Factors Affecting Goat Dairy Milk Quality in Vermont

FBRR 078 - 5/26

University of Vermont Extension

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Contents

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Introduction

North America is the second largest goat dairy market in the world (Atlantic Corporation, 2023) and the US market for goat milk and cheese has seen slow, steady growth (AgMarketing Resource Center, 2026). With an agricultural economy oriented towards dairy, declining cow dairy farms and a climate favorable to forage production, Vermont farmers, businesses and agricultural agencies have seen opportunities to expand goat dairies in the state and region. The Northeast Dairy Business Innovation Center has funded several studies on the potential for goat dairies, including a 2023 project led by the University of Vermont to investigate the opportunities and challenges related to the expansion of the dairy goat sector in Vermont and regionally, including the potential for growing bulk fluid goat milk production. That study also investigated the technical assistance needs of Vermont's goat dairy producers. This project builds on that project by seeking to directly address the need for technical assistance to support milk quality improvements in Vermont and build regional networks in the Northeast to share information supportive of the goat dairy sector. This paper reports on the progress of the following objectives:

Conduct a goat dairy management survey to determine best practices and herd management benchmarks. Specifically, the report addresses the following sub-objectives:

- Complete interviews with goat dairies in VT who have not yet participated in the "2023 Vermont Goat Dairy Research Report: Understanding the Challenges & Opportunities of an Expanding Dairy Goat Sector in Vermont" and engage with prior respondents if the topics evolve.

- Work with the University of Maine and/or the Agency of Agriculture to determine if there is a goat dairy database and investigate if a short survey in Maine is feasible.

- Conduct a management questionnaire with goat dairy farms participating in the QMPS testing services.

- Analyze milk testing results and integrate the management questionnaire results into the milk testing data. Investigate trends and publish a Milk Quality and Management Report.

The goat dairy industry in Vermont covers a wide range of scales and products. This project reached out to the 34 Grade-A goat dairy farms in the state. Eleven of these farms ship fluid milk to a processor as their primary source of revenue. The remaining 23 farms are farmstead creameries that process their own milk in on-farm plants into products including cheese, yogurt, kefir, bottled milk, and other value-added products.

This project included interviews with both farmstead creameries and bulk goat milk producers, a summary of the results and findings from on-farm audits conducted by Cornell's Quality Milk Production Services (QMPS), and findings from regional meetings organized by the project team. Interviews and milk quality audits reported here have removed identifiers to protect the confidentiality of participating farms. The team thanks those farmers for sharing their perspectives and allowing us to learn more about their production practices.

Key Findings and Recommendations

Importance of water quality testing on milk quality.

- Water quality and availability emerged as critical factors, particularly the widespread presence of *Pseudomonas,* which was identified on six of the nine farms that received water testing. The presence of *Pseudomonas* is of significant concern, as it can survive pasteurization and can reduce the shelf life and quality of finished dairy products. Many of these challenges could be addressed through relatively low-cost adjustments. However, some of the identified issues require larger system upgrades, such as new equipment, which could present a barrier for some farms.

- Expanding water quality testing for *Pseudomonas* is recommended.

- Encouraging farmers to shock wells with chlorine is recommended as an initial, low-cost control strategy

- Guidance and training for maintaining and adjusting equipment for goat dairies.

- Unlike cow dairies, goat dairies lack standardized milking equipment settings and evidence-based protocols for many routine practices, leaving producers reliant on guidance developed for other species. Addressing these gaps through targeted research, updated industry standards, and expanded extension programming will be essential for supporting the long-term viability and competitiveness of the Vermont goat dairy sector.

- Proper equipment maintenance was identified in the audits as a critical issue, as optimally functioning milking units can significantly impact both milk quality and overall milking efficiency. Notably, many of the identified issues could be addressed through low-cost interventions, presenting opportunities for meaningful improvements in udder health and milk quality with minimal financial investment. A key finding was the lack of small ruminant-specific guidance, particularly regarding optimal pulsation rates and the need for lag time between udder stimulation and unit attachment.

- Milking equipment issues relate to the function and calibration of the mechanical systems used to harvest milk, including vacuum pressure, pulsation, and system capacity. The most prevalent issues found included incorrect vacuum pressure, faulty pulsators, and insufficient pump capacity. Improperly functioning or calibrated equipment can contribute to teat end damage, increasing the risk of mastitis and reduced milk quality.

Improvements to milking routines and protocols have potential to improve milk quality and improve efficiency for many farms.

- Milking routine was a priority identified across participating farms. This encompasses the procedures and protocols followed by farm personnel during milk harvest, which play a critical role in maintaining udder health and milk quality. Prevalent issues identified in audits included inconsistency in routine execution, inadequate teat end cleanliness, and insufficient post-dip coverage.

Goat dairies have expanded their herd size over the past 5 years, and bulk producers plan to continue to expand.

- Over the past 5 years, 75% of the 16 farms interviewed had increased the size of their herd. This included 8 of the 9 bulk producers and 4 of the 7 farmstead producers. Looking forward, bulk producers plan to continue expanding, likely because they have an in-state buyer explicitly asking for more milk, with incentives for more milk in the fall and winter. The incentive for growth has slowed slightly among the farmstead producers interviewed, with 4 out of 7 expecting to maintain their current herd levels and only 2 are planning to expand.

Higher levels of milk production among farmstead producers point to opportunities for increased production among bulk producers.

- The average annual amount of milk produced per lactating doe varied significantly between farms. Average annual milk production per doe on farms producing bulk milk was 1,673 lbs per doe per year. In contrast, the average annual milk production of farmstead producers was 2,681 per doe per year. Future research should examine the factors that lead to these large differences in annual production between farmstead and bulk milk producers. Reported protein counts showed little difference between the two groups despite the difference in total production.

