IOWA STATE UNIVERSITY
Extension and Outreach

DAIRY GOAT News & Views from ISU Extension Dairy TEAM

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NE Iowa Dairy Goat Seminar a Big Hit!

There was much interest with our co-sponsored dairy goat seminar in Kalona on December 10th. Approximately 120 dairy goat producers and allied industry participants attended.

Paul Plummer, ISU DVM shared his expertise on CAE and ridding the herd of it and milking system considerations for better udder health. ISU Extension and Outreach specialists presented the following: Brian Daugherty spoke regarding goat housing and ventilation. Jenn Bentley shared a virtual tour and interview of the Steve Kutsch dairy goat operation by Sherrill, IA. Larry Tranel shared a powerpoint regarding low cost goat parlor design and labor efficiency. Portions of these presentations or handouts are included in this newsletter.

Butch Sowers from Central States Dairy Goat Production Sale, our co-sponsor shared his thoughts regarding goat conformation and buck goat sale updates. Producers attending gave great reviews of the presentations and especially the great lunch provided. It was a great day of sharing knowledge to help our dairy goat operations better themselves in herd health, facility management and labor efficiency. Due to weather the NW Iowa seminar was cancelled. It is hoped this seminar continues as an annual event along with quarterly webinars to assist our dairy goat producers become better and more profitable.

Sincerely,

Jenn Bentley and Larry Tranel
ISU Extension Dairy Field Specialists, NE and SE Iowa
Fred Hall
ISU Extension Dairy Field Specialist, NW Iowa

Newsletter edited by: Larry Tranel

2022 Dairy Goat Webinars

March 15, 2022 - Join Larry Tranel, Iowa State University Extension and Outreach NE/SE IA Dairy Field Specialist and Brian Dougherty, NE IA Ag Engineering as they discuss milking systems and facility design as it relates to milking dairy goats and recommended housing and ventilation design.

June 14, 2022 - Join Dr. Paul Plummer, Iowa State University, College of Veterinary Medicine, and Executive Director of National Institute of Antimicrobial Resistance Research and Education, as he discusses what CAE (Caprine Arthritis Encephalitis) is and practical ways to manage the spread of CAE in your herd.

September 13, 2022 - Subclinical mastitis at dry off can be a bottle neck in the push to improve milk quality in dairy goat herds. Iowa State University, College of Veterinary Medicine, are working to determine meat and milk withdrawal times in dairy goats for two intramammary antibiotic treatments commonly used to mitigate this issue in dairy cattle in order to give producers safer tools to provide top quality goat milk products to consumers. Both from ISU College of Vet Medicine, Dr. Pat Gorden, and Dr. Michelle Buckley, will present this research information.

This work is supported by the USDA National Institute of Food and Agriculture, Agricultural and Food Research Initiative Competitive Program, Antimicrobial Resistance number: 2020-04197.

Registration link:
https://go.iastate.edu/WU2N6J

For added information please visit our dairy goats and sheep tab at:
https://www.extension.iastate.edu/dairyteam/dairy-goats-and-sheep or contact the Dubuque County Extension office at 563-583-6496 to request a paper copy.

Happy New Year!
All Kidding Aside 😊

ISU Extension Dairy Team
"Bringing Profits to Life"

Frequently asked Questions on CAE in Dairy Goats

Paul J. Plummer, DVM, ISU Vet Med

What is Caprine Arthritis Encephalitis (CAE)?
CAE is a viral disease of goats that is very closely related to OPP of sheep and HIV of humans. In goats there are two predominant presentations. The most common presentation is an arthritic form in adult goats. This form is classically associated with debilitating arthritis but can also be observed in less severe manifestations. Animals may shed the virus with very minimal clinical signs. Other signs of this presentation would include chronic weight loss, symmetrically firm mammary glands, and loss of production ability. The second presentation is an encephalitic (neurologic disease) of young kids but this form is much less common than the arthritic form.

How is CAE spread?

The predominant means of CAE transmission is through the ingestion of infected colostrum or milk by kids born to an infected doe or kids bottle fed colostrum or milk from an infected doe. There is evidence to suggest that a small number of animals may get the disease after exposure to infected animals later in life however the relative likelihood of this compared to infection obtained through milk or colostrum is low.

How can I prevent the transmission of CAE from my does to their kids?
The implementation of an integrated CAE prevention program has proved very helpful on numerous farms. Such a program would vary somewhat depending on the management of your operation but would include the use of "heat-treated" colostrum and either pasteurized milk or milk replacer combined with strict segregation of infected animals. Such a program can also be very helpful in minimizing the transmission of other important disease processes including Johne's disease and mycoplasma. Our team of small ruminant veterinarians at ISU can assist you and your veterinarian in development of an appropriate program.

Does CAE affect production of my goats?
There is research demonstrating that there are production losses associated with CAE infection in goats. In dairy goats positive animals were found to be more likely to fall into the bottom quartile of herd production and had a lower butterfat (Smith 1988). In another study mature positive does gave 195 lbs less milk per lactation and had a 21 day shorter average lactation when compared to seronegative animals (Greenwood 1995).

