Chapter 3: Is Pasture Birthing for You?

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Specific Objectives

1. Identify at least three possible benefits of pasture lambing or kidding.
2. Identify at least two qualities of a good birthing pasture.
3. Outline the differences between set stocking and "drift lambing" during birthing.
4. Describe standard procedures for "processing" lambs or kids shortly after their birth out on pasture.
5. Identify the major problems associated with pasture birthing and methods to combat these problems.
6. Describe the life cycle of barber pole worm on Northeastern pastures.

Benefits of Pasture Lambing and Kidding

Spring time is associated with newborn lambs and kids frolicking on green pastures (Figure 3-1). In reality, many northeast sheep and goats give birth indoors in winter. This makes sense for farms targeting the Easter market for suckling lambs and kids or providing show prospects for the summer show circuit. However, if these early markets are not targets, one method to lower inputs is to time breeding so that birthing can occur outside during seasons when the grass is up (Figures 3-1 and 3-2). Whether this option makes sense depends on many factors, including marketing strategies, other spring activities, and parasite and predator challenges.

Figure 3-1. Boer doe kidding on spring pasture

More than 40 Northeast sheep and goat farmers participated in a Cornell project from 2009 to 2012 reviewing labor and feed costs for different birthing systems (Figure 3-3). As mentioned in Part 1, labor demands were substantially greater for farms with does or ewes giving birth in the winter of 2009 compared to the spring or fall. Furthermore, when comparing barn and pasture birthing in the spring of 2009, no pasture birthing farms lost dams at birth although 3 of 4 barn-birthing flocks had dams die. One benefit of pasture birthing cited by several participating farmers is that dams can separate themselves and birth undisturbed leading to fewer dystocia and mothering problems. However, Goat Farm #3 experienced Floppy Kid

Figure 3-2. Pasture lambing in the fall may also be an option

Syndrome during barn kidding in the Spring. Floppy Kid Syndrome makes a lamb or kid's muscles so flaccid that the animal is often unable to support itself. If the disease had occurred on pasture, kid loses in the first few weeks after birth may have been even more than the 22% reported because of the difficulty of treating collapsed kids on pasture.

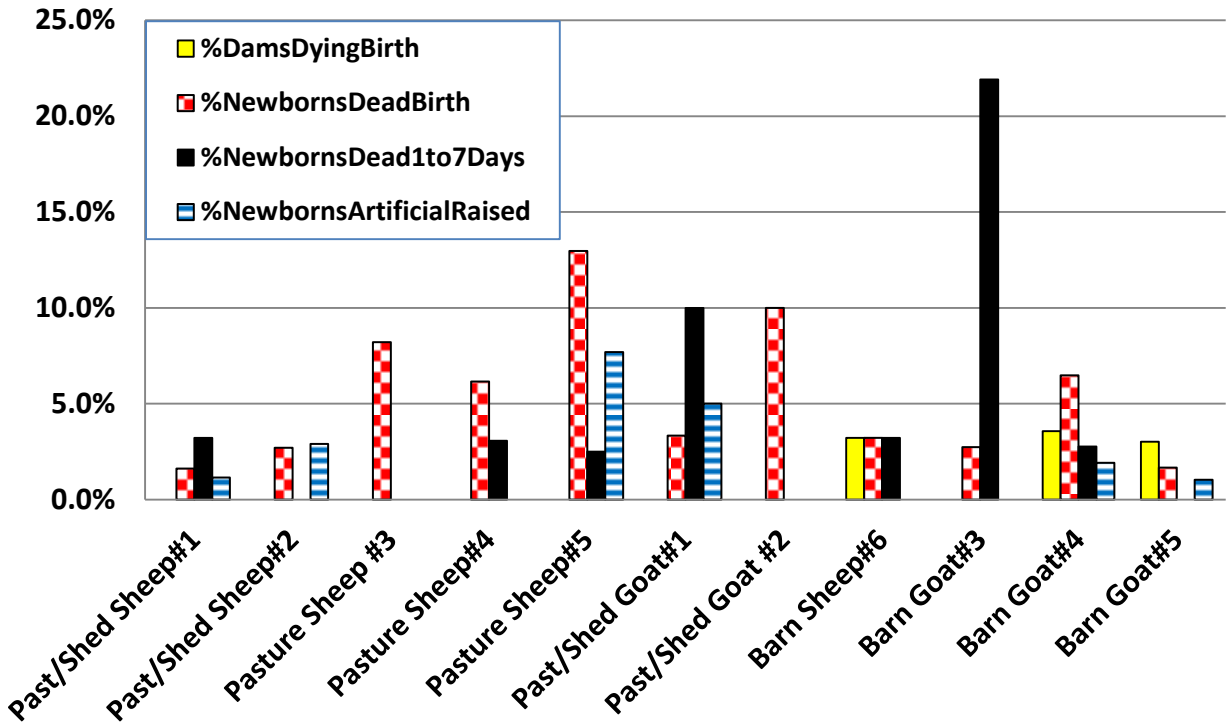


Figure 3-3. Relationship of barn, pasture, or pasture with shed (past/shed) birthing in Spring 2012 with herd productivity.

Additionally, for Spring'09 birthing farms, feed costs for pasture kidding goat herds from birth to weaning averaged $6.80 per dam compared with $21.74 for barn kidding herds (most barn-born kids were put out on pasture after 1 month of age) and $8.14 for pasture lambing sheep flocks as compared to $42.86 for barn lambing sheep flocks (lambs were left in the barn through weaning). Dams that give birth and raise their young in the barn in the spring consume harvested forage that could be used instead for winter feeding.

Thus far, we have only studied the 2009 birthing information provided by 18 case study farms. We are still analyzing the 2010 through 2012 farm data. However, one sheep farm did have 2008 birthing available to us for comparison. They changed their lambing management

system in 2009 to 1) lambing on pasture in the spring with shed access and then returning after lambing to a dry lot for 2 to 4 weeks before going back on pasture and 2) lambing in a common dry lot and shed in the fall. Previous to this, all their lambing had been in barns with ewes and their lambs being moved to claiming pens after lambing followed by group housing in the barn until weaning. Growth rate was slightly lower in 2009 but was offset by reduced mortality rates, decreased feed and labor costs, and increases in lambs weaned per ewe (Table 3-1). The success of pasture birthing is dependent on planning ahead for several factors. The following sections discuss some of the necessary preparations.