Extended lactation is a management practice that has been adopted by farms and additional managers are interested in adopting this practice.

- Currently half of all farms interviewed manage extended lactations. Average lactation cycles were not significantly different between bulk milk producers and those with farmstead creameries. Farms that have adopted extended lactations reported several benefits, including easier management of kidding and lower labor costs. Several farms that have not adopted cited appreciation for the break in milking offered by conventional lactation cycles. Opportunities exist to expand education in the costs and benefits of this management strategy.

- There is strong interest in additional targeted educational opportunities. Both farmstead and bulk milk producers expressed strong interest in animal health and nutrition educational opportunities. Bulk milk producers have a high level of interest in education on goat genetics.

Bucklings remain a common stressor due to limited market access for selling them.

- Managing excess bucklings is very stressful or stressful to half of producers interviewed. Among the 15 farms who responded to this question, only half had a "reliable" market, and one of those producers added the additional context that they don't have a reliable "single" buyer, but rather, they have found a way to consistently sell their bucklings. Assisting producers in identifying meat goat markets could lower the stress associated with buckling management and improve farm economics.

- Developing improved buckling rearing, hauling or processing capacity serving Vermont farms could further expand market opportunities.

Farmers and service providers both describe a need for more service providers with specific knowledge of small ruminant dairy and commercial production practices. Industry professionals described a lack of trained service providers and research for goat dairy production. Currently small ruminant dairy research lags behind that of other agricultural industries, such as cow dairy.

- Responses to the Needs Assessment Survey indicate that small ruminant dairy nutritionists and breeding specialists are among the top services that farmers need but cannot access. More research is needed to inform these service providers, provide benchmarking, and describe best practices.

Producer Interviews

Methods

The sampling frame for this study was all 34 Grade A commercial dairy goat farms in the state of Vermont. A database of dairy goat farms was obtained from the Vermont Department of Agriculture and augmented with knowledge of the research team. Farmers were invited to join the study through emails, direct invitations and recruitment phone calls. Participants were offered the opportunity for free milk quality assessments. Seventeen farms were enrolled in the project and 16 farms completed an interview.

The initial project registration form included questions about the farm business. After acceptance into the program, project specialists interviewed participants and entered the data into the UVM licensed Qualtrics cloud-based software program. Participating farmers were interviewed between April and September 2025. On-farm parlor audits and milk testing by Dr. Paul Virkler of Cornell's Quality Milk Production Services (QMPS) were conducted between December 2024–August 2025, and follow-up visits were held between January and September 2025 to discuss the results.

Producers were categorized as "bulk milk producers" and "farmstead producers" to understand

the needs of dairy goat farms selling to different markets. Bulk milk producers are defined as farms that sell raw fluid milk to a processor as their primary source of revenue. Farmstead producers are defined as farms that process their milk into value added products in on-farm processing plants. Farmstead producers primarily produce cheese but also include farm businesses that produce other dairy products.

Interviews were conducted with nine bulk milk producers and seven farmstead producers. One bulk milk producer had a milk quality assessment conducted but was not interviewed and one bulk milk producer was interviewed but did not have an on-farm assessment. Five farms were interviewed that had not participated in the 2023 "Understanding the Challenges & Opportunities of an Expanding Dairy Goat Sector in Vermont" project.

Findings

Farm Business Demographics

Goat dairy farms included in this project included farms that have been in business for up to a quarter of a century and those that have started in recent years. Bulk milk producers have been in business a median of 7 years, with a range from 2 to 19 years in business. Farmstead producers interviewed began their operations as recently as 3 years ago to as long ago as 25 years, with a median business duration of 10 years.

All farmstead producers own their own barn and facilities, while bulk milk producers were more varied, with 4 owning their own facilities, 2 farms both renting and owning, and 3 fully renting. Bulk milk producers were about evenly split between those who grow all their own feed and those who purchase all their feed, with about 4 farms in each category and 1 growing some and purchasing some. None of the farmstead producers interviewed grew all their feed, with 5 of 7 growing some and purchasing some, and 2 farms purchasing all their feed.

In Vermont there is only one large buyer of bulk goat milk, Vermont Creamery, and all bulk milk producers in this project ship to this processor. Farmstead producers are more varied in their products. All seven farmsteads produced some cheese, ranging from 10% to 100% of their sales, with a mode of 70%. Other products included one farm that bottles its own milk, two who sell raw milk, three that make soap, one that earns 10% from sales of goat meat, one that makes a fermented product (kefir), and one that sells cajeta (confection).

Farm Scale and Employment

While bulk milk producers have considerably larger herds, the labor-intensive value-added work of farmstead producers requires more labor. The result is that differences of employment between the two sub-sectors are minimal. Bulk milk producers employed an average of 4 people including themselves (median = 4, range 1–8), compared to farmstead producers who employed an average of 4 people including themselves (median = 4, range 2–9). All farms employed at least one family member full time, and 6 farms employed 1–2 family members part time. Four farms employed at least one non-family member full time, and 11 farms employed between 1 and 4 non-family members part-time. In total, the 16 farms interviewed provided 65 full and part-time positions.

Among 13 farms that reported wages, farmsteads paid workers more per hour than bulk milk producers, from a per farm average low of $18.80 per hour to an average high of $24.60 per hour. In comparison, bulk milk producers paid between an average low of $15.63 and average high wage of $17.50 hourly.