When and who should I test?
We recommend that all newly purchased animals be screened for CAE using the cELISA before they are introduced to the herd. Additional testing will depend somewhat on the desire and management system of the operation. Many farms elect to test the entire herd annually however more intensive testing will be required if a herd is trying to eradicate the disease. Please contact your local veterinarian for input and help with the development of an appropriate testing program.

Can false negative and false positive results occur with the cELISA?
The data from the company as well as several field trials indicate that false negative results are rare. In general, based on the manufacturer's research, it is more likely that a false positive result would occur. One potential source of false positives is testing of kids less then 4-6 months of age that still may have maternally derived antibody (obtained from colostrum that was heat treated) but do not have the virus. We recommend that any kids less then 6 months of age that tests positive be retested after 6 months of age if they are to be retained in the herd.

If my goat is infected with CAE is there any way to "cure" it?
Unfortunately the CAE virus integrates into the cells of the goat and there is no way to completely "cure" the animal of the disease. Thus, once a goat is infected the animal will always be infected.

Do all goats with CAE show clinical signs?
No, some animals may have the virus but show minimal or no clinical signs. It is possible however for these animals to shed the virus and they can be a source of infection for other animals in the herd.

How do I heat treat colostrum?
You cannot use standard pasteurization on colostrum because it will destroy the antibodies that are so important for kid health. To heat treat colostrum you need to heat it to 56 C (133 F) for 60 minutes. During that period of time the temperature needs to stay steady and not vary by more than a couple degrees.

Can I use colostrum replacer?
Colostrum replacer (not colostrum supplements) can be considered for use instead of natural colostrum. However, successful implementation can take some time and process during the transition. In many cases you may need to administer colostrum replacers at higher rates than listed on the packaging. Also realize that all commercially available colostrum replacers are made from cow colostrum, so their efficacy is not identical to goat colostrum (even if they have a picture of a goat on the packaging).

Do negative animals needs to be housed separate from positive animals?
Yes, although the risk of transmission during housing is lower than during colostrum consumption, it is possible for the virus to pass between animals housed together. This is especially true if there is a chance to have salivary or other bodily fluid contact.

For additional questions contact your ISU Dairy Extension Team and your local veterinarian.

Dairy Goat Producer Profile:
Steve Kutsch and family, Sherrill, IA

When did you get into dairy goat farming?
My sons and I started selling milk to Woolwich in Lancaster, WI starting in 2006. We are currently milking 185 does and with upcoming kidding season, we will be closer to 300 milking does in 2022. Our yearly average of milk production per doe is 8.5 pounds per doe per day.

Tell us about your parlor?
We built the parlor ourselves including all the decking, pouring of concrete, etc. When we built the parlor in 2006, approximate cost for the swing 12 parlor was approximately $2000. With one person milking, 140 dairy goats can be milked per hour. If we start to run into plate problems, we check all the equipment to make sure everything is running properly.

Any changes you'd make to the parlor?
I'd probably lower the decking down, so the ramp wasn't quite as steep for the goats to get into the parlor. I'd also wide the parlor, with two people milking it gets crowded. It is currently 3 feet wide; I'd make it another foot wider.

How do you feed your milking goats?
We originally started feeding round bales of hay, but experienced lots of waste and it was expensive. Since switching to chopping our haylage and silage, we have eliminated the waste issue. Haylage and silage are fed twice a day in an outside bunk that lines the length of the housing barn. Pelleted feed is fed twice a day when the does are milking.

How do you manage your feed costs?
Forages are tested for protein and relative feed value and then the commercial feed is adjusted accordingly. It is important to know quality of feed being fed to help keep costs down. Milk prices have not gone up the last few years, however shorting protein on the feeding end will result in suffering on the milk end; it takes managing both to maintain profitability.

How do you manage the kids?
Kids are fed three feedings of heat-treated colostrum in the nursery before moving into group pens. They are bottle fed one or two feedings before being trained to the bucket and grouped in pens of eight. Buck kids are sold within a week of age. The barn is well ventilated, floor is sloped to the center and down to the drains. The pens are bedded with straw and cleaned every 4-5 days. Kid survival rate is greater than 97%, attributing kid survival to colostrum management and early life care. Kids are weaned at 7-8 weeks of age based on grain intake. Doelings are at least 7 months or 70 pounds before breeding.

Advice to others getting into dairy goats?
Know what you are getting into and remember that animals need to be taken care of every day of the week. Consider purchasing animals with good genetics for a high producing herd, buy bucks through reputable sales.

Favorite breed?
Saanen's – seem to be more calm!

Favorite thing about milking goats? The milk check! 😊

Dairy Goat Milking Systems

By Larry Tranel, Dairy Field Specialist
Iowa State University Extension and Outreach

What is the best way to milk a dairy goat? It truly depends on many factors, but especially on herd size, labor availability and finances. Milking systems can range from hand milking to bucket milking to stationary milking parlors to rotary parlors.