Table 3-1. Comparison of flock productivity on the same farm from birth to weaning under two different lambing systems in both the fall and spring.

Year	Season	Daily feed costs, $/ewe	Labor at birth, h/ewe	Lambs dead, % of delivered	Daily gain, lb/d	Lambs weaned per ewe
2008 (barn & claiming pens both seasons)						
	Spring	0.58	1.13	10.8	0.78	1.9
	Fall	0.52	1.35	27.3	0.73	1.1
2009 (pasture/drylot in spring, drylot in fall)						
	Spring	0.23	0.9	4.8	0.72	1.8
	Fall	0.43	0.9	6.3	0.69	1.2

Choosing a birthing pasture

Birthing checks can be done quickly (especially with binoculars, Figure 3-4) if birthing pastures are close to the farm compound and dams are clearly marked ahead of time with spray painted numbers. Thus, pastures bordering your barn or house are most convenient, especially if you anticipate returning triplet litters or "orphans" to the barn for intensive rearing. Avoid pastures where predation has caused lamb or kid losses in the past unless you have made management changes to solve the problem. Consider threats from predatory birds as well as coyotes, foxes and neighborhood dogs.

Figure 3-4. Using binoculars to monitor births

Unfortunately these nearby, easily monitored pastures are often winter loafing areas and by spring are heavily contaminated with manure and internal parasites (Figure 3-5). Several worms such as brown stomach worm (*Ostertagia circumcincta)* and thin-necked intestinal worm (*Nematodirus spathiger*) may successfully overwinter outside. Barber pole worm (*Haemonchus contortus*), does not survive outside in winter but instead "hibernates" within host animals. However, its dormancy breaks by early March and livestock then shed barber pole eggs in their feces. Plan ahead to insure that sheep and goats don't access the proposed birthing paddocks over the winter. If distant pastures are used and you anticipate returning some animals back to the barn, consider the time and method required (Figure 3-6). Taking an occasional litter back to the barn on an all-terrain vehicle adds little extra time. However, on study farms where ewes lambed on pasture and litters were then routinely moved back to the barn, constant trailering added substantially to time demands.

Figure 3-5. Parasites may be a problem when lambing on popular pastures near the home or barn

Figure 3-6. Transporting a ewe and her lamb

Set Stocking or Drift "Lambing"?

A second decision to make is whether to "set stock" or "drift lamb" during the birthing season. Each method has its own challenges and both methods were used by farms in our study.

Set stocking for lambing or kidding

One very experienced farmer in our study set stocks his 300-ewe flock. The flock is overwintered outside with access to an evergreen hemlock grove. Two weeks prior to lambing in early May, each ewe is spray-painted starting with the number 1.The first 40 ewes go in his first 5 acre birthing paddock, the next 40 in the next 5 acre paddock, and so on until all 300 ewes have been assigned a paddock. The pastures are strategically fenced so that sheep in each pasture have access to either the large hemlock grove or to hedgerows. One group of approximately 100 ewes is placed in an easily observed, level 15 acre paddock. Udders are checked as ewes go through the chute. Ewes that appear to have udder problems (scar tissue, possible blind quarters, or low, pendulous udders) are assigned to a pasture bordering the house and barn in case any of their lambs must be artificially reared.

When lambs are born they receive the same spray paint number as their dam (Figure 3-7). Males are spray painted a different color than females. Thus, every lamb can be identified by sex, paddock, and dam. This system hinges on having plentiful grazing in each paddock to last through the peak of lambing season. After the majority of lambing is done (approximately 6 weeks after subdividing the flock), each group is returned to the working area to dock tails and notch ears. The groups are then gradually combined by joining two paddocks together after they have been worked and grouping the entire flock together by the end of the week for rotational grazing. The flock is worked again when lambs are approximately 3 months of age to separate male lambs (easily identified by their ear notching) and cull any ewes with no evidence of lactational udders. Pastures are fenced with 5 strands of electrified high tensile wire. The farmer prefers to use a wooden handled leg crook to get over the fences rather than going back and forth through gates on an all-terrain vehicle. Despite a healthy fox population, predation is not a problem.

Figure 3-7. Ewes and lambs with matching spray paint numbers

Some of the other set stocking farmers also preferred to divide their flocks into groups of about 40 dams for birthing and to gradually combine them about two to three weeks into peak lambing by leaving gates open between adjoining groups. Other farmers preferred to leave the entire flock together in one large group. The advantages of being left in one large group is that less fencing is needed to subdivide the pastures, the farmer only has to travel to one paddock to check for birthings and a guardian animal is not needed for each of the individual subdivisions. However, patrolling a large area with many animals in it is far more challenging for guardian animals than monitoring a single paddock subdivision. Farms with predation that lambed ~120 ewes on 25 acres reported losses to predators each year despite the use of two or three guardian animals.

Pastures that are used for set stocking during birthing should have water centrally located to discourage dams from having to travel far from their young to drink. The farmer must be able to predict what size paddock is needed, given the forage conditions each year, to support each birthing group through the peak lambing or kidding period. How compressed the birthing period will be depends on how long the service sires are allowed to remain in the flock. The majority of the birthing will take place during the first 2 weeks of birthing with a sharp drop off about 21 days into the birthing period.

It is important to have a plan to be able to quietly move a birthing group into an adjoining or nearby pasture if the forage does not last through the peak birthing period. As in a barn setting, mis-mothering is discouraged by **gradually** combining the flock and/or increasing flock density. Farmers reported problems with mis-mothering when young lambs and kids were crowded together to herd or trailer to distant pastures compared with opening an adjoining pasture, or when the density of the flock or herd increased substantially by sharply increasing flock size and/or suddenly decreasing the land available per litter. Newborns were especially vulnerable to these abrupt changes.

Drift “lambing” and variations

A big advantage of set stocking is that dams can pick out a nesting area and remain undisturbed until they and their offspring decide to rejoin the flock or herd. In contrast, several of our study participants practice intensive grazing management and move their animals with temporary fencing every 1 to 5 days. Thus, they often need to disrupt dams shortly after/during

birth whenever it is time to shift to the next grazing paddock. This can result in poor bonding between dams and offspring, leading to rejected offspring. Some farmers have adopted drift lambing procedures where dams who give birth during the 1 to 5 day period are left behind to form their own grazing unit to eventually combine with other "left behind" units. This appeared to work well for groups with 100 or more dams with concentrated birthing periods. However, many farmers only have a few dams giving birth during a paddock move. These dams may panic if left behind.