In addition to wages, 31% of farms provided employees with housing, 46% did not, and 23 provide housing sometimes (n=13). Additional non-wage benefits included 5 farms that provided farm products, 2 farms that included 3 to 7 days paid time off, as well as a range of benefits reported just once among the farms that included everything from use of a vehicle, gas stipend, garden space, gym membership and a retirement account.

Herd Characteristics

Nearly all farms began their herds with goats sourced from within Vermont, with only 2 bulk

milk producers beginning with goats from out of state. Most farms also brought in goats from other states, including 78% of bulk milk farms (n=9) and 57% of farmstead producers (n=7). Only three farms import semen from abroad, including 2 bulk milk producers and 1 farmstead producer. The majority of producers now manage a closed herd, with a slightly greater percentage of farmstead producers achieving this. Farmers' definitions of closed herds may differ, however, as some farms may consider their herds closed as long as they don't bring in adults but may still bring in breeding bucks or raise bucklings for breeding, purchased from other producers. Goat breeds differ between the two sub-sectors. Bulk milk producers favor the Saanen breed, while farmsteads tend toward Alpine goats. Bulk milk farms have a mix of breeds, while 3 out of 7 farmsteads have herds made up entirely of Alpines.

Herds on farms producing bulk milk were significantly larger than those for farmsteads. Total herd sizes for bulk milk producers ranged from 233 to 1,520 goats. In addition, the majority, 89% (n=9) have increased their herd size over the past 5 years. Several respondents indicated that they intend to continue expanding, citing financial reasons as the motivation. One farmer said "My herd is growing in order to stay in business and reach financial viability." Several others noted that they wanted to increase their herd size in order to fully utilize existing capacity. For example, one producer responded that they needed to add animals to "increase profitability and to maximize current facilities."

In contrast, farmstead producers engaged in the project had much smaller herds and only 4 out of 7 had grown their herd in the past 5 years. Herd sizes for these farmstead operations ranged from 24 to 504 goats. Farmsteads that increased their herd reported doing so to meet market demand for their products.

Bulk milk producers and farmstead producers also differed in the timelines of their kidding seasons. Nearly all farmstead producers kid in the Spring, with the one outlier being the farmstead producer selling bottled milk. Bulk milk producers had a significantly greater percentage of producers kidding in the fall and winter, largely driven by price incentives offered by the buyer for milk produced in late fall and winter. In addition, spread-