Due to milker ergonomics, most goats are milked on raised platforms to eliminate bending or kneeling for milker comfort. Goats are active, jumpy and somewhat combative with each other when standing side-by-side in milking systems, so some type of head restraint or division is highly recommended. A ramp can be used to get the goats onto a parlor platform for parlors that run more as a parallel or parabone parlor milking system (at 90 or 70 degree angles, respectively) but goats are often fine just jumping onto a platform from the pit area for systems using individual headlocks with no backrails.

Pit depth is often a concern in many parlors, including goat parlors. Often the decision is made to lower the platform since goats can only jump so high but usually at the expense of milker comfort. A person 6'0 tall milks comfortably at a 42" pit depth, so adjust height from there for the tallest milker, not the shortest. It is easier for a shorter person to milk six inches up than for a taller person to bend over even one inch due to back strain.

Thus, consider this in addition to how high a particular breed or size of goat can jump up onto a milking platform. With all considered, a ramp onto the end of the platform would usually be advised.

Milking parlors for smaller and medium sized herds are often self-constructed or constructed by non-milking equipment dealers. They can be made in a single sided or double-sided fashion with a variety of steel types and designs used. A double-sided 15 for example, might be self-constructed for less than $5,000 of steel and materials with a headlock type design for the stall work. This usually is not including the milking system or labor to construct.

For larger herds, a rapid exit parlor or rotary carousel system might be more preferred. These systems would seem the most preferred and ideal but as cost figures in it becomes more of a financial challenge. A rapid exit parlor might run in the $1,000 to $2,000 per stall with options of automatic feeding systems included. A new rotary parlor might cost in the $10,000 per stall range, with the milking equipment and installation possibly included. The high cost often leaves producers looking for lower cost alternatives.

Since the lower cost alternatives seem to have the most interest in average herd size operations, this will be our remainder focus. Breed of goat is important to determine size of parlor platform relative to a parabone (70 degree angle) and a parallel (90 degree angle). The parabone parlor typically has 32-38 inches of platform width with the brisket rail 24-28 inches from the butt rail.

Each doe needs an estimated 12 inches of width per stall. The parallel parlor typically has 46-52 inches of platform width with the brisket rail 28-36 inches from the butt rail. For rapid exit parallel systems, another 24 inches in front of the parlor should allow does to exit forward with enough space to turn and leave. Know that breed and size of doe can shift needed dimensions so measure an average doe before constructing.

The bottom backrail (often just one backrail) should be positioned so just above the hock on the average or taller goats to keep them positioned better. The brisket rail should be positioned at the juncture of the brisket and the neck and, if feeding in the parlor, should not be too high that it cuts into the neck and inhibits eating of grain. If using headlocks, then the same holds true for the position of the bottom of the headlock.

Dairy goats can be milked in swing-over systems or doubled-up systems where each stall on both sides have a milking unit. In addition, one unit can milk more than one doe per side so a swing 12 parlor might only have 6 milking units whereby each unit milks two does on one side before swinging to the other side. Other cost saving techniques are used milking systems and bulk tanks from dairy cow herds. Milking systems and even milking units can be adapted from dairy cow herds. For example, old flat bottom dairy units can be used to milk goats by sealing off two teat cup stems. Two inch milk line abounds in the countryside and 10 milking units can be used on a 2 inch line, 5 units per slope. Thus, a swing 20 goat milking parlor can be designed with this 2 inch pipeline whereby each unit milks two goats on one side, then swings over to the other side.

The above diagram is a swing parallel parlor that can load from either a ramp on the side or from the back as there are no back rails. It would be encouraged to use swing arms that would keep the milk hoses nearer to the goat being milked and also out of the middle for more ease of walking up or down through middle of the milking parlor.

For goat milking parlors without headlocks, indexing them is important as dairy goats need more restraint than dairy cows. Most of the concepts of our TRANS Iowa milking parlor for dairy cows are adaptable to dairy goats as well, just needing downsizing with specifications previously listed. Feeding is more prominent in dairy goat parlors for more individualized feeding (if done by hand) but doesn't need to be fed there, especially in total mixed ration systems.

For more information on dairy goat milking systems, consult the TRANS Iowa Low Cost Parlor design for dairy cows at: www.extension.iastate.edu/dairyteam and the National Dairy Goat Handbook, p. 263-269. It can be ordered at: https://smallruminants.ces.ncsu.edu/wp-content/uploads/2016/08/Dairy-Goat-Production-Handbook-Order-Form.pdf?fwd=no

Reprinted from American Dairyman magazine

Plan, Rather than Hope for Profits!

Dairy Goat TRANS is a spreadsheet generated program to assist dairy goat producers analyze their profitability. Contact Larry Tranel for more information.

Mastitis: Working through late lactation, dry off, & back to kidding

by Jennifer Bentley, Dairy Specialist and adapted from work of Dr. Leo Timms, former state dairy specialist

Mastitis is always a challenge for goat producers but late lactation accentuates this. Many understand the challenges of early lactation with the demand for milk production for commercial use or feeding multiple kids and meeting that demand nutritionally. There are three major reasons why increased risks occur in mid to late lactation:

1. Breeding season brings hormonal shifts with estrus that lead to slight immune suppression (and all does are here at once)

2. Late lactation means less milk and udder pressure, so lower flushing effect of organisms unless proper milking stimulation and practices are followed

3. Reduced appetite and increased aggressive behaviors (stressors) during breeding season, especially if bucks are introduced amongst the whole herd. Some of these are inevitable but others can be addressed with enhanced best management practices.

