

**IOWA STATE UNIVERSITY**  
Extension and Outreach  
**Healthy People. Environments. Economies.**

**SUSTAINABLE  
CORN.ORG**  
CROPS, CLIMATE, CULTURE AND CHANGE



United States Department of Agriculture  
National Institute of Food and Agriculture

# Climate Change Beliefs, Concerns, and Attitudes Toward Adaptation and Mitigation among Farmers in the Midwestern U.S.

J. Gordon Arbuckle Jr.  
April 9, 2013

This research is part of a regional collaborative project supported by the USDA-NIFA, Award No. 2011-68002-30190:  
*Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems*  
Project Web site: [sustainablecorn.org](http://sustainablecorn.org)

# Survey of Farmer Perspectives on Climate Change

## Two projects funded by USDA-NIFA

- Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems (CSCAP)
- Useful to Useable (U2U): Transforming Climate Variability and Change Information for Cereal Crop Producers

## Survey rationale:

- Agriculture is both vulnerable to climate shifts and a source of the GHGs driving changes
- Climate change-related threats to agriculture represent threats to society; calls for adaptation and mitigation strategies increasing

# Survey Rationale

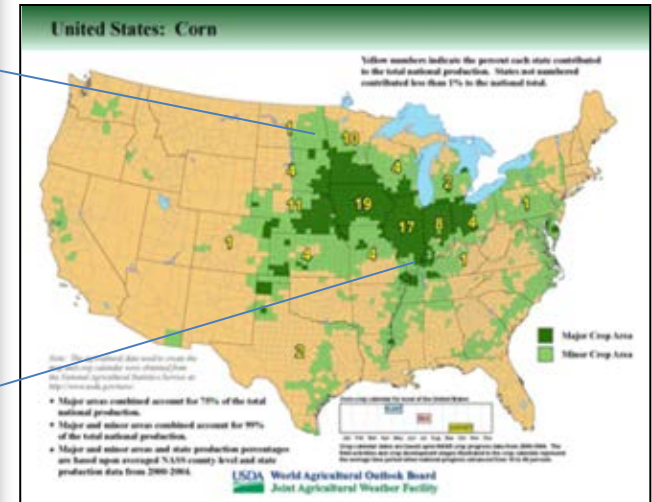
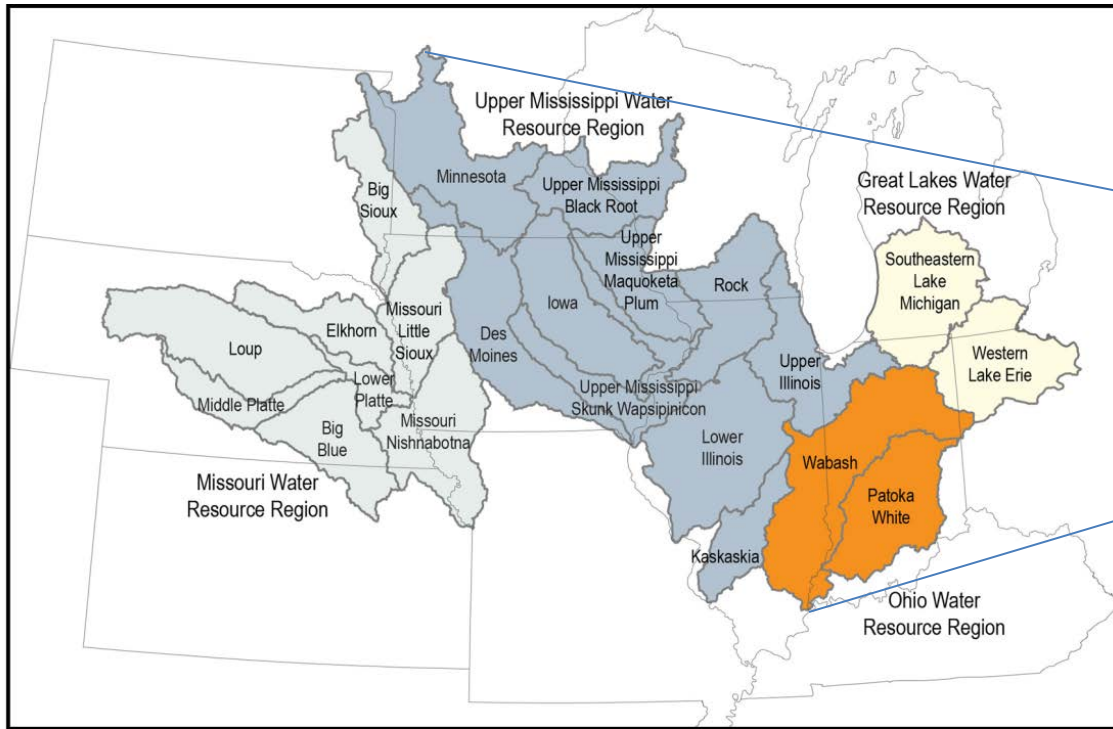
- Adjustment to potential natural hazards depends on perceptions of risks, which are mediated by beliefs about (1) the existence of the hazard and (2) its characteristics.
- If farmers do not believe that climate change is happening or do not perceive it as a threat, they will not likely undertake adaptive or mitigative actions
- Need to understand where farmers stand in order to develop effective outreach strategies

# Survey Research Questions

- What are the relationships between farmer beliefs about climate change, perceptions of climate-related risk, and attitudes toward adaptation and mitigation actions?
  - Do farmers believe climate change is occurring?
  - Are they concerned about potential impacts?
  - Do they support individual and collective adaptive and mitigative action?



# Survey Scope and Scale



Response rate:

- 4,778 farmers: 26% response rate
- Compared respondents and non-respondents on numerous ag census variables: No differences

IOWA STATE UNIVERSITY  
Extension and Outreach  
Healthy People. Environments. Economies.

**SUSTAINABLE  
CORN.ORG**  
CROPS, CLIMATE, CULTURE AND CHANGE



United States Department of Agriculture  
National Institute of Food and Agriculture

# Beliefs

“Please select the statement that best reflects your beliefs about climate change”

Climate change is occurring, and it is caused mostly by human activities	8%
Climate change is occurring, and it is caused more or less equally by natural changes in the environment and human activities	33%
Climate change is occurring, and it is caused mostly by natural changes in the environment	25%
There is not sufficient evidence to know with certainty whether climate change is occurring or not	31%
Climate change is not occurring	4%

Climate change is occurring, and it is caused mostly by human activities	8%
Climate change is occurring, and it is caused equally by natural changes in the environment and human activities	33%
Climate change is occurring, and it is caused mostly by natural changes in the environment	25%
There is not sufficient evidence to know with certainty whether climate change is occurring or not	31%
Climate change is not occurring	4%

