Assessing Forage Research and Education Needs of Organic Dairy Farms in the United States

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INTRODUCTION: Organic dairy farming has increased rapidly in the United States (US) over the past several decades, and the viability of these operations relies on forage production. The production of high-quality, high-yielding forage crops depends on optimal forage management and resilience to increasingly unpredictable climate.

In an effort to (1) assess current forage production practices and producer knowledge gaps and (2) identify forage research and educational needs of organic dairy and forage producers across the US, a survey was developed and distributed nationally in the fall of 2021. With the support of stakeholder focus groups, information on current organic forage production practices, weather impacts, and needs for research, information, education, and outreach was collected.

FARM DEMOGRAPHICS

Of the 643 organic dairy and forage producers across the US that received the survey, **165 responses** were collected (25.7% response rate). Geographically, the largest number of responses originated from organic dairy producers located in the northeastern region (57%), see **Figure 1**.

Demographically, 53% of the respondents self-identified as belonging to plain-sect communities. Nearly all (96.6%) of respondents were organic dairy farmers and 2.4% only produced organic forage.

The majority of respondents (89%) managed herds between 11 and 200 cows. A smaller percentage of respondents managed larger organic farms, with 6% of farms having 201 to 400 mature cows and 3% having more than 400 mature cows. Finally, the smallest herds ranging from 1 to 10 mature cows constituted just 1% of the total respondents.

Three focus groups were held virtually in the spring of 2021. Twenty-four stakeholders including organic dairy producers, Extension professionals, University researchers and staff, and other industry stakeholders from VT, NY, ME, VA, MT, and CA participated. Prior to the meetings, a short survey was sent to each participant. At the meetings, the results of the short survey were shared with participants to help prepare for and facilitate discussion. Meeting notes were compiled identifying the main themes regarding research priorities, educational needs, and resources necessary to overcome organic forage production challenges.

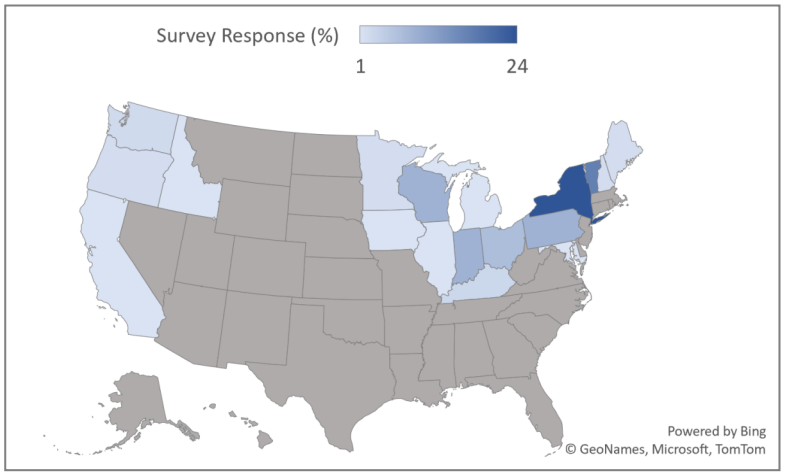


Figure 1. Distribution of survey response rate by State.

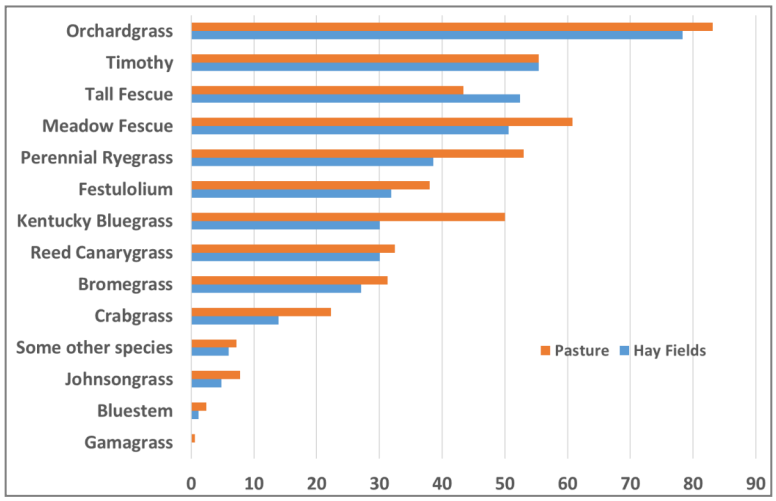


Figure 2. Most-cited grasses grown for hay and pasture.