Defining a milk quality problem is a priority no matter the stage of lactation. Certainly, active aggressive surveillance and identification of clinical mastitis through examining milk, udder conformation and abnormalities, and overall animal health are crucial. But most mastitis is subclinical, or unseen so use of tests like culture (infections), or somatic cell counts (SCC) (electronic or CMT doe side) are essential.

The California Mastitis Test (CMT) is a simple method used to first evaluate milk quality. CMT works by mixing milk with detergent that coagulates somatic cells, forming a gel reaction. The more somatic cells, the greater gelling. CMT scores range from 0-3 representing somatic cell counts of 0 to over 10 million. (refer to Table 1. CMTscoring system in goats, *Schalm, 1971*)

Most producers who screen their does look and usually only define mastitis by does that gel the paddle the worst (thick grape jelly consistency). While this is a problem doe, that jelly represents a clinical mastitis of over 10 million SCC. However, there are many does that are subclinical making it more difficult to detect. Using the CMT paddle, it can be detected by gel moving a little sluggishly but still moving. This represents SCC > 1 million and still a problem doe with mastitis.

Table 1. CMT Score	**Neutrophil cells/ml**	
	Median	**Range**
	60,000	0 – 480,000
Trace	270,000	0 – 640,000
1	660,000	240,000 – 1,400,000
2	2,400,000	1,000,000 – 6,000,000
3	---	>10,000,000

This tool helps to define where the infection may be occurring (early, mid, late lactation or around kidding). Using these results can help to understand and possibly culture problem does, define solutions to keeping does healthy, and developing strategies to address high SCC and infected does.

Cultures are useful, especially in defining if mastitis is contagious or not, as well as directing prevention and treatment strategies. Some does may have contagious mastitis, for example Staph Aureus, so identifying and eliminating these does or minimizing their spread at milking is critical. Remember the hands of the person milking can be the vector for spreading *Staph aureus*. Gloves need to be worn so they can be sanitized after handling infected goats.

Most other organisms, namely, streps & coliforms are environmental. These organisms can come from bedding, feces, water, or from skin. Commonly found is a skin bacteria, Staph Epidermitis, often identified as a “coagulase negative staph” (CNS) on culture reports to differentiate it from *Staph aureus*, a “coagulase positive Staph”. It is treatable if identified early.

Strategies to address mastitis risks should be year-round but enhanced during late lactation, as somatic cell counts can be high towards the end of lactation:

- Clean, dry environment focusing on reducing germ load.
- Proper nutrition to enhance immunity; when feed consumption decreases, milk production will follow.
- Heat stress can depress feed intake and lower milk production; keep does cool during the hot months.
- Keep fresh, clean water available always.
- Proper milking practices: stimulation times for effective, cleaner milk out.
- Pre and post milking sanitation including teat dipping and drying to reduce organism load, improve teat skin, improve milk out stimulation, and reduce overall mastitis risk.

- After pre-dipping, stripping teats of the first milk is a good practice to remove high somatic cells. It is also a good way to check the milk for signs of clinical mastitis; flaky, chunky, stringy, or discolored.

- Using single use paper or cloth towels ensures that each doe gets a clean towel for wiping teat ends.

- Keep doe standing for at least 30 minutes after milking to allow for the teat end to close and limit bacteria from entering the teat gland. Access to fresh feed immediately after milking is one way to keep them standing before going to lie down.

- When drying a doe off prior to kidding, monitor doe closely for signs of mastitis and intramammary infection; balancing feed intake to decreasing milk production.

- If administering a dry doe treatment intramammary, practicing good clean hygiene techniques.

- Body condition of does at dry off and proper management practices during the dry period are critical for a successful next lactation. Proper body condition (not thin or heavy) is critical and should be maintained during dry period.

- Proper nutrition, clean environments, and excellent ventilation. Work with nutritionists on extra needs of does with twins or greater.

At the time of kidding, all management practices still apply; nutrition, environment, and milking practices to optimize doe milk flow and reduce infection risks. Within a week of kidding, consider using the CMT, to evaluate all does for milk quality. It is important that this first milk known as colostrum mixes thoroughly with the CMT solution before interpretation. Monitoring milk quality will allow for bulk tank limits of SCC to be met, earlier detection and identification of mastitis, and overall dairy goat health. Work closely with your veterinarian on appropriate therapies; consider only treating positive CMT or problem udder halves to reduce costs and risks.

Milk testing is another way to help monitor milk quality. The Dairy Herd Improvement (DHI) Association allows for monthly data collection of individual does for somatic cell counts, milk fat, protein, and production. Keeping records is a good way to monitor individuals as well as overall herd health. Seasonal, feed, or management trends can quickly be assessed with routine monitoring. Management changes can impact milk production and quality very quickly.

