) who are thinking about the entire population of producers and how many seek out technical assistance. Those in the middle were including pasture walks and workshops as seeking support of an advisor.

### **Question 11: Group Involvement**

Potential answers range from 1—almost none are involved with a group that discusses farming, to 5—almost all are involved in a group that discusses farming.

Response:

3—About half are involved with a group that discusses farming.

In the initial vote, three voted for 3 and three voted for 4. In the end vote, four voted for 3 and two voted for 4.

Reasoning:

Participants noted county to county variation in farmers “plugging into” existing farmer networks. That is, in some counties there are a lot of farmer-to-farmer connections (an example was given of how a message would rapidly move through a community). And other communities have less interaction among producers, and, in the case of new farmers, many don’t yet have a community of farmer support/network or know how/where to seek advice and find resources. It was also noted that some farmers seek out groups like the Cattleman’s Association to plug into.

### **Question 12: Relevant Existing Skills and Knowledge**

Potential answers range from 1—almost all need new skills and knowledge, to 5—almost none need new skills and knowledge.

Response:

2—A majority will need new skills and knowledge.

In the initial vote, one vote for 1, three votes for 2, and two votes for 3.

Reasoning:

A participant who voted for 3 noted that producers know more than they think they know. It really isn’t new skills or knowledge, just application. The participant who voted 1 noted that pasture management is a skill and it takes new knowledge to read the fields, know when to move animals, etc. Other participants commented that in grazing, we are training people more than animals and a producer becomes more of an ecologist than a farmer. Also, the transition period takes considerable, careful planning.

### **Question 13: Innovation Awareness**

Potential answers range from 1—it has never been used or demonstrated in their district, to 5—almost all are aware it has been used or demonstrated in their district.

Response:

4—A majority are aware that it has been used or demonstrated in their district.

In the initial vote, five voted for 4 and one voted for 3.

Reasoning:

General agreement there is high awareness about rotational grazing via pasture walks, workshops, etc.

### **Relative Advantage of the Innovation**

### **Question 14: Relative Upfront Cost of Innovation**

Potential answers range from 1—very large initial investment, to 5—no initial investment required.

Response:

3—Moderate initial investment needed. (Editor's note: Interestingly, in Virginia participants chose 2, a large initial investment for rotational grazing. Their target population was cow/calf operations that already were in pasture. They attributed the high costs to stream fencing and crossings, in particular. I suspect the reason the Maryland participants thought it was a "moderate" investment is because Maryland requires mandatory stream exclusion, so those costs were not necessarily associated with converting to rotational grazing.)

Initial vote: two votes for 2 and four votes for 3.

Reasoning:

Those who voted 2 noted that perimeter fencing is expensive, if not already existing, and so are watering systems. It was also noted that beginning farmers who are converting cropland to pasture would have large upfront costs.

### **Question 15: Reversability of Innovation**

*Potential answers range from 1—not reversible at all, to 5—very easily reversed.*

Response:

5—Very easily reversed.

Initial vote: six voted for 5.

Reasoning:

Participants noted there are many examples of farms converting to grass and back to crops—even multiple times. Much of this is driven by commodity prices. Also, conversion has occurred as dairies fail and go out of business; commodity prices will affect this as well.

### **Question 16: Profit Benefit in Years that It is Used**

*Potential answers range from 1—large profit disadvantage in the years it is used, to 8—very large profit advantage in years it is used.*

Response:

5—Small profit advantage in years that it is used.

In the initial vote, one vote for 3, three votes for 5, and two votes for 6.

Reasoning:

The participant who voted 3 noted that you could lose money in the first few years because of the initial investment and loss of productive land. It was also noted that it was tough to make a profit in the market as the market is saturated, but you can still make money growing corn, for example. Those who voted 6 noted those who are making a profit are often selling feeder cattle that will be finished elsewhere and also there are benefits to direct marketing to consumers, especially if you already have an established client base, such as CSA vegetables, then add beef to the mix.

### **Question 17: Future Profit Benefit**

*Potential answers range from 1—large profit disadvantage in the future, to 8—very large profit advantage in the future.*

Response:

6—Moderate profit advantage in the future.

In the initial vote, two votes for 5 and four votes for 6.

Reasoning:

Participants noted that the ability to brand products based on the practice would take time, but would pay off in the long-term. It can take a while to develop a quality product and brand as well as to develop a client base. Future profits would also accrue from improving the overall condition of the farm, reduced labor costs, and improved quality of life. Also, it was noted there is the potential for more consumer demand as consumers get more education on the benefits.