LAND AND FORAGE MANAGEMENT

The amount of cropland owned by these producers ranged from 0 to 8706 acres with a median of 121 acres. Rented cropland ranged from 2.5 to 1999 acres with a median of 79 acres. As expected, farms managing larger herds tended to manage a larger number of acreage. The most widely grown grasses included orchardgrass (*Dactylis glomerata L*; 83%), meadow fescue (*Festuca pratensis*; 61%), timothy (*Phleum pratense*; 55%), perennial ryegrass (*Lolium perenne*; 53%), Kentucky bluegrass (*Poa pratensis*; 50%), and tall fescue (*Festuca arundinacea*; 43%) (**Figure 2**).

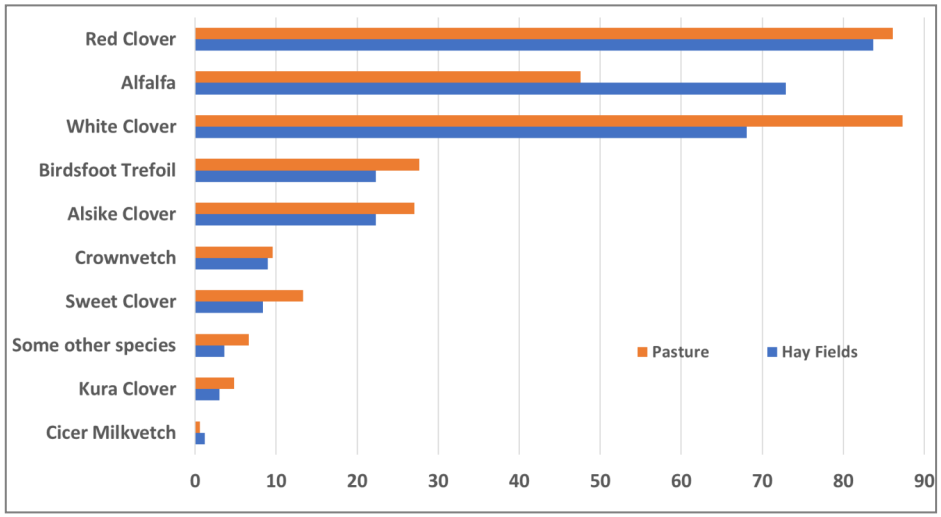


Figure 3. Most cited legumes grown for hay and pasture.

Farms were also growing legumes with the most popular being white clover (*Trifolium repens*; 87%), red clover (*Trifolium pratense*; 86 %), and alfalfa (*Medicago sativa*; 48%) (**Figure 3**).

Most forage was stored as wrapped bales (83%), while 63% was stored as dry bales in a building, and 35% was kept forage in upright silos. Seventy-nine percent of the producers segregated inventory of stored forages based on the quality. The majority of producers (68%) indicated that they never or very infrequently experience little loss in storage.

SATISFACTION WITH FORAGE PRODUCTION SYSTEMS

Overall, most respondents were somewhat or extremely satisfied with their forage production systems (**Figure 4**). However 20-33% of respondents indicated that they were extremely or somewhat dissatisfied with their weed control, irrigation system, and legume persistence. In addition, while over 40% of respondents felt their forage systems were somewhat enhancing milk production, cow body condition, and reproduction, 18% and 17% indicated their forage systems were severely or somewhat severely limiting milk production and farm income respectively.