One option for smaller flocks is to move the temporary fence forward but let the "back" fence remain in place for at least one extra shift. Thus, dams that have recently given birth can stay in the previous grazing strip without being separated from the flock. Good grazing must remain in the previous strip so that hunger does not cause dams to move forward prematurely from the nesting site. However, letting grass get excessively tall can cause problems especially for breeds that hide their young, because dams may lose track of where they have stowed their offspring. One of our study farms with 40 ewes that was experiencing bonding issues during lambing due to forced daily moves found that switching to this system substantially decreased mis-mothering.

Figure 3-8. A shade for pasture-lambing ewes

Electronet fencing is often used in intensive grazing systems. However, some farmers are very hesitant to lamb or kid in electrified netting for fear of newborns getting entangled and strangling. In our study, the majority of pasture birthing farmers used electronet. Unlike older lambs exposed to electronet for the first time who often require formal training, very young lambs and kids seemed to train themselves to the fencing using their dams as examples. However, farmers were careful to use large, usually rectangular shaped, paddocks and to avoid acute corners and narrow spacing. It is a good idea to avoid netting in places where the fencing runs through confined or sheltered areas as dams are more likely to give birth close to the fence in such cases.

Planning for inclement weather, mothering issues, predation and neighbors

Weather patterns can change radically in the spring. Have a contingency plan to get animals to shelter in case of sudden snow storms or freezing rains. Keep in mind that if the plan involves crowding the flock for transport, time will probably need to be set aside to help very young lambs and kids locate their dams afterward to avoid mis-mothering. Many farmers utilize hedgerows or woodlots during the birthing season. However, keep in mind that dams may mob shelters during bad weather. Any shelters should be very open with wide entrances to avoid trampling of newborns (Figure 3-8, Figure 3-9). Grannying (stealing of a newborn by another dam near parturition) may also occur when animals crowd together in bad weather. Plastic rain covers or "lamb macs" for newborns are not readily available in the U.S. but can be ordered from overseas or handmade with plastic sheeting or bread bags (Figure 3-10).

Figure 3-9. A ewe and her lambs sheltered by trees

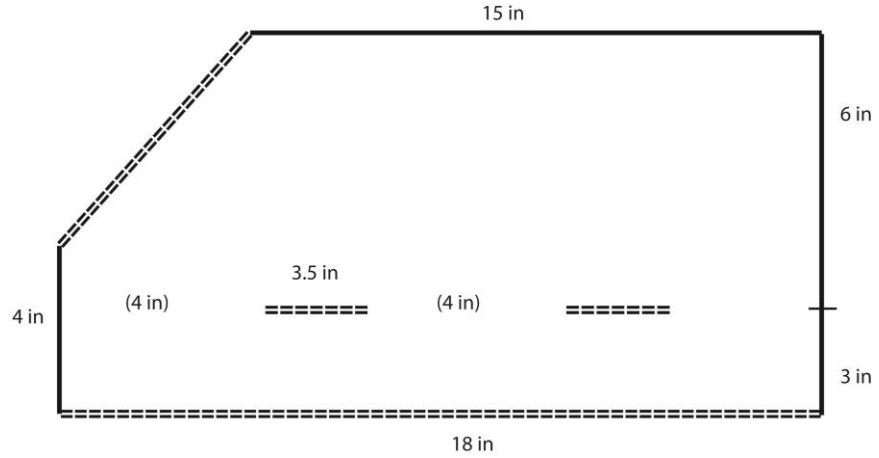


Figure 3-10. Pattern for making a lamb or kid raincoat

If a confined sheltered area or barn is available, and dams tend to give birth in it or are routinely herded back to it with their offspring for the first night after birthing because of predator or weather concerns, a kid board can be put at its entrance to keep extremely young kids and lambs from following their dams back out to the fields for the first few days after birthing (Figure 3-11). The reasoning is that once offspring are strong enough to scale the board, they are strong enough to keep track of their dam on pasture. Height of the board varies depending on breed and outside conditions.

Goats in particular may hide their offspring for the first few days after birthing on pasture rather than having them graze along with them (Figure 3-12). Not all does (particularly first time mothers) are good at remembering where they have stowed their newborns. This problem is especially aggravated if grass is tall or if does are used to returning to a barn or central area for grain supplementation or shelter at night.

Figure 3-11. Kid board to keep newborn kids in the home pen in a harsh grazing environment

First time mothers may hide their young, return to the centralized area for the night and forget by morning when their udders are full just where they put their newborns. Lambs are more likely to keep up with their dams or stand up and vocalize their distress if left in a hiding area too long.

Coping with dystocia or mis-mothering can be challenging on pasture. It helps to have some sort of makeshift "catch pen" that can be temporarily and quickly set up and into which dams can be quietly funneled. Metal corkscrew tie-out stakes for dogs are helpful to temporarily

restrain dams with dystocia or first time mothers hesitant to nurse young. Avoid setting up claiming pens (jugs) in birthing pastures because the flock may try to get to the feed in them and collapse the jugs onto newborns.

Over the course of our 4 year study, casting (turtling) of late pregnancy ewes or does on lush spring time pastures was one of the most common causes of ewe or doe death on pasture birthing farms. This is when an animal becomes stuck on its back and is unable to right itself. Ruminant animals will bloat and suffocate if left in this position for very long. There do not appear to be any clear cut solutions to this problem. Ewes in full fleece or dams carrying a lot of offspring are more likely to get cast. Does and ewes are more likely to want to relax and scratch their backs on sunny mornings or if infected with external parasites. Mild cases of bloat, grass staggers, milk fever, or imbalances between fermentable fiber and protein levels in the forage may contribute to either impaired muscle function or distended rumens, thus making it harder for heavily pregnant animals to right themselves and faster to bloat. Putting animals on pasture early enough in the spring that grass is still short and making sure that dams are not over conditioned may help. Monitor pregnant animals regularly and consider culling out family lines that seem to be more prone to turtling because of their conformation.