**Climate change is occurring 66%**

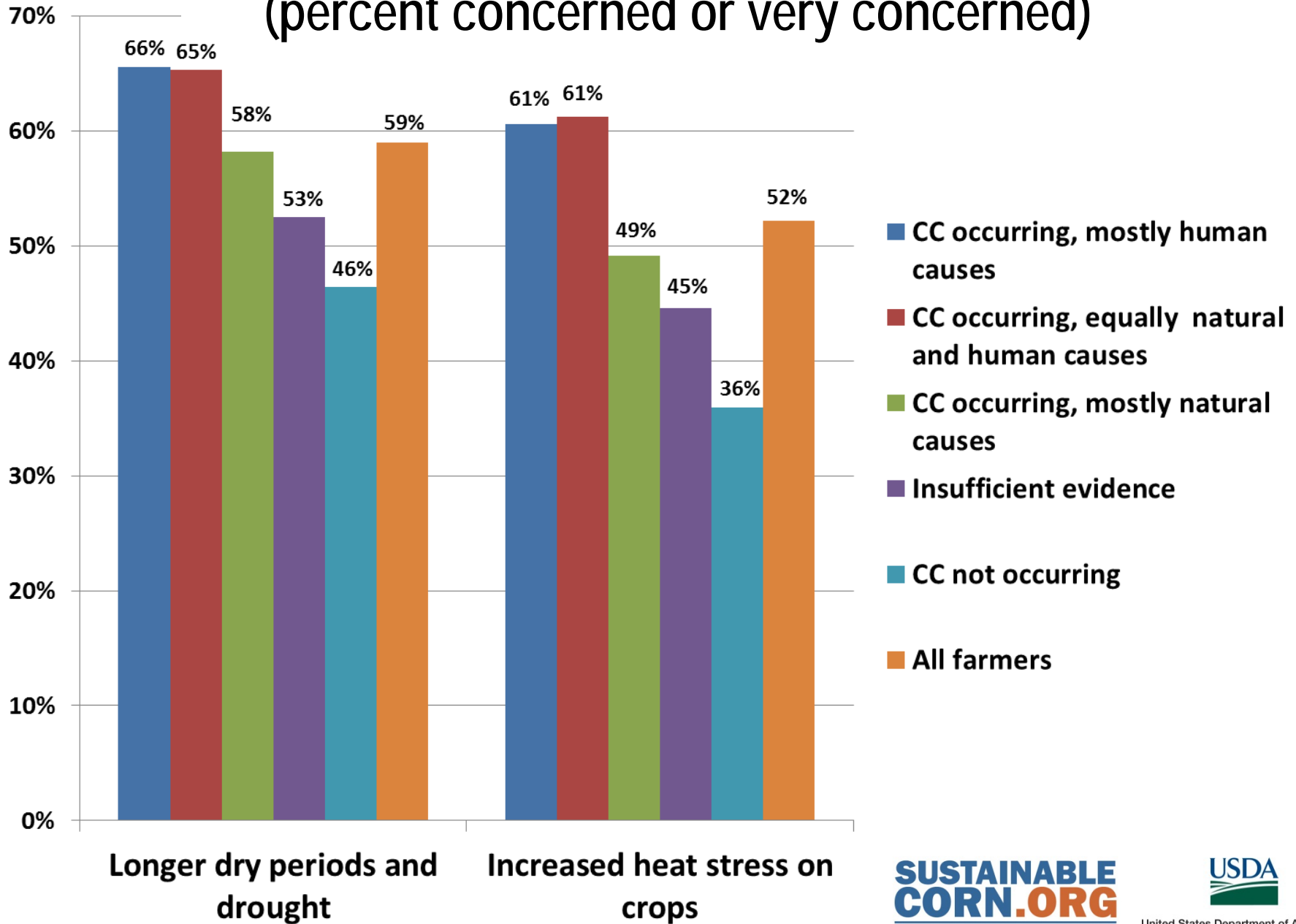
**➤ Humans are at least partly responsible 41%**

# Perceived Risks

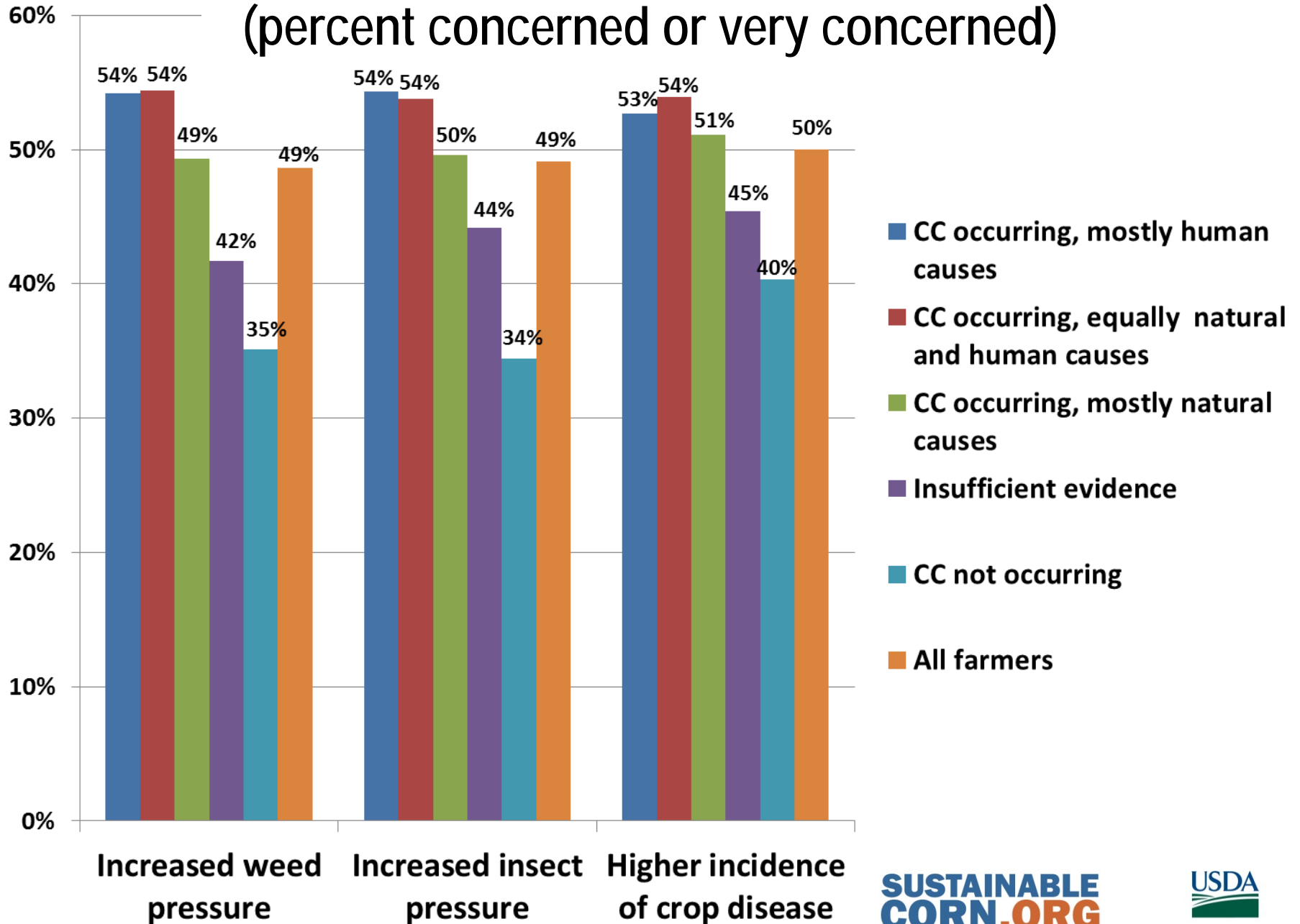
Developed questions based on predicted impacts of climate change on Corn Belt agriculture

- “How concerned are you about the following potential problems for your farm operation?”
  - Drought and heat
  - Excess water issues
  - Pest and disease issues
  - Nutrient loss
  - Soil erosion

