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## Adapting Small-Scale Fiber Production to the 21st Century: Maine's Evolving Strategies

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### **Cover Page Footnote**

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# Adapting Small-Scale Fiber Production to the 21st Century: Maine's Evolving Strategies

by Stephanie Welcomer and Mikayla Reynolds

## Abstract

This study, funded by the US Small Business Administration, aims to better understand the operational, strategic, and economic dimensions of Maine's fiber producers' businesses. Fiber producers are those raising animal-based fiber, including sheep, alpacas, rabbits, and goats. The producer focus of this paper highlights the responses from 27 fiber producers and their insights into the realities of Maine's fiber sector.

## MAINE'S FIBER STORY

Maine's fiber story pulls its narrative threads from its pastures and fiber animals, from globalization, from the heart of small farmers, from the cultural renaissance of tactile craft, and from the omnipresent limits of Earth's natural environment.

Generally, "Maine's agriculture operations tend to be small and family-based. 96% of Maine farms were family farms in 2017, and about two-thirds of farms had market value of crops under \$10,000" (Maine DECD 2023: 7). Specifically, Maine's fiber production and processing spans centuries (Gilmet 2023; Koch and Rybus 2020), including small farms producing and processing fiber for home and local use to large mills processing high-volume quantities of raw fiber for weaving and a range of consumer goods. In fact, according to the Maine Historical Society, Maine at one point had a number of woolen mills (typically situated along its rivers), in locations such as Old Town, Sebasticook, Lisbon Falls, Turner, and Bridgton.<sup>1</sup>

The infrastructure that supported industrial-scale fiber production, the processing mills, dyers, weavers, and meat processors, has largely moved out of Maine, and the United States (ASIA 2023; Parkes 2019). Following this loss of infrastructure and the end of the Wool Act in 1996, which had provided wool price supports, the industry has stalled. Comparing the number of fiber-producing farms in Maine from the 2017 and 2022 USDA Censuses of

Agriculture shows this industry-wide decline. The 2017 Census reports 347 farms raising sheep for wool and producing 40,460 pounds of wool with a value of \$40,000 (USDA 2017). Just five years later, there were 246 farms in Maine that produced 33,195 pounds of wool with a value of \$34,000 (USDA 2022a). Although the number of farms raising Angora goats dropped from 49 in 2017 to 40 in 2022, the total number of Angora goats increased from 211 in 2017 to 378 in 2022 (USDA 2022b). The number of farms raising alpacas in Maine also decreased over this time period, from 153 farms with 1,951 alpacas in 2017 to 119 farms with 1,499 alpacas (USDA 2022).

Though wool production in the United States (and Maine) faces challenges, there are compelling shifts afoot. For instance, according to Maximize Market Research, the global demand for wool (including sheep, goat, rabbit, and alpaca) was estimated at \$10.3 billion and is forecast to grow to \$15.23 billion by 2030. Additionally, wool has attributes that increase its attractiveness as consumers focus on sustainability, "consumers are becoming more conscious of the environmental and social impacts of their purchasing decisions, leading to a growing demand for sustainable and ethically sourced products. Wool's biodegradability, durability, and recyclability make it an attractive choice for eco-friendly fashion brands."<sup>2</sup> Plus, new markets for fiber are opening as the fiber arts have gained media attention and participation of younger generations. Summarizing this trend in an interview with the *New York Times*, knitter and attendee of the iconic New York State Sheep and Wool Festival, Vanessa Krebs states, "It's just really wonderful to use your hands and be connected to the world," she said. "Within the younger crowd," she added, "there is this kind of handmade power where people are learning how important it is to be able to sew or knit or do

anything to feel sort of connected and be a little more self-sufficient” (Adams 2022).

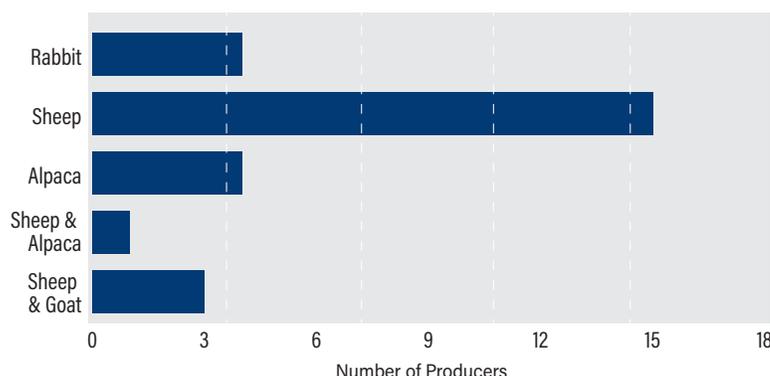
These shifts in demand mean that Maine’s fiber producers need to adapt to both challenges such as shortages of processing mills and a culture that has been centered on synthetic fiber goods and fast fashion (Barber 2021; Burgess and White 2019) as well as opportunities such as consumers who are increasingly focusing on sustainability and durability and who wish to practice crafts that engage their physical and cognitive faculties.