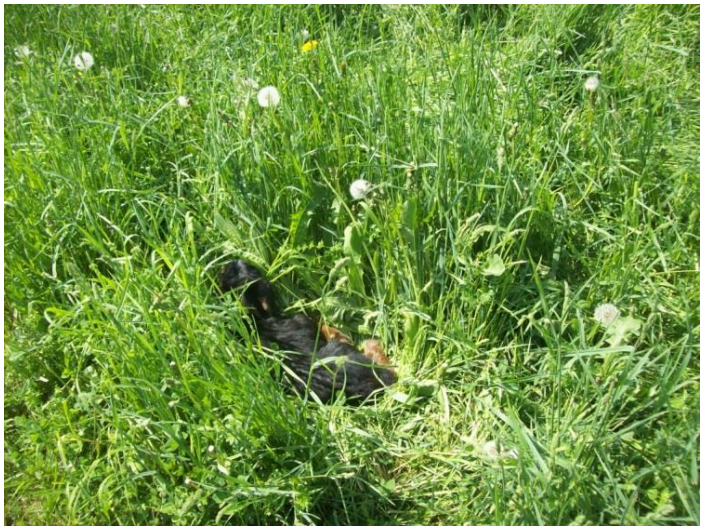


Figure 3-12. Kids hidden in tall grass

Some farmers on our study experienced no predation problems while others with similar fencing had problems with coyotes, foxes, or great horned owls. It is important to dispose of stillbirths and uneaten afterbirths quickly so that local predators do not cultivate a taste for them. Most study farms with a history of predation successfully combat it with guardian dogs (Figure 3-13), llamas, or donkeys and improved electric fencing. There are still problems if dams are birthing in too large an area because one or two guardian dogs may be insufficient, especially if the terrain is hilly or forested. If predation challenges continue both night and day, one option is to combine guardian species so that dogs patrol at night and llamas/donkeys take over during the

day. The situation is also aggravated if dams with offspring are mixed with dry animals because the guardian animals may become confused as to which members of the flock or herd most require guarding.

Figure 3-13. Livestock guardian dog at work

Not all guardian animals are suitable to have with sheep and goats during lambing or kidding. Two participating farms experienced animal losses when pairs of young dogs were left with the flock during birthing time. Young dogs can encourage each other to behave inappropriately if left unsupervised in stimulating situations.

Depending on the location of neighbors, let them know that lambing or kidding is going on in your fields. Some study farms reported losses of newborns when dams were panicked by 4th of July fireworks or the readying of guns for hunting season. Neighbor dogs can also be a problem.

Handling birthing checks and management tasks

Surprisingly, one of the main determinants of how often a farmer checks a birthing pasture seems to depend on how difficult it is to catch newborns. Most kids are awkward on their feet for a couple of days after birth. This is not true for many lambs in breeds of sheep. The majority of the sheep farmers practicing pasture lambing in our study try to conduct all their birthing tasks when they first spot a new litter. This is generally advisable if painless activities such as navel cord dipping, ear tagging, weighing, spray painting and recording are going on (Figure 3-14). Tail docking with bands often causes newborn lambs to lie down, stretch and fret. Therefore, it is best if the lamb can receive its crucial first feeding of colostrum prior to being banded. This is even more important if a more painful procedure such as castration is being done. The ideal situation is to do painful procedures after the offspring have a good start in life but before they are too difficult to catch or will have a hard time keeping up with a dam who is ready to move on from her nesting site. View a video of processing day old lambs.

Figure 3-14. Weighing pasture-born lamb

Figure 3-15. Border collie helping to catch newborn lambs

If you have a quiet herding dog or are working with goats, newborns can be processed as 2 day olds when hardier (Figure 3-15). A good lambing dog needs to be 1) an excellent reader of subtle body language on the part of both shepherd and dams, and 2) very confident and unwilling to back down, yet extremely quiet and calm.

Be sure to catch the entire litter to avoid the dam taking off with some of her offspring. You'll get good at holding several newborns between your knees. Catching can be done using a leg crook or fish net. You must desensitize dams toward this equipment prior to birthing. If offspring are being spray painted, goat dams may need to be acclimatized to the smell in advance by spray painting the doe. Ewes are generally less affected by the smell of spray paint. You need a good tote (Figure 3-16) to carry your equipment cross country. Favorites include 5-gallon pails (good to sit on), carpenter belts, small coolers, and carpet bags (good for stowing an extra lamb). Wooden crooks help to traverse electrified fences.

Figure 3-16. Tool kit for processing lambs or kids born on pasture

There is no discount for male lambs and kids in the Northeast if they are marketed prior to 6 months of age. However, some farmers prefer to castrate males for management purposes or for specialized markets. In our study, banding was the most commonly used method for tail docking (Figure 3-17) and castration when pasture birthing because farmers generally had no access to electricity in the field and wanted to avoid open wounds. Delaying banding too long can result in larger areas of exposed tissue on tail ends and scrotums increasing the risk of fly strike. Farmers banding at 1 to 2 days of age rarely reported fly strike problems. However, some farmers in our study preferred to delay docking until lambs were two weeks of age or older. In this case it is advisable to cut and cauterize tails with an electric docker and apply a fly repellent instead of banding. Fly strike did occur on some of the farms where tails were docked on older lambs.

Figure 3-17. Banding tail of lamb born on pasture

Creep feeding to supplement dams' milk is challenging on pastures because offspring follow their dams instead of congregating at a creep. However, creep feeders may improve lamb or kid productivity if litters are large or if heat stress is a problem and creep feeders are shaded. Locate the creep near places where dams tend to lie down to chew their cud (near water, gates, or shade) to encourage offspring to explore it. Make sure the creep is well built so that the flock cannot collapse it.

Heat stress

Plentiful milk production is one of the most important factors affecting kid and lamb growth. Manage pastures so that dams are on a high plane of nutrition. However, heat stress can impact milk yield by stressing dams and also depressing appetites. If ewes and does birth in May or June they will be in peak milk production when the weather is at its hottest in July and August. Depending on the water concentration of pasture forage and the number of offspring dams are supporting, round the clock access to fresh water may be critical.

Figure 3-18. Ewes and lambs mobbing water; be sure to provide sufficient trough space

Some farmers in our study expended significant labor to water dams and even then had difficulty providing sufficient space around waterers (Figure 3-18) for all dams to comfortably

meet their needs when drought was combined with high daytime temperatures. Compare the labor and monetary expense of different types of watering systems when deciding how to manage water for nursing dams. Black flexible plastic piping, water wagons, water troughs, 5 gallon buckets and garden hoses are some examples. Are there other nearby tasks to do while waiting for water tanks to fill or is it best to invest in more permanent systems with flexible piping? Properly functioning floats are simple labor saving devices out in the field. Positioning waterers in the shade can help keep water cool and encourage consumption (Figure 3-19).