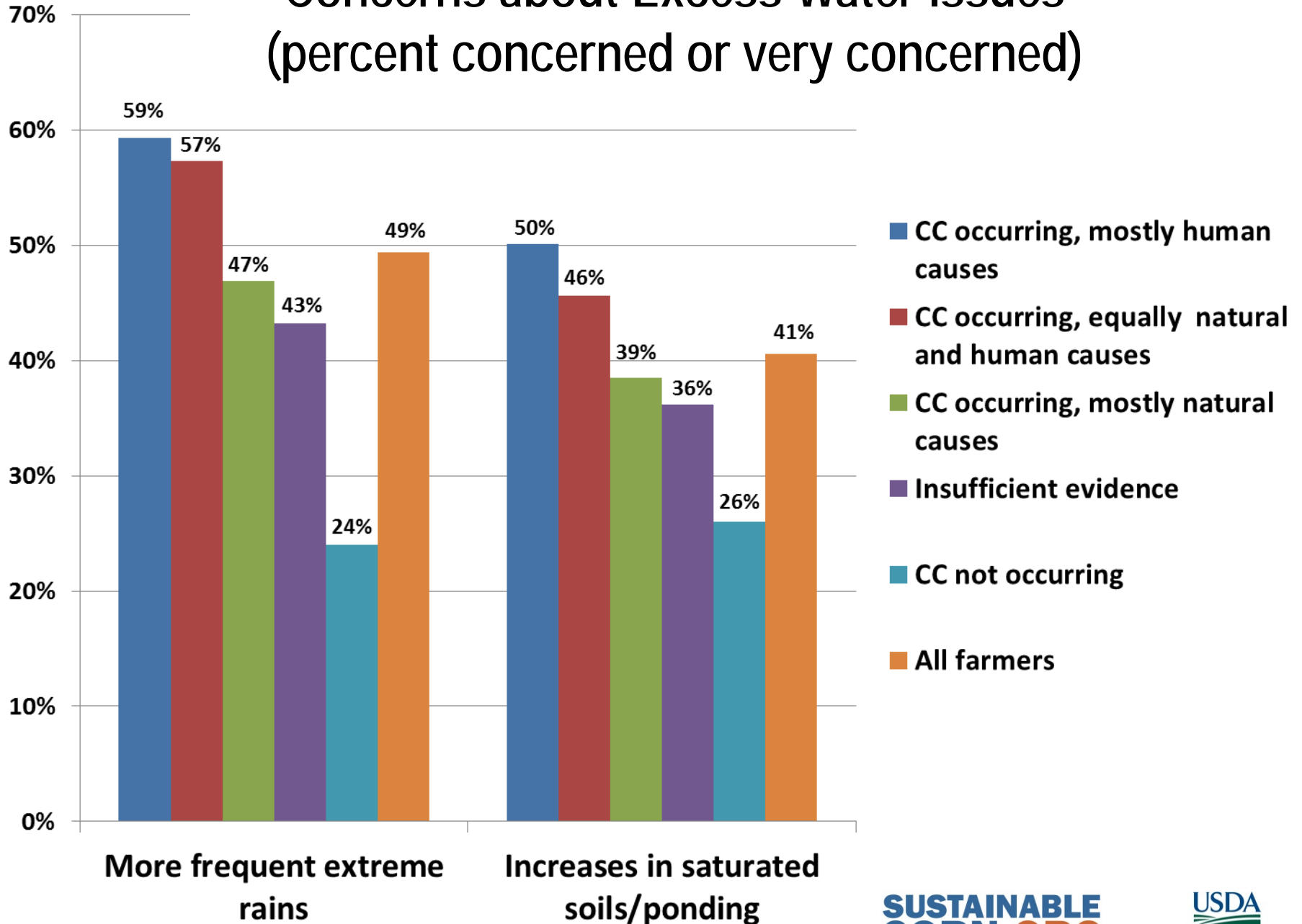
# Concerns about Drought and Heat (percent concerned or very concerned)



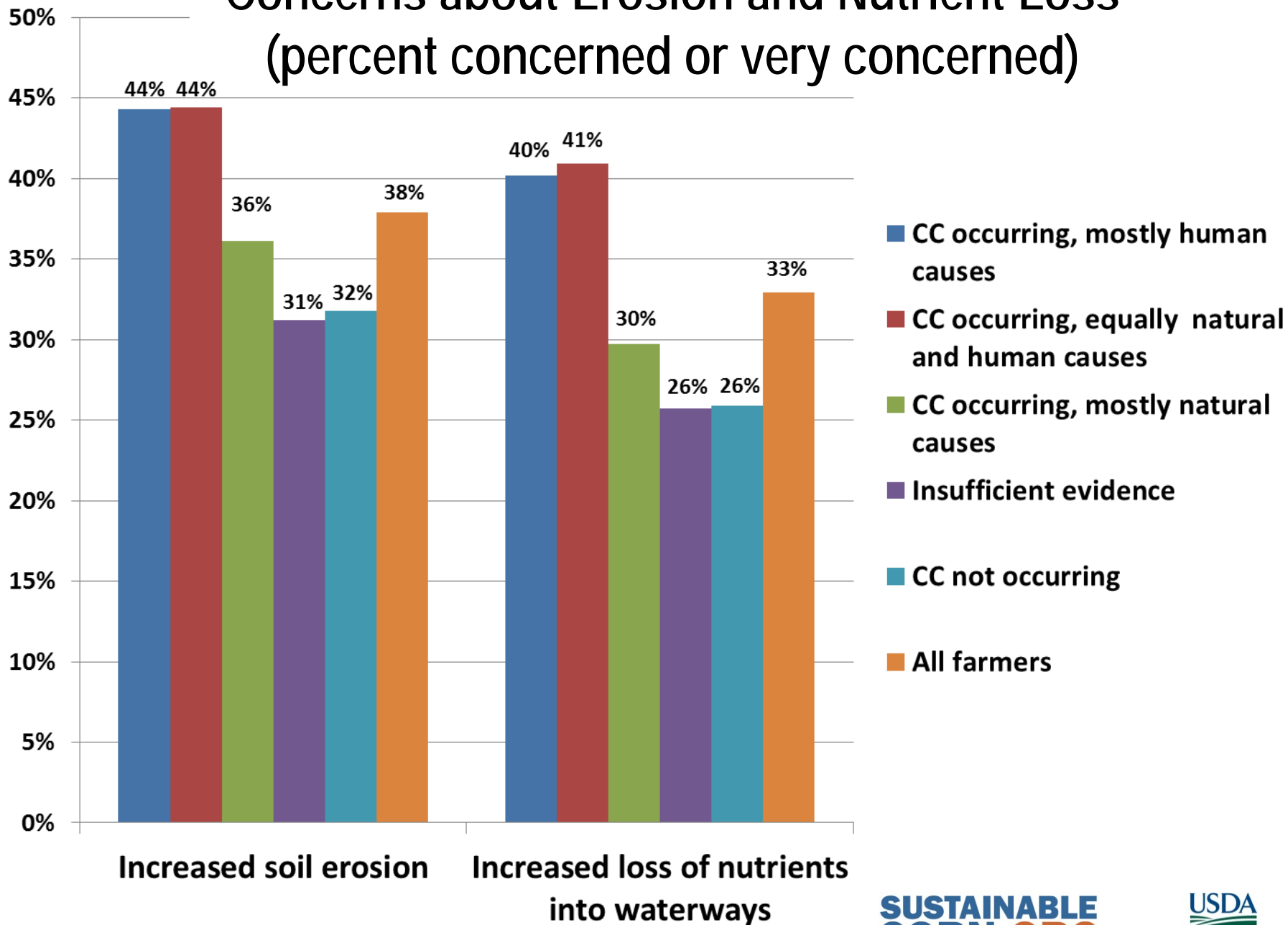
# Concerns about Pests and Disease (percent concerned or very concerned)