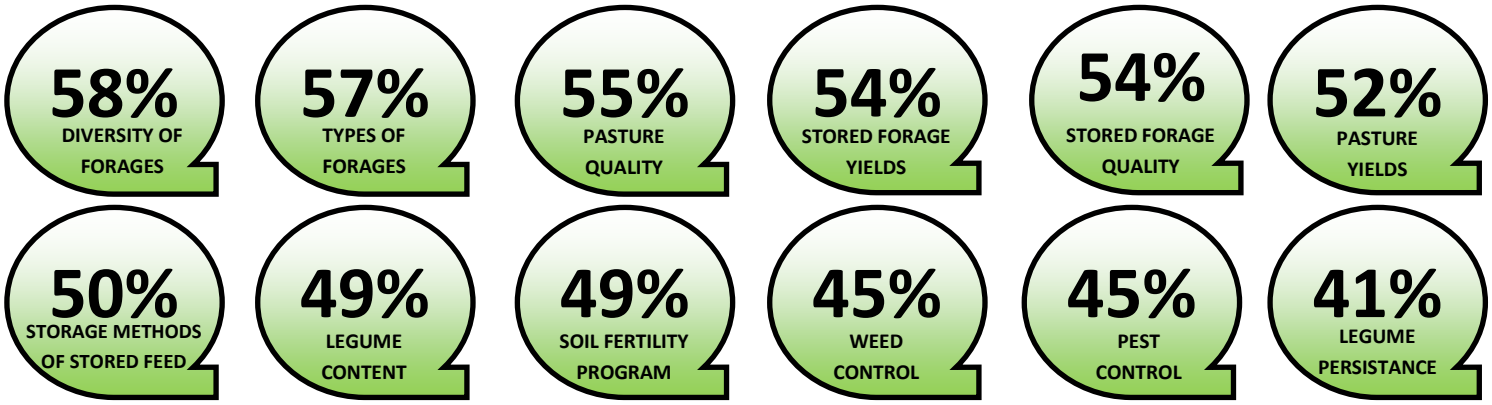


Figure 4. Percentage of respondents indicating they were somewhat or extremely satisfied with various aspects of their forage production systems.

FACTORS IMPACTING FORAGE SYSTEMS

Farmers were asked about primary factors that limit or enhance their forage production systems. The red arrow in **Figure 5** shows the most-cited impacts reported as somewhat and significantly limiting. Farmers also reported factors which enhance their forage systems, see green arrow in **Figure 5**. The impacts listed in the green arrow farmers reported as being somewhat and significantly enhancing. In addition to severe weather, farmers also experienced challenges associated with economics, labor, and water availability. Contrarily, other factors such as seed availability (49%), seed quality (52%), labor availability (40%), access to adequate water for irrigation (35%), storage type (53%), and customer operator availability (52%), were reported to be neither limiting nor enhancing by most producers.

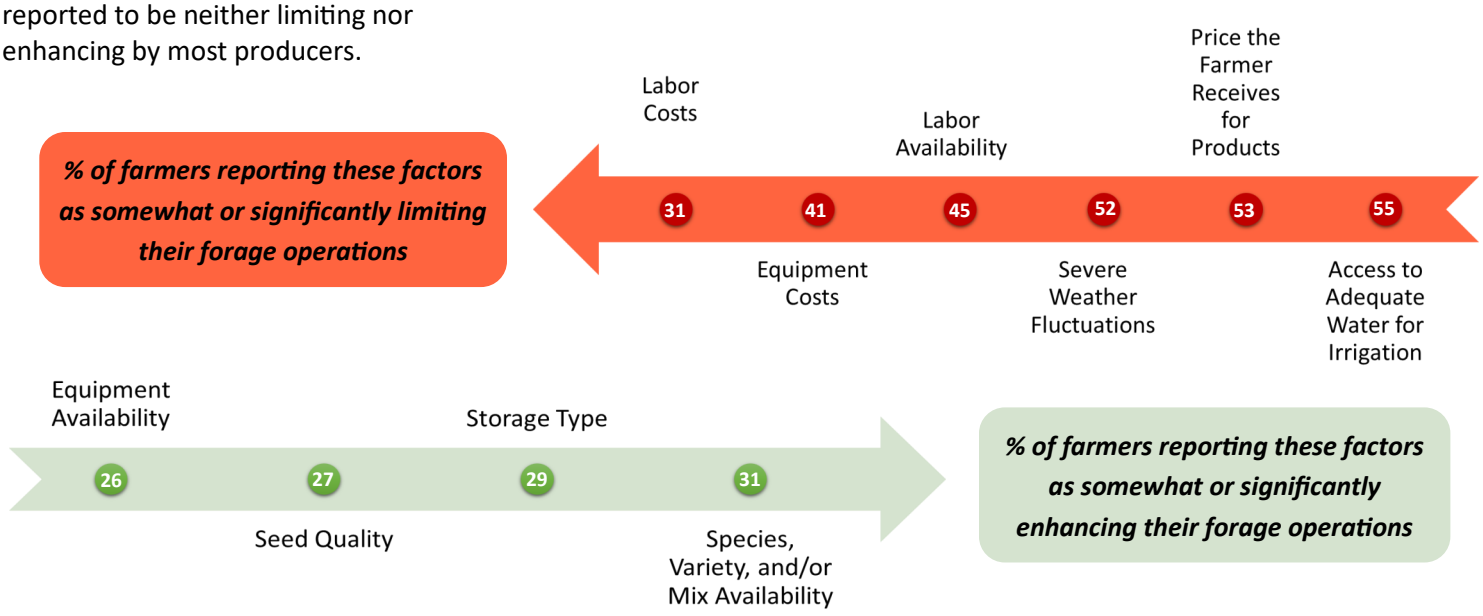


Figure 5. Most-cited factors farmers report as impacting their operation's forage program.