Reprinted from American Dairyman magazine

The Impact of Genetic Selection

Adapted from Carol Delaney, Univ. of Vermont Extension

If one wants to change a trait it needs to be measured and recorded, objectively and consistently. If milk yield and days in milk are important, their performances in the first year of lactation are very good indicators for future performance. Thus, you can base your selection of replacements on the yearlings' lactation performances. Ease of kidding is a worthy trait to track for its effect on economics (costs of labor, vet intervention, medical supplies, etc.) and production (time lost to recovery and uncaptured peak production potential).

The obvious genetic traits that researchers and farmers have focused on are milk production and yield of protein and fat since these directly determine income for fluid milk and cheese yield for farmstead cheese makers. However, if you select goats for higher milk production only and ignore personality and body traits, your herd may become malformed in relation to the milk yield. In the 1990s in France they emphasized high milk production in goats for a decade and they had to weed out the many goats with bad udders. It is best to consider soundness traits as well as production traits so as not to compromise the goats' ability to do well in the environment provided to them.

One milking trait of goats that has high heritability (65%) is the speed of milking. (For background, the degree of heritability roughly means how much of the trait, based on 100%, directly comes from the genes of the goat with the remaining difference in percentage coming from the influence of the environment.) Thus, if you have a very high producer but she is a slow milker, that adds milking time. Avoid retaining replacement does from her offspring because the heritability of the trait is so high.

Milk and protein yield have heritabilities of about 30–40% so their improvement can be made more gradually by measuring an individual goat's milk content and doing a comparison among the does. It is more difficult to increase the solid content (fat, protein, etc.) of milk while choosing for increased milk production because milk amount is inversely related to the percent of milk fat and protein in the milk.

Article adapted from: **A Guide to Starting a Small Commerical Dairy** by Carol Delaney, University of Vermont Center for Sustainable Agriculture. The book can be downloaded from:

https://smallruminants.ces.ncsu.edu/wp-content/uploads/2015/08/Carol-Delaney.pdf?fwd=no

Dairy Goats Have a Stake In Producing Quality Milk

by Fred Hall, Dairy Field Specialist

As the demand for goat milk and edible products continues to grow, producers have a vested interest in producing the highest quality milk to serve that market.

The first question is “What defines quality milk?” The four things that have to be considered are:

- somatic cell count,
- bacteria count,
- antibiotic residues
- overall appeal including color, flavor and odor.

This article will focus on the best management practices that lower somatic cell counts and bacteria in milk. The industry terms somatic cells in milk as SCC- somatic cell count or the number of somatic cells/ ml in milk. When the immune system detects harmful bacteria in the mammary gland, it sends more leukocytes to travel to the site of infection. This is how the doe’s immune system responds to help in fighting the bacteria.

As more cells fight the germs, the cells start to engulf them. Once engulfed, the leukocytes work to destroy the bacteria. Once the leukocytes destroy the bacteria they die and become a somatic cell, which gets shed through the milking process. The legal limit for SCC in the US for goat milk is 1,500,000 cells/ml.

A recently fresh doe usually has the lowest SCC of her lactation and SCC counts generally rise as her lactation progresses. Risk factors for high SCC include stressful parturition, nursing kids, dry-off, viral infections like CAE, environment and milking technique.

There are only three ways does get mastitis: contagious organisms spreading through the herd; environmental organisms infecting milking does; and does becoming infected during the dry period. The key is to minimize bacteria; no bacteria-no problem. A big part of that is to maximize teat end integrity.

This is where the consistent milking protocol comes into play. It is important that each udder preparation step is consistent from goat to goat, and from milking to milking. Goat’s need at least 20 seconds of stimulation for milk let down. Milking should commence 60 seconds after udder stimulation commences and no more than 120 seconds.

The ideal pre-milking prep should focus on:

- Minimize water usage
- Focus attention on teat surfaces only
- Use a sanitizer (pre-dip)
- Assure complete pre-dip coverage
- Allow pre-dip 30 seconds contact time
- Provide milk letdown stimulus 10-20 seconds

Remember that any liquid that goes on the teat must come off! Producers and researchers vary on if foremilk should be removed before or after udder preparation and as long as it is done consistently- it will serve the three major reasons you do it;

- Early detection of mastitis
- Promote stimulus for milk let down (starts the 60 second clock)
- Remove milk in the teat cistern that contains the high SCC and/or bacterial counts

The final “prep step” is drying the teat before milking, either by hand or with a machine. This is the most important step in the teat-cleaning regime- whether using paper or cloth- use one towel per animal. Your milking protocol, whether by hand or with a machine should pay special attention to prevent over milking that damages the teat sphincter.

Post-milking management once the udder is empty is a post-dip applied immediately using either a teat dip cup or a spray to the entire teat up to the base of the teat. The teat sphincter is open for 30 to 120 minutes post milking and the dip helps decrease the chance of transfer of pathogens to the udder immediately after milking. Encourage does to stand after milking by having feed and water available plus clean and dry bedding for them to lay on.

Another consideration is the milking order. It is especially important with herds that have contagious pathogens including Staph aureus. Milk the healthy fresheners first, followed by the healthy mature does and finally does with mastitis.