# Concerns about Excess Water Issues (percent concerned or very concerned)



# Concerns about Erosion and Nutrient Loss (percent concerned or very concerned)



# Most farmers are concerned.

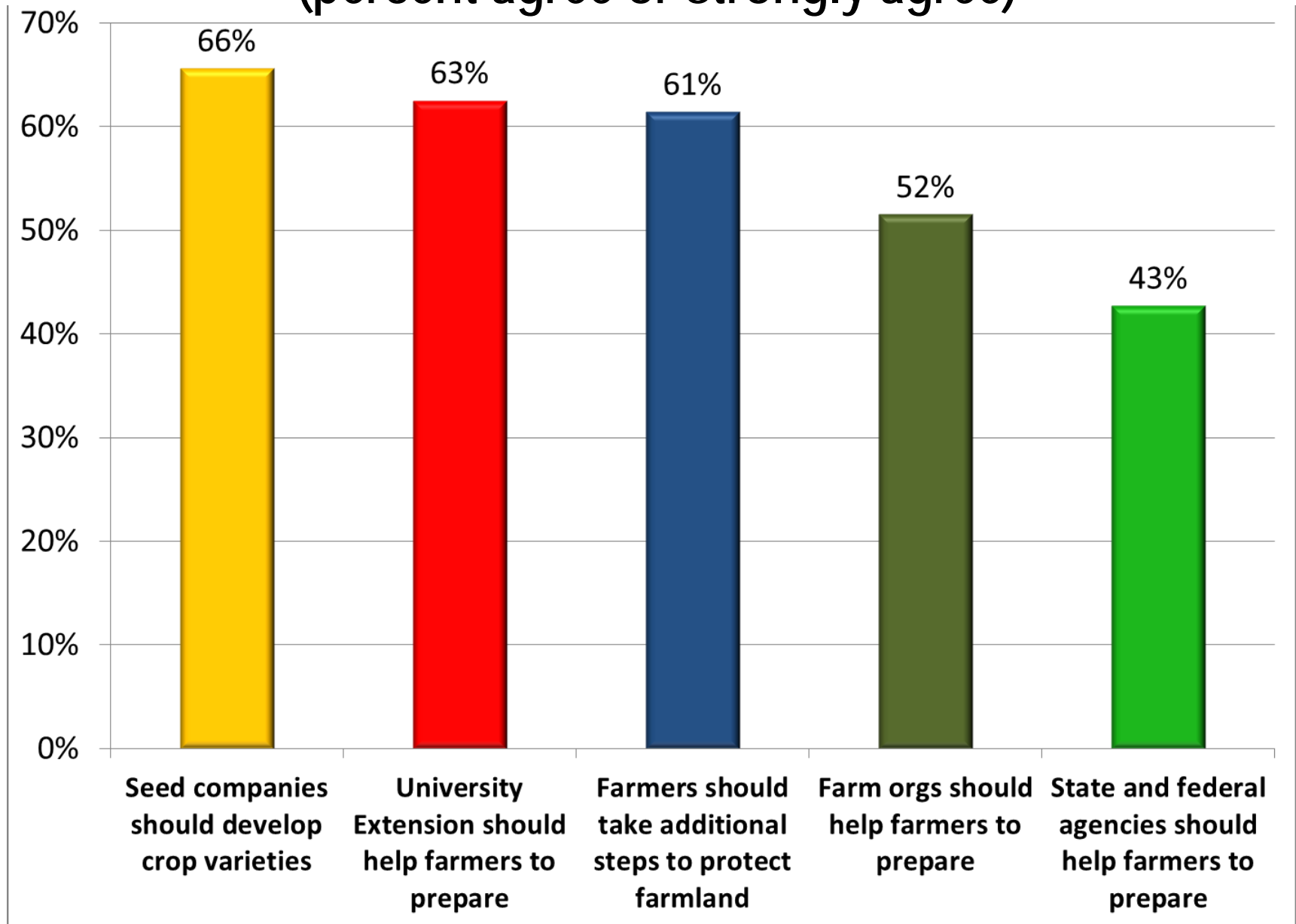
- Drought was the most prevalent concern, with heat, pests and disease, and excess water close behind
- Clear pattern of relationship with climate change belief: Farmers who believe that CC is happening and caused by humans are more concerned

# Attitudes toward Adaptation and Mitigation

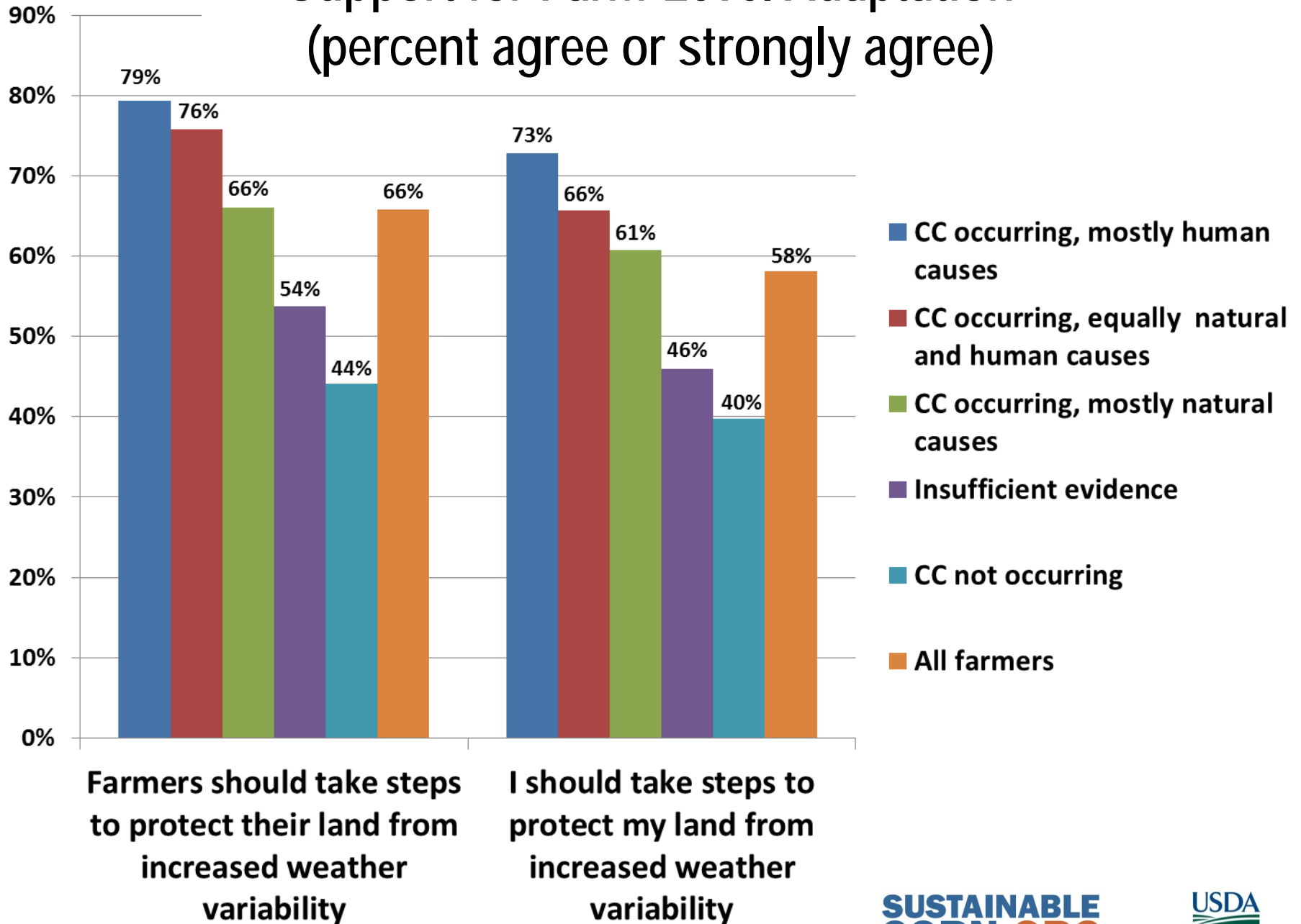
Normative items: What should be done and by whom?