### **Question 18: Time Until Any Future Profit Benefits are Likely to be Realized**

*Potential answers range from 1—more than ten years, to 5—almost immediately.*

Response:

3—Three to five years to realize profit benefits.

Initial vote: one vote for 2 and five votes for 3.

Reasoning:

As noted earlier, the visual indication of change/improvements can happen fairly rapidly. An example was given of a landowner noticing in less than a year that pastures that went from continuous to rotational grazing looked much better—very important given the land is part of a national park!

### **Question 19: Environmental Costs and Benefits**

*Potential answers range from 1—large environmental disadvantage, to 8—very large environmental advantage.*

Response:

7—Large environmental advantage.

Initial vote: six voted for 7.

Reasoning:

We didn't really discuss this as benefits to soil health, water quality, and climate change are fairly well established.

### **Question 20: Time to Environmental Benefit**

*Potential answers range from 1—more than ten years, to 5—almost immediate.*

Response:

3—Three to five years for environmental benefits.

In the initial vote, four voted for 3 and two voted for 4.

Reasoning:

Participants noted that the benefits include having permanent cover on land that would help reduce nutrient runoff, erosion, and build soil organic matter. Also, that the benefits of stream fencing, such as reducing bacteria and stabilizing stream banks, occur fairly quickly.

### **Question 21: Risk Exposure**

*Potential answers range from 1—large increase in risk, to 8—very large reduction in risk.*

Response:

4—No increase in risk.

In the initial vote, one voted for 3, three voted for 4, and two voted for 5. End vote: no change.

Reasoning:

A mixed bag response, with one participant voting for a slight increase in risk (3) and others a small decrease (5). The participant voting for 3 noted there is a risk of livestock getting loose—this would apply to farmers who previously didn't have livestock. For those who voted for 5, they noted that in the long-term, there would be improved soil quality and possibly reduced risk to severe weather (for example, drought), and since weather is a driver, this could lead to a small decrease in risk.

### **Question 22: Ease and Convenience**

*Potential answers range from 1—large decrease in ease and convenience, to 8—very large increase in ease and convenience.*

Response:

5—Small increase in ease and convenience.

In the initial vote, one voted for 3, one voted for 4, two voted for 5, and two voted for 6. Re-vote: one voted for 3, 4, 6, and 7; and two voted for 5.

Reasoning:

Lots of variability in responses here, even after discussion. Those who voted 3 noted that for many farmers, riding a tractor and feeding hay was relatively easy compared to walking pastures, and moving fences and animals. Those who voted 5 noted that once you have the system down and the animals trained, it is pretty easy. Also, one commented that there is a perception that rotational grazing is difficult.