### THE STUDY’S AIM AND METHOD

This study, funded by the US Small Business Administration, aims to better understand the operational, strategic, and economic dimensions of Maine’s fiber producers’ businesses. Fiber producers are those raising animal-based fiber, including sheep, alpacas, rabbits, and goats. In this study, the breeds of these animals varied both across and sometimes within producers. For instance, some sheep producers raised strictly Finn, Icelandic, or Shetland sheep, whereas other producers raised a mix of breeds, such as Cormo and Romney. Most Angora fiber rabbit producers carried one breed, such as German or French. Producers with fiber goats raised Angora almost exclusively, and producers raising Alpacas mostly raised one of the two breeds, Huacaya or Suri.

The data collection instrument, a semistructured interview questionnaire, included categorical and open-ended questions. We developed the interview sample group by consulting fiber experts (not producers) and the registries of fiber producers from past fiber festivals (e.g., Maine’s Fiber Frolic, the Real Maine Fiber Tour). We first contacted producers by email and followed that up with a phone call. If the producer was willing to be interviewed, we scheduled an interview. The first author interviewed 27 producers (the focus of this paper), 6 mill operators (some of whom were transitioning in or out of mill operation), and 2 single-sourcing fiber retailers, for a total of 35 stakeholders. The producer focus of this paper highlights the responses from the 27 fiber producers and their insights into the realities of Maine’s fiber sector. Of the 27 producers, 15 raised sheep, 4 raised rabbits, 4 raised alpacas, 3 had both sheep and goats, and 1 had both sheep and alpacas (Figure 1). If interviewees approved, we

FIGURE 1: Fiber Source Type



recorded and transcribed the interviews. The transcriptions were coded using nVivo software, and themes emerged through iterative coding. After we identified several macro themes, we assembled a draft presentation on the trends we had identified and shared it with a subset of the interviewees: five sheep producers, two rabbit producers, two alpaca producers, and one sheep and goat producer. We did this to get feedback on accuracy, relevance, and missing details. These follow-up visits were well received and gave us a more nuanced understanding of the patterns we were seeing.

### FARM OPERATIONS AND DEMOGRAPHICS

The interview had several specific questions about farm operations and demographics. In response to a question about the number of years of operation, participants presented a range of years. Most respondents had been in production for 5–9 years and 15–19 years (Figure 2). The interviews revealed distinct drops in those operating 10–14 years and over 25 years.

From responses to a question about the size of the operation, we found a wide variety of the number of sheep, with some producers raising fewer than 10 and others raising more than 100. Most sheep producers, however, raise between 20 and 40 sheep (Figure 3). There was less variation among rabbit producers, with a range of fewer than 20 to more than 60 rabbits per farm. Most alpaca producers raise fewer than 50 animals.

Questions about the acreage involved in fiber production uncovered a range of total acreage and average number of animals per acre. Sheep and alpaca farm sizes ranged from less than 3 acres to more than 18 acres. The

FIGURE 2: Years of Professional Fiber Making for Maine Producers

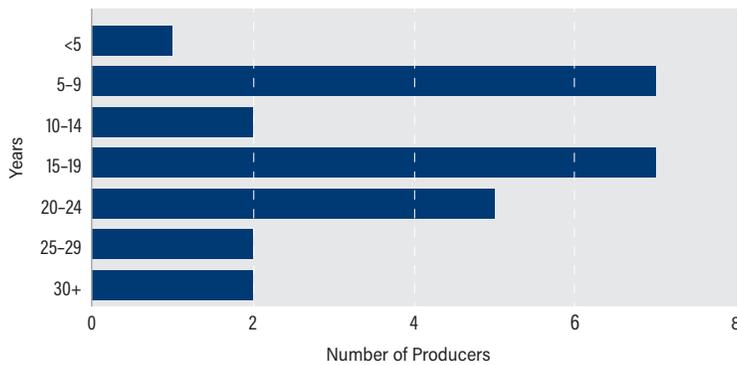


FIGURE 3: Number of Animals per Producer

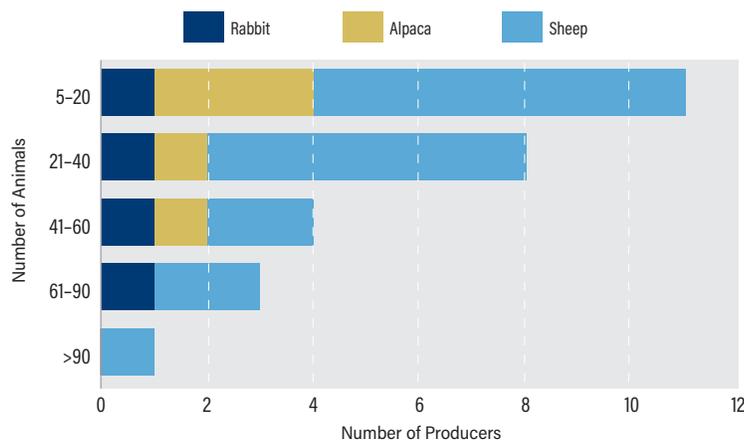
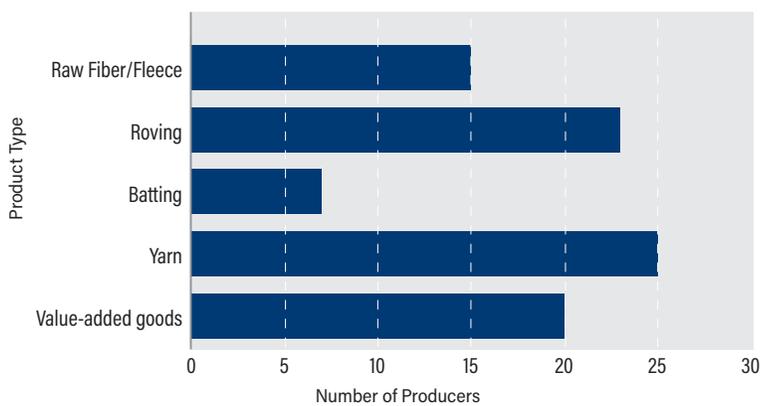