Figure 3-19. Water trough in shaded area to keep cool

It's advantageous to have shade in your pastures especially for sheep or fiber goats. However, if your grazing paddocks are small and animals are moving daily, it may be difficult to provide shade on a regular basis. Some participating sheep famers provided movable shade cloth shelters in their pastures. Goats, particularly kids, are generally harder on temporary shelters because of their tendency to play King of the Mountain or chew on strange materials. Additionally, manure accumulates in shaded areas where animals gather and parasitic worm larvae survive better in the shade. Thus, shaded areas can be a source of parasite infection. When deciding whether to make special efforts to provide shade in your pastures, consider whether heat stress or parasites are the more serious consideration under your farm's current conditions.

Internal parasites

Nursing dams and their suckling offspring are vulnerable to internal parasites especially when pasture conditions are warm and damp in late spring and summer (Figure 3-20). Internal parasites are probably the biggest challenge for raising lambs and kids on pasture. Genetics plays a role in this and some breeds and individuals are more susceptible. Animals should be monitored frequently for anemia (FAMACHA scores and lethargy), diarrhea and poor body condition and growth, and selectively dewormed as necessary.

Barber pole worm (with its accompanying symptom of anemia) is usually the deadliest pasture parasite. When dealing with sheep and goats that are highly susceptible to barber pole worm because of their stage of production (lactating dams and young stock) or breed, parasite management must be a top consideration in pasture management.

Plan ahead so that birthing pastures are not previously exposed to lots of worms. If at all possible practice "evasive grazing" techniques. Move animals out of a paddock fast enough to prevent infection from feces deposited during current grazing period (autoinfection). It takes about 3 to 5 days for barber pole larvae to hatch at 77 to 79˚F and up to 30 days to hatch at 50 to 52˚F. Once temperatures begin to warm up in the spring and grass starts to grow, a barber pole worm takes from about 5 to 14 days to go from being an egg deposited in manure on a pasture to an infectious (stage 3) larva positioned on a blade of grass. When working with your most vulnerable animals such as lactating dams and their nursing offspring, play it safe with 4 day (wet, warm) to 7 day (cooler, drier) grazing durations. Move animals out of a paddock earlier if the pasture is shorter than about 3 inches. About 80% of the infectious larvae are found in the bottom 2 inches of grass. Mowing the pasture very short as the flock or herd moves out can help expose manure to sunlight and reduce larvae survival.

Figure 3-20. Parasites can be a challenge when raising kids

In temperate climates, barber pole populations peak about 35 days after the egg laden manure is deposited on pasture but begin to drop substantially by 60 days. Again, for your most vulnerable animals try to allow a long enough rest period that there is substantial larvae die off before the herd or flock returns (60 to 105 days). If using a dead end host (cattle or equine) to vacuum up infectious larvae, plan to have this host follow about 21 to 35 days after your sheep or goats, depending on pasture growth.

In summary, highly susceptible animals should be moved out of a grazing paddock within at least 4 to 7 days depending on temperature and moisture conditions and each paddock rested for a minimum of 60 days prior to being exposed to sheep or goats again. However, the nutritional needs of nursing dams supporting twins and triplets are best met by pastures that are being managed for optimum fermentable fiber levels. Resting pastures for 60 or more days will allow the pastures to become too mature meaning that the fermentable fiber content will decrease substantially as the fiber becomes woody (lignified). To keep paddocks from becoming too mature, they can be brush hogged, harvested for hay or grazed by a dead-end host such as cattle or horses during the extended rest period. Keep in mind that anything that contributes to the density of manure in the paddocks or to improved larval survival will increase the parasite exposure.

Selection and culling

Having a well thought out decision-making system about which dams to cull and offspring to keep as replacements may be even more important when birthing on pasture than in a barn (Figure 3-21). Culling is an important tool to improve the future performance of your flock or herd. The system can be as simple as palpating udders when lambs or kids are approaching weaning age and culling any dam that has obviously not been supporting any offspring. If you have kept records, then culling can be more accurate. Dams can be culled for dystocia problems, mis-mothering issues, poor udders, or poor growth or survivability of their litters. Offspring can be kept from the dams that produce the heaviest litter weights at weaning age or consistently do a good job supporting multiple offspring across several seasons of the year.

Figure 3-21. Ewe with teats that are challenging for newborn lambs to suckle on their own

The culling and selection criteria should reflect traits that are important for good reproductive performance. Consider what problems cause you to expend significant labor. Can these problems be solved through management changes or do the characteristics of specific animals contribute to this problem? If so, include these characteristics in culling and selection

criteria. However, keep in mind that the more traits considered for selection the less progress will be made in a particular standard. One simple method is to keep all dams that consistently place in the upper 80% of litter weight at weaning age with the added caveat of also culling out a few individuals that are labor issues, such as escape artists, finicky mothers, or does or ewes that regularly have more parasites or health problems than the norm. A breeding program that matches the needs of your farm and market will reinforce good management practices and help develop a flock that performs well under a low input pasture birthing system.

Summary

Pasture birthing is an enjoyable, productive alternative for some farmers. However, it is not ideal for farmers who are uncomfortable having little supervision over birthing at a time when their labor and attention may need to be focused instead on hay or field crops, or family demands. Additional factors such as 1) the layout of pastures in terms of fencing, shelter, water and ease of viewing; 2) contingency plans in the event of inclement weather, 3) predator and parasite challenge; 4) availability of plentiful good quality pasture; and 5) market price for pasture raised lambs and kids need to be considered when deciding if pasture birthing is a viable option. However, with wise advance planning, pasture birthing can result in improved dam performance at birthing and significant decreases in feed costs and labor demands.

Suggested Activities

1. Calculate *a)* the estimated cost of birthing and raising a litter until weaning on pasture in May versus in the barn in May versus in the barn in February and *b)* the income expected from lambs or kids born in May as compared to those born in February.
2. Outline a contingency plan for dealing with inclement weather such as a sudden late blizzard or freezing rain during pasture birthing.
3. Learn to use *a)* FAMACHA exams, *b)* body condition scoring, *c)* weight gain or loss, and *d)* dag scores (sheep) or diarrhea symptoms (goats) to monitor sheep and goats for internal parasites. Keep in mind that symptoms vary depending on the type of parasite involved.
4. Have forage samples from your pastures analyzed at different stages of maturity and calculate how well these samples meet the needs of ewes or does that are nursing twins and consuming 4.5% of their body weight daily in forage dry matter.