# Predicted Adoption Levels

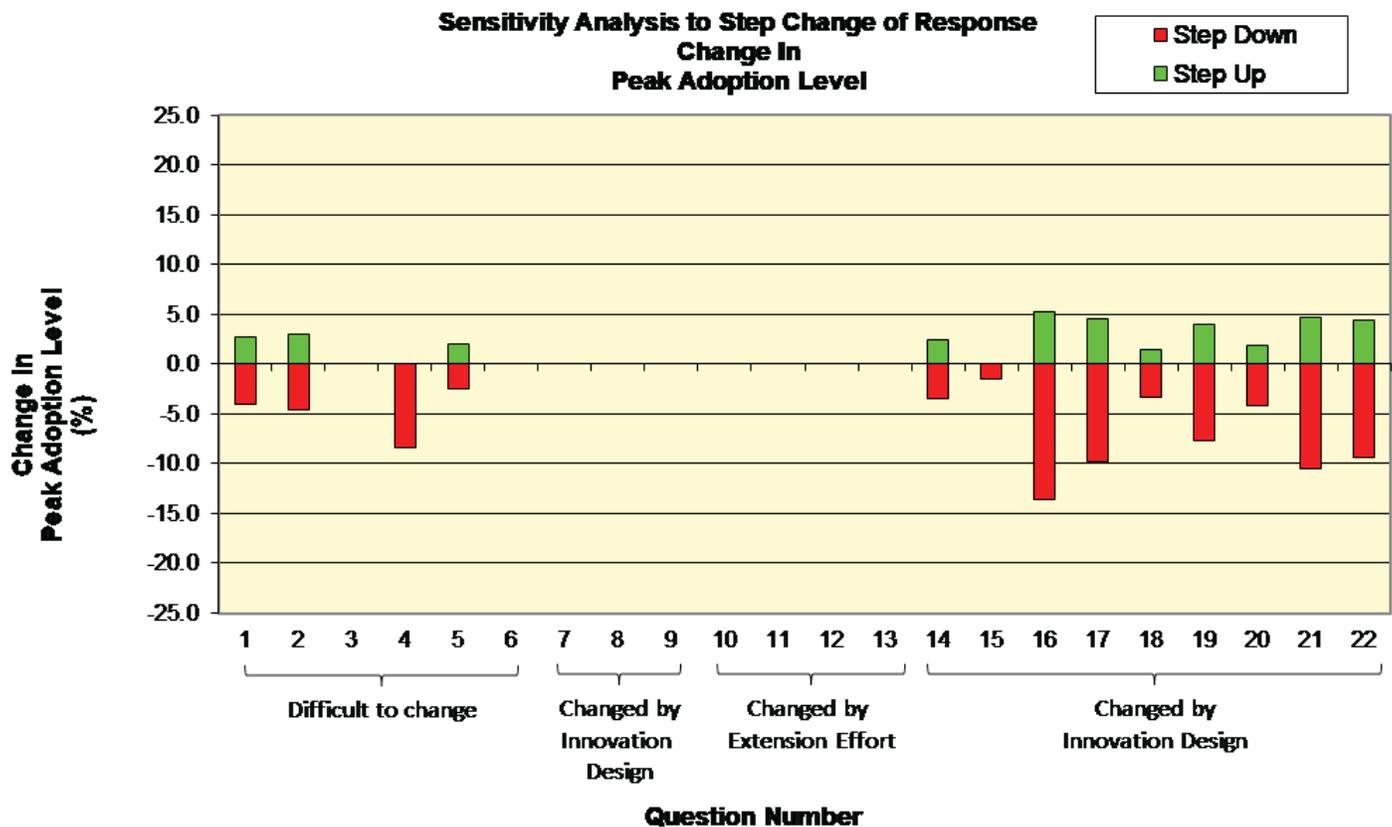
Predicted peak level of adoption <sup>1</sup>	90%
Predicted years to peak adoption <sup>2</sup>	9
Predicted years to near-peak adoption <sup>3</sup>	7
Year innovation first adopted or expected to be adopted	N/A
Year innovation adoption level measured	N/A
Adoption level in that year	N/A
Predicted adoption level in 5 years from start	78.2%
Predicted adoption level in 10 years from start	90%

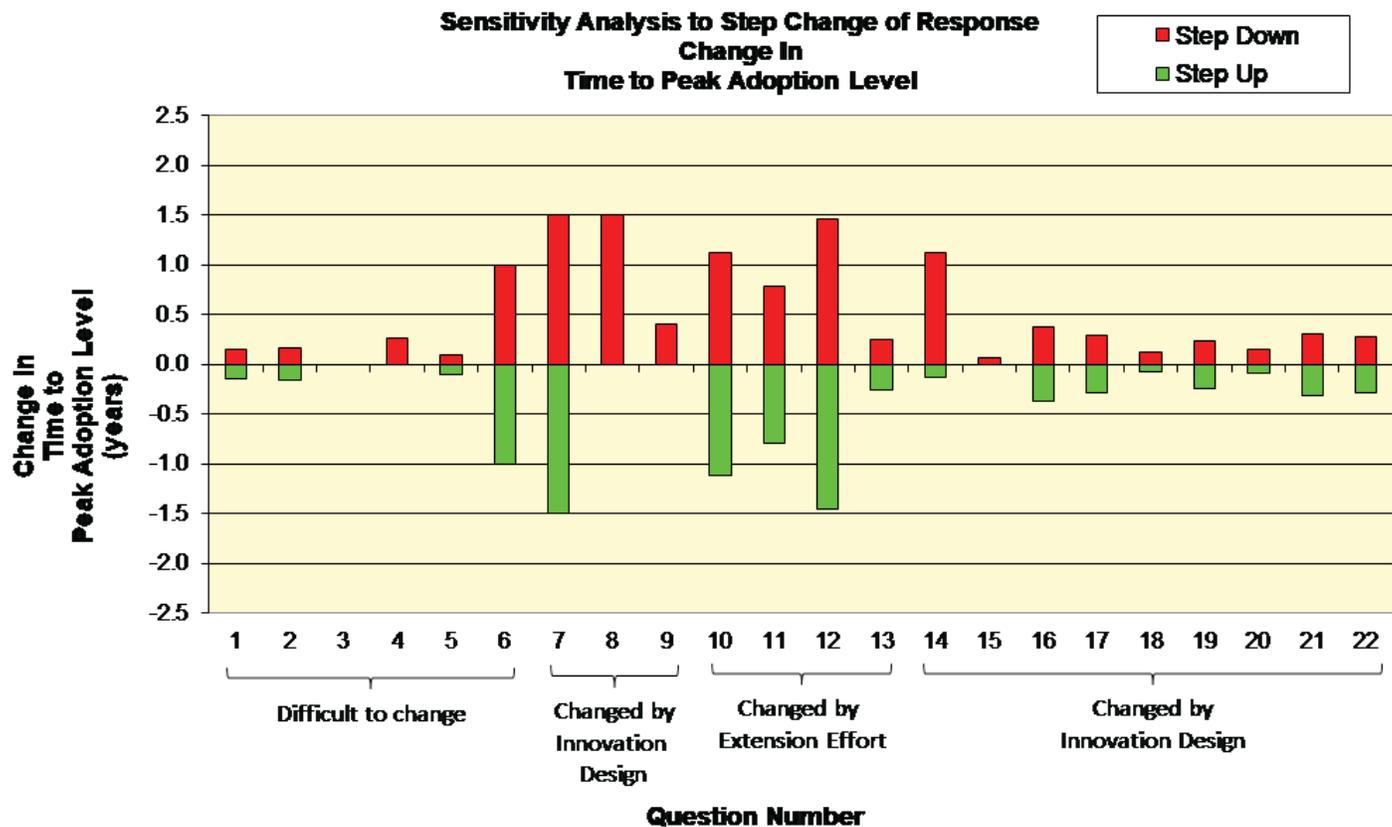
PLEASE NOTE:

1. The prediction of 'Peak Adoption Level' is a numeric output that is provided to assist with insight and understanding, and like any forecasts, should be used with caution.
2. The prediction of 'Time to Peak Adoption Level' is a numeric output that is provided to assist with insight and understanding, and like any forecasts, should be used with caution.
3. 'Time to Near Peak Adoption' represents the time to 95% of the maximum predicted adoption level.

## Sensitivity Analysis

The following charts show the effects on 'Peak Adoption Level' and 'Time to Peak Adoption' of single step changes up and down for all questions. The bigger the bar, the bigger the change on that particular parameter.





## Observations

ADOPT predicts that a high proportion of the target population (90 percent) should be willing to implement rotational grazing and the time to the peak adoption is nine years. Results of the ADOPT workshop in Virginia had similarly high rates of adoption. While very encouraging, these estimates are probably optimistic. As noted above by the red bars in the top graph, the questions that have the most influence on the adoption level are questions 16, 17, 21, and 22, dealing with profit in years the practice is used, future profit, effect on risk exposure, and ease and convenience, respectively. One participant noted that transitioning to grazing is more challenging than this outcome suggests. It takes time, careful planning, and money to establish good pasture. Funds are also needed to buy supplemental feed during the transition period. There was a fair amount of divergence from the participants on the answers to questions 16, 21, and 22; hence, there is a fair amount of uncertainty in these results and the estimate of potential adoption levels. Time to adoption was influenced most by questions 6 and 7—short-term financial constraints and trialability, both of which had fairly consistent answers, and questions 10 and 12, advisory support and relative skills and knowledge, both of which generated more divergent responses from participants.

One interesting difference between the Maryland and Virginia workshops was participant responses to question 5, about the portion of the population who have a long-term management horizon. In Virginia, it was believed that a minority of farmers have a long-term management horizon, whereas in Maryland, most participants chose the response “about half,” with some indicating it was a majority of farmers. Maryland participants noted that farmland easements are common, especially in Carroll and Baltimore counties, and that local zoning can restrict development and protect farmland, so development pressure, in some areas, is low. It was also noted that many farmers, including beginning farmers, want to invest in the future of their farm.

Participants noted that environmental benefits are not a motivating factor and in fact, there is quite a bit of “fatigue” around water-quality issues, with many farmers feeling like they have done their fair share. Participants noted that the strongest motivator for farmers is usually something they want done to improve their operation’s effectiveness/convenience/profitability. To that end, it is worth looking at the responses to questions 16 and 17 dealing with profit benefits and 22, ease and convenience, for insights.

