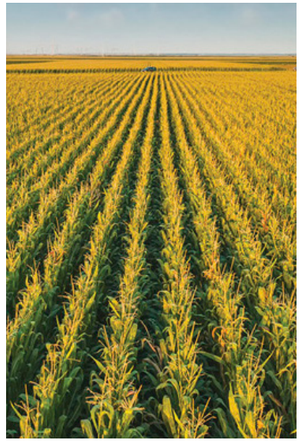

United States Department of Agriculture

Natural Resources Conservation Service

Helping People Help the Land

NRCS provides America's farmers and ranchers with financial and technical assistance to voluntarily put conservation on the ground, not only helping the environment but agricultural operations, too.

www.nrcs.usda.gov

NIACS

Northern Institute of Applied Climate Science

The Northern Institute of Applied Climate Science (NIACS) has been designed as a collaborative effort among the Forest Service, universities, conservation organizations, and forest industry to provide information on managing forests for climate change adaptation and enhanced carbon sequestration.

www.niacs.org

Climate Hubs

U.S. DEPARTMENT OF AGRICULTURE

July 2020

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MANAGING GRAZING LIVESTOCK IN A CHANGING CLIMATE: MIDWEST

Farmers and land managers are accustomed to adjusting management in response to changing conditions; fluctuations in markets, costs, pests, and weather are familiar variables. Climate change presents new challenges[1,2]; finding strategies to adapt to these changes can help farmers remain productive and profitable. USDA's Climate Hubs and the Northern Institute of Applied Climate Science have identified tools and approaches[3] to help farmers adapt their management and operations in response to current and future changes in climate. The conservation programs offered by the Natural Resources Conservation Service (NRCS) can provide technical and financial assistance to help farmers and landowners achieve their goals. Below are some examples of how adaptation strategies and NRCS programs can help you manage your resources and prepare your agricultural land for climate change.

HOW IS CLIMATE CHANGE IMPACTING MY FARM?

For a description of climate change impacts on farms in the Midwest, view the Midwest National Climate Assessments: https://nca2018.globalchange.gov/chapter/21/ and https://nca2014.globalchange.gov/report/regions/midwest.

TEMPERATURE INCREASES

Temperatures in the Midwest have warmed by more than 1.5° F between 1900 and 2010. Over the past few decades, the rate of temperature increase has been accelerating. Temperatures are projected to increase by another 5.6 to 8.5° F by the end of the century. The growing season has lengthened by an average of 9 days between 1950 and 2015, due largely to spring frosts ending earlier.

PRECIPITATION CHANGES

Mean annual precipitation in the Midwest has increased over the past century, with a tendency toward heavier and more intense rainfall events. Heavy rainfall has significant impacts on soil moisture, flooding, surface runoff and erosion, and infrastructure.

By late century, average winter and spring precipitation is expected to increase by 10-20%, relative to recent decades (1971-2000). Current projections indicate that summer and fall precipitation may experience less change, although summers may become somewhat drier. The number of days without precipitation is projected to increase, which may increase the likelihood of agricultural drought.

SOIL MOISTURE AND DROUGHT STRESS

Drought stress may increase due to warmer conditions, longer growing seasons, and longer periods between rainstorms. During more frequent intense rain events, water may be lost due to increased runoff rather than being stored in the soil, which could also increase drought stress and could lead to decreased crop yields. Even though total mean annual precipitation has and is likely to continue to increase[1], these factors may lead to net drier conditions for the Midwest overall, especially as warmer conditions lead to increased evaporation. There is some evidence that elevated carbon dioxide in the atmosphere and longer growing seasons may help increase some crop yields in the short term, but these gains are expected to decline over the long term, particularly due to the heightened frequency of extreme weather events.

WHAT CAN I DO?

Whether you are concerned about climate change impacts or are just interested in what you can do to keep your livestock healthy and profitable, NRCS has programs that can provide the technical and financial assistance to help you achieve your goals and objectives.

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM (EQIP)

Provides technical and financial help to landowners for conservation practices that protect natural resources.

CONSERVATION STEWARDSHIP PROGRAM (CSP)

Helps landowners, land trusts, tribes and other entities protect, restore, and enhance wetlands, grasslands and working farms and ranches through conservation enhancements.

CONSERVATION TECHNICAL ASSISTANCE (CTA)

The CTA program provides technical assistance to help landowners and users address opportunities, concerns, and problems related to natural resources.

WHERE DO I START?

After applying for a program, you'll meet with an NRCS conservationist, who will help you:

- Identify your **GOALS**, **OBJECTIVES** and **RESOURCE CONCERNS**;
- Consider how climate change will affect your land; and
- Develop a conservation plan including strategies and conservation practices that support climate adaptation.