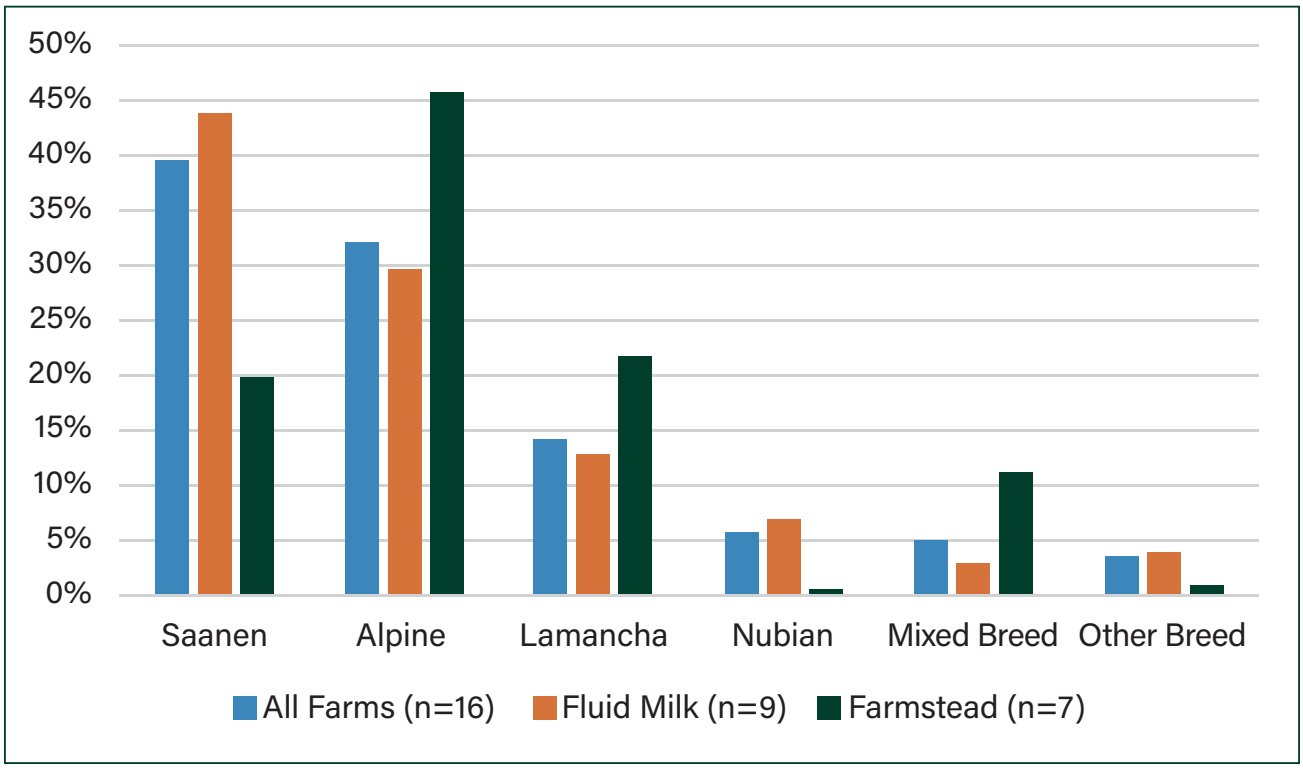

Figure 1: Goat dairy breeds present on Vermont farms

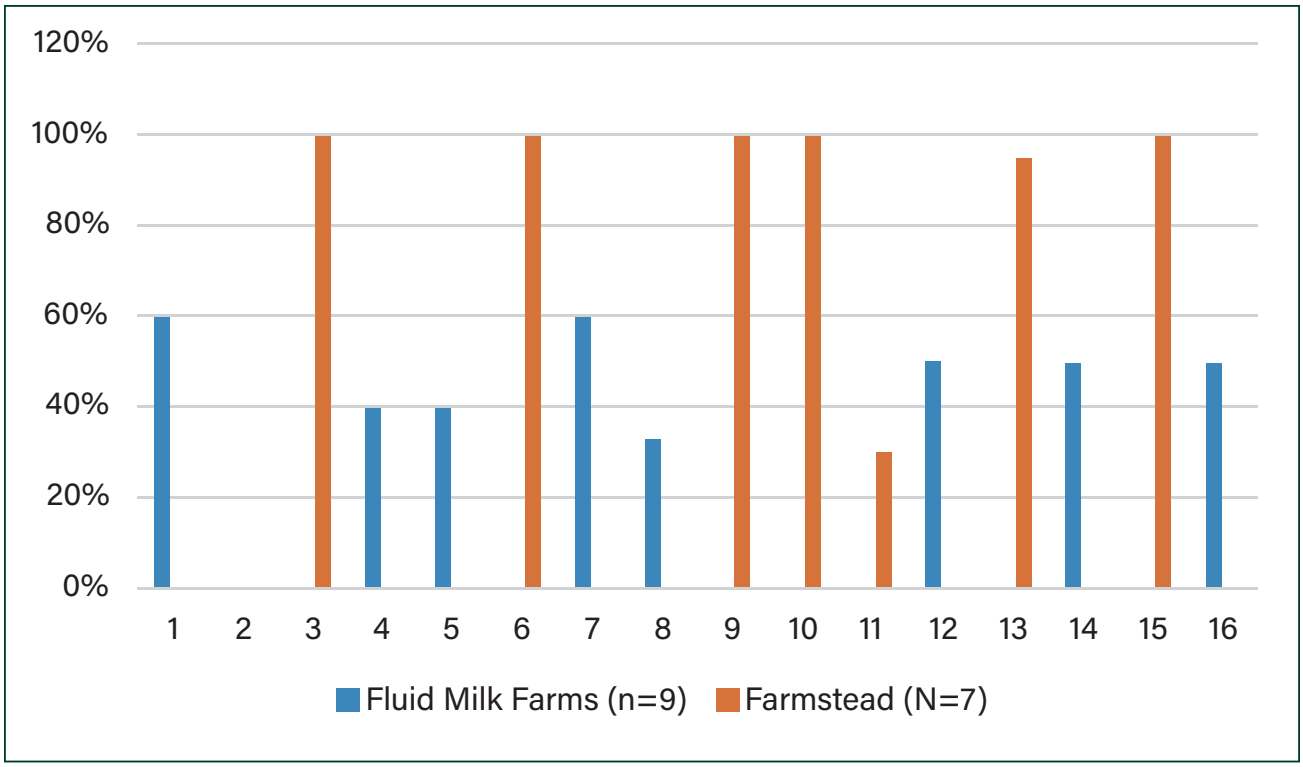

Figure 2: Percentage of springtime herd kidding on Vermont goat dairies

ing out kidding also helps manage the workload for these farms with larger herds.

Further driving change in kidding seasons is the increased number of farms adopting extended lactations as a management strategy. Currently half of all farms interviewed manage for extended lactations: 5 out of 9 bulk milk producers and 3 out of 7 farmstead producers. Average lactation cycles were not significantly different between the two sub-sectors, with bulk milk farms reporting an average of 418-day lactations and farmstead producers 405-day lactations, on average. In addition, several additional farms are considering adopting the practice. Farms that have adopted extended lactations reported several benefits, including easier management of kidding and lower labor costs. Conversely, two farms that have not adopted note that they value the break in milking on a more conventional lactation cycle. One farm was concerned about lowered milk quality if they moved to a longer lactation cycle.

Production

The average annual amount of milk produced per goat varied significantly between farms. Overall, the highest producing farm was a farmstead with a reported 3,777 lb of milk per year, and the lowest was a bulk milk producer reporting 1,220 lb average per year. Despite the significant difference in volume, protein counts were similar between the two types of producers. A caveat to the reported amount of milk produced per goat is that while all but one farmstead producer kept production records, nearly half (4 of 9), bulk milk producers responded that they did not maintain production data at a per goat, annualized level. Instead, these producers track production at the herd level and estimate daily and/or per doe production using data provided by their milk buyer from twice weekly milk pickups.

Technical advisors and consultants also noted several additional considerations when reviewing production levels. One outside consultant considers an annual threshold of 2,300 lbs per doe per year to be the target for a profitable farm. Technical consultants on the project team consider 6 lbs per doe per day to be a profitable target for bulk milk goat milk producers, amounting to about 2,000 lbs per doe per year. In addition, one team consultant

	Avg Annual Milk Production Per Doe (lbs)	Average Protein Percentage
Bulk Milk Producers	1,673	3.05
Farmstead Producers	2,681	3.05

Table 1: Milk Production and Protein Levels

notes that considering production alone may not be a good indicator of profitability and suggests alternative metrics, such as income over feed costs and pounds of milk produced over feed costs. Additional variations between operations including, but not limited to, labor costs, mortgage/rent and debt expenses also need to be considered when determining profitable production targets.