My final thought is to remember that milker hands come into contact with goats and milking equipment at every milking. Human skin is at high risk of containing bacteria, which can be transferred to the teat end. Wearing gloves is the gold-standard for protecting you and your goats, no amount of hand washing is as good as wearing gloves. It’s just not worth the risk.

Maximizing hygiene and following proper milking procedures will help with the overall goal of minimizing bacteria that enter the udder and controlling the growth of bacteria in the udder. In conclusion, all does have some stress and the good ones milk well right through it. But even good does lose production as stress increases. It’s our job to keep does clean, dry and comfortable especially around kidding to maximize production.

Milk Safety and Quality in At-Home-Processing *Dr. Michelle Buckley, DVM, ISU Vet Med*

According to the USDA's National Animal Health Monitoring System (NAHMS) the number of dairy goat operations nearly doubled between 1997 and 2017 from 75,000 to 136,000 while the average herd size decreased from 29.4 head per farm in 2009 to 19.8 head per farm in 2019. With smaller herds and more farms, more milk and milk products are being harvested and processed in homes.

With smaller herds, home processing and consumption of milk and milk products has become quite popular among dairy goat owners. Proper processing of milk and milk products is essential to maintain the health of the consumer and prevent foodborne illness. Two key components to ensuring a healthy milk product are preventing drug residues in milk and appropriate processing to eliminate any potential contaminates (such as bacteria). Home-processed products do not fall within the oversight of USDA inspectors as do products that are handled at large-scale processing facilities, it is doubly important for producers to understand how to mitigate these risks.

Judicious use of antimicrobials & milk withdrawal info; Use of records to track treatments & withhold times w/ DVM:

There are strict regulations governing drug use in food-producing animals. These species include cattle, goats, sheep, pigs, poultry, and camelids. The goal of these rules is to maximize the efficacy of a treatment, minimize the risk of antibiotic resistance, and prevent consumer exposure to medications through food.

Goats are considered a 'minor food animal species' in the US—as opposed to cattle, hogs, and poultry—because of their comparatively small population here. There are very few drugs that are explicitly labeled for goats. Drugs that are not explicitly approved for a species may be used at the recommendation of a veterinarian with doses and withdrawal periods specific to your animals under the guidance of the Animal Medicinal Drug Use Clarification Act (AMDUCA). Your veterinarian is familiar with this legislation and can help you to determine the most appropriate medications and doses to use for specific illnesses.

Every drug that is approved for food animal use in the United States is assigned meat and milk withdrawal times. This is a set period where meat and/or milk harvested from an animal may not be used for human consumption. Withdrawal periods are created based on extensive scientific research and can be found on the label of any medication that your veterinarian has approved for use in your livestock. Withdrawal periods are listed on the label for the major food animal species for which they are approved. Because goats are generally considered minor food animal species in the United States, your veterinarian will inform you of the appropriate withdrawal period for your animals and print it on the prescription label.

Failure to observe appropriate route, dose, or withdrawal periods can result in human exposure to residual pharmaceutical compounds within the milk or meat tissue. Appropriate animal identification and record-keeping is essential for tracking disease, drug use, withdrawal times, and reproductive metrics—ultimately improving food quality and safety. Maintaining accurate and up-to-date records can also help producers to more accurately evaluate cash flow within the farm, set farm-specific benchmarks, and help producers to determine a fair price for their product.

Written records have been utilized for decades, however these are easily misplaced and may be difficult to interpret. Digital records offer the opportunity to simplify record keeping and when combined with digital methods of identification (i.e., RFID tag or microchip) offers ease of accessibility and increased number of trackable metrics with the security of virtual storage.

According to the 2009 NAHMS Reference of Dairy Goat Management survey (most recent data available) only 58.6% of dairy goat producers kept records of any kind and 16.5% of producers surveyed kept electronic records. In contrast, the 2014 NAHMS Dairy Cattle Management Practices survey shows that 95% of all dairy cow operations utilized records of some kind and electronic records were used on 94% of large-scale dairies. Along with computer programs such as DairyComp 305 and PC Dart—which can be modified from dairy cattle to dairy goats—multiple smart phone applications exist which can be easily tailored to track desired metrics for farms of any scale. DHIA (the Dairy Herd Information Association) also provides milk testing services and records for dairy goat clients.

Popularity of unpasteurized milk products & benefits of pasteurization:

While commercial sale of raw milk is illegal in 40 states, direct-to-consumer sales are more loosely regulated. Consumption raw milk products has been intermittently popular over the years and goat dairy products have supplied an increasing proportion of this niche market. Reported benefits of consuming raw dairy products include preventing breakdown of proteins and probiotics. Research has shown that the amount of protein

breakdown caused by pasteurization is insignificant in terms of human health effects.

Probiotics – bacteria found to have beneficial effects on the digestive system—are also touted to be one of raw milk's primary benefits. It is important to remember, however, that the nutritional and bacterial composition of goat milk changes based on where she is in her lactation as well as her diet. Furthermore, research to identify bacterial strains with known or possible human health benefits has been inconclusive at best. There is currently no scientific evidence that raw milk from any species contains significant levels of "good" bacteria.