WEATHER-RELATED IMPACTS ON FORAGE SYSTEMS

Participants were asked how many years out of five did they experience weather-related impacts on their forage system (**Table 1**). Eighteen to twenty-one percent of producers indicated that at least half of the time they experienced drought stress, below average forage quality, below average forage yield, and unexpected harvest changes due to inclimate weather. Even given these weather -related issues, 80% of respondents indicated they never experienced difficulty meeting the organic standard minimum grazing season length or pasture intake requirements. The majority of respondents also indicated they never experienced significant disease or insect pressure.

Table 1. Ranking of weather-related impacts on farm's forage system by organic dairy producers surveyed in the fall of 2021.

Impacts	Never	At least half the time
Drought stress	3.2	19.0
Lower than average quality	3.8	17.8
Lower than average yields	5.0	17.7
Unexpected harvest changes due to inclement weather	5.2	21.0
Pasture availability challenges	17.8	12.6
Significant weed pressure	22.1	14.2
Winterkill	31.8	6.4
Significant insect pest pressure	57.0	2.0
Significant disease pressure	65.4	2.6
Can't meet minimum organic pasture intake requirement	82.4	7.2
Can't meet minimum organic pasture intake requirement	82.4	7.2
Can't meet minimum organic grazing season length	84.9	7.2

However, based on survey results producers may be adapting to these weather-related challenges through other strategies. As an example, 46% of respondents increase purchased forage, 36% increase purchased grain, 47% increase irrigation use, and 43% increase the acreage in the grazing system. Producers increasing irrigation use tended to be from the western region of the country. Regardless, the weather was pushing nearly half of the producers to expend more resources on purchased inputs to make up for poor yield and quality and this in-turn may very well be impacting the viability of organic dairy operations.

STRATEGIES TO MITIGATE WEATHER-RELATED IMPACTS ON OPERATION FORAGE SYSTEMS

In response to adverse weather conditions, 46% of respondents increase purchased forage, 36% increase purchased grain, 47% increase irrigation use, and 43% increase the acreage in the grazing system. Producers increasing irrigation use tended to be from the western region of the country.

Table 2. Self-perceived ranking by farmer of knowledge and/or resources as being lacking or sufficient in various topic areas.

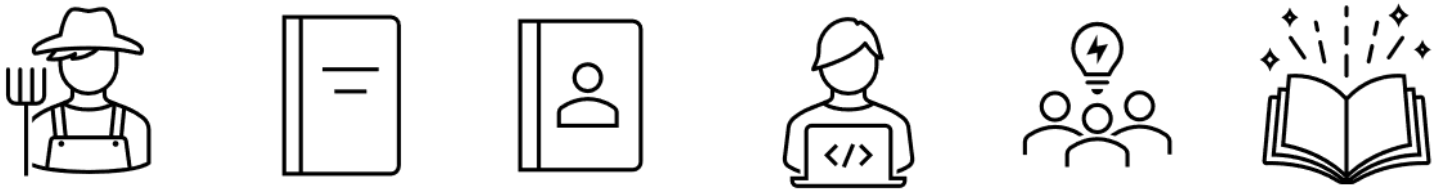
Topic Area of Skill	Lacking	Not Lacking
Balancing a high forage ration to optimize milk production	33.7	57.8
Calculating forage yields (tons per acre)	22.2	69.9
Calculating forage production costs	29.4	60.2
Identifying forage species	25.8	66.3
Interpreting forage testing results	24.6	62.7
Interpreting soil testing results	24.0	65.7
Managing grazing system to support soil & plant productivity	16.8	74.1
Maximizing forage dry matter intake	24.0	65.7
Selecting species/mixtures that suit needs	24.0	63.9
Irrigation system development/expansion	19.2	8.4
Selecting soil fertility amendments	33.7	53.0

SELF-PERCEIVED KNOWLEDGE LIMITING PRODUCERS' ABILITIES TO MEET FARM OPERATION GOALS

Respondents were also asked to identify knowledge and resource gaps that were limiting their ability to meet their farm goals (**Table 2**). In most categories, over 50% of respondents felt knowledge and resources were not limiting their ability to meet farm goals. However, over 33% of respondents indicated they were lacking knowledge and/or the resources to balance high-forage rations and maintain soil fertility.