FIGURE 4: Types of Fiber Products Sold



number of sheep or alpaca per acre ranged from an average of 28 animals in pastures between 1 and 5 acres to an average of 40 animals on pastures over 15 acres.

on-site farm stores. Many producers rely on digital marketing through online website-based stores, and social

In response to a question about annual production of farm fleece (raw, pre-processed), the interviews revealed that most sheep farms produce between 60 and 150 pounds of fiber per year. There was a distinct split in annual fiber production for alpaca producers: either <100 pounds or >400 pounds per year. Rabbit fiber production was typically under 20 pounds per year.

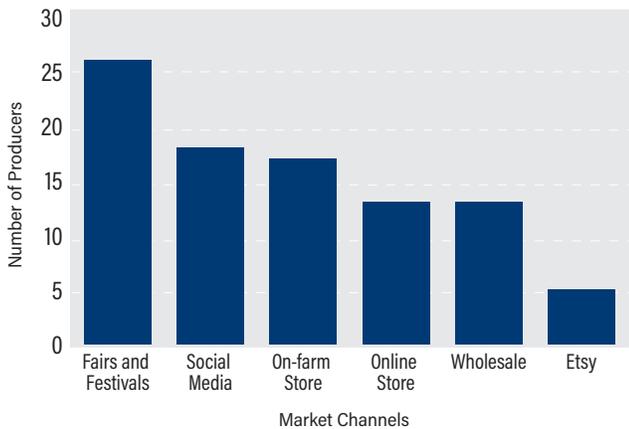
From these questions, we can develop a picture of fiber farms in Maine. Most have fewer than 100 animals, use less than 20 acres of pasture, and produce about 5 pounds of fleece per animal annually. These smaller farms largely rely on labor from just the farmers with little or no use of outside employees.

### SALES STRATEGY

To create a picture of fiber producers' sales strategy, the interview included questions about the products sold and the channels used for those sales. We found that producers vary in their approach to the products they sell and the channels they use (Figure 4). For instance, slightly more than half of sheep, alpaca, and rabbit producers (55 percent) sell raw fiber or fleeces. For more processed products, 85 percent sell roving (loose cords of fiber commonly used by spinners) and yarn but only around 25 percent sell batting (a loose "cloud" of fiber, commonly used by spinners and in assembling quilts). About 75 percent of producers sell value-added goods such as hats, mittens, rugs, blankets, and socks.

The producers' sales channel strategy shows the importance of face-to-face channels—fairs and fiber festivals—to these producers (Figure 5). Almost all 27 producers sold fiber products at events such as the Fiber Frolic, Common Ground Fair, the Windsor fair, the Fryeburg fair, as well as a host of other regional fiber events in places such as Freeport, Machias, Raymond, Turner, Wells, and Lewiston. Face-to-face sales also include

FIGURE 5: Market Channels Used by Producers



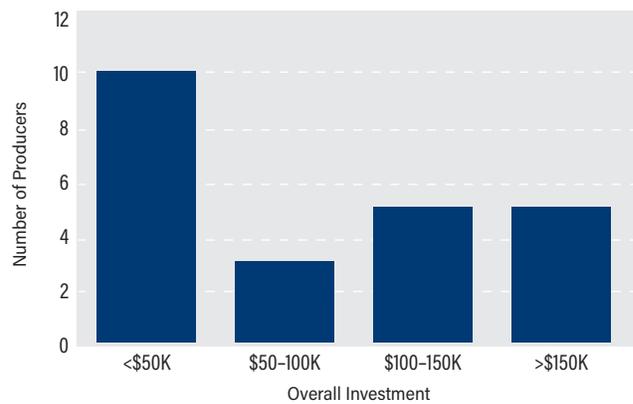
media platforms. Fewer producers utilize wholesaling to retailers, and marketing through Etsy’s online store.

### FARM ECONOMICS AND VIABILITY

The interview also included a series of questions designed to elicit information about farm economics and viability. Responses revealed that producers’ capital investment (excluding land) for fencing, feed, animals, and equipment ranged from less than \$50,000 to more than \$150,000 (Figure 6). Not surprisingly, producers with smaller acreage spent less on their investment for fiber production.

Most producers did not consider fiber revenue to be a significant portion of their income, with over 75 percent saying that it was not significant. On the other end of the spectrum, 7 percent of producers reported it was significant, and 15 percent said that in some years it could be significant. Notably, though most producers do not derive a significant portion of their income from fiber, their satisfaction with their profit levels was mixed. When asked “How satisfied are you with profit from fiber?,” 48 percent of producers rated their profit as satisfactory, 4 percent were more than satisfied, and 48 percent rated their profit levels as less than satisfactory. Among those who are satisfied, the reasons for this satisfaction are not solely based on economic measures, with producers defining “profit” on their own terms. Specifically, four producers stated that they were satisfied if their fiber operations covered costs so they broke even. Five producers found their profit was enough to merit satisfaction (usually between \$1,000 and

FIGURE 6: Overall Capital Investment



\$5,000), and another five said their quality of life from raising fiber gave them satisfaction.