Future research should examine the factors that lead to large differences in annual production between farmstead and bulk milk producers. Project team technical advisors theorize that the difference in production between farmstead and bulk producers could be related to factors including differences in goat housing density, hay quality, culling rates, the number of replacement does raised, and attention given to genetics. The impact of feed quantity and quality on profitability could also be an area for future study. Notably, despite the difference in total production, reported protein counts showed little difference between the two groups.

Seven bulk milk producers divide their herd into milking groups, as did 2 farmsteads, both of whom sell bottled fluid milk. Farms that divided their milkers had between 2 and 5 groups. Reasons given for dividing herds into groups included distinguishing between:

- Stage of lactation (several farms utilizing extended lactation tended to have more groupings)
- High and low somatic cell count groups
- CAE status breeding groups

Culling

Cull rates among farms interviewed for this project ranged from as little as 2% to as much as 25%. Nearly all producers reported low production as the primary reason for culling, with the other two respondents reporting production adjacent issues, e.g. age or udder morphology. Secondary issues included health issues, age, or disease. Several farms that were expanding their herds had low cull rates as they sought to add goats. Some farms that had expanded over the previous 5 years were currently culling at high rates as they evaluated which goats to keep and which to let go. As one farmer noted, "the first objective is to fill the barn and the second is to cull to improve the herd."

	Bulk Milk Producers (n=9)	Farmstead Producers (n=7)
Milkers	3.00	3.94
Dry Goats	0.78	1.59
Kids	0.79	1.18

Table 2: Mean amount of grain fed (pounds)

Technical advisors on this study theorize that financial limitations among some bulk milk producers to cull low producing animals at the same rate as farmstead producers may be one of the key factors dragging down production volume for the bulk producers as a group.

Disease Management and Biosecurity

Disease has had a significant impact on 8 of 16 farms interviewed, including two-thirds of bulk milk producers. All 9 bulk milk producers reported managing to control disease, as did nearly three-quarters of farmstead producers. Several farms are managing Caprine Arthritis and Encephalitis (CAE) in their herd, and others mentioned having Caseous lymphadenitis (CL), *Staphylococcus aureus,* and Johne's disease. Among those farms that responded that they weren't managing for "disease", farmers noted that they were managing herd health issues such as listeria or parasites.

Disease has led to increased cull rates, higher mortality rates, and lowered production. In addition to culling suspect animals, farmers are managing disease by employing formal CAE and Johne's testing and disease eradication programs, vaccination, using dewormers, isolating sick animals, rotating pasture, having a closed herd, and employing strict biosecurity practices. Increased mortality was reported to be a problem by 7 out of 16 farms, with the majority on bulk milk farms, with only 1 farmstead reporting issues with high mortality. It was not clear from the interviews whether all farms were measuring mortality using the same metric, e.g. whether they included only those kids born alive in their assessment. Future research could clarify this issue.

To control disease all but three farms reporting employing biosecurity measures. These included maintaining a closed herd, restricting access to the farm, and wearing disposable boot covers, washing boots with cleaning solution, and wearing clean clothes.

Milk Quality Testing & Management

Nearly all farms interviewed submit milk samples for testing to some extent, though only 6 submit samples to a commercial service and two send samples to the state milk quality laboratory. Bulk milk producers receive testing from their buyer as part of their contract which provides somatic cell counts (SCC), preliminary incubation (PI), lab pasteurization count (LPC), standard plate count (SPC) and component data. Four farms that do use a commercial facility test through the Dairy Herd Improvement Association (DHIA) and two farms test through Dairy One. Cost was the primary reason reported for not using a commercial service. Other reasons included lack of trust in the accuracy of results and difficulty finding a service with the necessary equipment to test large herds. Farms that utilized commercial services did so primarily to track SCC and mastitis in their herd.

Seven farms manage high SCC with individual sampling to identify the high SCC milkers, and another four utilize their veterinarian to help address high SCC. Nine farms managed PI counts by consulting with IBA, Inc. or other dairy supply companies.

More than two-thirds of farms interviewed received some past technical assistance with milk quality concerns. This included more than three-quarters of the 9 bulk milk producers and more than half of farmstead producers.

Technical Assistance & Training Needs

Farmers were asked to rank their interest in several training options. The rankings were similar between bulk milk and farmstead producers, with the exception of interest in genetics and breeding, which was significantly different with much greater interest from bulk milk producers. "Animal Health & Care" and "Animal Nutrition & Feeding" were most commonly requested. There was a low level of interest in "Milking Parlor and Barn Design", perhaps because farmers perceive changes to their parlor as financially out of reach. Notably, as discussed in the findings from the milking parlor audit section later in this paper, relatively low-cost changes to parlor operations can have a substantial impact on milk quality and efficiency. Technical advisors also noted that all parlors will need significant upgrades at some point and learning

about parlor options can help producers understand the benefits as they consider future plans. Offering trainings focusing on the range of options for improvement in milking parlor operations and design could attract more interest and result in improvements to milk quality as well as lowered operational costs. Similarly, offering training connected to the finding from audits that milking parlor equipment was not calibrated or adjusted correctly, resulting in lowered milk quality could boost interest in related trainings. Team technical advisors noted that producers may not be aware of what improvements are possible and profitable to adopt.

Training Needs	Median (Scale 1-5)
Animal Health & Care	4.5
Animal Nutrition & Feed	4.0
Genetics & Breeding	4.0
Equipment Repair	3.0
Biosecurity & Farm Safety	2.0
Equipment Knowledge & Operation	2.0
Milking Parlor & Barn Design	1.0
State & Federal Milk Regulations	1.0

Table 3: Training needs of goat dairy farmers (n=16)

When asked how technical assistance training could be improved, respondents suggested expanding education for larger, more experienced producers. They noted that available training is often for beginners or hobby farmers that reviewed basics they were already familiar with. Troubleshooting milk quality, improving animal health, and expanding access to new applied research were all mentioned as strategies to make future training more valuable.

