U.S. Dairy Farmer Perceptions and Actions Around Climate Change

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Background

The United States dairy industry has established an industry-wide goal of achieving greenhouse gas (GHG) neutrality by 2050. This research aimed to understand where U.S. dairy farmers are in their thinking and actions around climate mitigation and adaptation strategies to help achieve this goal.

In the spring of 2023, a national survey of U.S. dairy farmers was conducted to understand how farmers are thinking about and approaching changing climate and weather, with a focus on animal, manure, and land strategies that can help reduce the majority of emissions within the industry. The survey was publicized through a variety of outreach channels including:

- Postcard mailings to all farmers enrolled in Farm Service Agency programs, as well as to a subset of dairy farmers with 10 or more cows provided by DTN
- Advertisements in two trade publications (Progressive Dairy and Hoard's Dairyman)
- Dissemination through Dairy Management Inc's farmer service staff

A total of 920 farmers, approximately 1 in every 29 U.S. dairy farmers, responded to the survey. Respondents primarily represented dairy farms from the Great Lakes and the Northeast, followed by Southeast/ Central, West, and Central West regions (Figure 1).

Dairy farmers operated on a combination of rented and owned land, averaging 249 acres rented and 489 acres owned. Respondent herd size ranged from 10-12,000 head, with an average herd size of 329.

Most respondents were male (77%), with 19% identifying as female, 2.6% prefer not to answer, and the remainder non-binary or another gender identity. On average, farmer respondents were 54 years old and had been farming for 34 years.

Twenty-seven percent of respondents identified as part of the plain community, which includes religious sects such as the Amish and Mennonite.

Farm debt is common among farmer respondents. Seventy-six percent of dairy farms reported having any level of debt, with 25% reporting their farm's debt to be more than 100% of their annual income.

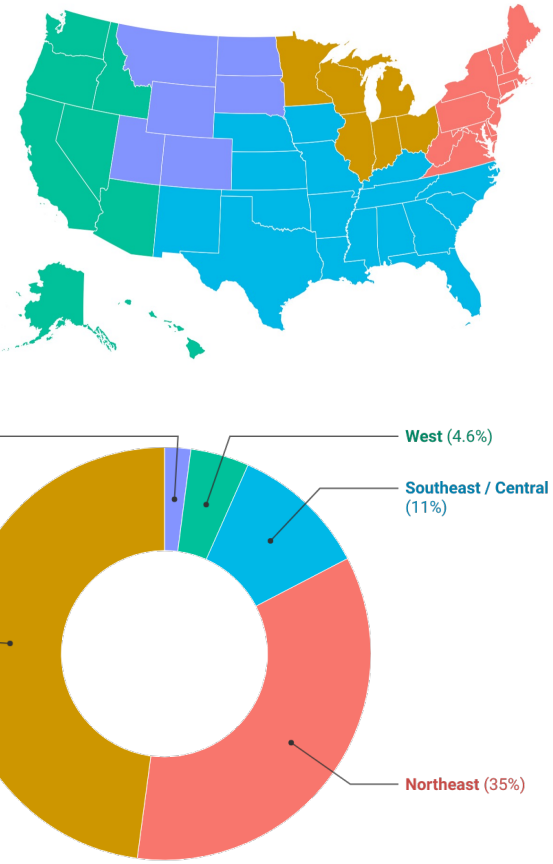


Figure 1. Map of United States with breakdown of responses by region

Responses received from 1 in every 29 U.S. dairy farmers

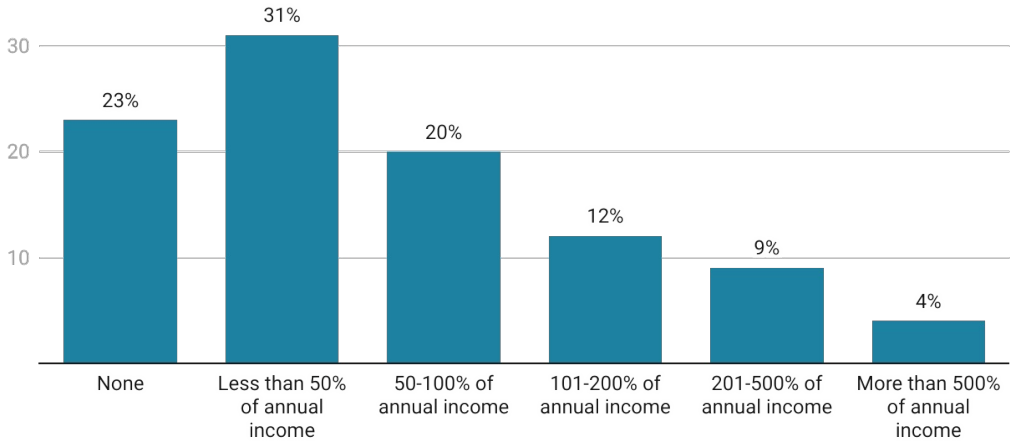


Figure 2. Level of debt as a percentage of annual farm income

Overview of Climate Practice Adoption

Most U.S. dairy farmers have adopted at least one climate-friendly farming strategy.

97% At least one mitigation or adaptation practice

79% At least one mitigation practice

90% At least one adaptation practice

Current Use of Climate Mitigation Practices

Manure-Based Practices

When asked about current use of manure-based mitigation practices, nearly half (46%) of dairy farmers reported composting manure, with aeration of manure (16%) and separation of liquids and solids in manure (15%) less common. Use of anaerobic manure digesters was low, reflecting the high startup and maintenance costs associated with this practice.

Land-Based Practices

Land-based mitigation practices are among the most implemented climate strategies, with 48% of dairy farmers currently diversifying pasture or forage crops grown, 34% increasing the length of their grazing season, and 31% incorporating rotational or mob grazing.

Animal-Based Practices

Animal-based, or enteric, strategies are not widely utilized. Twelve percent of farmers reported currently incorporating feed additives, such as tannins, oils, or seaweed/kelp, to lower methane emissions.