Given the limited financial benefits from fiber production, but considering its palpable quality of life benefits, where do producers want to go in terms of scale—do they want to increase, decrease, or stay the same size? We found that most producers making under 100 pounds of fiber per year wanted to downsize. At levels between 100 and 200 pounds of annual fiber production, more producers were thinking of downsizing than increasing production (Figure 7).

Producers explained that their scale plans were based on a number of factors, such as the farm’s income from other sources, the prior year’s product mix, and the farmer’s general time available for expansion (Figure 8). Other factors included work/life balance, land, family, and space.

We found that most producers have augmented fiber income through selling animals for breeding. Through careful attention to bloodlines and genetics, 59 percent of producers sell breeding stock to supplement their income and support other producers’ efforts to raise high-quality fiber-producing animals. For additional sources of income, 74 percent of producers have diversified farms that earn income from a variety of goods and services such as vegetables, meat, metalsmithing, flowers, or ecotourism.

### PRODUCERS’ CHALLENGES

The interviews’ data shows that Maine’s fiber farms are small, diversified farms that earn income that does not support the producer but often covers costs. The resources these producers devote to fiber production are

FIGURE 7: Desired Scale by Current Production Scale

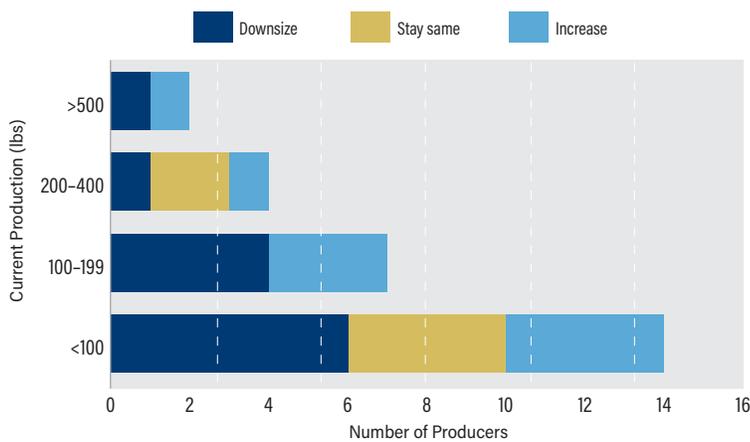
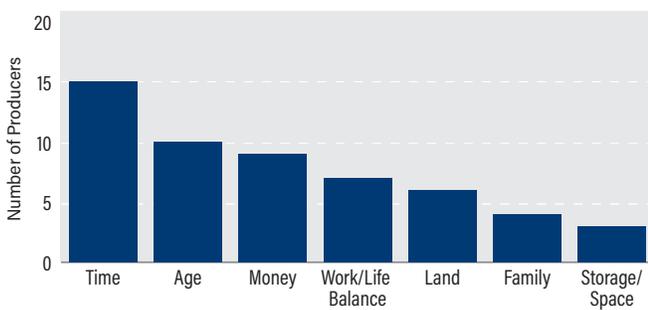


FIGURE 8: Fiber Producer Scale Factors



evolving as many producers adjust their scale due to time, age, and financial limitations. Most respondents produce and sell value-added fiber goods. As we dig below the surface of these numbers, we find the challenges and opportunities that producers identified in response to interview questions. Producers were asked the open-ended question of “What are key challenges you face?” From analysis of these responses, we found three broad categories of challenges: educating consumers, supportive infrastructure, and financial viability.

### Educating Consumers

The category of educating consumers includes helping consumers understand the qualities and value of locally produced wool, the sustainability of wool compared to synthetic fibers, and the resources involved in producing and processing finished fiber. The following quotes from producers highlight these issues.

*People haven't seen sheep/animals handled, folks are*

*disconnected from natural world.*

*It's one of the most underrecognized, underappreciated, and one of the hardest corners of agriculture, because it is expensive to do and is expensive to raise these guys, and people don't appreciate and understand the work that goes into it.*

*People do not honor the historical truth and indigenous natural dye work origins, people don't know that there's hundreds of breeds with wools with different qualities/applications.*

*It's all a cooperative between everything. People have to understand fiber in the first place to even want it. Because they're brainwashed to think that fleece is much better if you buy it from the store, and it's cheaper.*

*I think that the amount of energy and resource, even if it wasn't us, that goes into producing a natural fiber—they would understand that there's a value in that that is beyond being able to knit with acrylic. I think that having that understanding in a broader scope of people would mean we'd have more customers, I guess. Or maybe more people who'd go into fiber who would understand that it's worth the amount of work you do because there's a value in it, and it isn't cheap. You don't have to do something for cheap in order to have it be worthwhile.*

*Now, with climate change, there's this whole. . . . “Sheep are bad because they fart and it contributes to climate change, so we shouldn't be eating meat. We shouldn't be raising sheep. We shouldn't be wearing wool.” Instead, we're going to wear polar fleece, which is from fossil fuels and never decomposes in your landfill and creates microplastics every time it's washed. And God knows what it creates in its production and who's producing it.*

*Whereas a wool sweater? Totally regenerative. You can raise sheep without even any grains. There's no tillage agriculture there. And when you're done with it, you can patch it. And when you're done with that, it's gonna totally decompose.*

Producers see educating consumers as critically important. They want consumers to understand why the price is different from the synthetic yarns available in big-box stores and to have a better grasp of goods that come from farming and culturally rooted processes.