Buckling Management

An inherent challenge to dairy production is what to do with male youngstock. While substantial opportunities exist to access goat meat markets across the US, markets are more limited in Vermont due to relatively low demand and largely unavailable access to Halal processing. In addition, the longer bucklings are kept on the farm, the greater the cost to the farm. Among the 15 farms who responded to this question, only half had a "reliable" market, and one of those producers who said they did note that they don't have a reliable single buyer but rather have reliably been able to market their bucklings.

Fifteen interviewees reported what they did with their bucklings. Almost half, 46.7%, sold to a private buyer or buyers. One reported selling to a livestock dealer as their primary market and a private buyer as a secondary market. One of the interviewees who said they sold to private buyers also sold to a dealer. Three farms euthanize their bucklings as a management strategy. Two of the respondents reported that bucklings had formerly been a cause of high stress but now reported low or no stress related to managing bucklings. As part of this project, a webinar was developed specifically focused on bucklings, and in particular how they are managed for meat markets in France, described in greater detail later in this paper.

Assisting producers with connections to meat goat markets could lower the stress associated with buckling management. Developing a Halal processing facility or a buckling rearing facility in Vermont could further expand market opportunities.

Future Plans for Expansion

Overall, over the past 5 years, 75% of the 16 farms interviewed had increased the size of their herd. This included 8 of the 9 bulk producers and 4 of the 7 farmstead producers. Looking forward, bulk producers plan to continue expanding, likely

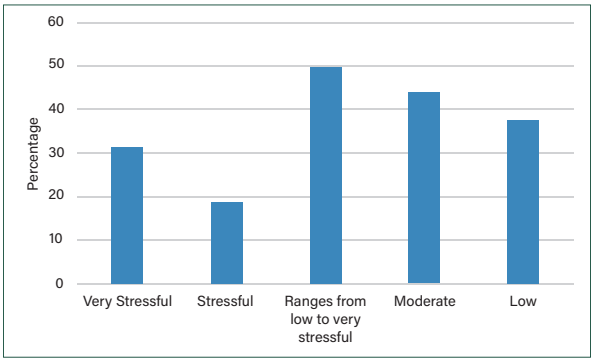

Figure 3: Owner stress associated with buckling management (n=15)

because they have an in-state buyer explicitly asking for more milk, with incentives for more milk in the fall and winter. The incentive for growth has slowed slightly among the farmstead producers interviewed where 4 out of 7 expect to maintain their current herd levels and only 2 are planning to expand.

Opportunities and Challenges

Looking ahead, both bulk producers and farmsteads see opportunities for their businesses to thrive. For farmsteads, a common objective is to expand their markets and make better use of facilities. A few want to consider adjacent activities such as agritourism. Among the bulk producers there was a greater range of suggestions. Improving production and herd health through improved genetics and increasing the number of goats was stated by several farms, along with reducing mortality and addressing disease issues. As farms expand, seeking opportunities to make capital improvements is important to several farms.

In contrast to the range of opportunities offered across the bulk and farmstead producers, farmers across and within each sub-sector listed very similar challenges, notably issues with labor, whether that is their own limited time or the ability to find reliable and qualified labor.

On-Farm Parlor Audits and Milk Quality Assessments

Milk quality is a critical determinant of farm profitability, product safety, and market access for small ruminant dairy producers. However, many farms lack access to specialized diagnostic services or the technical expertise necessary to identify the root causes of milk quality challenges. The objective of this component of the project was to provide participating farms with comprehensive, on-farm assessments of their milking equipment, milking routines, and system cleaning effectiveness, and deliver targeted recommendations to support improvements in udder health and milk quality.

For this project, UVM Extension partnered with Dr. Paul Virkler of Quality Milk Production Services (QMPS) at Cornell University to provide comprehensive milk quality assessments for participating farms. QMPS specializes in on-farm diagnostics and offers three complementary services: a herd survey, an extension survey, and a wash analysis. The herd survey involves individual milk sampling of each animal to identify mastitis pathogens and inform herd management. The extension survey observes and evaluates the milk-

Opportunities for Farmstead	Opportunities for Bulk	Shared Challenges
Expanding markets	Improve genetics and breeding	Access to labor
Agritourism	Increase production and herd size	Profitability
Making better use of facilities	Improve milk quality	High infrastructure and equipment costs
Herd growth	Capital improvements	Workload pressure (owners and staff)
	Control disease, improve kidding and reduce kid mortality	

Table 4: Opportunities and challenges facing goat dairies

ing routine and equipment, including teat end scoring, unit alignment, pulsation, and vacuum settings. For the purposes of this report, findings from both the herd survey and the extension survey are presented together as parlor audit findings, as both services assess udder health and milking management at the farm level. The wash analysis evaluates the effectiveness of the milking system cleaning process by analyzing wash temperatures, chemical concentrations, and slug performance. These services provide a full-farm evaluation of udder health and milking management, including milking equipment, animal housing, animal hygiene, and milking protocols.

