



**Goat Production in Maine:
A Report to the Somali Bantu Mutual Assistance Association of Lewiston-Auburn**

Submitted by the Students of Bates College Anthropology 339

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Goats at Saunders Road Farm, Photo Credit: Celia Feal-Staub

I. Introduction and Acknowledgements

This report was written during the Fall semester of 2019 by the students of the Anthropology senior seminar called “Production and Reproduction” (AN 339) at Bates College for use by the Somali Bantu Mutual Assistance Association of Lewiston-Auburn at the request of Muhidin Libah, the current Executive Director of the Association. The report includes information on a number of topics that should be of use in the establishment of a goat-rearing operation to provide halal goat meat in the Lewiston-Auburn area in Maine. It is divided into sections by content area, with each section containing an overview and summary of useful information and/or resources for the reader. Each also includes annotations with selected references, to facilitate the reader’s own consultation of sources for further information. The sections (in order) are: On Raising Goats in Maine; Goat Breeds; (Halal) Slaughter in Maine; and a final section on the Regional Goat Meat Market.

The authors would like to thank the Somali Bantu Association and Muhidin Libah, in particular, for their assistance and collaboration on this project and for the opportunity to learn from this process. Additionally, we would like to thank the Bates College Purposeful Work Fund for enabling this cooperative project and Sam Boss of Bates’ Harvard Center for Community Partnerships for providing insight and advice on the community engaged portion of the project. Finally, we would like to thank Professor Eames for her guidance and support throughout the process.



Goats with ANTH 339 students at the farm. Photo Credit: Hannah McKenzie



Unidentified goat from Muhidin Libah's herd. Photo Credit: Nell Pearson

II. Raising Goats in Maine

Diet:

Goats are ruminants and have a digestive system which uses pre-gastric fermentation. This means that ingested food is fermented by bacteria and then enters the small and large intestines. Goats are browsers which means that they are experts at finding nutritious grass, hay, and shrubs. Regarding the diet of kids, it is essential to recognize the key parts of a diet to develop a healthy goat.

Goats are in the Bovidae family, which functionally means that they are ruminants (mammals which are able to obtain nutrients by eating plants which are then fermented in a specialized stomach prior to digestion, using microbial actions) with a four-stomach digestive system. Goats possess microbes that can break down fiber; the by-products of this process provide energy to the animal. Therefore, the best, and most cost-effective form of energy for goats is high-quality plant matter (Delaney, 2012).

Protein is one of the most important parts of a goat's diet; it is the primary producer of the bacteria that breaks down their food as well as the producer of muscle growth in goats. Fats are typically not thoroughly digested within the rumen - the goat's first stomach. If goats are fed too much fat in their diet, it will result in a lack of digestion

within the intestines. Although fat is an excellent source of energy, it will not be beneficial in the long run.

Mineral supplements are recommended to be added to their food supply as it has the potential to reduce diseases within kids. Accessible clean water should be a priority for kids to have available. If goats do not have a proper drinking source, it will result in an increase in food consumption and lead into an overweight goat that would not be suitable for lean goat meat (Berg, Robinson, Giraud, 2012).

Feeding philosophies are highly variable depending on the goat farmer. Below is information on commonly addressed factors that comprise a healthy goat's diet. Suggestions found in this report can be used or discarded in any combinations and combined with previous existing knowledge to create the best goat diet plan.

In general, nutritional needs of goats are dependent on the animal's breed, age, weight, production status, and factors such as climate and the mineral content of the land where the goat grazes. All goats have a digestive system that functions very differently than humans, so they share some key dietary considerations. Goats prefer to eat leafy plants that are as tall or taller than their heads. A normal eating pattern for a goat is eating 4-6 times per day. A goat will, therefore, eat more if her food is refreshed more than twice a day, though this may of course not be feasible when time considerations are made. Goats prefer water that is between 60-80 degrees Fahrenheit.

The suggested proportion of fiber to include in a goat's diet is 32-40% (Delaney, 2012). The suggested proportion of starch to include in a goat's diet is 18-25%. The suggested proportion of protein to include in a goat's diet is 10-16.5% (Delaney, 2012). Given a choice - goats prefer to eat grasses, weeds, and woody species daily. In the spring they may prefer more grasses, and after it is warmer begin eating more of a mix of leaves and weeds.

Breeding:

Goats are typically seasonal breeders (Summer-Fall). Their estrus cycle ranges from 18-21 days and a doe's season lasts from a few hours to three days. Kids are recommended to be bred from 7-10 months of age (Schivera, 2015). Doe's may begin at 3 months of age but should not be reproducing that early due to the lack of development. Does milk for about ten months and takes a break for two months. After this two month break, they may return to milking or if there is an outside supply of milk, kids will resort to the other source (Schivera, 2015). Goats reproduce when there is a decrease in daylight and you can adjust their cycle of reproduction by adjusting their settings. While unethical, this would increase the amount of production during the year (Schivera, 2015).

Housing:

Goat housing is a critical factor that is often overlooked. Although goats, in general, have the potential to thrive in a great variety of weather conditions, housing is needed for reproduction, protection, and safety. A house or a shed that goats typically live in is an open shed with bedding or straw on top of the dirt. Open-sided structures is essential towards goats feeling protected as well as having access to the pasture. Bedding allows warmth during colder temperatures as well as comfort when reproducing. A goat shed is usually 10 feet by 14 feet wide and is no higher than 6 feet (Hamito, 2009). Within goat housing and shelter, there are a plethora of factors that are essential towards keeping the housing healthy and sustainable. Factors such as ventilation, lighting, dust, and temperature should all be taken into consideration while raising goats (Hamito, 2009). While the shed does not have any modifications on the inside, sometimes ledges and steps are installed for vertical movement (Hamito, 2009).

Fencing:

The fencing for goats is a key factor in the success of the production of goat meat or dairy. Fencing for goats keeps the goats safely inside and keeps everything from the outside away from the goats. Goat fencing determines whether or not outside predators influence the goats. It ranges from parasites from other animals to even larger predators that may prey on kids or even goats. Goats are highly intelligent animals that typically do not question the idea of escaping until they are trained to not do so. In terms of conventional fencing, there are two different types of fences that are useful for goats. The first of which is boundary fencing which is top selvage wire topped with barbed wire and the second of which is subdivision fencing which is the cheaper alternative that has potential for does to sneak under (Lund, May, 2003). If the lower section of a fence is too high, it may also lead to predators crawling beneath and harming the goats. Certain fences are strategically placed so that predators that dig beneath soil level may not enter (Lund, May, 2003). Regarding electric fences, having a steady and constant voltage level is essential.

Ailments / Injuries, Healthcare, and Diagnostic Techniques:

The use of four of our five senses (sight, smell, hearing, and touch) is an invaluable tool in recognizing and diagnosing health problems in goats. It is recommended to take notes on how your healthy goats look, smell, and sound so that the healthy goat notes may be used as a reference point in diagnosing. The following diagnostic techniques can be useful when there is a suspected ailment in a goat. When it becomes necessary to call a veterinarian or other outside expert, the ability to describe the following characteristics will prove useful.

What is animal movement like? Does the goat appear to move easily and naturally, or does she limp, struggle, or stay apart from the rest of the herd? Does the goat get on its knees to graze?

Inspection of the goat's feet: check the goat's hooves; is one hoof warmer than another? Are there any visible injuries? Is there any twine, wire, or other objects wrapped around the foot? Check for excessive growth, swelling, or rotting of skin between toes. Are there any unusual or putrid smells coming from the feet? This can be an indication of footrot. In cases of footrot, the diseased goat should be isolated from the herd, and treated with zinc sulfate immediately, repeated weekly for a month.

Does the goat stretch when it rises from a lying position? Stretching is generally a sign of good health. Does the animal appear to have a normal appetite? Does it graze eagerly, and eat the food provided in feeders?

What do the animal's droppings look like? Are there fresh droppings in the pen and in the field? Check for blood and mucus in the feces. Small white segments in the droppings may be a sign of tapeworms. Have abnormal feces specimens tested. Check urine for blood, as this can be a sign of a problem.