- “Organizations, agencies, and individuals can do a number of things to prepare for or address potential changes in climate. Please provide your opinions on the following statements.”
- Focus on preparing for “increased weather variability”
  - Farmers
  - Government agencies
  - Farm groups
  - Extension
  - Seed companies

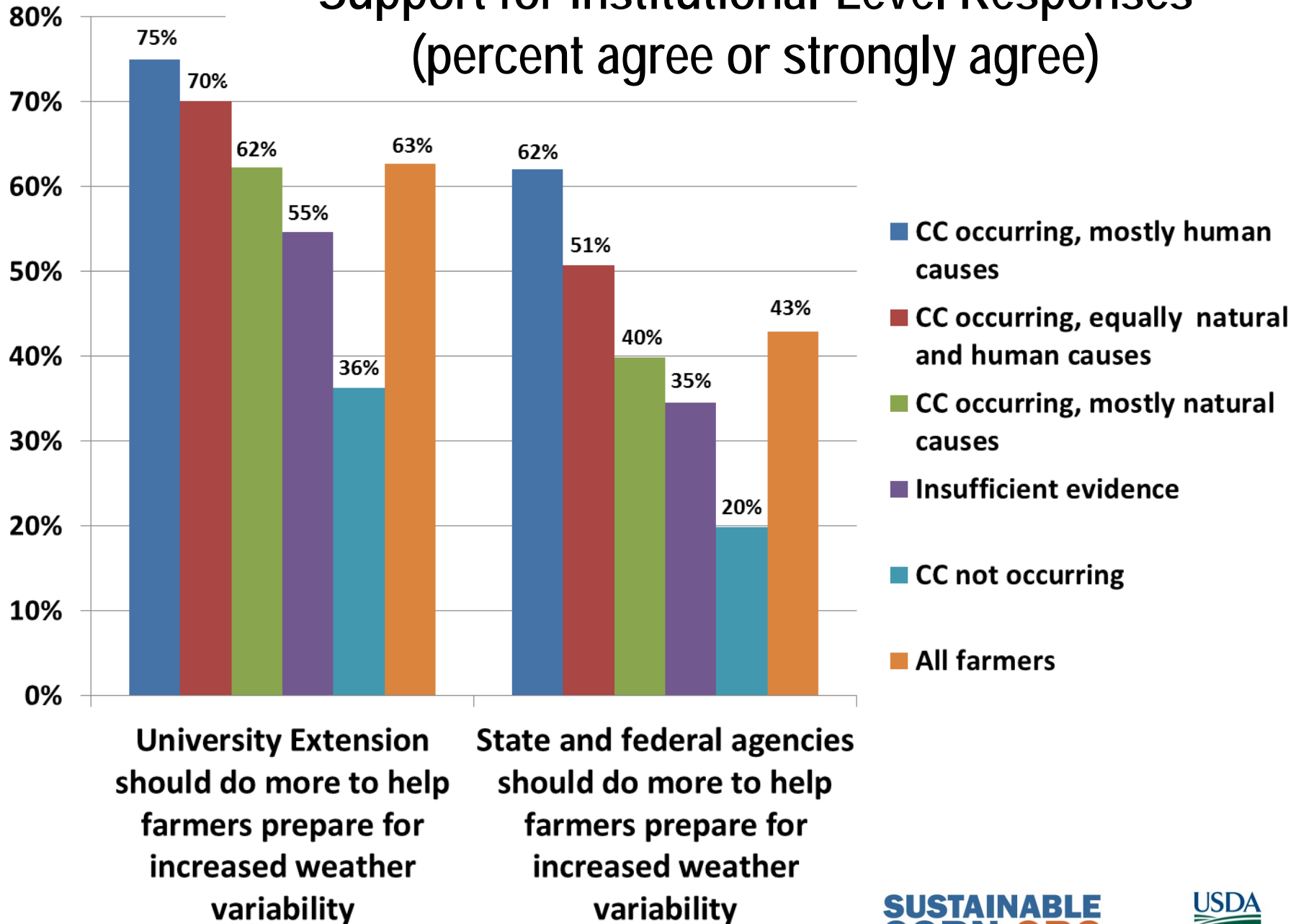
# Support for Action to Prepare for Increased Weather Variability (percent agree or strongly agree)



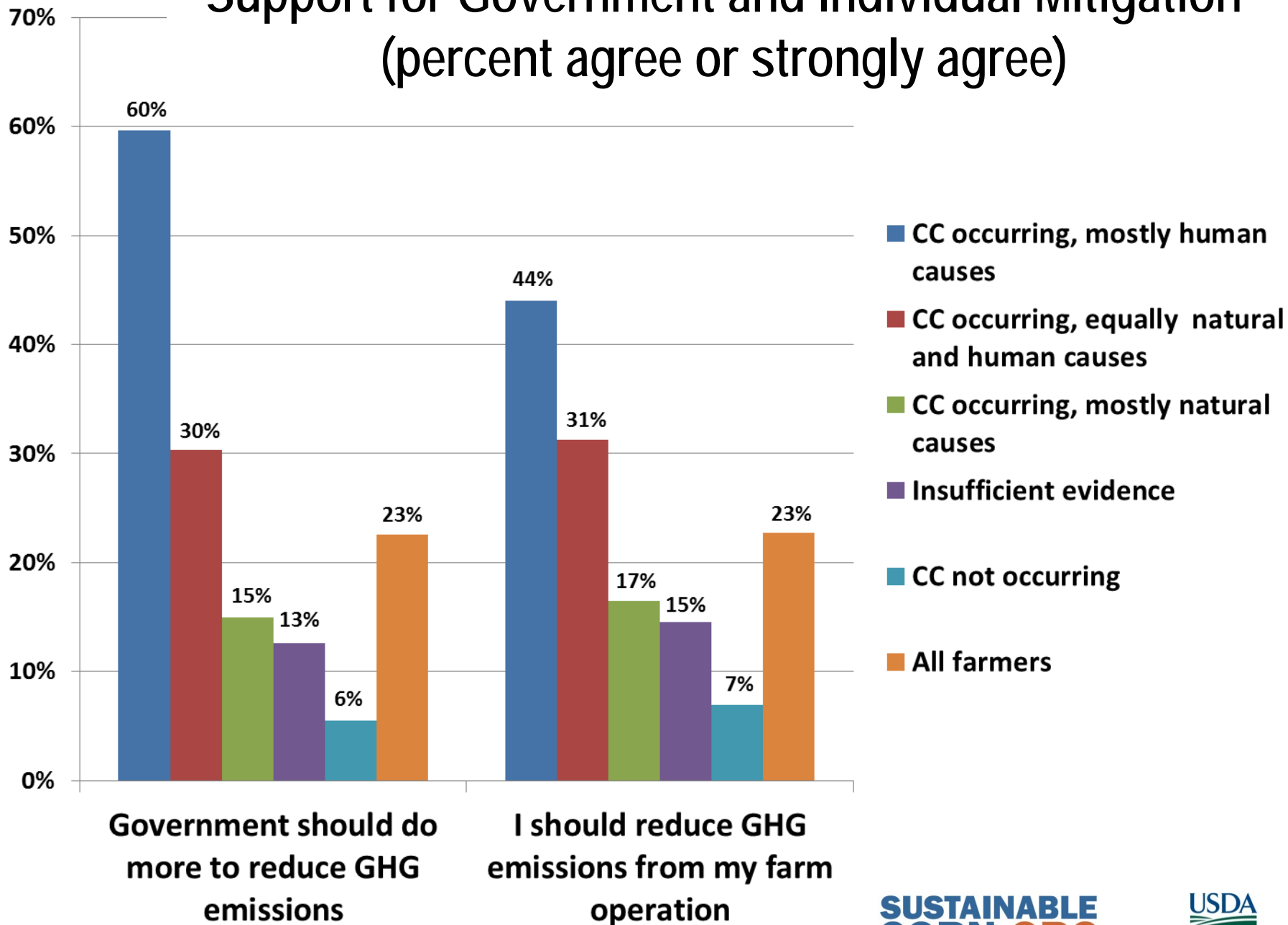
# Support for Farm-Level Adaptation (percent agree or strongly agree)