### Infrastructure Challenges

Producers also identified a supportive infrastructure and fiber network as a critical challenge. Infrastructure and fiber network includes three types of connections: businesses that support producers up and down the supply chain (e.g., hay, veterinarians, equipment

merchants, mills), other fiber producers, and the natural environment. Illustrative quotes from producers follow.

### Supporting businesses

*The state needs another mill—several mills.... Aroostook [Fiberworks] shut down suddenly...finding mills that will do rug yarn in-state...younger generations of farmers don't have a lot of support.*

*Definitely vets are an issue, because they don't know anything about sheep in this part of the country.*

*Vets. That's been an interesting thing, the vet that I use for the sheep and goats is \*\*\*. And the vet I really liked and used as my vet just left \*\*\*. So, the person I was talking to, that's my second favorite. But my interactions with them with their staff last year were as if all they take care of is pets, even though it's a large animal practice.*

*Hay is at a premium, cost of raising sheep has increased—it has gotten to be far more expensive than it had been.*

*Finding good hay sources, hay is expensive. Until we can make our own hay, I don't think we'll ever make money on our sheep.*

### Other fiber producers

*And once you start this kind of snowball of things falling apart—like farmers going, and then you have all the infrastructure that hold farmers together—it's really, really serious. Then we have the farmers with farmers in this country aging. The average age is 55 or 65. It's the knowledge. The knowledge is not being passed on from generation to generation.*

*The Maine Sheep Breeders Association has just sort of fallen apart. And so, there's just not the push there to keep people active, to keep them interested, to keep them producing. It's harder.*

*Back in the day, the farmers all stuck together pretty much. Now, it's so hard to get them to work as a group.*

*There seems to be an aversion to collaboration.*

*You are dealing with farmers so it's harder to network. People see it as competition not collaboration.*

*There are not as many spinning groups as there used to be.*

### Natural environment and climate change

*But this year, my sales are down significantly because people don't have feed. New Hampshire is in a drought. Vermont was in a drought. So, hay costs are really high so people don't want to add to their flock or start a new flock at the moment. And then, all your infrastructure costs have gone up significantly.*

*I feel like because the environment is in pretty serious, big trouble. It's gut-wrenching what's happening to our climate*

*and how many people don't know. And it's happening to me and my field. I've seen so many changes.*

*I'd say water and heat are big issues. My sheep have shade shelters that I've made so they can get into the shade. Because my field doesn't have enough trees in it for them to be under trees all the time.*

*Climate change—hotter in the summer makes coats grow less.*

### Financial Viability

Connected to educating consumers and a supportive infrastructure/fiber network is the farm's financial viability. Producers discussed their farms' viability relative to financial returns on their efforts to raise fiber animals and sell fiber products. Almost without exception, they all mentioned the low return on their outlays and efforts, as the following quotes show.

*So, for the wool products, the only way that we can financially make it work is that you have a niche product, which is hand-spinning quality, raw wool. The difference in price between what we sell, which can be like \$16/pound, to what is the general wool market price, which is like \$0.40/pound right now, or something like that. It is vastly different. I actually don't know. It's one of those perplexing things, having been in agriculture for a while, that I'm like, I actually don't know how anybody makes the food that we eat or the products that we wear at the prices that are in the commodity market.*

*There's nobody that spins and knits for economic reasons. The whole thing is a non-economic enterprise, both income and payment.*

*Not many farms are profitable—often one partner works off-farm to provide economic stability and for health insurance.*

*Farmers often have to work other jobs for benefits—this takes away from farm.*

*It's hard to earn a fair wage for fiber work labor.*

*You can't make any money in crafts, and you can't make any money with animals.*

*I do hand-spin, but I'm not selling my hand-spun. People couldn't afford hand-spun, to include labor in price would make price unaffordable.*

## PRODUCERS' STRATEGIES FOR RESPONDING TO CHALLENGES

Producers recognize that the challenges of educating consumers, infrastructure and fiber network support, and financial viability all have dimensions that can be partially addressed through individual actions. Yet, these challenges also have aspects that are beyond the reach of

the individual and require broader macro-level actions. The interview's questions elicited responses that highlight both individual-level actions and suggestions for macro-level actions that would improve fiber farms' viability.

### *Individual-Level Actions to Educate Consumers*

Producers have focused on educating consumers through two main channels, their sales interactions (e.g., farm store, farmers' markets, fairs, and festivals), or at classes (either through educational sites or farm-based classes). They see educating consumers as an ongoing process that is a continual necessity, as the following excerpts indicate.