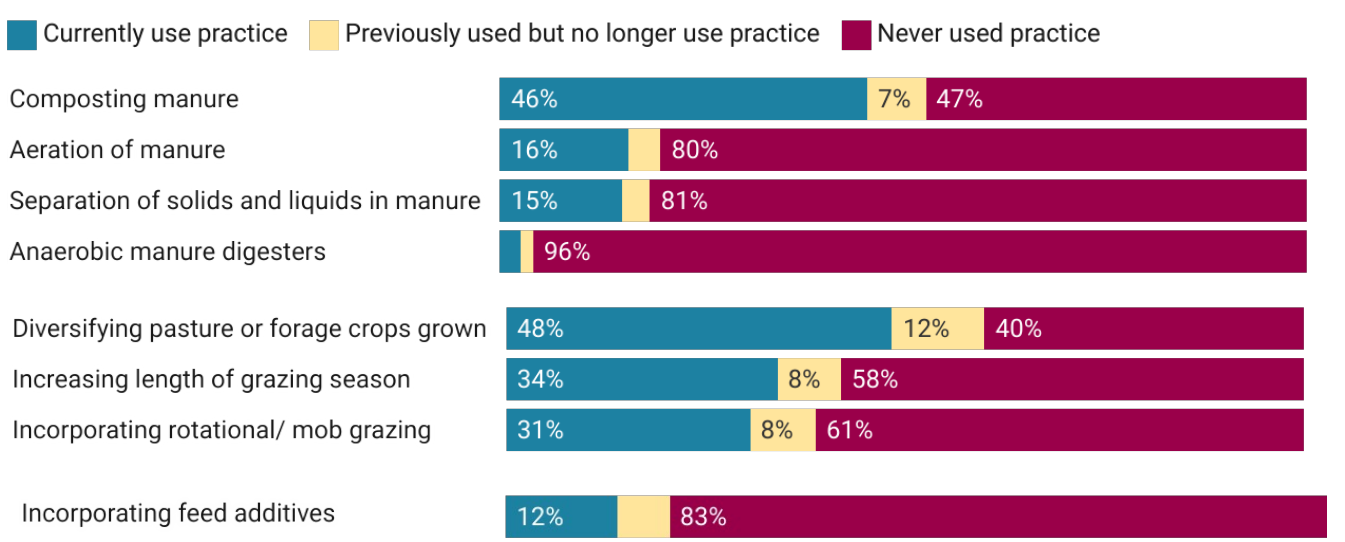


Figure 3. Current and previous use of manure-based, land-based, and animal-based climate mitigation practices.

Potential Future Use of Mitigation Practices

Respondents expressed the greatest potential interest in animal-based mitigation practices, such as selective breeding and vaccinations for methane reduction, although many of these strategies are not yet market ready. While 10% said they were likely to implement selective breeding to reduce methane in the next decade, an additional 27% expressed neutrality and 15% were not sure. In total, over half (52%) of farmer respondents may open to this practice when it becomes available. Similarly, 49% expressed interest or openness to cow vaccinations for methane reduction (Figure 4).

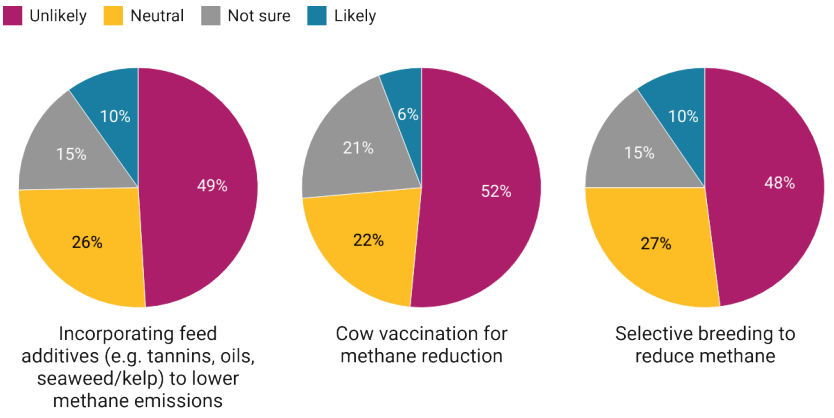


Figure 4. Likelihood to adopt new animal mitigation practices in next 10 years

Current non-adopters were largely uninterested in land-based mitigation strategies, such as increasing the length of grazing season or incorporating rotational or mob grazing, which may not be relevant to their operation structure. However, 41% of farmers may be open to diversifying pasture or forage crops grown in the next decade (Figure 5).

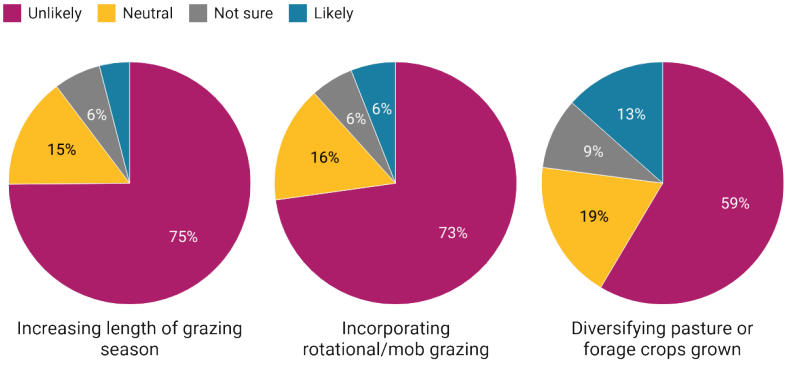


Figure 5. Likelihood to adopt new land-based mitigation practices in next 10 years

Nearly half of non-adopters expressed likelihood or potential openness (neutral, not sure) to implementing new manure-based mitigation practices, especially composting of manure, aeration of manure, and separation of liquids and solids, while anaerobic digesters were less likely to be used by farmers in the next decade (Figure 6).