The participants were split about their belief that the practice was profitable, in the near-term, noting that it could be expensive to adopt initially (if it meant taking productive land, for example, grain crops, out of production) and that it was tough to make a profit in that the market (presumably for grassfed beef) was saturated. It was noted that many of those making profits were selling “feeder cattle” that will be finished elsewhere. Participants were more confident that grazing would be profitable over the long-term, noting it was possible to make a profit if you are direct marketing to consumers, but that it may take a while to develop the client base and quality brand. In addition, future profits would also accrue from improving the overall condition of the farm, reducing labor costs, and improving quality of life.

There was a lot of variability in responses to the question about whether shifting to rotational grazing would make the farm operation easier and more convenient. Some participants noted that “riding a tractor and feeding hay” was relatively easy, compared to walking pastures, and moving fences and animals. Others observed that once you have the system down and animals trained, it is fairly easy. Also, one commented that there is a perception that rotational grazing is difficult. Overall, it seems the answer is relative to timing—that is, if a farmer is transitioning to grazing, this initial period would likely be perceived as a decrease in ease and convenience. Over time, i.e. three to five years, a producer would experience an increase in ease and convenience. For many farmers, overcoming this initial decrease in “ease and convenience” may be a big obstacle to adoption of the practice.

In terms of where farmers seek information, there was a divergence of opinions among participants in whether or not producers relied on technical advisors (question 10). There was more consistency around the response to the reliance on other farmers (question 11), with most of the participants believing that about half of the target population are involved in farmer groups (including farmer-to-farmer interactions), whereas in Virginia, it was believed that a majority were. Maryland participants noted county-to-county variations in farmers “plugging into” existing farmer networks. That is, in some counties there is a lot of farmer-to-farmer connections and in other communities, there is less interaction among producers, and, in the case of new farmers, many don’t yet have a community of farmer support/network or know how/where to seek advice and find resources.

## Recommendations

Taken together, these observations lead us to the following recommendations:

First, continue and expand farm field days, pasture walks, etc. where farmers talk to other farmers about rotational grazing and its benefits: to their bottom line, quality of life, and increased animal health. Efforts should be made to host these events in communities where farmer-to-farmer networks are weak. In addition, to help convey the idea that converting to grazing can be relatively easy, these events should include new grazers (as opposed to long-time grazers) as spokespersons to share their stories and experiences and help convey the “do-ability” of the practice. These recommendations logically draw from the observations that producers are motivated by profit as well as ease and convenience (Questions 1 and 2), that there are areas where farmer-to-farmer networks are weak (Question 11), and that there is a perception that grazing is difficult (Question 22).

Second, efforts should be made to continue and expand efforts to connect producers with markets as well as to generate consumer demand. As noted in discussion of questions 16 and 17, there is potential with direct marketing to consumers, but building a reputation and clientele can be challenging, especially for new producers.

It was also noted that there is a saturated market for pasture-based goods, therefore increasing consumer demand will be key. By way of example, the Maryland Grazers Network (MGN) mentor farmers requested years ago that the annual Grazing Calendar/Planner be a “consumers guide” in an effort to educate consumers on the benefits of pastured animals, focusing on human health, animal health, and the environment. The MGN also works with Future Harvest and the “Amazing Grazing” directory to market these producers to new consumers. With large population centers in relatively close proximity to Maryland producers, there is an opportunity to greatly increase demand, which could help encourage greater adoption of rotational grazing.

Third, leverage the idea that many farmers have a long-term management horizon and a desire to invest in the future of their farm (Question 5) by developing outreach materials that highlight the long-term benefits of grazing. To that end, we will share the results of another component of the Conservation Innovation Grant to quantify the environmental and economic benefits of converting to more intensive grazing systems by evaluating water quality, greenhouse gas, and soil health changes on “case study farms” before and after converting to rotational grazing. One participant advised that talking about climate change and the benefits to greenhouse gas reductions would be non-starters for producers, so materials developed from these case studies will focus on benefits to soil health, increased resiliency to weather extremes, and long-term farm productivity.

In conclusion, application of ADOPT provided the forum for an informed and engaged discussion about potential barriers to adoption of rotational grazing in the “northern tier” of Maryland. More importantly, the results led to some tangible recommendations that, if implemented, could lead to greater adoption.

This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under number 69-3A75-16-038. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the U.S. Department of Agriculture.

# ADOPT: Adoption and Diffusion Outcome Prediction Tool.