*I started by giving demonstrations and teaching and bringing sheep to schools and teaching Navajo weaving and spinning. And spinning on the great wheel and doing the little local fairs, but more as a demonstration than a selling opportunity.*

*I spend a lot of time at festivals educating people—make them think about differences between factory yarn and natural... why wool is so good.*

*So, there's some education ongoing with almost every customer. Some places I go, I have my posters and stuff that explains all kinds of stuff on why angora is good. And also specific to angora is it had a bad reputation back in the 1920s about shedding the fiber out of the product. It was things like you had to store your angora sweater in the freezer. And then, when you wore it, it wouldn't shed so much. Or men didn't like it when you wore an angora sweater to a dance because it would end up on the men's tuxedos and stuff.*

*I'm always at market, and I feel like I definitely educate people.*

*I just let people know that it's happening, and people come and help. That, to me, is a really important way to connect community to the whole issue of fiber, how fiber is—some people have never seen sheep. They've never touched a fleece. That's a really important way that I can do. It's a small scale, but if you have a lot of small producers around, they can all do that. It just invigorates and energizes people to see what's happening.*

*If somebody is interested in learning about sheep and they call up and they want to see my sheep, I don't care if they buy them or not. I will give them more information than they ever would want.*

*We usually demonstrate the whole weekend at Common Ground, and she's on the porch all weekend for Fryeburg, so a lot of teaching.*

### *Individual-Level Mentoring*

Producers have also focused on infrastructure support, even as some organizations have become

dormant or have disbanded. For instance, some have found support through spinning groups or other breed-specific groups. Many producers have found and are giving support through mentoring. Several producers recognize the impact of mentors they have or had.

*I don't think I could have made it without my two main sheep mentors.*

*\*\*\*\* took me on as her apprentice for a year and a half. She was a rug-hooker, but I learned a lot of my dyeing techniques, and I learned some of that creativity. She gave me the confidence to pick back up the spinning wheel.*

*I think it's really important that people have mentors so that they don't jump in and get animals that they're not prepared to take care of, or just don't make awful mistakes...it's important to have good mentors out there...I had some lovely people who gave me great advice and gave me an opportunity to try it out, different breeds, before I settled on Finn sheep. And so, that's how I started.*

*And I have sheep mentors too. \*\*\*\*\* taught me everything I know about wool. Everything. I learned so much from him. I used to go up to their farm before the Fiber Frolic and buy fleece from them. I spent all day with them opening up fleeces and talking about fleeces. I learned so much from him.*

*You had to talk to people who did this. You had to find your mentors and all of that. It required quite a bit of time and effort.*

*In turn, producers are currently mentoring other producers who are new to the profession.*

*When I sell sheep buyers are not just buying something that's going to give them meat, wool, and whatever, but they're buying my expertise with this breed of sheep. I sell my mentoring.*

*Lambing season, my phone is available 24 hours a day to people who...I've delivered a lot of sheep over the phone.*

*I want to give back to the people that I'm trying to get started. I could sell my animals for more money sometimes. Why should I? I want these people to be able to start and not be strapped two years down the road and get divorced because they got themselves strapped and they can't afford it, or they're not feeding the animals right. Try to get yourself mentored. Don't be scared to ask the questions of the ones that are doing well and stuff. We're not here to step on you and think you're going to take us over. We want to help you.*

Though these individual-level actions—finding other functioning organizations, educating people at fairs, festivals, and farmers' markets, and becoming mentors—help address aspects of the challenges they face, producers identified wider-level initiatives that would have a notable impact.

## POTENTIAL MACRO-LEVEL RESPONSES

Macro-level initiatives involve governmental or nonprofit organizations and vary in terms of their specificity. At the widest level, producers named changes in federal and state governmental policy as critical to supporting small agriculture. Producers also described initiatives that involved government or nonprofits to build markets through education, build physical infrastructure, and increase support for producers and the sector itself.

Desired policy changes at federal and state levels specified a larger emphasis and focus on the needs of small agricultural producers.

*I think the Farm Bill helps the big guy more than the little guy, so a revamping of the Farm Bill's approach to ag [agriculture]. But that's a huge thing.*

*If the feds stopped supporting big AG [agriculture] and took a little better thought about small AG and the benefits of small AG.*

*We do not have national support. We don't have support through the USDA, except when it comes to soils and land management, NRCS. They're wonderful. But as far as fiber animal production, we do not have the support of the USDA. Price support would be one. Either subsidize us the way you do everybody else, or put a limit on how much is coming from overseas. Because everybody else has a limit. There's a limit on how much beef and chicken and stuff like that that come in from overseas. But there's not on wool product, on wool or lamb, meat.*

*Fiber is under-noticed. Part of sustainability is educating people about all the things that can be made. Differentiate between wool and synthetic. Emphasize wool is better and Maine wool is best. Sustaining small farms helps Maine's sustainability...it's important for Maine to be [a pioneer in] getting wool and natural animal fiber back into everyday life/products.*

*Supporting small agriculture instead of huge agriculture—we can be very useful to the state. We bring tourists.*

Producers also spoke to the need for better marketing of fiber in general and the wider impact of a coordinated consumer-education program.