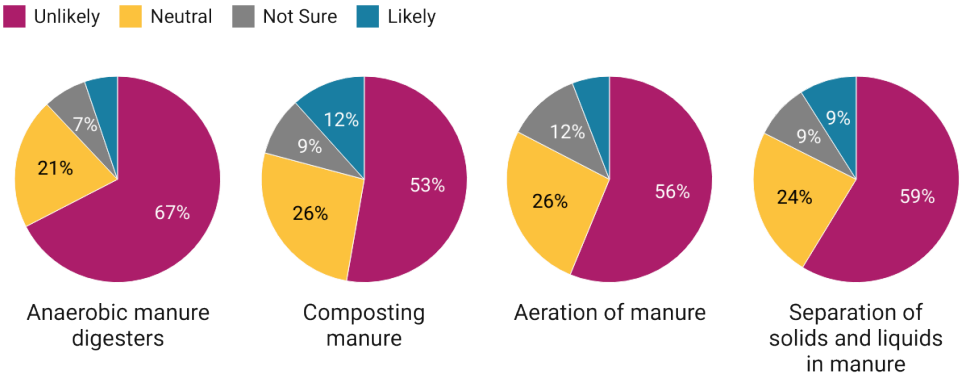


Figure 6. Likelihood to adopt new manure mitigation practices in next 10 years

Current Use of Climate Adaptation Practices

Ninety five percent of dairy farmers reported implementing at least one or more adaptation practices, particularly practices that provide clear animal welfare benefits. Eighty-six percent are currently using indoor housing to reduce heat and cold stress, followed closely by cooling fans in barns (80%) (Figure 7). Shade structures (53%) and sprinklers (30%) are also common. Recognizing that the use of indoor housing for animals may predate climate concerns, when these practices are excluded the overall adaptation practice adoption rate remains high (90%).

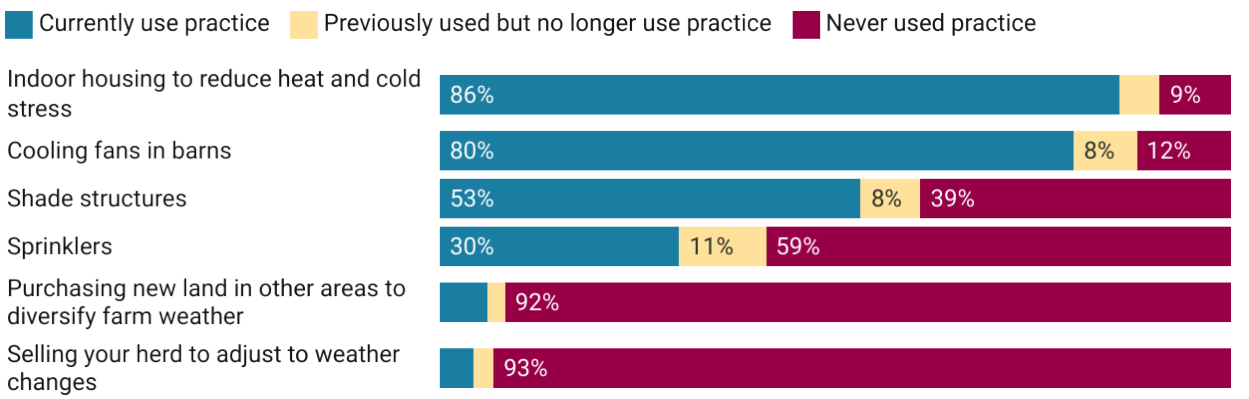
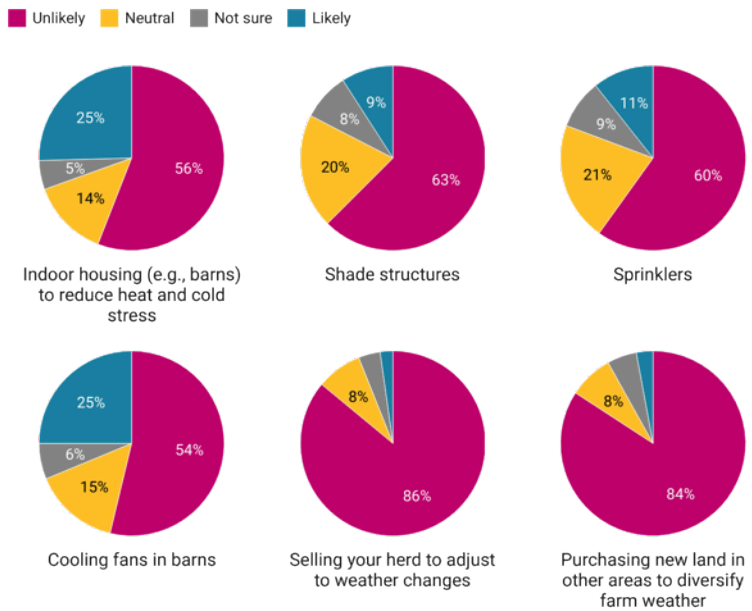


Figure 7. Past and current use of climate adaptation practices

Potential Future Use of Adaptation Practices



Farmers who have not already implemented these climate adaptation practices express the greatest potential interest in strategies that promote animal welfare, such as housing and cooling infrastructure (Figure 8). Most respondents do not anticipate selling their herd to adjust to weather changes or purchasing new land to diversify farm weather.

Figure 8. Likelihood to adopt new adaptation practices in the next 10 years

Perceived Impact of Climate Practices

When asked to evaluate farming practices in terms of the impact on farm emissions, cow wellbeing, and farm profitability, perceived that animal-based mitigation practices will improve emissions, decrease profit, and possibly reduce cow welfare (Figure 9). These practices may need to be incentivized for future adoption.