# Support for Institutional-Level Responses (percent agree or strongly agree)



# Support for Government and Individual Mitigation (percent agree or strongly agree)



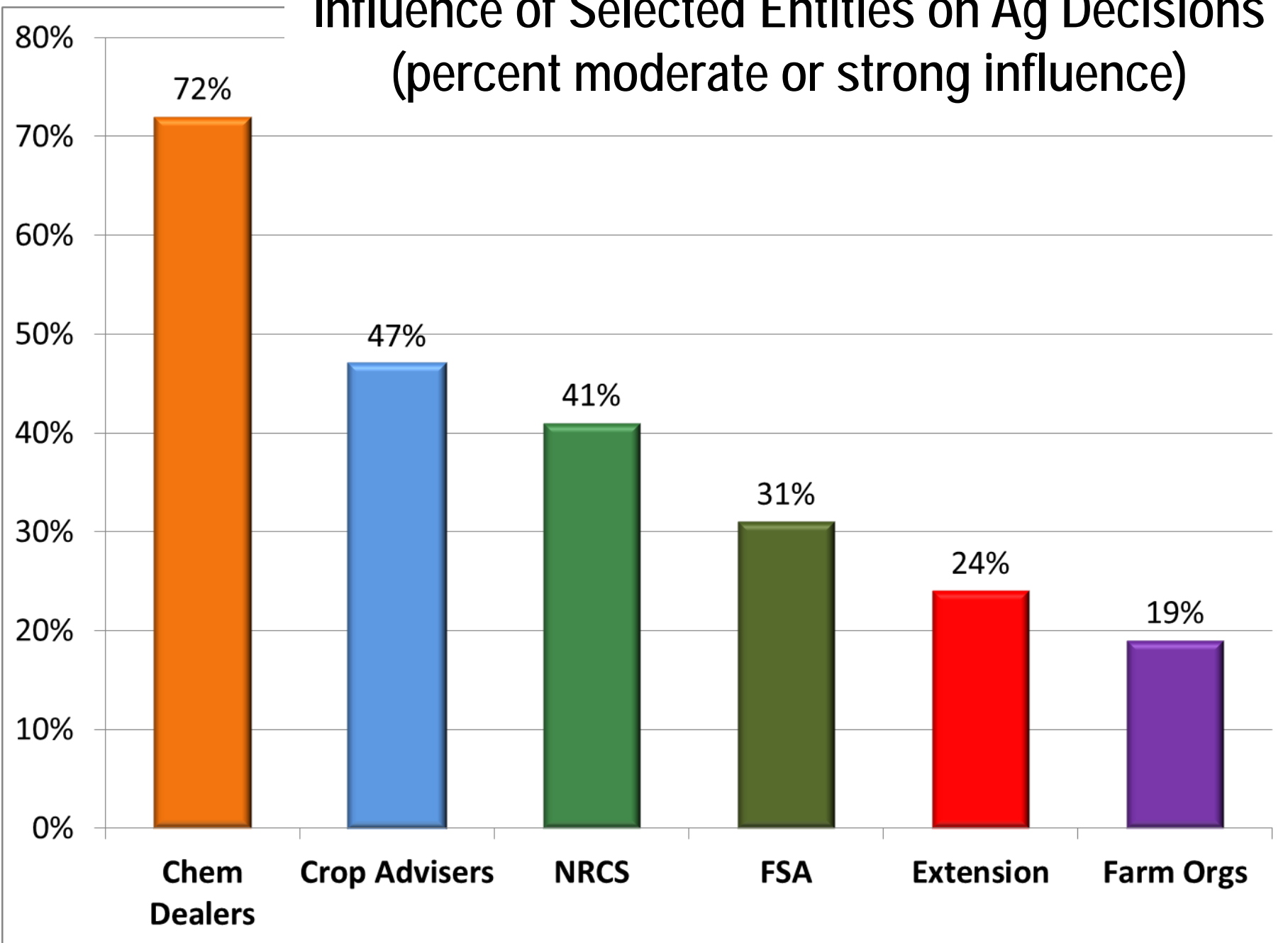
# Adaptation or mitigation?

- Most farmers support adaptation actions, especially individual-level, but also institutional-level
- Most farmers do not support government or individual action on GHGs, except those who believe that humans are primary cause of climate change
- Relationship pattern between climate change belief and support for adaptation and mitigation action same as for perceived risk

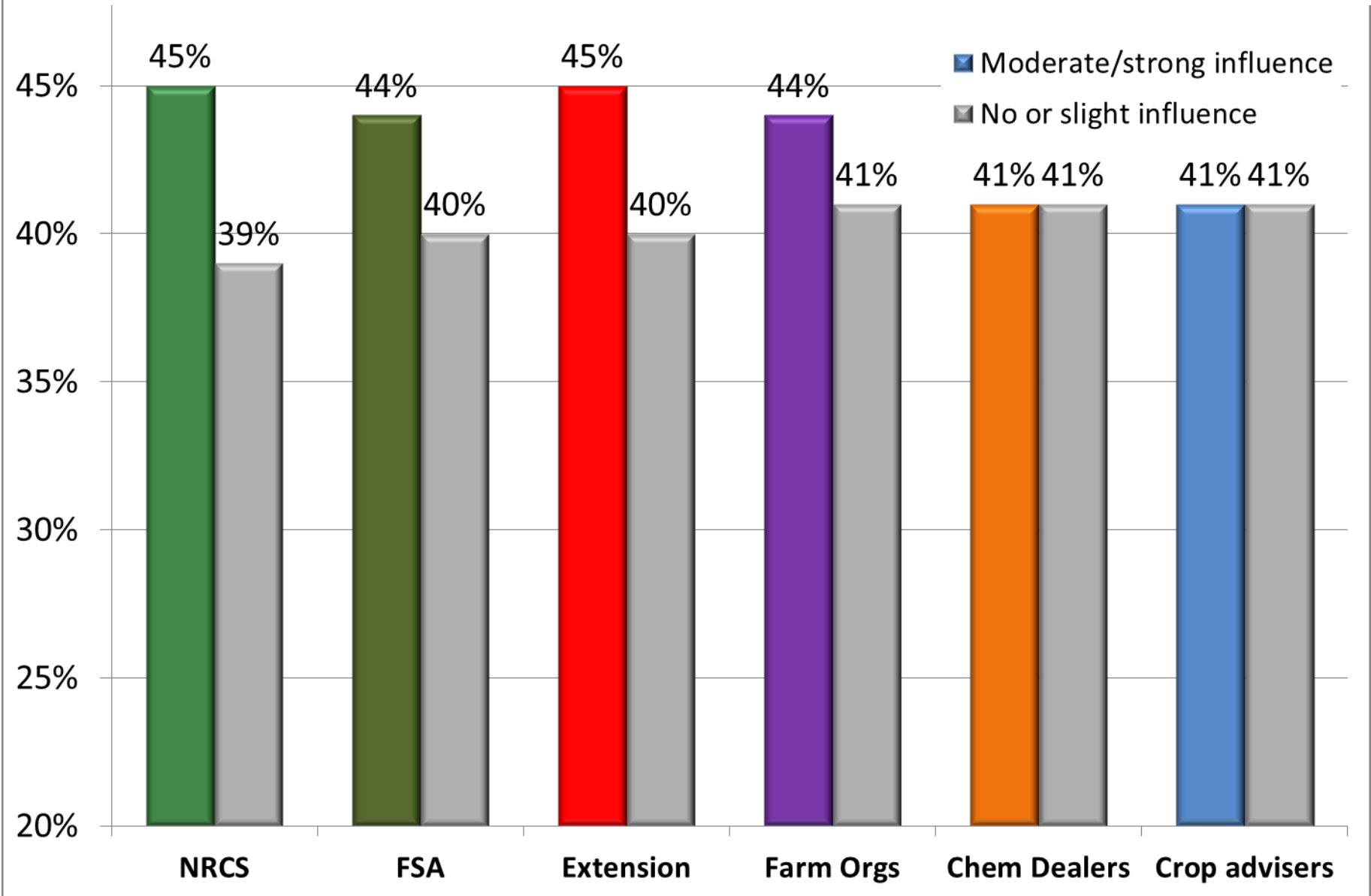
# Influence of Key Organizations

- Many factors influence farmer decision making
- Individuals, private sector, public agencies
- Asked “Please indicate how influential the following groups and individuals are when you make decisions about agricultural practices and strategies.” Scale from “no influence” to “strong influence.”
- NRCS, FSA, Extension, Ag chemical dealers, farm organizations, other farmers, etc.