Does the animal have a normal breathing rate? An average breathing rate for goats is between 12 - 15 breaths per minute. Is there a rattling sound with breathing? Does the animal appear to be panting?

The techniques above all offer examples of the ways in which the senses can be used to learn what healthy goats look, sound, feel, and smell like. Once a baseline understanding of healthy goats is established, it becomes easier to detect ailments and illnesses earlier on. All of the suggestions above are adapted from "Bulletin #1032: Tips for Detecting Disease or Injury in Sheep and Goats" from the University of Maine Cooperative Extension. This is an incredibly useful resource for more information about illness detection in goats, and is appended below in full.

For further health issues, contact Maine State Veterinarian: Dr. Michele Walsh, michele.walsh@maine.gov, 207-287-7615

Selected References with Annotations (Part II)

Belanger, Jerry, and Sara Thomson Bredesen. 2018. *Storey's Guide to Raising Dairy Goats: Breed Selection, Feeding, Fencing, Health Care, Dairying, Marketing*: Storey Publishing.

Belanger and Thomson Bredesen cover many of the essential topics to introductory and advanced goat care covered in the other guidebooks included in this bibliography: milk, feeding, proper fencing, health and breeding. They have a more extensive range of topics than other introductory books, including more specialized topics such as keeping records

and making goat dairy products (ie yogurt, kefir, and butter). This book is especially useful for its accessibility - the authors carefully define each goat-related term before diving into specifics and assume almost no prior knowledge on the reader's part. Running through the book are color photographs, which add both an aesthetically pleasing element to the reader's experience, as well as an aid for readers who better process procedural information visually.

Brzozowski, Richard; Lichtenwalner, Anne; Weber, Jim. 2015. "Bulletin #1032, Tips for Detecting Disease or Injury in Sheep and Goats." *Cooperative Extension Publications, The University of Maine.*

This four-page fact sheet, published by the Cooperative Extension and School of Food and Agriculture at the University of Maine, provides crucial information on recognizing signs of disease and injury within a goat population, by using one's senses. Brzozowski, Lichtenwalner, and Weber recommend keeping notes and taking photos of both healthy and unhealthy goats in order to improve one's diagnostic abilities. They provide suggestions for diagnostic techniques including observation of the goat's movement, feet and hooves, appetite, patterns of stretching, droppings and urination, hydration levels, and facial features. Also included are recommendations for properly listening to goat vocalizations, breathing, chewing, and regurgitating, as well as smelling for ammonia-type scents along with other unusual smells. Almost every technique listed in this fact sheet relies on the use of one's senses, and on comparisons to previously healthy goats in order to catch disease and injury early and efficiently.

Bueschen, Joy; Bueschen Tim. 2018. "Goat School." *Zeoni Creations.*

<https://www.goatschool.com/>.

The 'Goat School' website is a resource created by Joy and Tim Bueschen, primarily intended to advertise their in-person Goat School, but also useful as an online resource. Their school is located in Monson Maine, and they offer two-day goat care workshops multiple times a year for \$350 (currently discounted to \$320). The Bueschen's Goat School would likely be an excellent resource for learning goat-care techniques that are specific to the Maine climate; topics covered include preparing to bring goats home/ to the owner's farm, what to look for in a seller's goat and site, and skills to raise goats with confidence once they have been relocated. More specialized skills taught include hoof-trimming and de-worming goats. Although the 2019 date of the workshop has passed, the school could be a valuable resource in the future.

Caldwell, Gianaclis. 2017. *Holistic Goat Care: A Comprehensive Guide to Raising Healthy Animals, Preventing Common Ailments, and Troubleshooting Problems.* White River Junction, Vermont: Chelsea Green Publishing.

Caldwell's goat-raising manual provides an excellent and, true to its name, holistic overview in best practices for raising healthy goats. The book is divided into five general sections – the developmental history of the goat, how to properly house, feed, and contain goats, treating common goat ailments, goat reproduction information, and a section with more detailed information regarding disorders that affect goats. Caldwell approaches each of these five sections with the thesis that every aspect of goat care should fit holistically into a larger health plan, and that goats deserve respect and admiration. This is an extremely useful resource for gathering a baseline understanding, though should be supplemented with more detailed information pertaining to Central Maine climate issues in goat care as well.

Delaney, Carol. 2012. *Guide to Starting a Commercial Goat Dairy*. Burlington: UVM Center for Sustainable Agriculture.

Delaney's book, published by the UVM Center for Sustainable Agriculture in cooperation with the United States Department of Agriculture, provides a guide for a goat farmer who is interested in raising goats as a commercial dairy business – on a larger scale than many of the other hobby guides included in this bibliography. Though the book is specifically written for goat dairy farmers, much of the information is applicable to meat goat farmers as well. She includes chapters on planning the space for goats, building a farm budget, costs of goat feed, resources for buying, selling and marketing goats and meat in the United States Northeast, goat feeding behavior and diet recommendations, and lastly an extensive selection of additional resources. This book is less accessible than many other goat care guide books but is useful to consult when more detailed information is required on a specific topic.

Hamito, Desta. August 2009. *Shelters and Housing for Sheep and Goats*. Ethiopia Sheep and Goat Productivity Improvement Program

This article as a technical bulletin was essential for research towards the housing details needed for goat prosperity within different climates. While Auther Hamito directed his research towards goats and kids in Ethiopia, due to goats being flexible animals towards the climate, many of the presented themes are applicable towards colder climates in Maine. Hamito emphasizes that housing for goats needs to be discussed more especially within countries that do not have the resources to healthfully raise goats. Lack of proper housing and shelter leads to poor animal conditions and eventually poor dairy or meat produce. This article also touches on the themes of goat meat or chevon being produced and how a shelter will decipher whether or not a goat will produce better or worse meat for consumers. Protection from outside predators and protection from goats escaping are the two jobs that proper housing and fencing should accomplish and are a few things that are often overlooked when raising goats.

Niemann, Deborah. 2018. *Raising Goats Naturally: The Complete Guide to Milk, Meat, and More*. New Society Publishers.

Niemann provides a personalized guide to many of the most important aspects of raising and caring for healthy goats. Topics include proper housing, choice of breeds, day-to-day life with goats, parasite control, injuries illnesses and disease, and pregnancy and birth. The book is extensive and incorporates detailed information along with stories of the author's own experiences raising goats. Niemann's writing style is friendly and frank, almost making the reader feel as if they are reading a novel at times.

Sayer, Maggie. 2010. *Storey's Guide to Raising Meat Goats: Managing, Breeding, Marketing*. North Adams: Storey Publishing.

Sayer's book is a semi-broad overview of goat care but is further specialized than other resources included in this bibliography as it is specifically pertaining to best practices in raising goats for slaughter. Sayer includes information on the pros and cons of raising meat goats, finding a high-quality goat veterinarian, choosing meat breeds, where to buy goats, 'how to think like a goat', transporting goats to slaughter, common parasite problems, marketing goat meat, and promoting your business. The book contains detailed, relevant information for a small-scale meat goat farm in Maine, and also includes relevant quotations from experts in the field – such as the president of the American Meat Goat Association. Among the multitudes of useful information provided by Sayer are charts which indicate what types of goats are used by which religious groups for which holidays, and which types of goats are preferred by various ethnic groups at non-holiday times. The credibility of this information is questionable, as Sayer makes broad claims about these preferences for groups such as Greeks, Hispanics, Jews, Muslims, Somalis, and West Africans – it seems highly implausible that entire ethnic groups share a goat meat preference as Sayer suggests.

Thistlethwaite, Rebecca, Jim Dunlop, Bill Niman, and Nicolette Hahn Niman. 2015. *The New Livestock Farmer: The Business of Raising and Selling Ethical Meat*. White River Junction, Vermont: Chelsea Green Publishing.