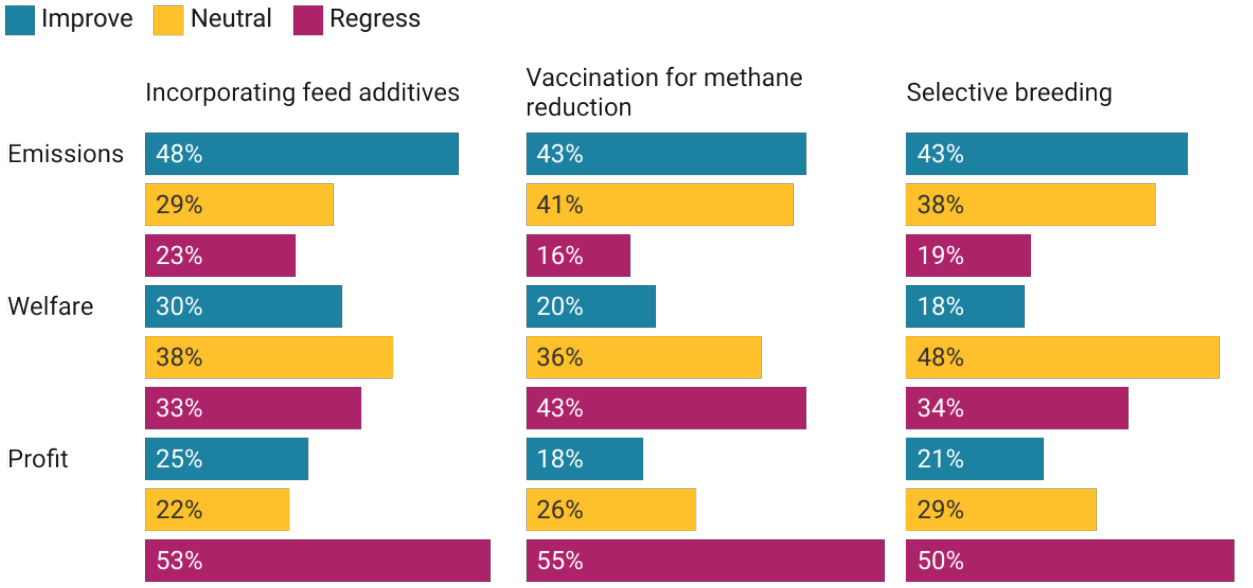


Figure 9. Perceived tradeoffs of animal-based mitigation practices

The majority of respondents perceived farm profit and animal welfare improvements with land-based practices, but less greenhouse gas benefits (Figure 10). Given that farmers largely reported cow welfare and farm profitability as drivers to the adoption of new practices, this may indicate that there would not be need for additional incentives or regulations to promote these practices.

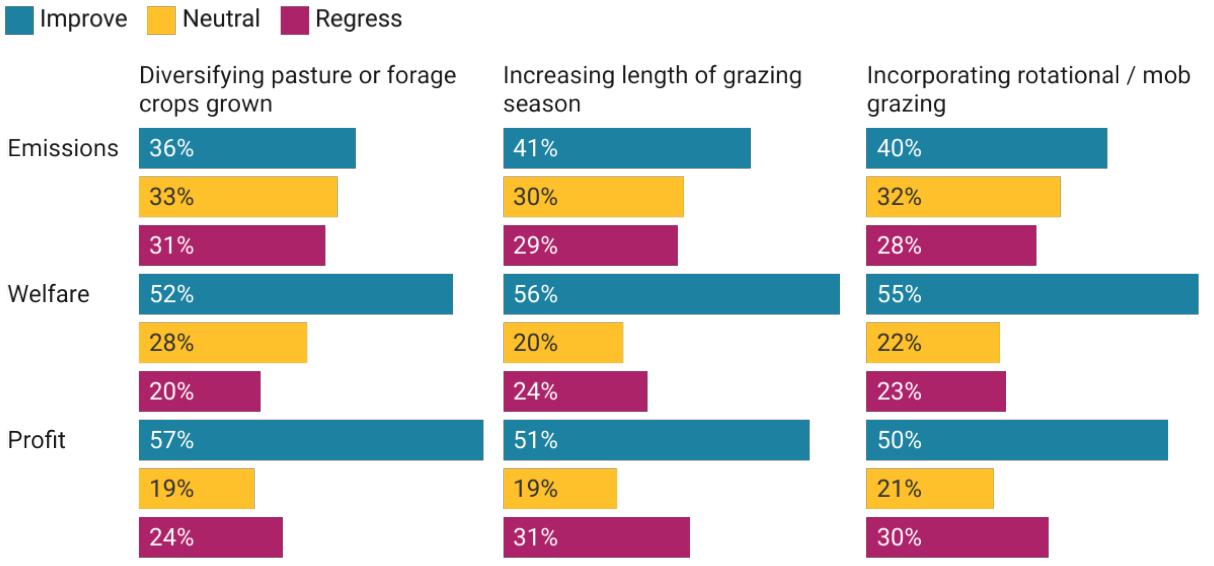


Figure 10. Perceived tradeoffs of land-based mitigation practices

Dairy farmers perceived that manure-based mitigation practices will improve emissions, but most will decrease farm profit (Figure 11). This suggests that producers might need incentives and cost shares for manure management changes.

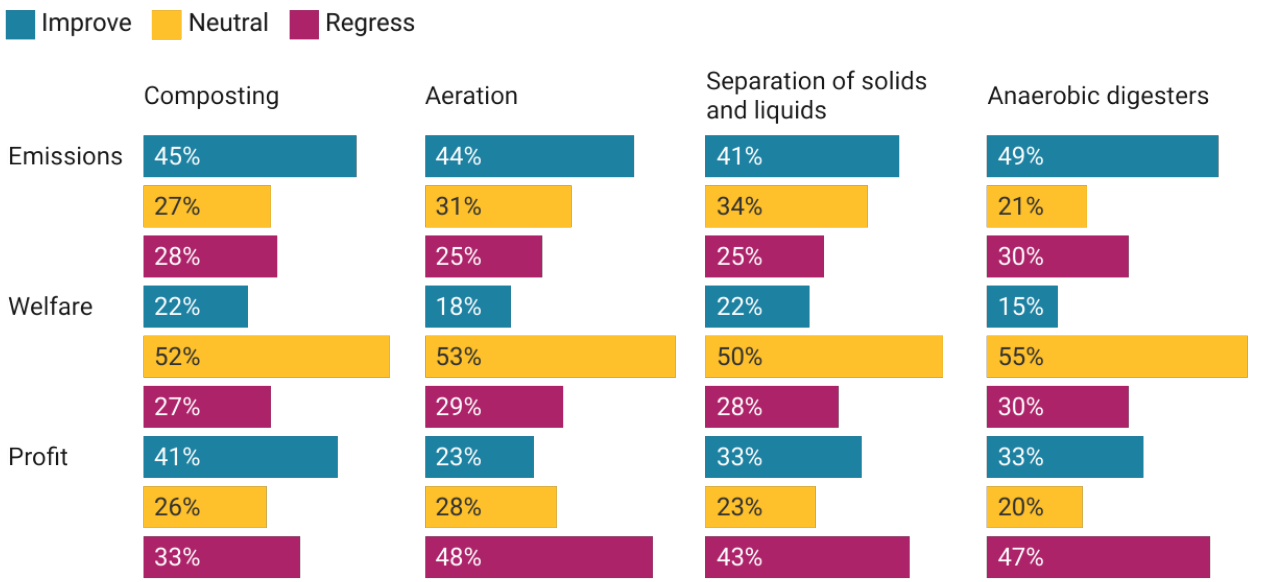


Figure 11. Perceived tradeoffs of compost-based mitigation practices

Respondents perceived improved cow welfare and profit for most adaptation practices. A potential area of opportunity would be to support farmers in implementing energy-efficient farming practices to keep emissions low.