OBJECTIVE: PREPARE LIVESTOCK TO COPE WITH CHANGE

ADAPTATION APPROACHES: *Prepare livestock to cope with warmer and drier conditions.*

CONSERVATION PRACTICES: *Prescribed Grazing, Silvopasture Establishment, Forage and Biomass Planting*

Day and nighttime temperatures are rising, a trend which is expected to continue. This can lead to heat stress for livestock, with impacts on growth, production, and reproduction. Building shelters or planting trees for shade in pastures can provide areas for livestock to cool off. Silvopasture systems benefit livestock by incorporating trees into existing pastures. Higher temperatures can often mean decreases in soil moisture, which can stress pasture grasses and forage, slowing their growth and regeneration. It may become increasingly important to manage forage for maximum cover, which can help reduce evaporation, keep the soil cooler, and increase infiltration. Plan ahead to maintain adequate residual forage (manage grazing heights). A prescribed grazing plan can help you determine best practices for managing the needs of your livestock and your pasture health. You may also want to consider planting a wider variety of pasture species, some of which are adapted to warmer and drier conditions, to provide optimal animal nutrition in spite of changing climate patterns.

OBJECTIVE: INCREASE AVAILABILITY OF LIVESTOCK WATER

ADAPTATION APPROACHES: *Expand or improve water systems to match water demand and supply.*

CONSERVATION PRACTICES: *Water Well, Watering Facility, Livestock Pipeline*

As temperatures and humidity rise, it will become even more important for animals to have access to ample clean water, as livestock's demand for water will likely increase. Develop a plan to maximize your water resources by utilizing water bodies and wells and installing pipelines and watering facilities that your livestock can easily access.. Minimizing the distance livestock must travel to get water can improve performance and encourages more efficient use of the pasture. For rotational grazing systems, portable watering facilities can be useful to decrease the distance the animals must travel to get a drink, while also preventing damage to soil and vegetation from high livestock concentrations around a stationary tank. Adequate fresh, cool, clean water is critical for animal health. Flow rates, tank sizes, walking distance, and visability all influence water intake.

OBJECTIVE: REDUCE THE IMPACT OF EXTREME PRECIPITATION

ADAPTATION APPROACHES: *Reduce peak flow, runoff velocity, and soil erosion; Protect water quality.*

CONSERVATION PRACTICES: *Prescribed Grazing, Forage and Biomass Planting, Heavy Use Area Protection*

The frequency of intense rainfall is increasing in many regions; the greater volume and velocity of water flow heightens the risk of runoff, erosion, and nutrient loss. Planting permanent vegetation and managing grazing appropriately can help retain soil. A prescribed grazing plan offers guidance on appropriate stocking rates and grazing periods; by managing livestock grazing based on plant growth and forage availability, you can work to maintain adequate vegetative cover in pastures. As part of your grazing plan, it is important to develop contingency strategies to deal with episodic events such as drought or intense storms. Keeping the soil covered with healthy vegetation can offer some protection from extreme precipitation, while also meeting other objectives, including reducing erosion, improving animal health and productivity, and maintaining or improving water quality and soil health. In areas that see particularly heavy livestock traffic, consider installing heavy use area protection (HUAP), which provides a stable, non-erosive surface.

OTHER RESOURCES AVAILABLE

Conservation programs, practices, and easements are available through the NRCS. Visit your local USDA Service Center or www.nrcs.usda.gov. More adaptation strategies and approaches are available, including wetlands, wildlife and more. Visit the Climate Change Response Framework website at: forestadaptation.org/adapt.

CITATIONS

1. Angel, J., C. Swanston, B.M. Boustead, K.C. Conlon, K.R. Hall, J.L. Jorns, K.E. Kunkel, M.C. Lemos, B. Lofgren, T.A. Ontl, J. Posey, K. Stone, G. Takle, and D. Todey, 2018: Midwest. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 872–940. doi: 10.7930/NCA4.2018.CH21

2. Pryor, S. C., D. Scavia, C. Downer, M. Gaden, L. Iverson, R. Nordstrom, J. Patz, and G. P. Robertson, 2014: Ch. 18: Midwest. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 418-440. doi:10.7930/J0J1012N.

3. Janowiak, M., D. Dostie, M. Wilson, M. Kucera, R. Howard Skinner, J. Hatfield, D. Hollinger, and C. Swanston. 2016. Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Midwest and Northeast. Technical Bulletin 1944. Washington, DC: U.S. Department of Agriculture.