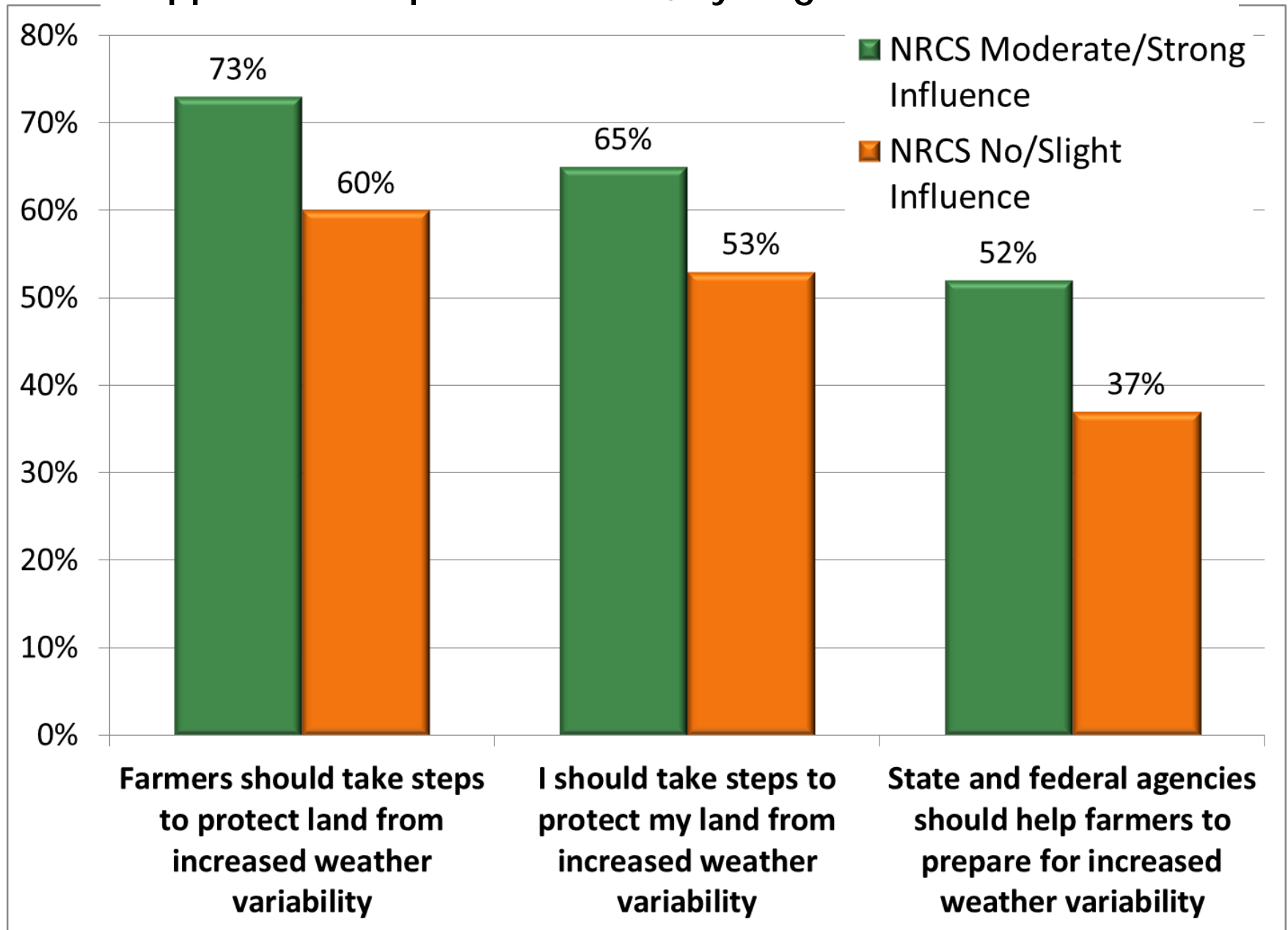
# Influence of Selected Entities on Ag Decisions (percent moderate or strong influence)



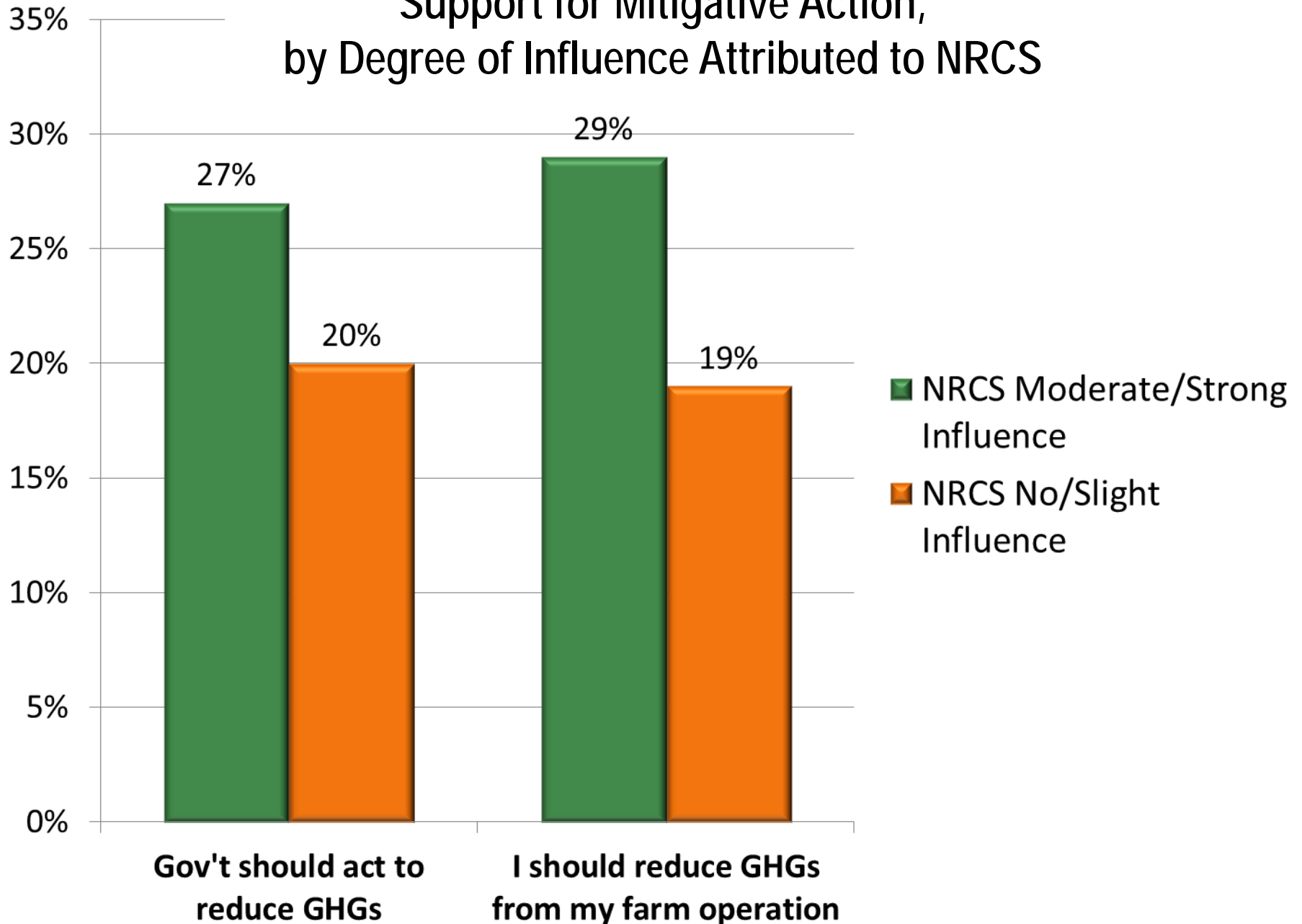
# Percent belief that climate change is occurring and due mostly or equally to human activity, by level of influence