PRODUCER INFORMATION RESOURCES FOR SUPPORTING FORAGE PROGRAM DECISION-MAKING

Over 50% of survey respondents indicated they use other farmer's experiences and grazing plans to help make decisions in their forage systems (**Figure 6**). Nutrient management plans, nutritionists, and farmer publications were also frequently consulted. Interestingly, 31% said they never utilize crop consultants, 28% never use organic educational organizations, and 26% never consult local research data/reports.



54% Other Producer Experiences

54% Grazing Plan

43% Nutrient Management Plan

42% Nutritionists

39% Farmer Publications

37% Seed Company Catalogs

Figure 6. Percentage of various types of resources used by producers to gather forage-related information.

INFORMATION, KNOWLEDGE, OR SKILLS NEEDED TO IMPROVE FORAGE PRODUCTION AND MANAGEMENT

Survey respondents indicated a desire to build knowledge and skills on renovating and establishing forages especially with minimal or no soil disturbance (**Figure 7**). Related to this topic, producers also needed information on equipment options and sources to implement these reduced tillage strategies. In addition, information on forage species, varieties, and mixtures that are versatile, resilient, and adaptability to various soil types was deemed critical by respondents. Furthermore, soil fertility and nutrient management strategies including managing and applying micronutrients effectively and selecting cost-effective fertility amendments were also identified as areas to build knowledge and skills.

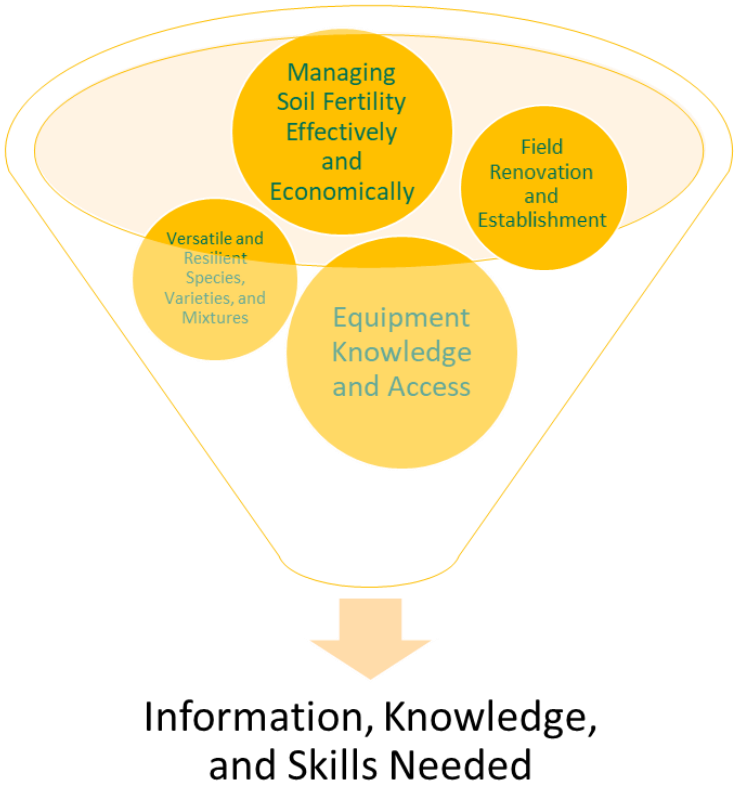


Figure 7. Areas survey respondents indicated they need skills.

FORAGE RESEARCH AND EDUCATION NEEDS

Among important topics of forage research and education needs, the focus groups identified four major research areas: climate change resilience, forage quality, forage selection, and economics. (**Figure 8**).

Focus group attendees highlighted the need to provide education on water and nutrient-use efficiency of forages, research on forage species and varieties with resistance to pests, drought, heat, and winter cold tolerance as critical topics. Focus group participants also expressed a need to identify forage mixtures to increase yields and carbon sequestration, or to mitigate greenhouse gas emissions. Research and education focused on strategies to enhance quality including energy, sugar types, minerals, non-starch carbohydrates, and pectins in forages was identified as a high priority. Evaluation of fiber digestibility and its relation to volatile fatty acid (i.e., acetate)

production and absorption versus milk and component yields were identified as research areas of interest. Research focused on harvest timing for optimum nutrient content and quality, forage storage options and strategies, forage inventory management, and nutrient management is also needed.