Glossary

Bonding *– the hormone-controlled formation of an exclusive attachment between a dam and her offspring.*

Creep feeding *– establishing a pen that lambs or kids can enter but their dams cannot. This permits offspring to access extra feed to supplement their dams' milk; especially useful for triplets or offspring from low milk producing dams.*

Dystocia *- Labor difficulty due to malpresentation of the lambs/kids or large size in relationship to pelvic cage or dilation.*

Grafting *– fostering a kid or lamb from another litter onto a dam that is not its own.*

Grannying *– the hormone-driven stealing of newborns by another dam as she goes into labor.*

Jugs *–small, usually, portable pens to temporarily contain a dam and her litter after birthing to facilitate bonding, sometimes referred to as claiming or lambing pens.*

Neonate – *a term for a "newborn".*

VCS (vaginocervical stimulation) *– the process of stimulation of the cervix and vagina of a dam within 24 hours after lambing or kidding by gently inserting a gloved hand and moving it back and forth for up to 15 minutes. This process stretches the cervix and birth canal simulating birthing. When successful it causes a re-release of the hormones responsible for triggering a dam to bond with each new kid as delivery occurs. VSC is used to graft or foster additional lambs or kids onto a dam.*

Appendix I. Example #1 of an Animal Health SOP

STANDARD OPERATING PROCEDURE
T&R Center Sheep Farm, Cornell University

ENTROPION

Signs

• Lambs at birth, usually noticed within a few days.

• The margin of the eyelid (usually lower lid) in one or both eyes rolls inward.

• Squinting and tearing, discoloration of wool below eye from discharge.

• Cloudiness of the cornea where irritated by hairs or lashes.

• Corneal ulcers may develop, accompanied by growth of blood vessels across the cornea.

Treatment

• Mild cases can be corrected by manually rolling the lid outward into its normal position several times during the first day of life.

• Apply Michel wound clips, usually 3 perpendicular to the lid margin, to crimp up a fold of skin below the eyelid. The clips can also be placed parallel to lid.

• Alternatively, snip out a thin ellipse of skin below the eyelid with clean sharp scissors or crush the same piece of skin with hemostats.

• If a corneal ulcer is present, apply an antibiotic eye ointment twice a day for several days.

• If the condition cannot be corrected with one of these techniques, request veterinary examination - the lateral canthus of the eye may need to be cut to permit correct positioning of the lids.

• If an older, emaciated animal is affected, ask for a veterinary examination to determine cause of wasting and need for culling.

Prevention

- Watch closely for additional lambs with entropion, so they can be treated early.
- Check lambs before releasing them from the jug.
- Record the occurrence of entropion in the lambing book, as the condition is hereditary. The affected lamb should not be kept for breeding.

Appendix II. Example #2 of an Animal Health SOP

STANDARD OPERATING PROCEDURE
T&R Center Sheep Farm, Cornell University

JOINT ILL

Signs

• Lambs 1-4 weeks old, occasionally older (polyarthritis)

• Lameness in one or more limbs

• May walk with stiff gait or arched back

• May carry a leg

• Joints may be swollen and warm

• Fever may be present (>104˚F)

• May appear unthrifty if anorexic or not competing for milk

• Often secondary to navel infection

• Vertebral body abscess may appear similar; same treatment

• Distinguish from a fracture (inappropriate movement or crunching, usually carries the leg) - see fracture SOP

Treatment

• Antibiotics as soon as signs noticed, unless imminent slaughter. Treat with only one antibiotic at a time, unless instructed by vet

• Penicillin:

  o 1 mL subcutaneously daily for 5-10 days especially if pus at the navel

  o 21 day withdrawal

• Oxytetracycline (Biomycin, 200 mg/mL):

  o 1 mL subcutaneously on abdomen or neck daily for 3 to 5 days

  o 1 mL per 20 pounds especially for older lambs with polyarthritis

  o 30 day withdrawal

• Florfenicol (Nuflor, 300 mg/ml):

  o 1 mL per 25 pounds subcutaneously daily for 5-7 days or 1 ml/15# every other day for 3 or 4 treatments.

  o 30 day withdrawal

• If not better by next weekly vet visit, have veterinarian evaluate the lamb

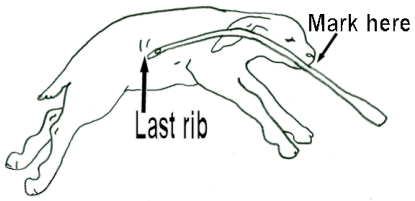
Prevention

Provide clean bedding in lambing area and jugs and dip navels in 7% iodine to limit navel ill

Appendix III. FEEDING A KID (OR LAMB) BY STOMACH TUBE

Needed: an 18 French feeding tube, 60 cc (cc = ml) syringe, water, colostrum

1. Only if kid is able to swallow and has a body temperature of >99ºF. If kid is unable to swallow, administer an IP dextrose injection (see next page). If kid is cold and <5 hours old, warm promptly (monitor temperature so kid does not get overheated) and then tube feed. Note - Giving 50% dextrose orally sometimes revives weak but conscious kids enough to start swallowing. If ≥ 5 hours old, tube feed and then warm.
2. Measure the feeding tube from the tip of the kid's nose straight to the level of the last rib and mark. This length from nose to rib is the amount of tube you'll want to insert.