Contributing authors Dunlop, Hahn Niman, Niman, and Thistlethwaite lay out four key goals of their book: keeping meat producers in business while assisting them in earning fair wages, treating animals humanely, using practices which are gentle and restorative to the Earth, and providing nutritious and good-tasting food to as many people as possible. The book is divided into two sections – the first focused on raising various species of livestock humanely and effectively, and the second focused on the business and logistical hurdles of slaughtering and marketing meat. Throughout the entirety of the information

they provide, the authors remain focused on the production of ethical meat – which is defined by them as meat that comes from farmers who want their animals to live comfortably and die quickly and humanely. *The New Livestock Farmer: The Business of Raising and Selling Ethical Meat* proves useful for more specific information regarding best practices in ethical slaughter and raising goats to be slaughtered.

Schivera, Diane. 2017. *Raising Organic Livestock in Maine: MOFGA Accepted Health Practices, Products, and Ingredients*, Maine Organic Farmers and Gardeners Association

This article discusses the different strategies that farmers use specifically in the state of Maine. This article was written by livestock specialists and provides essential information on the necessities of growing and raising animals in cold conditions. This article lists the important materials needed, the resources for people to reach out for help, and detailed steps to take when your animals get sick. This article has bulleted steps on how to help your animals with digestive disorders, pink eye, flies, or other common diseases. While other articles discuss the possibilities of these incidents happening, this article provides genuine and expert-approved solutions. Another benefit that this article carries is that it is all based on the state of Maine and may be very helpful for the research of raising goats in Greene. This article is written for people that would like to gain knowledge of strategies of making a healthy farm environment in the state of Maine.

Smith, Cheryl K. 2010. *Raising Goats for Dummies*: John Wiley & Sons.

Many sources regarding holistic, generalized goat care are written in a beginner-friendly manner. Those which are more technical tend to be highly specialized and not relevant to a small-scale goat farm in Central Maine. As the title suggests, Smith writes an incredibly accessible text that covers both what goats can add to the caretaker's life, along with practical information about goat health, proper environments for goats, training goats, breeding, and common issues along with their solutions. *Raising Goats for Dummies*, like many of the other reference books included in this bibliography, provides an incredibly useful overview with adequate detail in most areas, yet may need to be supplemented in cases of less common diseases or other problems.

III. Goat Breeds

Based on our research, there are four breeds of goat that seem particularly promising for meat production in Maine at the Somali Bantu Association's goat farm: Boer, Myotonic, Kiko, and Texmaster. Boer goats are significantly larger and produce more meat than any of the others. They are also able to be crossbred with many different other breeds of goats. However, Boer goats are also the least resistant of these breeds to parasites. Myotonic are smaller and produce less meat, but are generally adaptable and significantly more resistant to parasites. Kiko produce particularly high quality meat and are in the middle in terms of both size and resilience in the face of parasitic infections. The Texmaster is a cross between Boer and Myotonic. It produces less meat than the Boer, but is also more docile and has lower infant mortality rates among the kids. Among American goat farmers that maintained herds of 10 goats or more, roughly 60% utilized Boers, 38% raised crossbreeds, and 10% kept Spanish goats (USDA 2012, 2).

Boer:

- Largest, produces the most meat
- High fertility year-round
- Least resistant to parasites
- Can be crossbred effectively
- Hardy and adaptable
- Kids die at higher rates



¹ All images in this section from American Goat Federation (see ref. below)

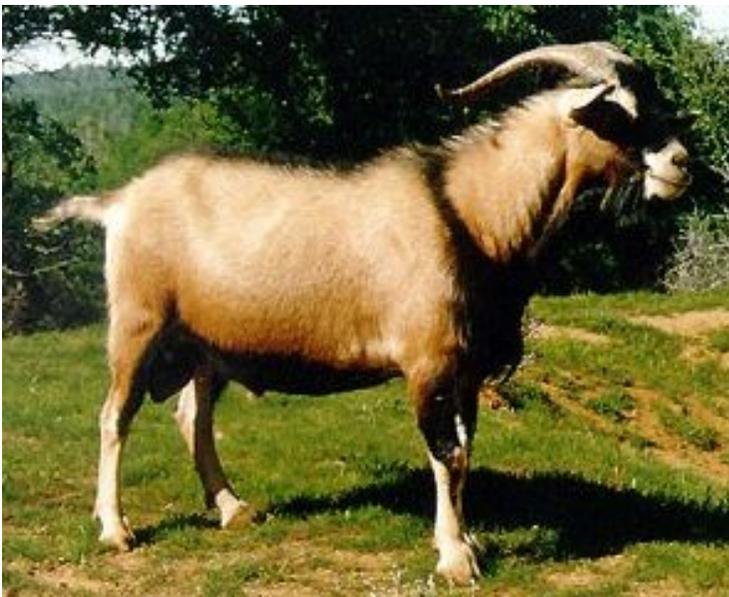
Myotonic:

- Faints when excited
- Docile and easy to contain and care for
 - Less likely to try and jump fences and such
- Most resistant to parasites
- Smaller, produce less meat



Kiko:

- Arguably highest quality meat
- Mid-size
- Medium resistance to parasites
- Can also be dairy goats



Texmaster:

- Crossbreed of Myotonic and Boer
- Mid to large size, produce a significant amount of meat
- More docile than Boers



Additional Resources for Farmers:

Farming has the potential to be a risky business venture as it is highly dependent on environmental conditions, animal or crop health, as well as other factors outside the realm of human regulation. By creating effective partnerships, finding resources, and understanding how to access local and regional markets are crucial steps for any grower. The USDA offers a number of business planning tools for small-scale new farmers, as well as female, veteran, and young people seeking to enter this field. The USDA webpage, the first link on the list below, provides a “Getting Started” section that walks the reader through four stages, including resources to help farmers create a business plan, business development, taxation, links to grants, as well as opportunities to connect with mentors and other organizations that can provide support. Many goat farmers choose to sell direct-to-consumer, as this maximizes profits for the cultivator themselves (USDA 2012, 3). Other options to help keep this business viable could include hiring out a herd of goats to clear vegetated areas or trim lawns.

Helpful Links:

- United States Department of Agriculture resources related to grants, mentorship, business planning, and education:
<https://newfarmers.usda.gov/technical-assistance-planning-your-business>

- The American Goat Federation provides detailed descriptions on meat goat breeds:
<https://americangoatfederation.org/breeds-of-goats-2/meat-goats/>
- Use of goats for lawn maintenance, clearing vegetated spaces:
<http://www.goatworld.com/articles/brushcontrol/brushcontrol.shtml>
- The University of Maine Extension has a Goat Livestock webpage that includes written resources and educational opportunities:
<https://extension.umaine.edu/livestock/sheep-and-goats/>
- Beginning Farmer Resource Network of Maine:
<https://extension.umaine.edu/beginning-farmer-resource-network/>

Selected References with Annotations (Part III)

American Goat Federation. n.d. "Meat Goats." Accessed October 12, 2019.

<https://americangoatfederation.org/breeds-of-goats-2/meat-goats/>

This web article provides a general overview of meat goats and the various breeds including Spanish, Boer, Kiko, Myotonic, Savanna, and Texmaster goats. Each description explains the characteristics of each breed including weight, hair type, optimal climate, reproduction rate, temperament, and growth rate. This general information is crucial for gaining background knowledge on various breeds and being able to understand which breeds might be the best fit for Muhidin's requirements.

Dubeuf, Jean-Paul, and Jean Boyazoglu. "An International Panorama of Goat Selection and Breeds." *Livestock Science* 120, no. 3 (2009): 225-31.

This source is a global overview of how different types of goats have spread, declined, and adapted to environments. While it does not provide information specific to Maine, it does have a lot of useful content about how goats are used worldwide as well as a discussion of which goats are used for which purposes across the world. This makes it easy to see which goats are likely to be good for meat production. Plus, even though Maine is not mentioned, seeing which types of goats are hardy or adaptable gives a reasonable benchmark for which ones are likely to be the safest in the elements of Maine. It also provides a significant list of bibliographic sources that I fully plan on mining through in the future to find more supplementary evidence. The final thing of use in this piece is the discussion of cross breeding and maximizing the efficiency of each and every goat. This may not be on the table in the short run, but long-term cross breeding is something that should be considered in raising goats, particularly if it does lead to goats better suited for meat production in Maine's cold northern climes.