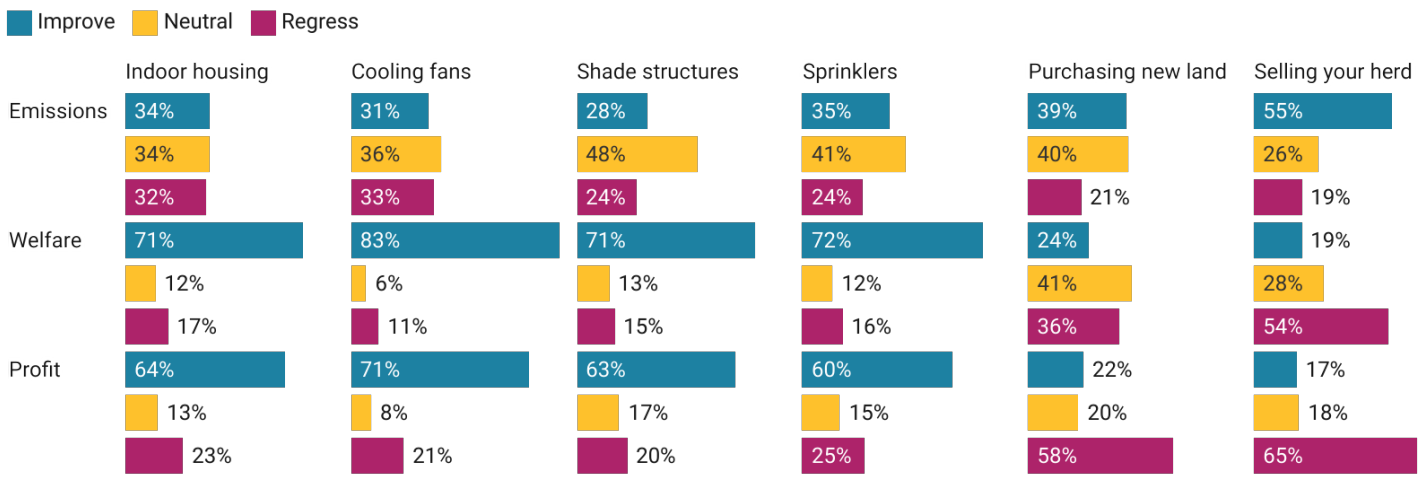


Figure 12. Perceived tradeoffs of climate adaptation practices

Drivers and Barriers to New Practice Adoption

When making decisions regarding the adoption of new farm practices, farmer respondents were equally driven by cow welfare and farm profitability/ milk production. Over 1/3 of respondents ranked one of these two factors as the most important in their decision-making process.

Dairy farmers indicated that the three most significant barriers that prevented them from adopting climate-friendly management practices on their farm, were the initial costs (75%), maintenance costs (61%) and debt payments (51%) (Figure 13). Importantly, a lack of technical information or assistance was only cited by about one quarter of respondents, suggesting that additional information, outreach, or assistance are not key barriers for most farmers.

Cow welfare and farm profitability were the top decision-making factors reported by farmers

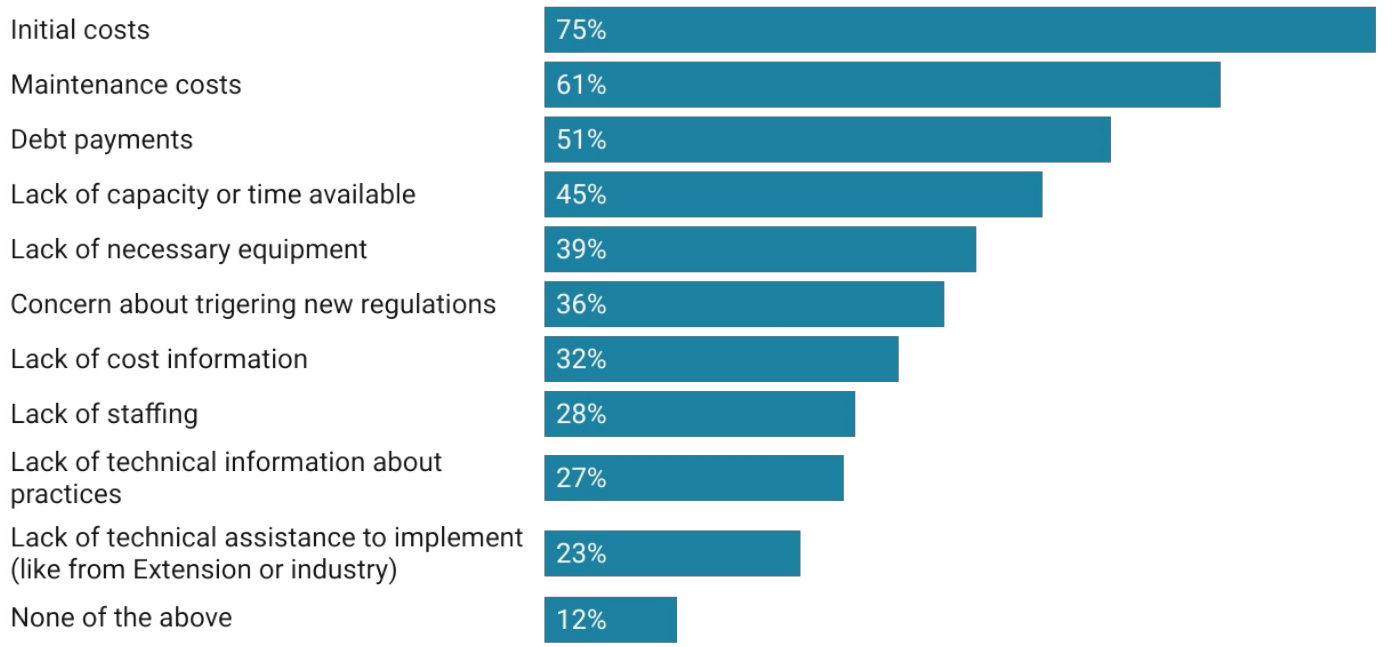


Figure 13. Perceived barriers to adopting climate-friendly management practices

Climate Change Perceptions and Concerns

The majority (83%) of farmer respondents indicated that climate change is occurring, with a mix of attributions for the causes of climate change (Figure 14).