A total of 16 farms enrolled in the project, representing a mix of farmstead creameries (n=7) and farms shipping fluid milk to a processor (n=9). These farms ranged in size from 14 to 950 milking does. Prior to each on-farm visit, a preliminary phone call was conducted with the farmer, Dr. Paul Virkler of QMPS, and a UVM Extension technical assistance provider. This call served to collect background information on the milking system and any existing milk quality concerns, allow the farmer to raise specific questions or priorities in advance of the visit, and outline what to expect during the audit. All 16 farms received parlor audits, while 11 of the 16 farms also received a wash analysis. Each on-farm assessment was conducted by Dr. Virkler and accompanied by a UVM Extension technical assistance provider, ensuring that findings and recommendations could be communicated directly to the farmer with local extension support. Following the assessment, a follow-up visit was conducted with each farm to review results and provide additional technical assistance. Parlor audits and wash analyses were conducted between December 2024 and August 2025, with follow-up visits completed between January and September 2025.

Parlor Audit Findings

Findings from the herd and extension surveys identified key areas for improvement within the milking parlor, collectively referred to as parlor audit findings. These findings were broadly categorized into three areas: milking equipment, milking routine, and mastitis. Milking equipment issues relate to the function and calibration of the mechanical systems used to harvest milk, including vacuum pressure, pulsation, and system capacity. The parlor audit process utilized specialized equipment to assess vacuum and pulsation performance relative to industry standards. The most prevalent issues included incorrect vacuum pressure, faulty pulsators, and insufficient pump capacity. Improperly functioning or calibrated equipment can contribute to teat end damage, increasing the risk of mastitis and reduced milk quality.

Milking routine was another major area of priority identified across participating farms. This category encompasses the procedures and protocols followed by farm personnel during milk harvest, which play a critical role in maintaining udder health and milk quality. The most prevalent issues included inconsistency in routine execution, inadequate teat end cleanliness, and insufficient post-dip coverage. Teat end cleanliness is particularly important, as milk passes directly through the teat canal during harvest, increasing the risk that contaminants may enter the milk stream. In addition, consistent and thorough post-dip coverage is essential for protecting teat ends and reducing the risk of bacterial infection that can lead to mastitis.

Mastitis was also identified as an area of concern, although it was not found to be a primary driver of milk quality challenges among participating farms. Herds that sampled individual animals (11 of 16) provided additional context for mastitis prevalence across participating farms. Three farms had at least one animal test positive for a contagious mastitis pathogen, while one farm identified the presence of an environmental mastitis pathogen. The most common mastitis-causing pathogen detected in the limited sampling was *Staphylococcus aureus,* which is a contagious mastitis pathogen. Mastitis, whether environmental or contagious, can be difficult to diagnose and treat in small ruminants due to limited treatment options and variable efficacy of available therapies. These findings informed farm-specific recommendations for further testing and milking order management.

Collectively, these parlor audit findings highlight several key takeaways for improving milking management and milk quality. Proper equipment

Issue Category	Top Priority Issue (% of farms)	Among Top 3 Priority Issues (% of farms)	Common Examples
Milking Equipment	56%	88%	Incorrect vacuum pressure, faulty pulsators, insufficient pump capacity
Milking Routine	38%	81%	Teat end cleanliness, post-dip coverage, lag time, inconsistent routine
Contagious Mastitis	6%	25%	*Staphylococcus aureus* (staph) detection
Environmental Mastitis	6%	6%	Udder hygiene

Table 5: Summary of parlor audit issues (n=16)

maintenance emerged as a critical factor, as optimally functioning milking units can significantly impact both milk quality and overall milking efficiency. Notably, many of the identified issues could be addressed through low-cost interventions, presenting opportunities for meaningful improvements in udder health and milk quality with minimal financial investment. A key finding from this study was the lack of small ruminant-specific guidance, particularly regarding optimal pulsation rates and the need for lag time between udder stimulation and unit attachment. Substantial variation in milking routines was observed across participating farms, reflecting this gap in standardized recommendations. In contrast to dairy cattle systems, where milking routines and timing have been extensively studied, limited research exists to define best practices for small ruminants, highlighting an important area for future research and extension efforts.

Wash Analysis Findings

In addition to parlor audit findings, the wash analysis provided critical insight into milking system cleaning performance, identifying key factors that influence milk quality across participating farms. The wash analysis was conducted on eleven of the sixteen participating farms. Of these, nine farms also received water testing as part of their wash analysis. Similar to the parlor audits, findings were categorized into three areas: mechanical equipment, water, and chemical factors.

Mechanical equipment findings focused on the system's ability to effectively clean all components of the milking system. For example, improper milk line slope can result in inadequate cleaning of pipelines and milking units, creating conditions that support bacterial growth and compromise milk quality.

Water-related issues were further categorized into bacterial contamination, temperature, and volume. Bacterial contamination was primarily associated with *Pseudomonas* species, thermoduric (heat-tolerant) organisms that can contribute to elevated laboratory pasteurized counts (LPC), indicating bacteria that persist after pasteurization. Six of the nine farms that had their water tested had a detectable presence of *Pseudomonas* in their water supply. Water temperature was also identified as a concern, with insufficient heat maintained throughout the wash cycle. In addition, inadequate water volume limits the effectiveness of cleaning processes on several farms.

Chemical factors refer to the concentration and use of cleaning and sanitizing agents necessary for effective system sanitation. These issues were not identified as a major contributing factor among participating farms.

Collectively, the wash analysis findings highlight several key takeaways related to milking system cleaning and its impact on milk quality. Water quality and availability emerged as critical factors, particularly the widespread presence of *Pseudomonas,* which was identified on six of the

Issue Category	Top Priority Issue (% of farms)	Among Top 3 Priority Issues (% of farms)	Common Examples
Mechanical Equipment	27%	45%	Air injector issues, milk line slope, bulk tank cooling
Water: Bacterial Contamination	45%	64%	*Pseudomonas* in water supply (6 of 9 farms tested)
Water: Temperature	18%	82%	Insufficient wash water temperature; low dump temperature
Water: Volume	9%	72%	Inadequate wash sink fill volume

Table 6: Summary of wash analysis (n=11)

nine farms that received water testing. The presence of *Pseudomonas* is of significant concern, as it can survive pasteurization and can reduce the shelf life and quality of finished dairy products. Similar to the parlor audit findings, many of these challenges could be addressed through relatively low-cost adjustments. However, some of the identified issues require larger system upgrades, such as new equipment, which could present a barrier for some farms.