This ambiguous finding combined with known pathogens that can enter the milk of even clinically healthy animals, makes this a poor argument for consumption of raw milk products. It is important to remember that these bacteria can be transmitted directly from the animal, as well as through milking equipment, debris on the outside of the udder during milking, or even from human contact after it is harvested from the animal. Therefore, evaluating animal and udder health is not an adequate method of ensuring safety of unpasteurized milk products.

Some studies report that up to 1/3 of milk samples from apparently healthy animals result in cultures of bacteria that can result in human illness. These diseases range in severity from gastrointestinal upset to neurologic disturbances. For example, studies show that up to 30% of goats have a subclinical intramammary infection at dry off culture. Coagulase negative staph. is the most commonly cultured group of mastitis and can commonly result in mastitis during the dry period or at freshening.

One method of combating this issue is through the use of intramammary antimicrobial treatment and sealant at dry off. With a standard dry period of 30-60 days, the withdrawal period for the intramammary antibiotic will be well past by the time of kidding. Accurate breeding dates, appropriate dry off times, and adequate dry period length are just a few examples of parameters requiring accurate recordkeeping for milk quality and safety.

At home pasteurization techniques:
Pasteurization is the process of heating milk to a specific temperature and maintaining it there for a set period before cooling for refrigeration. The Pasteurized Milk Ordinance provides guidelines for pasteurizing milk at several different temperatures and the corresponding durations.

Temperature	Time
63°C (145°F)	30 min
72°C (161°F)	15 s
89°C (191°F)	1.0 s
90°C (194°F)	0.5 s
94°C (201°F)	0.1 s
96°C (204°F)	0.05 s
100°C (212°F)	0.01 s

Recommended time and temperatures for pasteurization of cow's milk from J. Lucey, "Raw Milk Composition". Nutrition Today, 2015

Small-scale hobby farm and homestead producers may find it easiest to utilize a double boiler system for small-batch pasteurization. The preferred temperature/time combination for this pasteurization technique is 167oF at 15 seconds. It is essential that the batch is stirred constantly in order to ensure uniform heating throughout. Once the target temperature and time have been achieved, move the pan to a bowl of ice water and continue to stir the milk. Add ice to the bowl of water as it warms in order to continue cooling milk.

Small batch pasteurizers can be purchased for home use in varying sizes and price ranges for operations with corresponding needs. These may be appropriate for producers that are milking more than a few goats or who are creating product for public sale.
Milk quality and safety can be complicated topics and your local veterinarian should be consulted for detailed questions related to your specific animals.

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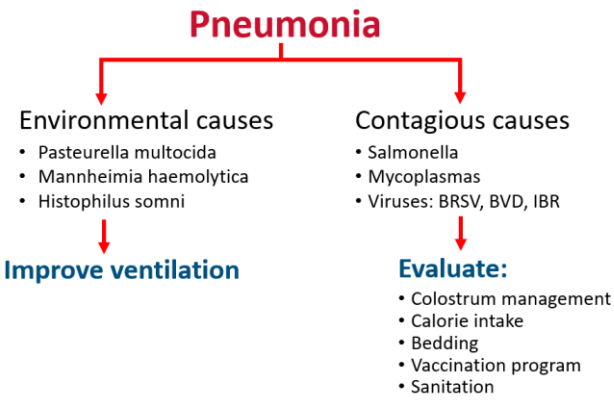
Ventilating Your Goat Facility for Optimum Animal Health

by Brian Dougherty, Agricultural Engineer

Proper ventilation can be difficult to achieve in goat facilities, especially if the building wasn't originally designed to house goats. To determine whether or not poor ventilation is causing respiratory problems, work with your veterinarian to determine what is causing the issue before investing in ventilation upgrades. Improving ventilation is not a cure-all for respiratory issues. It needs to be considered as part of an overall animal health and welfare strategy.



If you can smell ammonia when you first walk into the barn or if you have excessive condensation or dripping from the ceiling or roof, this is a good indication that airflow is inadequate. Ammonia levels should be below 10 ppm measured at nose level.

Once you determine that ventilation needs to be improved, the next step is to determine what type of ventilation system will work best for your facility. Natural ventilation can work well for buildings with no ceiling and good access to prevailing winds. These buildings may just need to be opened up a bit at the eaves and ridge to improve airflow.

If the building has a ceiling that can't be removed and/or is tightly constructed, then a mechanical ventilation system may be a better option. Negative pressure systems that pull air from the barn can work well if there are air inlets that allow evenly distributed fresh air to be pulled into the building without creating drafts on the animals. If there are large, uncontrolled openings such as doorways that can't be closed, then a positive pressure system that forces fresh air into the barn may be a better choice. Either way, mechanically ventilated systems need to be properly designed and controlled to provide adequate fresh air exchange without creating dead spots or drafts.