Emond, S. (2008). Meat goats (2nd ed.): Alberta Agriculture and Food , Information Packaging Centre U6.

This book is an excellent source of general information about goats that are used in meat production. It does not describe the different kinds of goats, but does give a complete overview of how to raise meat goats generally. When combined with the website from the American Goat Federation, this could be a very useful tool to have in order to be able to combine the basics of care and long term herd management/ breeding and such with an idea of the more specific nature of the goats being raised.

Mazhangara, Irene Rumbidzai, Eliton Chivandi, John Fisher Mupangwa, and Voster Muchenje. "The Potential of Goat Meat in the Red Meat Industry." Sustainability 11, no. 13 (2019): 3671.

This article outlines ways that goat meat could become a much bigger part of the red meat market in the United States. The authors argue that goat meat has a greater role to be played in the future, and that policy should be adapted to accommodate this. While the Somali Bantu Association has an idea of interest in the local community, it is still good to know the state of the goat meat market more generally. It could affect prices and whether there will be alternative sources that people can go to for the meat.

Simões, João, Carlos Gutiérrez, and SpringerLink. *Sustainable Goat Production in Adverse Environments: Volume I: Welfare, Health and Breeding*. 1st 2017 ed. Cham: Springer International Publishing, 2017. doi:10.1007/978-3-319-71855-2.

I, personally, would consider Maine an adverse environment, so this book seems perfect. It provides information on how to best breed and maintain goats in a healthy manner. I intend to use this, along with the Emonds book, to find out what the best practices are for raising goats, with this book allowing for particular focus on how to breed goats in an adverse environment. Unfortunately, it focuses mostly on arid, tropical, or subtropical types of extreme, however, it does still discuss the needs of goats. It does also talk about diagnosing pneumonia and other diseases generally associated with the cold, so that could still be useful. Additionally, it has a section about crossbreeding the Boer goat, which is one of the ways of effectively raising meat goats (they are much larger goats). As such, this is one practice that will have to be seriously considered moving forward.

University of Maine Extension. "Resources for Small Food Businesses in Maine." Accessed October 12, 2019.

<https://extension.umaine.edu/food-health/resources-for-small-food-businesses-in-maine/>

Business development tools for small farmers in Maine, including online resources. This source provides links to classes, funding opportunities. It is helpful to understand what resources are available to local farmers who are trying to establish themselves.

USDA. Accessed October 12, 2019. "Technical Assistance for Planning Your Business." newfarmers.usda.gov/technical-assistance-planning-your-business

The USDA offers a number of business planning tools for small-scale new farmers, as well as female, veteran and young people seeking to enter this field. The webpage provides a "Getting Started" page that walks the reader through four stages, including resources to help farmers create a business plan, business development, taxation, links to grants, as well as opportunities to connect with mentors and other organizations that can provide support. This provides a great general overview of what people entering into agriculture should consider and how to connect with other farmers who can provide expertise.

USDA. 2011. "Goat 2009 Part 11: Reference of Goat Health and Marketing Practices in the United States." https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms/NAHMS_Goat_Studies

The USDA provides broad sets of data that are compiled into various reports, such as goat operations, biosecurity, disease, health and marketing practices. This provides contextual information regarding what goat production and farming looks like in the United States and which diseases are prevalent.

Wang, L., A. Nguluma, M. L. Leite-Browning, and R. Browning. "Differences among Four Meat Goat Breeds for Doe Fitness Indicator Traits in the Southeastern United States." *Journal of Animal Science* 95, no. 4 (2017): 1481-88.

This article is sort of the opposite of what would have been ideal (an exploration of which goats do well in the Northeast), but it can still be useful in a more limited capacity. For instance, many times something that would be a disadvantage in the Southeast might be beneficial in the North. If a goat has too heavy of a coat, it would overheat in Alabama, but avoids freezing in Maine. As such, this source will likely be used to see if there are any goats that would be well suited to New England based on their descriptions herein. The study demonstrates that Boers do not fare well in the South, but that Spanish goats do.

IV. Slaughter in Maine

Methods of Slaughter

There are two main slaughter options for small scale goat farmers in the state of Maine. These two options can be divided into the categories of meat sold before slaughter to individual customers, known as the “custom slaughterhouse” option, or meat sold after slaughter, known as the “commercial slaughterhouse” option. Both of these categories allow for halal slaughter practices. According to the Maine state regulations, there should not be an issue with halal slaughter practices. The state allows for ritual slaughter as an exception to otherwise relevant regulations for “humane” slaughter, particularly regarding the method of killing.

Custom Slaughterhouse Option

Especially in the beginning, if you are selling directly to specific customers, becoming a registered “custom slaughterhouse” might be a great starting point. If you were registered as a “custom slaughterhouse” in Maine, you could slaughter goats, sheep, and chickens yourself on your property (or the property you are using) as long as you’re selling each animal slaughtered exclusively to the people who have previously agreed to purchase the meat (such as your own Somali Bantu community that is in need of goats for ritual). After you have butchered and packaged the meat, the state requires “custom slaughterhouses” to label this type of meat as “not for sale” on the packaging. This signifies that only those who have previously agreed to purchase it from you will be allowed to buy it and eliminates possible confusion.

Becoming a “custom slaughterhouse” involves much less regulation than other options such as “commercial slaughter” because there is direct communication between the buyer and seller. The act of butchering is required to be “sanitary” but this definition is left up to the determination of buyer and seller, rather than predetermined by the state, allowing small farms that are just getting started to bypass regulations for equipment that may be expensive and unnecessary for small scale slaughter. While most regulatory inspections required by commercial slaughter would be avoided with this option, an annual water test for coliforms and nitrates is still required. More information can be provided by the Maine State Department of Agriculture office at the time of your registration or found on the website link included below titled “Quality Assurance & Regulations; Red Meat and Poultry Inspection.” To register as a custom slaughterhouse, you must do so through the Maine State Department of Agriculture office. This registration is free but it is required by law that you do so before starting operations. Our recommendation is that you register as a custom slaughterhouse to save money and avoid extensive regulations.

Commercial Slaughterhouse Option

The other major option would be to register as a "Commercial slaughterhouse." If you choose to register as such, you will have the ability to slaughter goats, sheep, or chickens and sell the meat after packaging to any person interested in buying it. There are no restrictions regarding the number of animals you can slaughter, but the regulations which you must adhere to are much more strict than with "custom slaughter" and there are yearly fees associated.

Outsourcing Slaughter

If it were preferable to avoid the above registration process, Central Maine Meats is a USDA facility that offers you the option to drop off your goats and slaughter them for you. You would drop off the goats at their facility (a 30-minute drive from Greene, ME.) and pick up the packaged meat at your convenience. The facility offers proper halal slaughter methods if requested. As we mentioned previously, if you were to sell the goats to such an outside market or at an auction rather than having a "custom slaughterhouse," there are additional regulations regarding the identification and tagging of goats.

More Local Regulations

Moreover, according to the town of Greene regulations, manure and grazing areas must not be located within 100 feet of a pond or within 75 feet of any other body of water. If you were to move to another location in Maine, we recommend that you follow this same guideline and also check with the local office about whether other regulations apply to that town (though we expect, if they do, there will not be many).

Relevant Contacts

Jennifer Eberly, State Veterinarian and Director, Maine Meat and Poultry Inspection, Maine Department of Agriculture, Conservation and Forestry (207-287-7512 or Jennifer.Eberly@maine.gov)

Agricultural Compliance Office, Maine Department of Agriculture, Conservation and Forestry (207-557-0252)

Quality Assurance & Regulations; Red Meat and Poultry Inspection:

https://www.maine.gov/dacf/qar/inspection_programs/red_meat_poultry_inspection.shtml

To Start the Process of Custom Slaughter Licencing: (207) 287-3841

Maine State Slaughter Regulations:

<http://legislature.maine.gov/statutes/22/title22ch562-Asec0.html>

Registration form for custom slaughterhouses:

https://www.maine.gov/dacf/qar/inspection_programs/documents/Custom%20Exemption%20Registration%20Fillable%20Form%20.pdf

Contacts for local slaughterhouses:

https://www.maine.gov/dacf/qar/inspection_programs/documents/State%20and%20USDA%20Inspected%20Establishments%202018.pdf

Selected Annotated Sources (Part IV)

“The Food Chain: Ritual Slaughter Under Threat.” *BBC*. August 29, 2019.