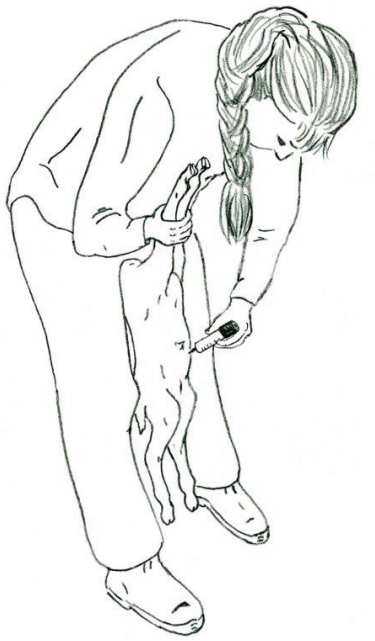


3. Sit with the kid on your lap facing away from you. Hold his head so his mouth is level with his eyes. Pass the tube straight down the mouth past the cheek teeth down the esophagus and into the stomach. Some resistance is normal. Stop at mark.
4. You want the colostrum to go to the stomach and not choke the kid by going to its lungs instead. If the tube is in the correct place - in the esophagus rather than accidentally in the trachea (windpipe) - you will be able to feel it by rubbing your fingers along the neck between the trachea and the neck bones.
5. Indications that it went down the wrong pipe (trachea) are: kid coughing or unable to bleat, inability to see and feel the tube, tube stopping far short of the mark, or hearing breathing when you listen in tube.
6. Remove the tube if you are in the trachea and go through steps #3 - #5 again.
7. When you know the tube is in the correct place (i.e. you can feel the tube), inject 5 cc (cc = ml) of warm water into tube.
8. If the water doesn't flow, try pulling the tube out slightly, as you may be against the stomach wall. Reposition the tube back to pre-measured mark. If still no flow, remove tube and measure again.
9. Once flow into the stomach is confirmed, fit a 60 cc dosing syringe on the stomach tube. Be sure that the colostrum is at about 102 - 104ºF. Check with your wrist. Colostrum can be delivered by gravity, using the barrel of the syringe as a funnel, or can be injected slowly with the plunger of the syringe. *Be sure to warm up colostrum carefully using a hot water bath or double boiler set up rather than putting it directly on stove or in microwave because colostrum readily turns to cheese at high temperatures and antibodies will be destroyed.*

10. Rinse tube while tube is still in kid by injecting 5 cc of warm water into it.
11. Kink the tube by folding over the end and then pull it out of the kid while keeping the kid's head elevated.Place the kid in an upright position.
12. Prop kid up on its chest floor with a rolled up towel if necessary. (steps #11and #12 are to avoid aspiration pneumonia).

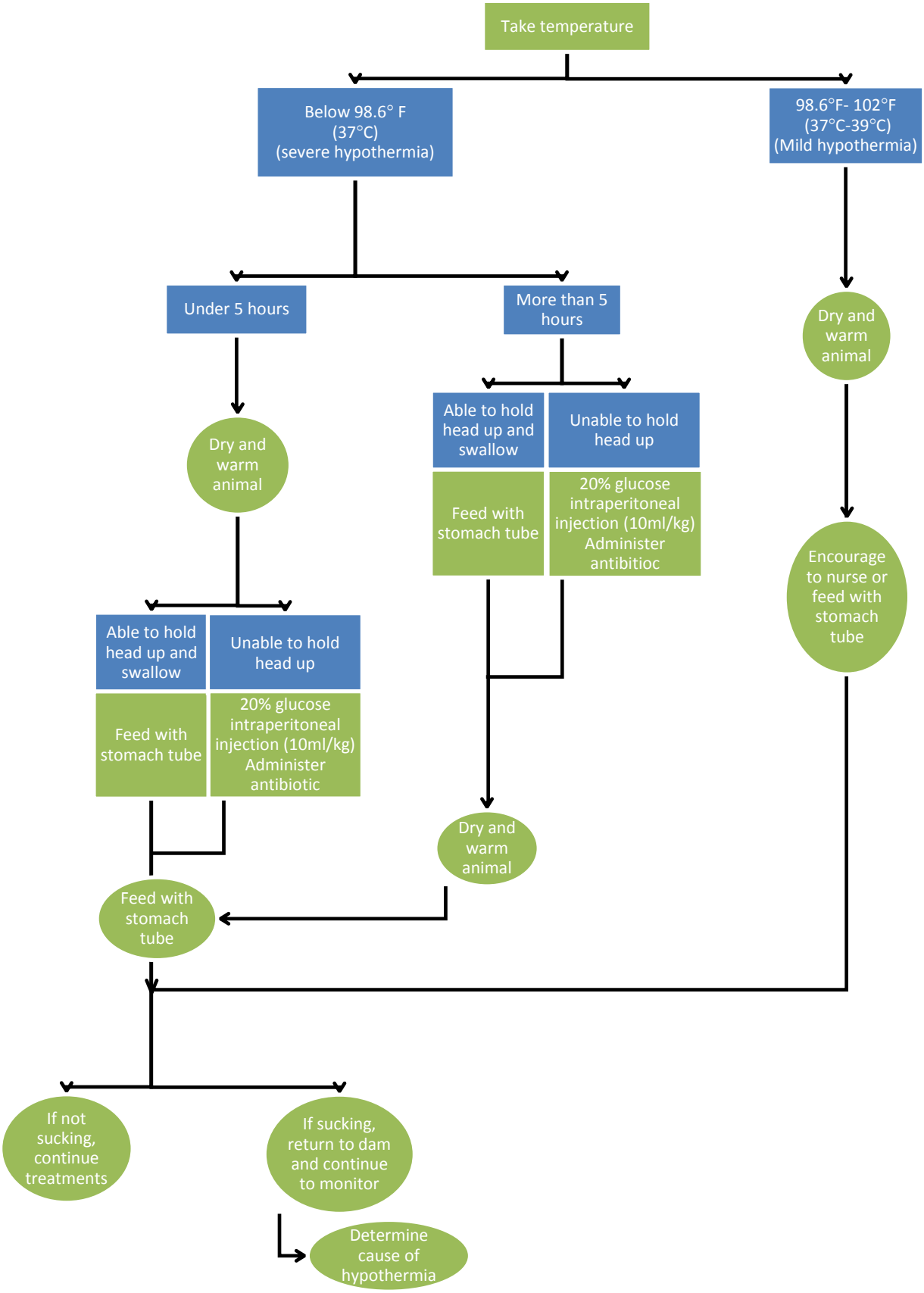
Appendix IV. GIVING AN INTRAPERITONEAL (IP) DEXTROSE INJECTION TO A KID OR LAMB

1. This procedure is for very young kids or lambs (within the first few days of life) that appear alive but comatose or far too weak to swallow. It is not indicated for older, severely weakened kids or lambs.
2. Prepare a 20% dextrose solution in a sterile 60cc syringe at a dose of 10 ml/kg body weight. (There are 2.2 lbs in a kg.) For example, an 11 lb kid (5kg) needs 5kg x 10ml/kg = 50ml of 20% dextrose solution. However, generally you will have a 50% dextrose solution. Since 20/50=0.4, you multiply 0.4 x 50 ml= 20 ml of 50% dextrose. You will dilute the 20ml of 50% dextrose with 30ml of boiled water to get 50ml of 20% dextrose. An 8 lb kid needs about 35 – 38 ml of solution (14 ml of 50% dextrose to 21 cc of boiled water) in a sterile 35 cc syringe. A 5 lb kid needs about 25 ml of solution (10 ml 50% dextrose to 15 ml of boiled water).
3. Warm solution to ~104ºF.
4. Hold the kid or lamb up by its front feet and let it hang from your arm or between your legs.
5. Locate your targeted injection site, 1 inch below and to the left of the umbilicus (where the umbilical cord enters belly) and clean if visibly dirty. You can use a marker to circle the site.
6. Using a sterile 19 or 20 gauge 1 inch needle (not on the syringe), enter the peritoneal cavity at a 45º angle aiming down towards the pelvis.
7. If blood, colostrum, or other fluids leak out of the needle hub, you have probably gone through an abdominal organ rather than into the intraperitoneal cavity. Pull out, get a new needle, and try again.