Positive pressure ventilation tubes are another option that can improve airflow in both natural and mechanically ventilated barns. These tubes work by placing a fan in the exterior wall that forces air into the barn through a tube with rows of small holes along the length of the tube. These are a great option for providing minimum wintertime ventilation rates without creating drafts. They can be designed to work with odd-shaped pens, low ceilings, and other challenging situations. However, they need to be properly designed in order to function correctly. The size and positioning of holes and the output of the fan all need to be customized for each facility. Off-the-shelf tubes with pre-punched holes are a poor choice for goat housing.

Mechanical ventilation rates

Ventilation rate	Adult goats	Young goats	Air exchange rate
Cold weather	20 cfm	3 cfm	4 ACH
Mild weather	60 cfm	10 cfm	15 ACH
Hot weather	150 – 200 cfm	30 cfm	60 ACH
Draft free	< 100 fpm	< 50 fpm	*cfm = cubic feet per minute* *fpm = feet per minute* *ACH = air changes per hour*

Contact your ISU Extension dairy specialist or agricultural engineer for assistance with a ventilation assessment on your farm.

Dairy Goat Nutrition

To maintain milk production and good health, goats should be fed a diet balanced for energy, protein, minerals, and vitamins based on requirements defined by the National Research Council. To reduce costs, forages such as hay, silage, and pasture should constitute a majority of the diet.

Goats are efficient browsers and can select a high-quality diet from lower-quality forages, especially when consuming nontraditional pasture plants (e.g., weeds, shrubs). Available forages should be evaluated based on plant species and maturity, with the highest-quality forages reserved for pregnant, lactating, and growing animals.

Supplementing the diet with grain mixes to provide additional energy and protein is important, especially during lactation. Grain mixes may also contain supplemental minerals and vitamins. Feeding grain should be limited because a high-grain diet with low fiber intake can lead to rumen health problems (e.g., indigestion, acidosis) and lower milk fat content.

Availability of dietary energy is important for high milk yield, while protein and fiber affect milk quality. High-producing does require quality forages and supplemental grain at a rate of 1 pound per 2.5 to 3 pounds of milk.

Forages generally do not contain sufficient minerals to meet dietary requirements, so supplements are usually required. Mineral mixes of salt with calcium, phosphorus, and trace minerals are typically used. Legume forages (e.g., alfalfa, clover) contain sufficient calcium and will only require phosphorus with trace mineral supplement.

If pasture is the predominant source of forage, then vitamin supplements are not critical. If only hay or silage is used, then supplemental vitamin A, D, and E will be required. Vitamins can be supplied in a free choice mineral source or in the grain mix. Commercial cow rations or custom grain mixes varying from 14 to 20 percent protein can be fed to goats (Table 3). Table 3 provides simple, general mix for example only. For more specific information for grain mixes for your dairy goat, contact a competent dairy goat nutritionist.

Most products formulated for sheep will not contain enough copper for goats. It is important to routinely use a technique called “body condition scoring” to evaluate the adequacy of the nutritional program you use. Body condition scoring categorizes animals in scores from 1 (emaciated) to 5 (obese) based on the amount of palpable subcutaneous fat over the loin, ribs, and sternum. Does should have adequate (score 3) body reserves in late pregnancy as they enter lactation. High producing does lose significant body condition during early lactation but should regain it again during late lactation and early pregnancy. Details on body condition scoring and calculating goat nutrition requirements can be found on the Langston University Web site: http://www.luresext.edu/goats/index.htm

Table 3. Example grain mixes with varying protein content for goats.

	Concentrate protein content (% of mix)			
	14.0	**16.0**	**18.0**	**20.0**
Ingredient	% of total			
Cracked or rolled corn	40.0	35.0	29.0	24.0
Rolled oats	20.0	20.0	20.0	20.0
Soybean meal (44 percent)	17.0	22.0	28.0	33.0
Beet or citrus pulp	10.0	10.0	10.0	10.0
Molasses	10.0	10.0	10.0	10.0
Trace mineral salt[1]	1.0	1.0	1.0	1.0
Limestone[2]	1.0	1.0	1.0	1.0
Dicalcium phosphate[2]	0.7	0.7	0.7	0.7
Magnesium oxide	0.2	0.2	0.2	0.2
Vitamin premix[3]	0.1	0.1	0.1	0.1

1. Must contain adequate selenium in deficient areas
2. Amounts can be varied to adjust to legume or grass forages
3. Should provide 1,000 IU/lb vitamin A, 500 IU/lb vitamin D, and 5 IU/lb vitamin E

This article was part of a publication on Agricultural Alternatives, Dairy Goat Production, developed by the Small-scale and Part-time Farming Project at Penn State with support from the U.S. Department of Agriculture-Extension Service.

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Iowa Concern Hotline 800-447-1985 is available for:

Stress – available 24 hours/day and 7 days per week
Crisis – Free and Confidential
Legal Education – Dial 711 or TTY/TTD;
Financial Concerns -- iowaconcern@iastate.edu

211 is a free, comprehensive information and referral line linking Iowa residents to health and human service programs, community services, disaster services and governmental programs. This service is collaborating with the Iowa Department of Public Health to provide confidential assistance, stress counseling, education and referral services related to COVID-19 concerns.

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