<https://www.bbc.co.uk/sounds/play/w3csyp0n>

This was an assigned text for the course—one that I found particularly useful in providing a specific, in-depth example of a conflict between ritual slaughter and state regulation in another geographic context. The piece examines a situation in Belgium regarding new restrictions on slaughter methods and how those restrictions affect Muslim and Jewish communities and businesses.

Kuruvilla, Carol. “Organic Halal Meats Get Muslims Thinking About What It Really Means To Eat Religiously.” *Huff Post* (2017).

https://www.huffpost.com/entry/organic-halal-meat_n_5924144,
accessed 10/12/19.

This article is an accumulation of multiple interviews with Muslim farmers and butchers who advocate for more natural and organic farming practices as key elements to the meaning of halal. It first focusses on Muslim small farmer Kurdiehm, who says that meat is not halal if it is not also “Tayyib”-- pure and clean. In his opinion, meat that is not raised ethically and organically and treated kindly during its whole life is haram and not permissible to eat. The article also mentions New York butcher Latif, who follows a similar holistic line of thinking when it comes to halal. Although this article is not scientific, its first person narratives are essential to my growing understanding of the discrepancy between how governments and big producers see halal and how many small farmers and Muslim butchers see the practice. As I looked through the comments below the article I found a wealth of information surrounding the idea of Tayyib and its growing mainstream importance in the US. Some of these sources which provide further information surrounding the idea of Tayyib are:

<https://sustainablefoodtrust.org/articles/halal-meat/>

<http://hijabman.com/journal/halal-zabihah-organic-eat-local/>

Lerner, Pablo, and Alfredo Mordechai Rabello. 2006. "The Prohibition of Ritual Slaughtering (Kosher Shechita and Halal) and Freedom of Religion of Minorities." *Journal of Law and Religion* 22, no. 1: 1-62.

Offering extensive background information on Halal (and kosher) slaughter practices and modern laws concerning ritual slaughtering, the article eventually makes its own argument. It argues that religious freedom (for ritual slaughter without stunning) outweighs the cost of additional animal suffering. Though it is not specific to Islamic practices only, I view this article as providing a voice to what is one extreme end of the broader conversation regarding slaughter regulation and religious freedom.

V. The Goat Meat Market

Premiums and Price Impacts:

Studies done on halal meat-markets across the country provide valuable data that exemplifies both the communal demand and larger market issues. One such study is titled "Consumer Willingness to Pay a Premium for Halal Goat Meat: A Case from Atlanta, Georgia," completed by Mohammed Ibrahim in 2006-7. In his study, Ibrahim seeks to demonstrate that "Muslims will pay a premium price for halal goat meat" and that "the demand for halal goat meat among goat-meat-eating Muslims may be profitable for goat producers" (Ibrahim 72). Using a mathematical model, combined with collected survey information and personal data, the study finds that "the halal attribute carries a potential premium of about 50 cents per pound of goat meat in the larger Atlanta area. This finding can be used by stakeholders in the goat industry to earn a price premium through halal slaughter" (74). Although this data is specific to the Atlanta population, it carries a valuable implication regarding how to combat the issue of high price in the goat-market. Using this premium precedent could incentivize local farmers to consider halal goat production or encourage other community members to get involved.

When looking at the current market for goats within Maine in particular, prices generally range from between \$75 to almost \$300. The distinction in prices is largely due to the reputation or quality of the source. Generally, the options for goat purchase break into a few categories: formal goat shows or livestock auctions; specialized goat farms; and miscellaneous online sources like Craigslist or other individual sellers. Each of these options presents its own benefits and drawbacks, as you attempt to partake in the industry for live goats in Maine. Formal goat auctions guarantee a higher quality of animal and a certainty about origins, but these events only happen select times during the year and can carry a larger price tag per goat. Specialized goat

farms are more accessible and still provide a large amount of information about the goat itself, but these sources are often limited in the size of their herd and whether the goats are to be used for meat or slaughter. Finally, a site like Craigslist offers a large variety in breed, price, and location, but cannot guarantee the health or history of the goat being sold or its owner. Seeing that none of the currently available options suit the needs of the Somali Bantu community in Lewiston, our recommendation would be to construct a different system which better accommodates the needs of the people.

Sourcing Goats:

Food access is determined by factors influencing spatial accessibility, affordability, and the quality of food sellers. These variables become even more clear-cut and critical in the context of the Lewiston local community and its access to Halal goat-meat. The significance of goat-meat for the Somali community must be conceptualized into establishing practical and available locations to buy goat-meat. Our research showed that the majority of Muslim consumers of goat-meat place pressure on where they purchase their goat-meat. A study conducted by Professor Jeffrey C. Fisher and three fellow researchers examined the factors that contribute to where the Somali community chooses to purchase their meat in Ohio (2009). These purchase and consumption patterns showed that people preferred to buy their goat-meat from smaller businesses and retail stores, as opposed to larger grocery stores or chain food markets. The results of the study showed that “72% purchased from a Muslim owned retail store, 13% purchased from a large grocery store, and only 8% purchased from a direct farmer (Fischer et al. 2009, 47).

The type of store consumers prefer to buy their goat-meat from is indicative of what spaces the Somali community perceive as providing the healthiest, cleanest, and most trustworthy goat-meat. The Fischer study further illuminates how a sense of “cleanliness” and “trust” is critical for the Muslim population to feel comfortable purchasing goat-meat (Fischer et al. 2009, 49). Many of the participants expressed high concern towards not knowing where the animals had come from, and were explicitly bothered by the possibility of consuming goats which had previously been fed by-products, injected with hormones, or contaminated with pork. This dictated where the community members chose to purchase their goat-meat, with the majority purchasing from a Muslim owned small retail store. Based on this research, we believe that effort could be put into establishing more Muslim-owned, local, and smaller food businesses. This will provide the Somali Bantu community with more alternatives than depending on the large supermarket, where there is a wide gap of knowledge between where and how the food was produced and the consumer’s culturally-rooted needs. Such establishments will allow the Somali community to exercise their culturally-rooted food preferences and gain dependable access to stores that sell high quality, Halal goat-meat.

Local Implications:

Looking at the national market for halal goat meat provides us with valuable perspective on how the market could function within the Lewiston-Auburn area. Given the high demand for halal goat meat in the community, the organization could easily expand their business in the halal meat market like June Baker from Cooperstown, New York did. In a New York Times article written by Monte Williams, Baker says she has made “a modest profit” from raising goats for meat” (Williams 1996). This claim is furthered by Jan Greenberg from The New Food Economy’s statement that, “goat meat is expensive and difficult to produce” (Greenberg 2016). However, neither woman is raising goats specifically for halal purposes. When the meat is produced in accordance with halal practices, as suggested by Ibrahim, the extra 50 cents per pound of goat meat is added to their profit, so the margins would increase (Ibrahim 2011, 74). This gives our business model hope, as SBCMALA looks to expand the halal goat meat production and access in an effort to improve the lives of the Somali-Bantu community in Lewiston-Auburn.

The potential expansion of the operation would also create jobs for local Somali-Bantus in tending to the goats, sourcing goats for slaughter, and connecting this business to buyers. Kristen M. Langellier’s article titled “Negotiating Somali Identity in Maine” focuses specifically on the Somali population in Lewiston. Langellier notes that, in Lewiston, “as many as 50% of the able-bodied may be unemployed” (Langellier 2006, 100). SBCMALA could tap into this labor market and not only create more jobs for the community but ensure that the Somali-Bantus of Lewiston-Auburn know exactly where their meat is coming from and that it has been slaughtered in accordance to halal practices. As Fisher et al. puts it, “they felt it was easier to trust that it was *Zabiha* if the owner was a Muslim” (Fisher et al. 2009, 49). Fisher et al. continues by saying, “Many participants noted they had no way of knowing where the animal slaughtered came from and this was of tremendous concern” (Fisher et al. 2009, 49). Both of these concerns could be solved if the organization were to tap into the Somali-Bantu labor market in Lewiston-Auburn as it expands its goat farming operation into the broader market for halal goat meat in Lewiston-Auburn. If executed properly, the expansion of this goat farming operation could not only help to solve the lack of supply for halal goat meat in Lewiston-Auburn, but also create jobs for the local community and allow SBCMALA to turn a profit that could then be reinvested into the local Somali-Bantu community.