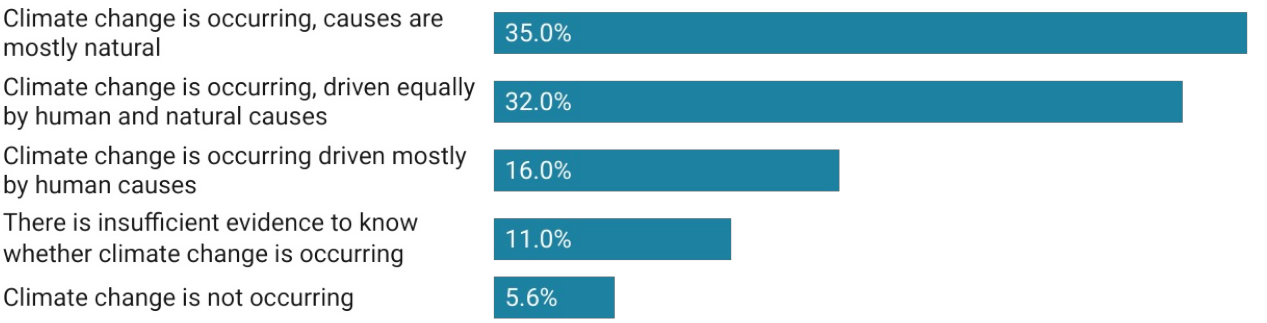


Figure 14. Dairy farmer beliefs about climate change

Nearly half of dairy farmer respondents (44%) reported noticing more variable or atypical weather in their area, though fewer farmers indicated that their farm or other dairy farms in their area were impacted by these changes (Figure 15).

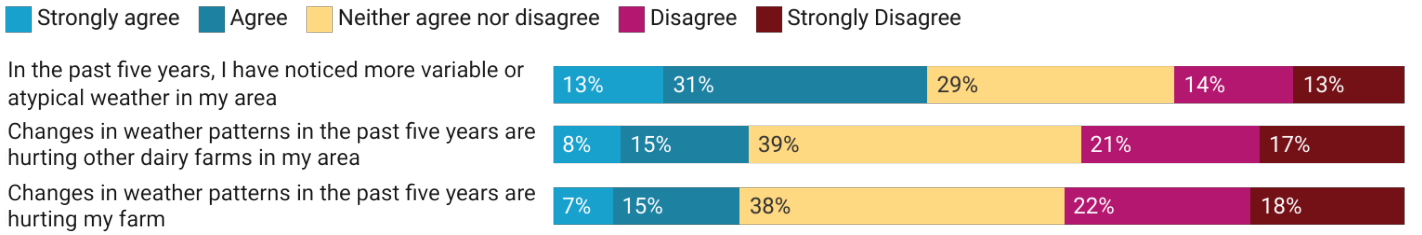


Figure 15. Dairy farmer experiences over past five years

Most respondents expressed neutrality or uncertainty about how future climate and weather impacts would affect aspects of their farm (Figure 16). However, over half of farmers believe climate change will negatively or very negatively impact feed costs for their farm, while 38% believe crop production will be negatively impacted, and 33% express concern about milk production.

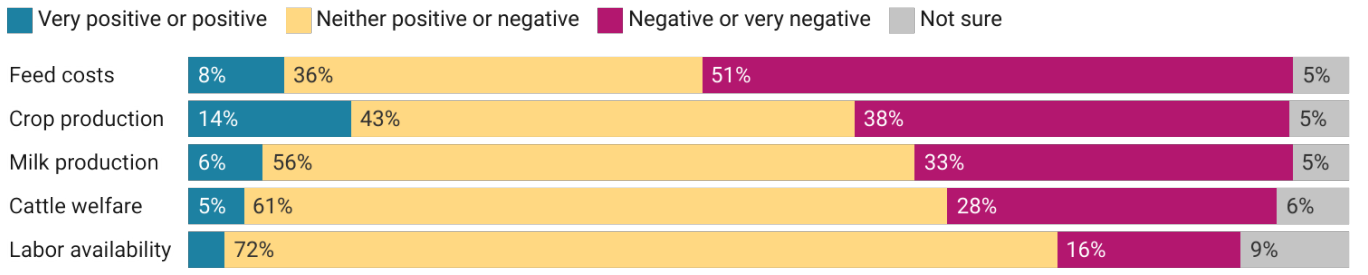


Figure 16. Anticipated impacts of climate change on dairy farming

Climate and Weather Variability Concerns by Region

In all regions but the West, dairy farmers had the greatest concern for longer dry periods and droughts, while dairy farmers in the West indicated that a lack of access to water was the primary weather impact of concern in the next decade. Other climate concerns include increased heavy precipitation events in the Great Lakes and Northeast regions, and increased pests or diseases in the Central West.

