



United States Department of Agriculture Midwest Climate Hub

Adaptation Resources for Agriculture *A Case Study: Small Acres Family Farm*

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Small Acres Family Farm raises grass-fed lamb on 65 acres of pasture in southeastern Indiana. The land has been in their family for years, but they returned to the farm within the last ten years. During the growing season, the animals are moved to fresh grass every 3 to 5 days; in winter, they are kept in a sacrifice area and are fed hay and grain. The Small family participated in the Adaptation Workbook* 5-step process to see if there are ways for their operation to become more resilient in a changing climate.

*For more on the Adaptation workbook, visit: https://www.climatehubs.usda.gov/sites/default/files/adaptation_resources_workbook_ne_mw.pdf

Small Acres: Working through the Adaptation Process

1 DEFINE: The Small family has three main goals for their farming operation: to improve soil health, raise grass-fed lamb sustainably, and increase profitability. Proper pasture management and bringing in off-farm amendments will build the soil over the long term, leading to healthier lambs and increased profits.

2 ASSESS: While there are numerous climate change impacts and vulnerabilities that will affect Indiana agriculture, the Smalls noted two impacts that will present challenges to their operation; Increased rainfall in winter and spring, including more extreme precipitation events, contribute

to runoff, erosion, and loss of nutrients and topsoil. More mud in pastures also causes stress to the lambs. Secondly, decreased soil moisture in summer is expected to cause crop and forage stress, potentially diminishing the growth and regeneration of pasture grasses.

3 EVALUATE: In the table below, the management challenges and opportunities that may occur as a result of climate change are recorded with the feasibility of meeting management objectives under current farm management. In this table, it is understood that the land unit for each item is the entire farm.

Step 3: EVALUATE Management Objectives Given Projected Impacts and Vulnerabilities

Objective	Challenges to Meeting Management Objective with Climate Change	Opportunities to Meeting Management Objective with Climate Change	Feasibility
Improve soil health	More and heavier rainfall may cause increased runoff and erosion.	N/A	Medium
Improve pasture health (grass growth and regeneration)	Increased heat and decreased soil moisture are likely to cause poor pasture grass conditions in some years.	Longer growing season may allow for more grass growth and more grazing days, if enough soil moisture is available.	Medium

For more information on the Midwest Climate Hub, please visit:
<https://www.climatehubs.usda.gov/hubs/midwest>

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4 IDENTIFY: The fourth step delves into brainstorming tactics that can be implemented to enhance the farm's ability to adapt and meet management goals. During the workbook exercise, the Small family discussed tactics that they are planning or could implement: improving pasture soil health by bringing in off-farm inputs, planting trees to provide shade in pastures, adjusting lambing dates to avoid spring soil wetness, culling the herd to select for the best adapted animals, and planting a variety of drought-tolerant species in their pastures. Below is a partial list.

5 MONITOR: The Small family is committed to improving the land and actively adapting their operation to anticipated climate change effects. In order to track progress toward their farm objectives, they selected three monitoring items to evaluate the effectiveness of their chosen tactics. Visual inspections of pasture quality, tissue samples from lambs (indicating lamb health), and the number of days the pastures can be grazed each year (indicating pasture productivity) are all ways the Smalls can monitor the success of their adaptation plan into the future.

Step 4: IDENTIFY Adaptation Approaches and Tactics for Implementation (partial list only)

Adaptation Action		Benefits	Drawbacks & Barriers	Feasible?
Approach	Tactic			
1.1 Maintain and improve soil health	Manage grazing and bring in inputs such as hay (rolled out on fields), horse manure and leaf litter	Improved water holding capacity in soils, improved grass growth and animal nutrition, reduced runoff and erosion	The amount of organic inputs needed to significantly improve all 65 acres are enormous, with long timeframes	Yes
2.3 Maintain livestock health and performance	Aggressively cull bottom 20% of herd, selecting for best adapted individuals	Improves genetics of the herd, making them more adapted to management style and local site conditions over time	None	Yes
3.3 Manage livestock to cope with warmer and drier conditions	Plant trees to provide shade in pastures (or allow for strips of natural regeneration)	Reduces heat stress, may provide human food and resources (persimmon, black walnut, etc.) as a side benefit	Cost of trees, labor to care for seedlings (need to fence animals out to prevent damage)	Yes
6.2 Diversify existing systems with new combinations of varieties or breeds	Plant a variety of drought adapted pasture species	Increases dietary diversity and nutrition for sheep, maintains pasture quality in spite of low soil moisture	Cost of seed, struggle to get plants to establish and grow on poor, eroded soil	Yes
8.4 Match infrastructure and equipment to new and expected conditions	Build a barn to overwinter sheep	Minimize impact on excessively wet soils in winter and spring	Cost of infrastructure, increased labor for moving hay, cleaning barn, and spreading manure	No

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The Take-Away

The [Adaptation Resources for Agriculture Workbook](#) can be a valuable process for any agricultural producer to undertake as long as one is willing to think outside the box and look beyond next year's cropping or grazing season. Take action now to improve your operation and production resiliency.

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