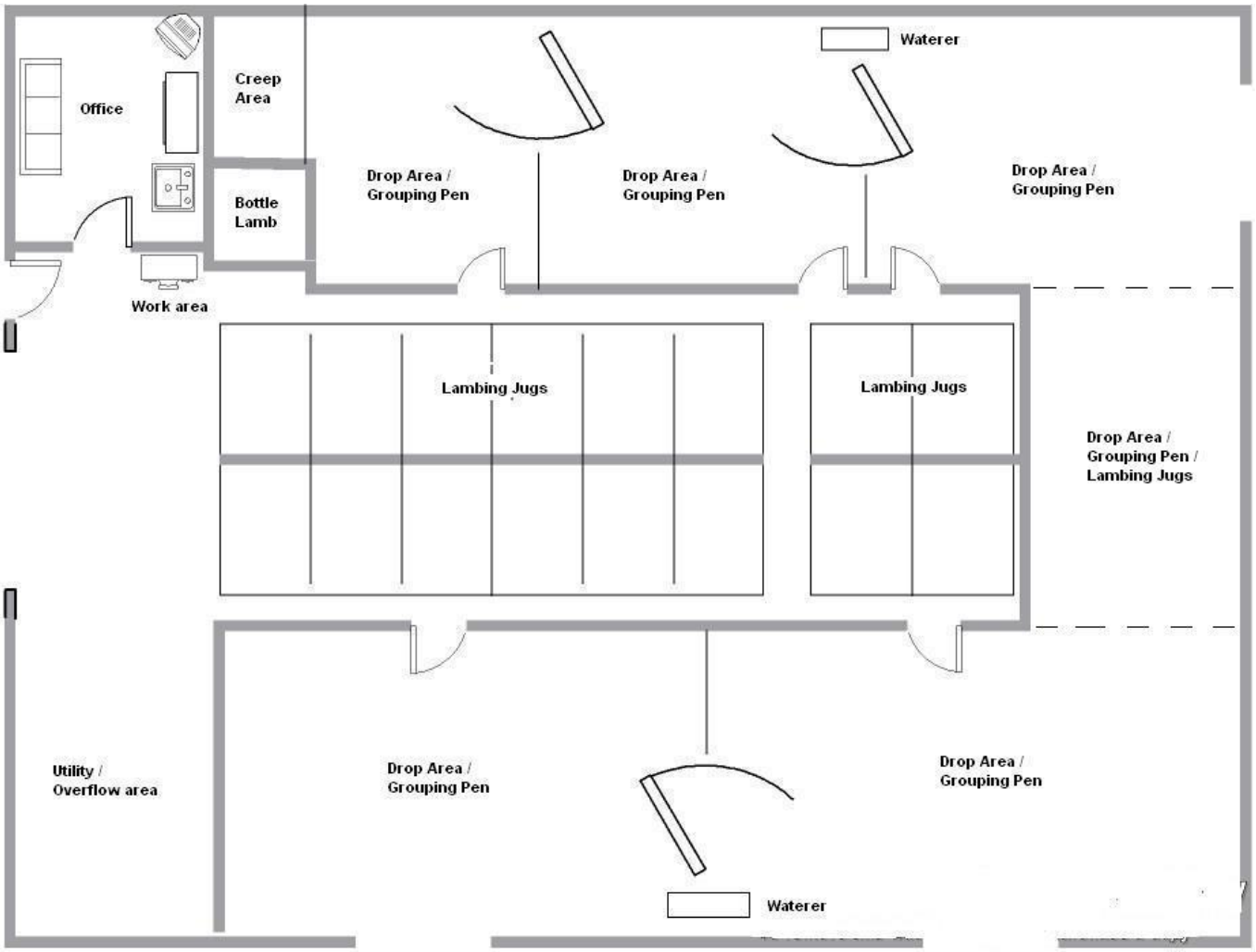
8. Please note, there is a risk for the kid or lamb of infection when you put the needle in alone because air can escape down into the body cavity. If you are sure the baby animal has not eaten, it is probably better to put the syringe directly on the needle. The disadvantage with this method is that if you pull back on the syringe and there is blood or colostrum in it, you will contaminate the dextrose solution and need to start over with a new batch and a new sterile syringe.
9. Once the needle is inserted without fluids being seen, attach the syringe to the needle and gently pull back to double check for blood, etc. Inject warm solution at roughly a 45º angle towards the rump (if a lump forms, the needle is only under the skin and needs to be deeper). Afterwards -warm the kid or lamb up and give warm colostrum or milk, whichever is appropriate, when he/she revives.
10. To discourage possible infection from the IP dextrose injection, treat the baby animal with antibiotics SQ afterwards based on your veterinarian's recommendations.

Appendix V. CARING FOR WEAK KIDS AND LAMBS – *Katie Roberts*



Appendix VI. SAMPLE LAMBING BARN PLAN

This plan outlines the layout for Drop Areas (group pens where dams will give birth), Lambing Pens (jugs or claiming pens where individual litters are placed after birthing) and Grouping Pens (mixing pens or group pens where litters are comingled). Shortening the distances between these areas and improving the ease of animal flow between them can substantially reduce labor demands during lambing and kidding seasons. The area for artificial rearing of newborn orphan or abandoned lambs is identified in this plan as "Bottle lamb" and should be situated in high traffic areas where newborn lambs or kids can be easily observed and trained to *suckle. Courtesy of Gail and Gary Boeve, Pipestone Lamb and Wool Program.*



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