*A lot of farmers really couldn't afford to put any kind of advertisement out there to let the public know it would be available really. Some of the farmers. If the State itself could help promote all the smaller farmers....*

*Having the ME Dept. of Ag. getting involved in elevating fiber...emphasize the importance of small farms.*

*I like the idea of the State helping with the marketing or something. Or all the stickers and the signs and stuff, or labels you can put on your stuff, the Real Maine stuff.*

*It's one of the most underrecognized, underappreciated, and one of the hardest corners of agriculture, because it is expensive to do and is expensive to raise these guys, and people don't appreciate and understand the work that goes into it. People are disconnected from meat sources and the importance of it and the importance of sustainability and fiber. The more I realize that there's a disconnect, the more I realize that some of this just comes down to education and changing what people see as important. It's hard to say that it's on the customer's side, but I feel like that's where it is, and people understanding like this costs this much because it's sustainable, and it's done with love.*

*There's so much anti-small-scale...that has no understanding of the difference between a big herd CAFO [concentrated animal feeding operation] -produced animals...and small-scale and what the advantages to carbon sequestration are with small-scale composted manure and increase in carbon sequestration in the soil. And rotational grazing and all of that. There's just no understanding of the difference. And if there were a way to highlight that, I think we'd see a lot more support for smaller farms.*

Producers also identified physical infrastructure as being critically important for the sector. This infrastructure includes supply chain actors such as mills, dyers, veterinarians, butchers, and feed producers (mostly hay).

*The supply chain for the farm is always breaking somewhere, the system is so broken regarding government and the process for thinking about ag and food.*

*We don't have a lot of large animal vets, but if there was some kind of a grant-supported program at least to sort of morph the way large animal vets are in the landscape.*

*Support more processing facilities that can handle different types of fiber.*

*There aren't enough mills. It's not cost-effective. You have to send as much wool, you know, the more you send in a lot, the cheaper it is. And it's slow.*

*[More mills will] help the younger generation to continue with farming and with these animals. Because if they look at it now, they don't see a lot of support. The state needs it. They need several fiber mills.*

*Butchers are harder to find—need to support the meat industry to support the fiber industry, you can't raise sheep without selling meat*

The final theme producers identified as important to supporting them and the sector are targeted initiatives for individuals and farms. These include addressing gaps in

financing, business management, farm management, health care, mentors. and a pipeline of young farmers.

*It's like MOFGA, bringing more younger people in to do the farming...we need to create the kind of place that can incubate that sort of innovation.*

*Inspire younger generations and people to get involved, start own farm.*

*Policies that would help—going back to health care—protect farmers' health care [and mental health care] would be huge at a national level. That's something that I think every farm deals with.*

*It would be beautiful to have someone help you develop regionally specific diets for sheep, like mix up grain. USDA used to have a service for grazing management plans. And they don't offer them in Maine anymore because they don't have anyone to do them. They don't even know how to begin to send samples away to do something because that information isn't really readily available unless you really dig for it....we run our own fecal egg counts for parasite loads on the farm. And we've taught other people how to do it. But if you don't have that skill, it's a huge cost.*

*Develop a workshop focusing on nutrition and sheep.*

*It would be great to have more business counselors to help with—business planning and finances.*

*A lot of farming is marketing. A lot. I mean, if you're going to sell your product, you have to figure out how to sell your product. And it would be great if there was somebody out there explaining to you how to do that, or helping you.*

*If you don't know what you're spending, or what you're making or not making, then how does that appeal to you? People don't have a clue what those numbers are. People don't keep track of pricing/evaluating costs. Teach them how at one of these events or something like that and give them the—it's confidence.*

*If we had some financial advice, that would be huge. Because there was a farm down the road from us, and a processor who actually sort of was a mentor in the beginning. He was saying, "Oh, you can write this off your taxes." But we've never figured out how we can write that off of our taxes. So, to have help with that would be excellent.*

## DISCUSSION

It is important to recognize the interconnectedness of this study's themes and their impact on the success and challenges faced by Maine's natural fiber sector. The three key themes, educating consumers, infrastructure and fiber network, and farm viability are interdependent at both the individual producer level and the wider organizational level.

At the individual producer level, farm viability depends on actions by fiber producers (or producer groups) to drive activities in response to sector needs and challenges. When producers direct resources to educating consumers (such as posting flyers, attending fiber events, and teaching potential customers about fiber properties), the market expands as consumer knowledge about natural fiber grows. In turn, as consumers better understand natural fiber properties and qualities, a larger market for fiber develops, which drives demand and correspondingly decreases price pressures. Easing price pressure allows producers to charge higher prices that improve the likelihood of sustaining their fiber business (increasing farm viability).

Farm viability is also directly connected to individual efforts to strengthen the sector's infrastructure and business-to-business fiber network. Specifically, advocating for more supply chain participants (e.g., mills, feed producers, equipment providers), fiber groups, and fiber farm mentors builds physical and intellectual resources intrinsic to fiber's production. Producers working towards a strong infrastructure and fiber network bolster, not only physical equipment and supplies, but also information sharing across the supply chain, ultimately improving farm viability through greater efficiency and effectiveness.

From a wider organizational perspective, these themes are amplified as more organizations with broader reach and deeper resources have the potential to make a more powerful impact. When it comes to the infrastructure theme, the network effects of organizational partnerships with governmental and nonprofits yield potential access to additional resources, both directly within the larger agriculture industry and indirectly from other spheres such as regional associations. Specifically, nonprofits and governmental organizations can support key operations through grants, financial incentives, and loans, or through developing a more robust infrastructure by improving resources and incentives for more mills or skilled veterinarians.