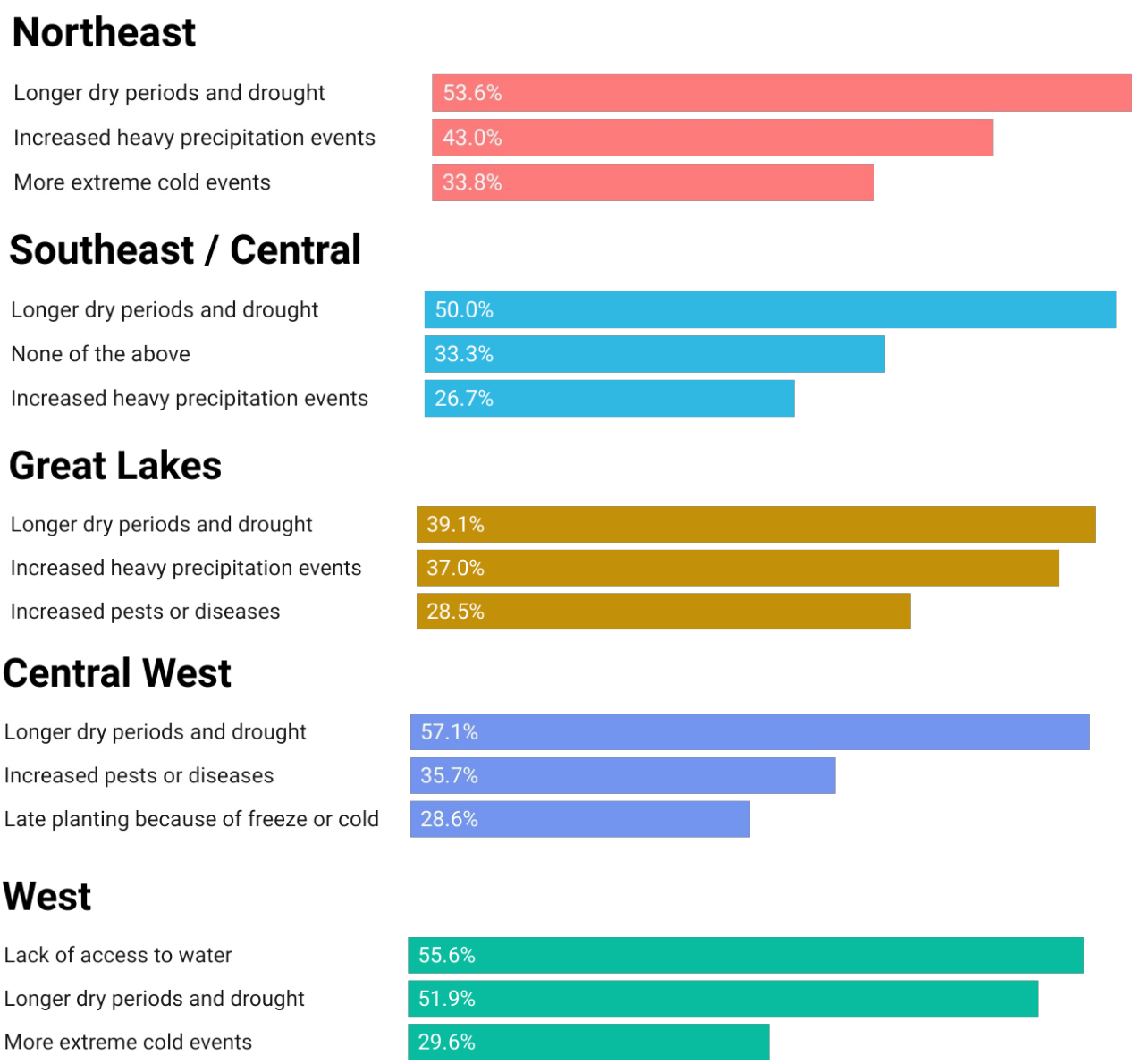


Figure 17. Top climate change and weather variability concerns, by region

Climate Communications

Dairy farmers indicated they primarily speak with animal nutritionists (67%), other farmers (62%), and veterinarians (53%) about adapting to changing weather and climate.

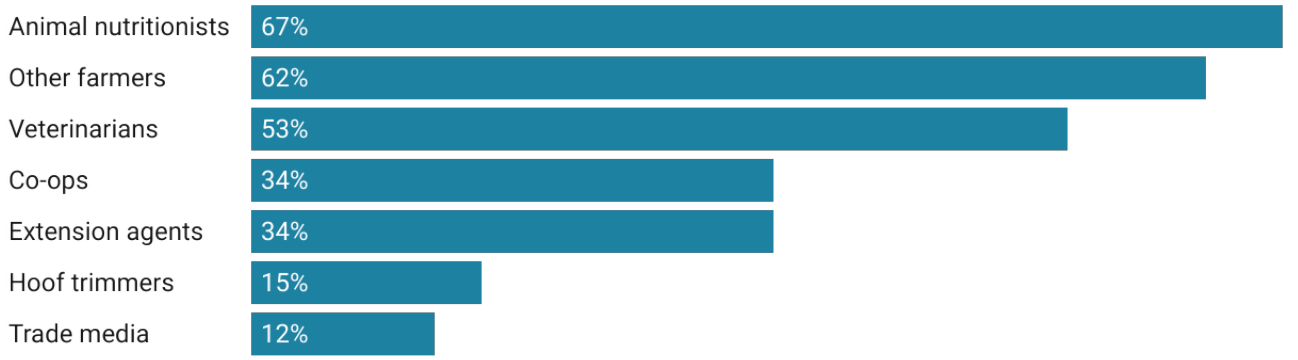


Figure 18. Networks that dairy farmers report speaking with about climate adaptation

With a growing number of terms used to describe farming in the recent past, respondents were asked to indicate what kinds of terms they use to describe their farm and hear other farmers using. Overall, the majority of farmers are not using the terms that are frequently used in communication about climate change and sustainable agriculture, with only 1/3 using any of the presented terms to describe their own farming practices, though 44% heard other farmers using such terms. "Sustainable agriculture" and "regenerative agriculture" were the most commonly used terms among respondents, while "sustainable agriculture", "carbon market", and "carbon farming" are among the most popular terms farmers heard used among other U.S. dairy farmers.