Participants expressed the need to have expanded evaluation of forage species, variety, and mixtures under a wide variety of environments to meet the need of organic dairy producers throughout the U.S. The need for expanded forage breeding programs to focus on developing varieties adapted to a changing climate was critical. Producers are looking for forage characteristics to build climate resilience related to issues of persistence, drought and heat tolerance, and winter survival. Some of these needs can be addressed through education with currently existing informational resources and through breeding and other research to address gaps.

Research is needed on legumes for grazing, persistent perennial ryegrass, corn that has a gametophyte factor to prevent cross pollination with transgenic varieties, late maturity forages, and the subsequent effects on nutrient content and digestibility.

The final research and education need identified related to economic returns from soil fertility/soil health strategies and field renovation. There are significant costs associated with maintaining soil fertility and reseeding fields, but limited research is available on the economic returns of those efforts.

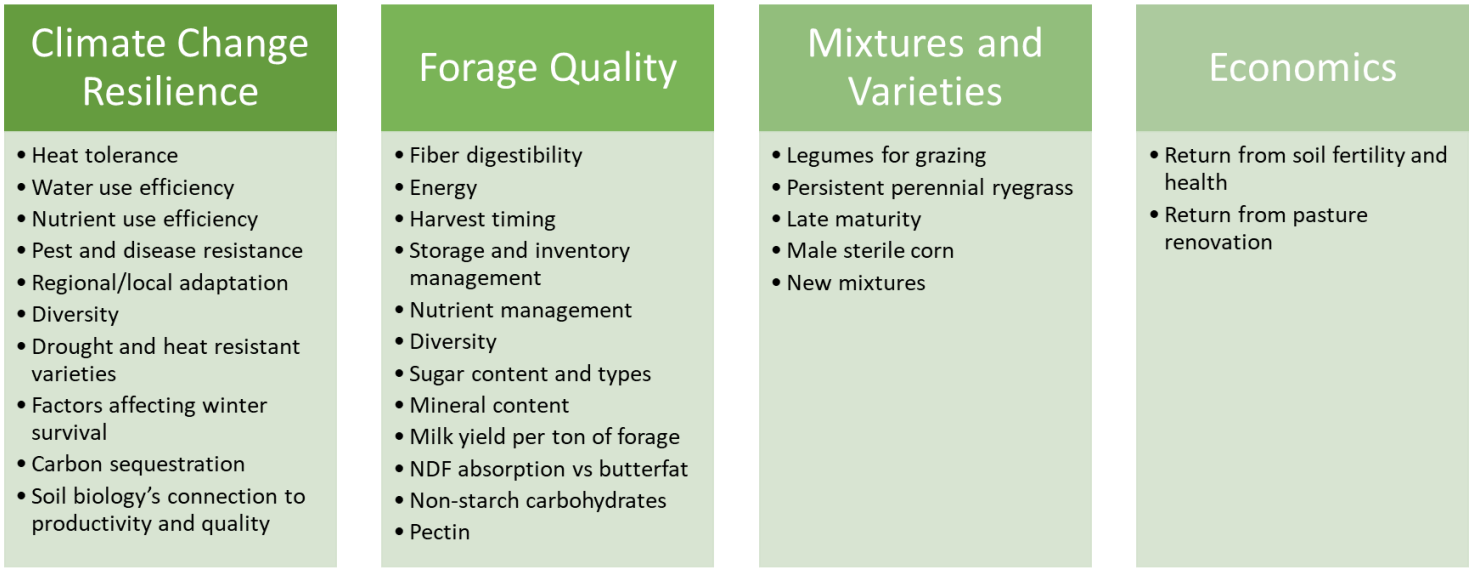


Figure 8. Research topics respondents identify as most critical to them at this time or that they are most excited by.

CONCLUSION

Production of high yield and quality forages is critical to the sustainability of organic dairy farms, especially with the ongoing erratic weather conditions. The results of this survey and the focus groups provided insights on current forage production practices and management, factors affecting forage operations, and effects of climate on forage systems. Knowledge gaps and skills needed by organic dairy and forage producers were identified and can be used for developing effective educational and outreach programs to create resilience in organic forage production. Results from these efforts identified these most critical areas of research and education: climate resilience, forage quality, economic viability, and versatile, adaptive forage options. Continuing these efforts to create and disseminate this critical information in coordination with the organic forage and dairy communities is integral to the viability of these industries into the future.

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