Selected Annotated Sources (Part V)

Fisher, Jeffery C, Richard Stock, David A Mangione, and Larry A Nye. 2009. "Meat Goat Demographics and Niche Marketing." *Tropical and Subtropical Agroecosystems*: 47–51.

This study seeks to examine Halal meat purchase and consumption patterns for the Muslim population in Ohio, with particular attention placed on the goat. The article provides insight as to the relationship between religion, cultural practices, and goat production and reproduction. Religious concerns, convenience, food safety and quality are critical parts of the lens which I must use to understand meat goat consumer trends. In addition, this study's conclusions will help me apply an understanding of the demand vs. supply gap in the U.S. to my research into the goat market in the Lewiston/Auburn area.

Greenberg, Jan. "The Goat Gap: Why Aren't American Farmers Raising as Many Goats as We Eat." *The New Food Economy*; February 29th, 2016.

This article by Jan Greenberg addresses one of the key questions our research is attempting to address: why demand for goats so highly outweighs the supply, and how to remedy that within the Somali community in Lewiston. This source in particular investigates how the larger meat industry isn't structured for the production of goat meat on a large scale, which is one of the constraints most problematic facing Mainers looking for goat meat. Also, the article is valuable in understanding the apprehension of farmers towards raising goats and the particular environments they thrive in, attempting to diagnose the American aversion to goat farming. While this source is particularly useful and full of pertinent information, the specificity that comes with halal practices and goat exchange within this culture cannot be captured with such a broad lens. The reasons why goats aren't raised countrywide versus the reasons for a lack of halal goat meat in Maine may align, but are not identical.

Ibrahim, Mohammad. "Consumer Willingness to Pay a Premium for Halal Goat Meat: A Case from Atlanta, Georgia." *Journal of Food Distribution Research*, March 2011, 72–76.

This is an excellent case study regarding the demand for halal goat meat in Georgia; surveying a similar Muslim community to the one we find in Lewiston. Mohammad Ibrahim emphasizes the influx in demand for goat meat without an adequate supply. In looking at their data, conclusions, and potential solutions, we may be able to formulate possible ideas for our own circumstances. Also, the study identifies what the test group was willing to pay on average and how much that varied based on things like family size, which would be an important factor to consider in our own research. While Ibrahim and

his research provide a concrete and quantitative perspective on halal goat meat demand, it fails to address the broader social and economic implications.

Langellier, Kristin M. 2006. "Negotiating Somali identity in Maine." *20th ICC 2006*.

Langellier's article focuses on the Somali population in Maine, and Lewiston in particular. While it failed to mention halal goat meat in any way, it is very helpful in giving the paper research a sense of place and serves as a good tool in connecting the community engaged learning project with the literature review as a whole. This piece was especially helpful in giving me background knowledge about the Somali population in Lewiston that I used to more easily comprehend Muhidin's talk about his organization.

Williams, Monte. "Bringing Goat to the Table; New York Farmers Try to Widen the Market for Kid, an Immigrant Favorite." *The New York Times*. *The New York Times*, June 15, 1996.

Written in 1996 the article is broad look at the budding goat meat industry in New York at the time and looks at many different ways in which goat is beginning to make its way into the market. The main takeaway from this piece for me in terms of our project is the idea that goat meat farmers are buying old dairy farm properties as the farms already have the infrastructure for holding animals, but are not viable for cows as the fields for grazing no longer grow enough grass. Goats don't need as much food to eat and are less picky on the vegetation they eat which makes these abandoned farms perfect. This idea could be pitched to Muhidin to help him find a new property to expand his operation. Also, working in conjunction with a dairy farm by sharing land may be another possibility for him.

VI. Conclusion

Thank you for the opportunity to assist the Somali Bantu Community in their goat rearing and supply project. We hope some of this information is useful. If you have any questions please contact Professor Elizabeth Eames at Bates College Anthropology Department 207-786-6082 or eeames@bates.edu. Please note the **Addendum** at the end of this report, located after the compiled annotated bibliography. It is an interview with Dr. Anne Lichtenwalner of University of Maine at Orono, a possible further resources for SBCMALA as the group proceeds with this project.

VII. Full Consolidated Annotated Bibliography

American Goat Federation. n.d. "Meat Goats." Accessed October 12, 2019.

<https://americangoatfederation.org/breeds-of-goats-2/meat-goats/>

This web article provides a general overview of meat goats and the various breeds including Spanish, Boer, Kiko, Myotonic, Savanna, and Texmaster goats. Each description explains the characteristics of each breed including weight, hair type, optimal climate, reproduction rate, temperament, and growth rate. This general information is crucial for gaining background knowledge on various breeds and being able to understand which breeds might be the best fit for Muhidin's requirements.

Belanger, Jerry, and Sara Thomson Bredesen. 2018. *Storey's Guide to Raising Dairy Goats: Breed Selection, Feeding, Fencing, Health Care, Dairying, Marketing*: Storey Publishing.

Belanger and Thomson Bredesen cover many of the essential topics to introductory and advanced goat care covered in the other guidebooks included in this bibliography: milk, feeding, proper fencing, health and breeding. They have a more extensive range of topics than other introductory books, including more specialized topics such as keeping records and making goat dairy products (ie yogurt, kefir, and butter). This book is especially useful for its accessibility - the authors carefully define each goat-related term before diving into specifics and assume almost no prior knowledge on the reader's part. Running through the book are color photographs, which add both an aesthetically pleasing element to the reader's experience, as well as an aid for readers who better process procedural information visually.

Brzozowski, Richard; Lichtenwalner, Anne; Weber, Jim. 2015. "Bulletin #1032, Tips for Detecting Disease or Injury in Sheep and Goats." *Cooperative Extension Publications, The University of Maine*.

This four-page fact sheet, published by the Cooperative Extension and School of Food and Agriculture at the University of Maine, provides crucial information on recognizing signs of disease and injury within a goat population, by using one's senses. Brzozowski, Lichtenwalner, and Weber recommend keeping notes and taking photos of both healthy and unhealthy goats in order to improve one's diagnostic abilities. They provide suggestions for diagnostic techniques including observation of the goat's movement, feet and hooves, appetite, patterns of stretching, droppings and urination, hydration levels, and facial features. Also included are recommendations for properly listening to goat vocalizations, breathing, chewing, and regurgitating, as well as smelling for

ammonia-type scents along with other unusual smells. Almost every technique listed in this fact sheet relies on the use of one's senses, and on comparisons to previously healthy goats in order to catch disease and injury early and efficiently.

Bueschen, Joy; Bueschen Tim. 2018. "Goat School." Zeoni Creations.

<https://www.goatschool.com/>.

The 'Goat School' website is a resource created by Joy and Tim Bueschen, primarily intended to advertise their in-person Goat School, but also useful as an online resource. Their school is located in Monson Maine, and they offer two-day goat care workshops multiple times a year for \$350 (currently discounted to \$320). The Bueschen's Goat School would likely be an excellent resource for learning goat-care techniques that are specific to the Maine climate; topics covered include preparing to bring goats home/ to the owner's farm, what to look for in a seller's goat and site, and skills to raise goats with confidence once they have been relocated. More specialized skills taught include hoof-trimming and de-worming goats. Although the 2019 date of the workshop has passed, the school could be a valuable resource in the future.

Caldwell, Gianaclis. 2017. *Holistic goat care: a comprehensive guide to raising healthy animals, preventing common ailments, and troubleshooting problems*. White River Junction, Vermont: Chelsea Green Publishing.