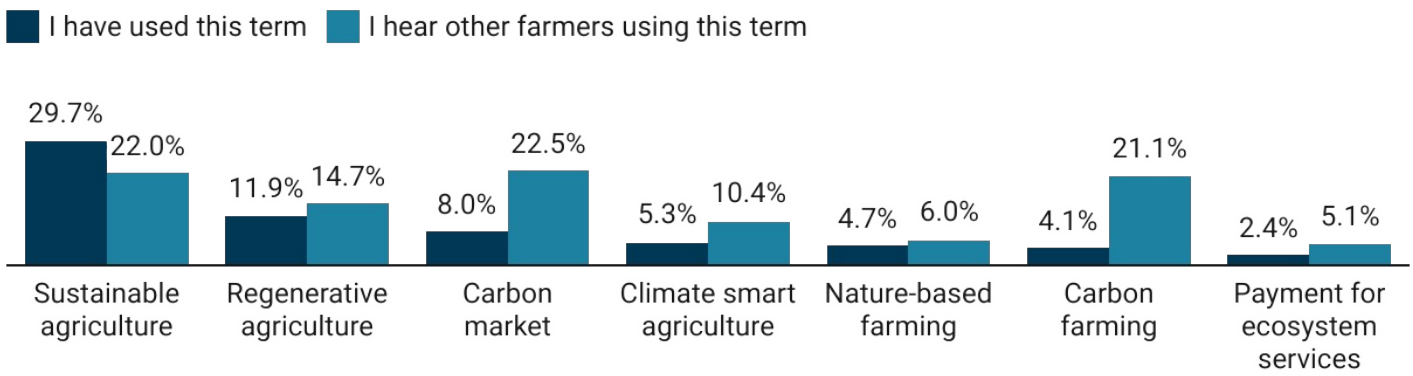


Figure 19. Terms used by dairy famers

Carbon Market Perceptions

With an evolving landscape of carbon market opportunities, farmers were asked about climate program perceptions. Overall, 82% of farmers may be open to climate programs that pay to reduce GHG emissions (i.e., payment for ecosystem services)- including those who are neutral or currently unsure (Figure 20). However, 66% feel they do not have enough information about these programs and 59% feel there is too much uncertainty about these programs. Lack of information and uncertainty, rather than cost and productivity worries, are areas to address for these programs.

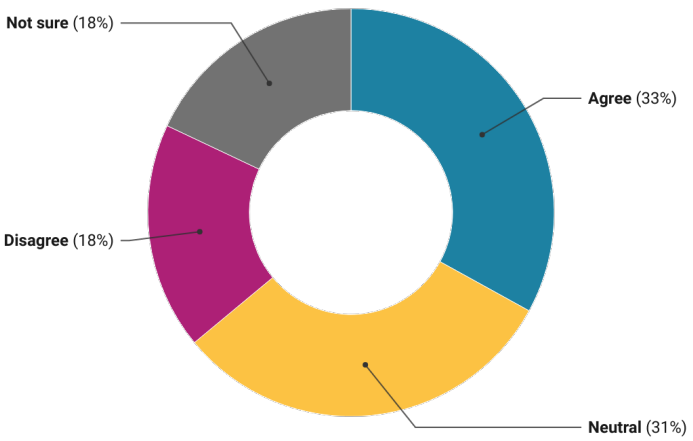


Figure 20. Respondent agreement with the statement, "I would like to participate in a program that pays me to reduce my greenhouse gas emissions."

The majority (82 %) of respondents may be open to carbon market programs

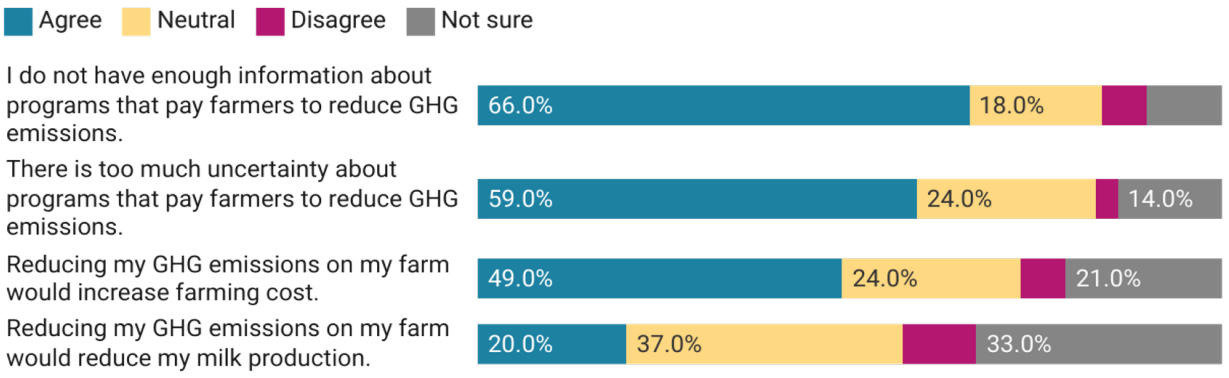


Figure 21. Perceptions around programs that pay to reduce emissions

Summary and Implications

Climate change is here, and dairy farmers are talking about- and acting upon- it. Many dairy farmers are already implementing climate adaptation and mitigation practices. On average farmers perceive land based strategies to be profitable and good for animal welfare, which might motivate them enough to adopt them without additional incentives or regulation. Conversely, animal-based and manure strategies are perceived to have higher climate benefits, but bigger impacts of profitability and animal welfare.

When considering the adoption of a new farming practice, farmers are equally driven by animal welfare and farm productivity. Barriers to adaptation and mitigation practices include upfront costs, maintenance costs and farm debt. Given that many existing programs and policies don't cover maintenance costs or consider debt, this is an area of improvement to further support farmers.

Most U.S. dairy farmers believe that climate change is occurring, and nearly half have experienced more variable or atypical weather in their area. Drought is a top climate concern among dairy farmers across the country, with increased heavy precipitation events and increased pests or diseases also notably on the minds of farmers. In the west, lack of water access is of concern to more than half of farmer respondents. Farmers are speaking with their peers, as well as animal nutritionists and veterinarians, about these concerns.

Climate programs, such as incentives to reduce GHG emissions, are of general interest to farmers. However, the majority feel that they do not have enough information about these programs and that there is too much uncertainty about these programs. Further outreach and education are needed to support farmers in overcoming these concerns and successfully engage with climate programs.

Climate practice investment

Animal welfare motivations

Not just initial costs

Climate change is here and farmers are talking

Climate program uncertainty

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