These findings provide a clear foundation for targeted recommendations aimed at improving milking management and milk quality. Following the farm audits conducted by UVM Extension and QMPS, each farm received a summary of findings along with tailored recommendations. No significant differences in findings or recommendations were observed between farmstead and bulk milk producers. These findings underscore the need for continued research and extension outreach specific to small ruminant dairy systems. Unlike dairy cattle, goats lack standardized milking equipment settings and evidence-based protocols for many routine practices, leaving producers reliant on guidance developed for other species. Addressing these gaps through targeted research, updated industry standards, and expanded extension programming will be essential for supporting the long-term viability and competitiveness of the Vermont goat dairy sector.

Regional Networking and Development

UVM Extension engaged with goat dairy farmers, service providers, and researchers across the US to better understand the state of the goat dairy industry in the Northeast and nationally. The project sought understand goat dairy trends and to identify opportunities for collaboration with specialists to bring goat dairy expertise to a wider group of farmers in the Northeast.

Methods

Several producer workshops, a service provider roundtable and an online needs assessment survey collected testimonials and information to establish ways to enhance the regional capacity for goat dairy technical assistance. Over 140 workshop participants and 41 responses to the needs assessment captured feedback from farmers, researchers, and service providers in Vermont, New Hampshire, New York, and Maine. UVM extension met individually with goat dairy service providers from across the country to learn about their work and the needs they see in the industry. Members of the UVM team spoke with Extension agents, a livestock nutritionist, and industry consultants from Maine, New Jersey, Tennessee, Iowa, and California.

Key Findings

Both farmers and service providers describe a need for more service providers with specific knowledge of small ruminant dairy and commercial production practices. Both in individual conversations and in the Goat Dairy Service Provider Roundtable, industry professionals described a lack of trained service providers and research for goat dairy production. Responses to the Needs Assessment Survey indicate that small ruminant dairy nutritionists and breeding specialists are among the top services that farmers need but cannot access. More research is needed to inform these service providers, provide benchmarking, and describe best practices. Currently small ruminant dairy research lags behind that of other agricultural industries, such as cow dairy.

Service providers in the Northeast and nationally are interested in collaborating with each other and with UVM to bring more services to the goat dairy sector. At the Service Provider Roundtable, attendees shared the needs they see in the industry and the services they offer. A nutritionist discussed infrastructure limitations with a feed mill representative, a veterinarian shared that they provide consulting nationwide for milk sample testing and interpretation. A breeding specialist from Quebec provided insights on the goat dairy industry in Canda. Attendees expressed appreciation for the event, and for the time being invested in the goat dairy industry. UVM plans to build on the connections made during this discussion to continue to expand the support that UVM Extension can offer to goat dairy farmers in the Northeast.

Next Steps

Three key areas or partners have emerged as opportunities for expanding technical assistance to goat dairy farmers: 1) working with the University of Maine Extension to expand technical assistance to goat dairy farmers in Maine, 2) collaborating with Iowa State University Extension and the Sustainable Dairy Goat Agrisystems (SDGA) Initiative, and 3) expanding a small ruminant service provider directory.

Maine has 47 goat dairy farms, compared with Vermont's 37, though the size and type of operations differ between the two states. Maine does not have a large processor that purchases fluid goat milk in bulk, therefore all the goat dairies in the state process their own milk and/or sell raw milk for human consumption. Farms in Maine are also generally smaller than those in Vermont. According to data from the state of Maine, their largest goat dairy milks 80 goats. In Vermont, the largest goat dairy milks 950 goats, and of the 16 farms UVM interviewed, 11 farms milked more than 100 goats. Both farmers and service providers in the state of Maine have demonstrated interest in the educational programming and technical assistance provided by UVM Extension. The University of Maine Extension is eager to serve goat dairy farmers and hosted a UVM milk quality webinar to share the findings from this project. Maine farmers made up a significant portion of the attendees of the herd management webinars, and shared insights and asked questions about milk quality, buckling rearing, and slaughter facilities.

UVM expects to continue collaborative efforts with U. Maine Extension to bring milk quality and herd management technical assistance and education to Maine farmers. Iowa State University is leading a nationwide dairy goat sustainability initiative in collaboration with The University of Tennessee, The University of Arkansas, and UC Davis. With funding from the UDSA, this project seeks to support dairy goat production in the US through research in four areas: animal health, financial assessment, lifecycle assessment, and community capital assessments. Members of the UVM team have connected with SDGA team members in Iowa and Tennessee to learn more about their work and find opportunities for collaboration. UVM Extension presented the results of the milk quality project at a monthly goat dairy webinar hosted by ISU Extension, and team members attend these webinars regularly. Additionally, UVM is collaborating with Larry Tranel of ISU, who is leading the goat dairy financial assessment for SDGA, to develop financial profiles of goat dairy farms in Vermont.

UVM continues to develop a Directory of Small Ruminant Service providers, using input from farmers and service providers we have worked with, recommendations from the Goat

Dairy Needs Assessment Survey, and participants at our workshops and webinars. Service providers who attended the Roundtable discussion expressed interest in being listed in this directory, as well as using it as a tool in their work with farmers.