Caldwell's goat-raising manual provides an excellent and, true to its name, holistic overview in best practices for raising healthy goats. The book is divided into five general sections – the developmental history of the goat, how to properly house, feed, and contain goats, treating common goat ailments, goat reproduction information, and a section with more detailed information regarding disorders that affect goats. Caldwell approaches each of these five sections with the thesis that every aspect of goat care should fit holistically into a larger health plan, and that goats deserve respect and admiration. This is an extremely useful resource for gathering a baseline understanding, though should be supplemented with more detailed information pertaining to Central Maine climate issues in goat care as well.

Delaney, Carol. 2012. *Guide to Starting a Commercial Goat Dairy*. Burlington: UVM Center for Sustainable Agriculture.

Delaney's book, published by the UVM Center for Sustainable Agriculture in cooperation with the United States Department of Agriculture, provides a guide for a goat farmer who is interested in raising goats as a commercial dairy business – on a larger scale than many of the other hobby guides included in this bibliography. Though the book is specifically written for goat dairy farmers, much of the information is applicable to meat goat farmers as well. She includes chapters on planning the space for goats,

building a farm budget, costs of goat feed, resources for buying, selling and marketing goats and meat in the United States Northeast, goat feeding behavior and diet recommendations, and lastly an extensive selection of additional resources. This book is less accessible than many other goat care guide books but is useful to consult when more detailed information is required on a specific topic.

Dubeuf, Jean-Paul, and Jean Boyazoglu. "An International Panorama of Goat Selection and Breeds." *Livestock Science* 120, no. 3 (2009): 225-31.

This source is a global overview of how different types of goats have spread, declined, and adapted to environments. While it does not provide information specific to Maine, it does have a lot of useful content about how goats are used worldwide as well as a discussion of which goats are used for which purposes across the world. This makes it easy to see which goats are likely to be good for meat production. Plus, even though Maine is not mentioned, seeing which types of goats are hardy or adaptable gives a reasonable benchmark for which ones are likely to be the safest in the elements of Maine. It also provides a significant list of bibliographic sources that I fully plan on mining through in the future to find more supplementary evidence. The final thing of use in this piece is the discussion of cross breeding and maximizing the efficiency of each and every goat. This may not be on the table in the short run, but long-term cross breeding is something that should be considered in raising goats, particularly if it does lead to goats better suited for meat production in Maine's cold northern climes.

Emond, S. (2008). *Meat goats (2nd ed.): Alberta Agriculture and Food , Information Packaging Centre U6.*

This book is an excellent source of general information about goats that are used in meat production. It does not describe the different kinds of goats, but does give a complete overview of how to raise meat goats generally. When combined with the website from the American Goat Federation, this could be a very useful tool to have in order to be able to combine the basics of care and long term herd management/ breeding and such with an idea of the more specific nature of the goats being raised.

Fisher, Jeffery C, Richard Stock, David A Mangione, and Larry A Nye. 2009. "Meat Goat Demographics and Niche Marketing." *Tropical and Subtropical Agroecosystems*: 47–51.

This study seeks to examine Halal meat purchase and consumption patterns for the Muslim population in Ohio, with particular attention placed on the goat. The article provides insight as to the relationship between religion, cultural practices, and goat

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Offering extensive background information on Halal (and kosher) slaughter practices and modern laws concerning ritual slaughtering, the article eventually makes its own argument. It argues that religious freedom (for ritual slaughter without stunning)

outweighs the cost of additional animal suffering. Though it is not specific to Islamic practices only, I view this article as providing a voice to what is one extreme end of the broader conversation regarding slaughter regulation and religious freedom.

Mazhangara, Irene Rumbidzai, Eliton Chivandi, John Fisher Mupangwa, and Voster Muchenje. "The Potential of Goat Meat in the Red Meat Industry." *Sustainability* 11, no. 13 (2019): 3671.

This article outlines ways that goat meat could become a much bigger part of the red meat market in the United States. The authors argue that goat meat has a greater role to be played in the future, and that policy should be adapted to accommodate this. While the Somali Bantu Association has an idea of interest in the local community, it is still good to know the state of the goat meat market more generally. It could affect prices and whether there will be alternative sources that people can go to for the meat.

Niemann, Deborah. 2018. *Raising Goats Naturally: The Complete Guide to Milk, Meat, and More*: New Society Publishers.

Niemann provides a personalized guide to many of the most important aspects of raising and caring for healthy goats. Topics include proper housing, choice of breeds, day-to-day life with goats, parasite control, injuries illnesses and disease, and pregnancy and birth. The book is extensive and incorporates detailed information along with stories of the author's own experiences raising goats. Niemann's writing style is friendly and frank, almost making the reader feel as if they are reading a novel at times.

Sayer, Maggie. 2010. *Storey's Guide to Raising Meat Goats: Managing, Breeding, Marketing*. North Adams: Storey Publishing.

Sayer's book is a semi-broad overview of goat care but is further specialized than other resources included in this bibliography as it is specifically pertaining to best practices in raising goats for slaughter. Sayer includes information on the pros and cons of raising meat goats, finding a high-quality goat veterinarian, choosing meat breeds, where to buy goats, 'how to think like a goat', transporting goats to slaughter, common parasite problems, marketing goat meat, and promoting your business. The book contains detailed, relevant information for a small-scale meat goat farm in Maine, and also includes relevant quotations from experts in the field – such as the president of the American Meat Goat Association. Among the multitudes of useful information provided by Sayer are charts which indicate what types of goats are used by which religious groups for which holidays, and which types of goats are preferred by various ethnic groups at non-holiday times. The credibility of this information is questionable, as Sayer makes broad claims about these preferences for groups such as Greeks, Hispanics, Jews,

Muslims, Somalis, and West Africans – it seems highly implausible that entire ethnic groups share a goat meat preference as Sayer suggests.

Simões, João, Carlos Gutiérrez, and SpringerLink. *Sustainable Goat Production in Adverse Environments: Volume I: Welfare, Health and Breeding*. 1st 2017 ed. Cham: Springer International Publishing, 2017. doi:10.1007/978-3-319-71855-2.

I, personally, would consider Maine an adverse environment, so this book seems perfect. It provides information on how to best breed and maintain goats in a healthy manner. I intend to use this, along with the Emonds book, to find out what the best practices are for raising goats, with this book allowing for particular focus on how to breed goats in an adverse environment. Unfortunately, it focuses mostly on arid, tropical, or subtropical types of extreme, however, it does still discuss the needs of goats. It does also talk about diagnosing pneumonia and other diseases generally associated with the cold, so that could still be useful. Additionally, it has a section about crossbreeding the Boer goat, which is one of the ways of effectively raising meat goats (they are much larger goats). As such, this is one practice that will have to be seriously considered moving forward.

Thistlethwaite, Rebecca, Jim Dunlop, Bill Niman, and Nicolette Hahn Niman. 2015. *The new livestock farmer: the business of raising and selling ethical meat*. White River Junction, Vermont: Chelsea Green Publishing.

Contributing authors Dunlop, Hahn Niman, Niman, and Thistlethwaite lay out four key goals of their book: keeping meat producers in business while assisting them in earning fair wages, treating animals humanely, using practices which are gentle and restorative to the Earth, and providing nutritious and good-tasting food to as many people as possible. The book is divided into two sections – the first focused on raising various species of livestock humanely and effectively, and the second focused on the business and logistical hurdles of slaughtering and marketing meat. Throughout the entirety of the information they provide, the authors remain focused on the production of ethical meat – which is defined by them as meat that comes from farmers who want their animals to live comfortably and die quickly and humanely. *The New Livestock Farmer: The Business of Raising and Selling Ethical Meat* proves useful for more specific information regarding best practices in ethical slaughter and raising goats to be slaughtered.

Schivera, Diane. 2017. *Raising Organic Livestock in Maine: MOFGA Accepted Health Practices, Products, and Ingredients*, Maine Organic Farmers and Gardeners Association

This article discusses the different strategies that farmers use specifically in the state of Maine. This article was written by livestock specialists and provides essential information

on the necessities of growing and raising animals in cold conditions. This article lists the important materials needed, the resources for people to reach out for help, and detailed steps to take when your animals get sick. This article has bulleted steps on how to help your animals with digestive disorders, pink eye, flies, or other common diseases. While other articles discuss the possibilities of these incidents happening, this article provides genuine and expert-approved solutions. Another benefit that this article carries is that it is all based on the state of Maine and may be very helpful for the research of raising goats in Greene. This article is written for people that would like to gain knowledge of strategies of making a healthy farm environment in the state of Maine.