Educating consumers at a larger scale involves the compounding impacts of marketing and informational messaging from business partners, government agencies, and nonprofits. The greater scope and depth of larger organizations reaches more consumers, thereby expanding the market for fiber goods and easing the price pressure for fiber businesses. These actions also better establish Maine's fiber brand and contribute to stronger incomes for

individual businesses and economic viability for the whole fiber sector throughout the supply chain.

In sum, organizational initiatives undergirding the sector's infrastructure and fiber network and educating its consumers creates real brand advantages, decreases costs, increases farm and business knowledge, efficiency, and effectiveness, and improves profit opportunities. Ultimately these efforts increase farm viability and, therefore, sector-wide fiber sustainability in Maine.

## RECOMMENDATIONS

The individual-level and broader regional-, state-, and national-level actions outlined here provide fiber producers and agricultural policymakers with much to contemplate. There are, however, some actions that can be considered now for addressing critical gaps. First, the sector is splintered in terms of its' representative organizations. While there are several groups dedicated to specific fiber breeds or events, there is not one group that represents the whole fiber sector. This lack leaves the sector without a way to coordinate its multiple interests and advocate for the sector at the state, regional, and national levels. Such an organization could (and we argue, should) represent all fiber animals along with the diverse geographic locations and sizes of fiber farms and should be created and run by the producers (and other supply chain members) themselves. It would take time to create such an organization, but it would be pivotal in formulating and representing producers' interests. Examples of such a representative group for producer sectors include the Maine Cheese Guild, the Maine Brewers' Guild, and the Maine Beef Producers Association.

The second recommendation we make is to build on the successes of fairs (e.g., Windsor Fair, Common Ground Fair), festivals (e.g., Fiber Frolic), fiber-arts ecotourism (e.g., Maine FiberArts Tour), special programs (e.g., Camden Public Library's "The Unbroken Thread: 200 Years of Spinning and Weaving in Maine," Pejepscot History Center's panel "Common Threads: Perspectives on Historical Textile Arts") and elevate the visibility of fiber and the fiber arts through a larger-scale event. This event would leverage Maine's craft brand, highlighting the traditions and practices of fiber production, along with other Maine craft arts such as metalsmithing, furniture-making, basket-making, ceramics, and jewelry-making. This exhibition could be housed at a high-profile venue such as an art museum or an arts-and-crafts-focused

college and would attract those interested in finished products, as well as those who want to know more about the origins of craftwork. Specific to fiber, this could include the work of turning raw fleece into yarn or roving and then into apparel, tapestries, rugs, blankets, and more. Such an event would ideally work with diverse populations spanning age, income, and craft experience. Audiences such as local K–12 schools, and community and four-year colleges could build knowledge and enthusiasm among younger people, which would be critical to craft's future health. By placing fiber arts with other craft arts, it not only increases the population of potential visitors to the exhibition, but it also situates craft as intrinsic to Maine's history and to its present and future economic vitality. The Philadelphia Museum of Art Contemporary Craft Show, the Fuller Craft Museum, the Heard Indian Fair and Market, the Ann Arbor Summer Art Fair, and the Portland Fine Craft Show can serve as models for such an event.

The third recommendation is to form a special task force to prepare for the shift in the ecology of fiber. The current fashion and clothing industry is one of the most polluting and water-consumptive industries throughout the world (Allington 2023; Schlossberg 2019; Van Syckle 2019). As the effects of climate change, landfill pollution, and water shortages continue to mount, the importance of sustainable fiber systems is increasing, and some manufacturers are responding (Friedman 2021; Wall Street Journal 2016). Maine can be ready to take advantage of this shift. Additionally, demand for ecologically positive fibers is increasing (ASIA 2020). With its many small farms and supply of agricultural workers, culture committed to respecting the agricultural landscape and protecting the environment, and well-respected Maine brand, Maine can be a leader in sustainable fiber production.

## CONCLUSION

Maine's fiber sector is challenged by a macro-environment favoring large agricultural producers, by consumers with limited experience of fiber farms or fiber crafts, and by an infrastructure depleted by globalization. Yet, there is a strong core of producers that are making extraordinary fiber and value-added products—they do inspiring work every day. There is also a Maine brand that connotes integrity, excellent quality, hard work, and care for the land. Consumers travel from distant reaches both nationally and globally to experience

Maine's crafted fiber. Concurrently, there are visible ecological and social crises—climate change, pollution, poverty, inequality—that are calling societies to rethink what is produced, how it is made, who is paid a fair wage, and who is supported and who is not. Fiber producers, processors, and artists—with collaborative partnerships—can be strategic actors in positioning Maine to be a model of adaptive resiliency responding to these opportunities and challenges. Building on the palpable energy evident in Maine's fiber community, these adaptations underline cultural respect for land, small farms, and artists, capitalize on the synergistic dynamics derived from collaboration, and can ultimately provide notable economic impacts to the fiber sector, as well as adjacent sectors, and the state as a whole.

## ACKNOWLEDGMENTS

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## NOTES

- 1 <https://www.mainememory.net/search?keywords=woolen+mills>
- 2 <https://www.maximizemarketresearch.com/market-report/wool-market/210009/>

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