# Support for Adaptation Action, by Degree of NRCS Influence



# Support for Mitigative Action, by Degree of Influence Attributed to NRCS



# NRCS, Farmers, and Climate Change

- More than 40% of farmers indicate that their ag decisions are moderately or strongly influenced by NRCS
- Farmers who are influenced by NRCS are more likely to believe that climate change is occurring and caused by humans
- Farmers who are influenced by NRCS are more likely to support adaptation and mitigation actions

# Best Management Practice Use

- Provided a list of 17 practices including grassed waterways, terraces, filter strips, cover crops, reduced tillage, no-till, etc. and asked farmers to indicate whether or not they were using them.
- Simple count, no data on extent of use.
- Developed a summative index

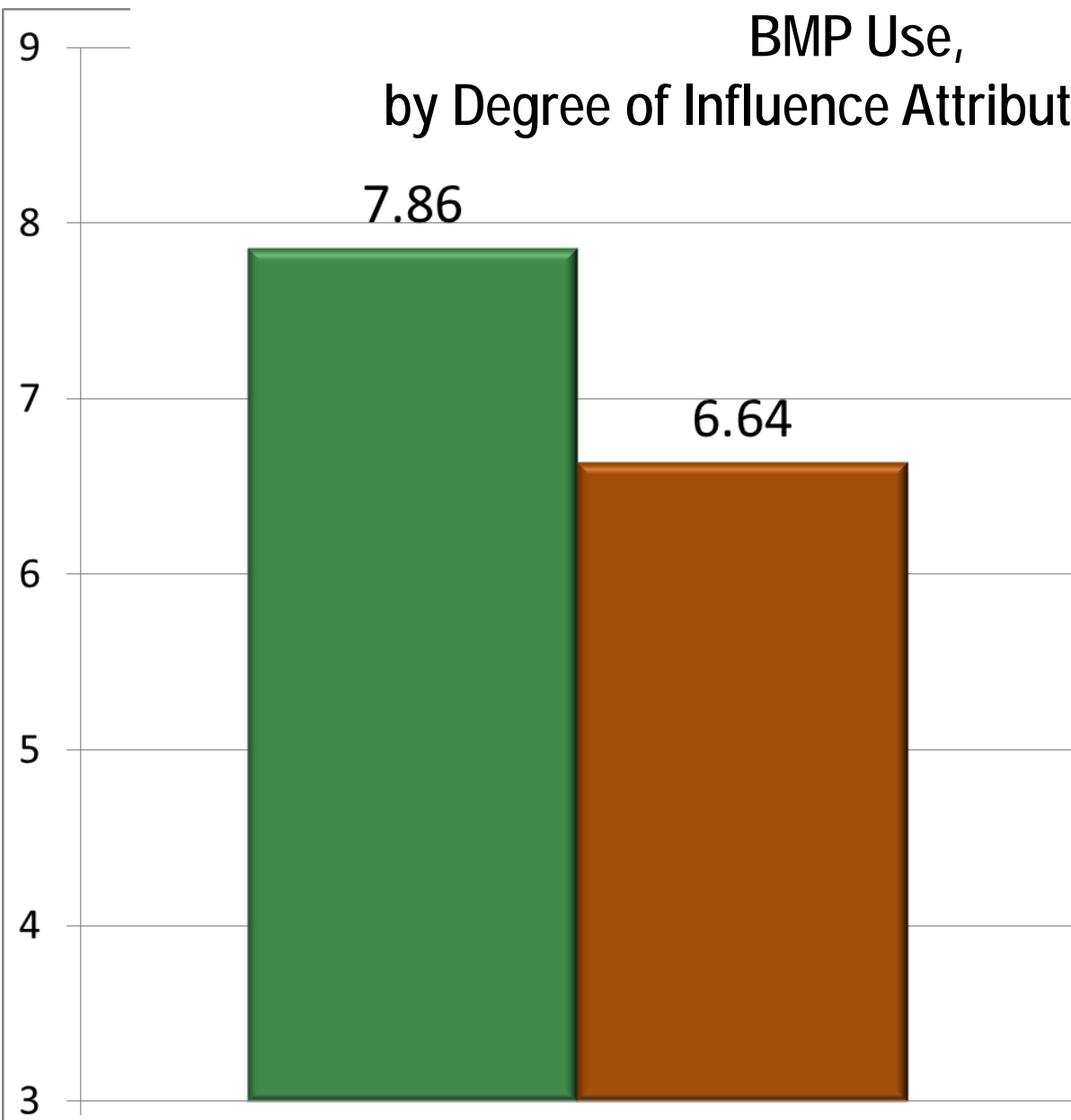
# BMP Use, by Degree of Influence Attributed to NRCS

7.86

6.64

- NRCS Moderate/Strong Influence
- NRCS No/Slight Influence

Practice index: Use of 17 key practices



# Take-Home Points

- Many farmers are concerned about predicted climate change-related threats to Corn Belt agriculture
  - Risk perception varies greatly, associated with belief
- Many support individual-level adaptation: Adaptation is what farmers do
- Many also support institutional adaptive action, thought somewhat more supportive of Extension than gov't
  - However, uncertainty and disbelief associated with lower support
- Most farmers do not believe that climate change is caused by human activity
  - Mitigation through GHG reduction is unpopular, except among farmers who believe that humans are main cause of climate change
  - Many conservation practices and strategies have both adaptive and mitigative properties: cover crops, reduced tillage, nitrogen management, etc.
- NRCS influential among many farmers, and those farmers tend to be more open to action to adapt to increasing weather variability

# Next Steps for CSCAP

- Conducting in-depth interviews with 200 farmers
  - Detailed understanding of how they think about climate change and potential impacts
  - Use of/perspectives on key adaptive and mitigative practices
- Developing typologies to inform more effective engagement with farmers: who is concerned, who is not?
  - How to translate concern into action?
  - How to address lack concern?
  - How to communicate effectively about preparing for potential impacts of climate change
- Development of programming and materials that resonate with farmers without alienating those with differing perspectives

IOWA STATE UNIVERSITY  
Extension and Outreach  
Healthy People. Environments. Economies.

**SUSTAINABLE  
CORN.ORG**  
CROPS, CLIMATE, CULTURE AND CHANGE



United States Department of Agriculture  
National Institute of Food and Agriculture

Thank you!

This research is part of a regional collaborative project supported by the USDA-NIFA, Award No. 2011-68002-30190:  
*Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems*  
Project Web site: [sustainablecorn.org](http://sustainablecorn.org)