Smith, Cheryl K. 2010. *Raising goats for dummies*: John Wiley & Sons.

Many sources regarding holistic, generalized goat care are written in a beginner-friendly manner. Those which are more technical tend to be highly specialized and not relevant to a small-scale goat farm in Central Maine. As the title suggests, Smith writes an incredibly accessible text that covers both what goats can add to the caretaker's life, along with practical information about goat health, proper environments for goats, training goats, breeding, and common issues along with their solutions. *Raising Goats for Dummies*, like many of the other reference books included in this bibliography, provides an incredibly useful overview with adequate detail in most areas, yet may need to be supplemented in cases of less common diseases or other problems.

University of Maine Extension. "Resources for Small Food Businesses in Maine." Accessed October 12, 2019.

<https://extension.umaine.edu/food-health/resources-for-small-food-businesses-in-maine/>

Business development tools for small farmers in Maine, including online resources. This source provides links to classes, funding opportunities. It is helpful to understand what resources are available to local farmers who are trying to establish themselves.

USDA. Accessed October 12, 2019. "Technical Assistance for Planning Your Business." newfarmers.usda.gov/technical-assistance-planning-your-business

The USDA offers a number of business planning tools for small-scale new farmers, as well as female, veteran and young people seeking to enter this field. The webpage provides a "Getting Started" page that walks the reader through four stages, including resources to help farmers create a business plan, business development, taxation, links to grants, as well as opportunities to connect with mentors and other organizations that can provide support. This provides a great general overview of what people entering into

agriculture should consider and how to connect with other farmers who can provide expertise.

USDA. 2011. “Goat 2009 Part 11: Reference of Goat Health and Marketing Practices in the United States.”

https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms/NAHMS_Goat_Studies

The USDA provides broad sets of data that are compiled into various reports, such as goat operations, biosecurity, disease, health and marketing practices. This provides contextual information regarding what goat production and farming looks like in the United States and which diseases are prevalent.

Wang, L., A. Nguluma, M. L. Leite-Browning, and R. Browning. "Differences among Four Meat Goat Breeds for Doe Fitness Indicator Traits in the Southeastern United States." *Journal of Animal Science* 95, no. 4 (2017): 1481-88.

This article is sort of the opposite of what would have been ideal (an exploration of which goats do well in the Northeast), but it can still be useful in a more limited capacity. For instance, many times something that would be a disadvantage in the Southeast might be beneficial in the North. If a goat has too heavy of a coat, it would overheat in Alabama, but avoids freezing in Maine. As such, this source will likely be used to see if there are any goats that would be well suited to New England based on their descriptions herein. The study demonstrates that Boers do not fare well in the South, but that Spanish goats do.

Williams, Monte. “Bringing Goat to the Table; New York Farmers Try to Widen the Market for Kid, an Immigrant Favorite.” *The New York Times*. *The New York Times*, June 15, 1996.

Written in 1996 the article is broad look at the budding goat meat industry in New York at the time and looks at many different ways in which goat is beginning to make its way into the market. The main takeaway from this piece for me in terms of our project is the idea that goat meat farmers are buying old dairy farm properties as the farms already have the infrastructure for holding animals, but are not viable for cows as the fields for grazing no longer grow enough grass. Goats don't need as much food to eat and are less picky on the vegetation they eat which makes these abandoned farms perfect. This idea could be pitched to Muhidin to help him find a new property to expand his operation. Also, working in conjunction with a dairy farm by sharing land may be another possibility for him.

Addendum**Interview with Dr. Anne Lichtenwalner DVM PhD**

1. *From your experience, which meat goat breed is the most resilient in Maine? How do you determine which breeds to choose- do you consider meat quality, taste, behavior, price?*

We see many Boer goats in Maine, and the purebred ones can be somewhat difficult to raise (true of any high-performance breed of animal). I like the tendency to cross these meat breeds with others that have bigger frames and may be better moms. How to decide which to raise? I am not an expert on that. However, if it were me, I'd see what was affordable for my needs, and either buy from a reputable producer who could show that their animals are free of CAE, CL, Johnes disease, and parasites (and has excellent biosecurity), OR I'd plan on a short-term plan wherein I'd put up with the risk of losing some animals because I'd be sure to buy young kids in early spring, feed them well, and sell all of them in the fall (all in, all out). This is like what commercial producers do- a thorough clean-out can be done once all animals are slaughtered, and you start anew once some time has gone by.

2. *Do you see any opportunities for more industrialized production to meet demands for goat meat/products in Maine?*

I don't have a good estimate of the size of the market. Primarily it is an ethnic market, and there are probably some good surveys/studies of the regional market. I might suggest that others in Extension could be of help; do you want me to pursue that question?

3. *Do you know if there has been a historical resistance to the goat industry here? Could you expand a bit regarding the history of the goat industry in Maine?*

Another area in which I am not well-versed. However, I have been working with goat producers during the last 10 years here in Maine. We have a mixed group of dairy and meat producers, whose general operations differ substantially. In the meat goat industry when I first came here, there was some emphasis on high-priced broodstock and I think a number of people "bought in" without really knowing what they were getting into. It reminded me of the situation with llamas and alpacas 40 years ago; the average

price was about \$20,000 per animal. Everyone thought they were going to get rich, which of course didn't work out. However, I am not aware of any "resistance" to the goat industry. There are a number of very well-run and successful goat milk dairies in Maine, and many people with small or medium-sized meat goat operations.

4. *Do you have any insight on slaughter regulations? How many animals can you slaughter at a home site? Does this number change based on live goats sold and then killed or killed before the sale?*

Slaughter is a sensitive and carefully regulated topic. In Maine, we have a number of livestock slaughter facilities (such as West Gardiner Beef, Herring Brothers, Central Maine Meats [including Halal slaughter]). There are regulations that allow some types of "home" slaughter, or that allow selling animals "on the hoof" and then providing the slaughter services. It would be good for you to look over the information at https://www.maine.gov/dacf/qar/inspection_programs/red_meat_poultry_inspection.shtml

5. *Do you know of regulations regarding buying goats out of state?*

The Maine State Department of Agriculture, Conservation and Forestry has regulations that control shipping animals into the state. You can find out more at https://www.maine.gov/dacf/ahw/animal_health/livestock_importation.shtml

6. *Where do you source your goats? Are goat auctions reputable sources?*

So, (as in #1) I would decide on a strategy of either being super picky and very protective of my animals (especially critical if I planned on breeding my animals and having them on the farm year-round), OR not being too picky, having animals only part of the year, and being willing to risk my investment (in which I'd consider buying at the auction, or preferably buying from farms with male kids they didn't really want). In general, auctions are not good places to buy animals. Especially ruminant babies at auctions may well have not gotten a good start, like an adequate feeding of colostrum (first milk) which is critically important to later health.

7. *Do you recommend any goat shows in particular?*

No, but best to talk to producers who raise the kind of goats you want.

8. *Which diseases are the most common/relevant in Maine?*

I think most losses occur due to parasites, and poor management (faulty nutrition, poor housing). We sometimes see CL (caseous lymphadenitis), footrot, meningeal worm, listeriosis, bacterial pneumonia (due to several causes), clostricial diseases (like tetanus). Some of these are very easily prevented with vaccines (especially tetanus and other clostridial diseases).

9. *What diseases would threaten an entire herd?*

All of the above. It's a great idea for goat farmers to have a vet in their area who can help them out when they need it. Budgeting at least a few hundred dollars yearly to have the vet come out and do rabies vaccinations and give some health advice is a great investment. Our lab can run fecal tests to check for parasites, which can help avoid losses and can keep farmers from wasting money on wormers.

For further questions please contact Dr. Lichtenwalner at anne.lichtenwalner@maine.edu.