UK UNIVERSITY OF KENTUCKY College of Agriculture

Kentucky Dairy Notes

January 2013

2012 University of Kentucky Southern Dairy Challenge Team

2012 University of Kentucky Southern Dairy Challenge Team (from left to right): Barbara Wadsworth (coach and graduate student), Alexis Thompson (Sophomore from Phoenix, Arizona), Makenzie Waymeyer (Junior from Walton, Kentucky), Chris Thomas (Senior from Campbellsville, Kentucky), Caroline Hohlman (Senior from Long Island, New York), Taylor Reiter (Senior from Boston, Massachusetts), and Dr. Donna Amaral-Phillips (coach)

Undergraduate students from the University of Kentucky participated in the 2012 Southern Dairy Challenge held in Newberry, SC on November 8-10. At this event, students are placed on teams with members representing various universities across the southeast US. Together they evaluate a dairy operation and present recommendations to a panel of judges regarding the strengths, opportunities for improvement, and a prioritized plan for their host farm based on the farmer's goals, performance records, and observations on-farm. With this educational event, they can apply concepts they have learned in the classroom to real farm situations and then defend their recommendations. Before attending this event, the students visited dairy farms in Kentucky. The team would like to thank the Kentucky dairy farm practice farms for allowing them to visit and learn from these operations. In addition to participating in this educational event, students wrote an article for Kentucky dairy producers about an aspect of dairy production for this class. This issue of Kentucky Dairy Notes contains a sampling of these articles written by these students and reviewed and edited by the coaches for Dairy Challenge.

Environmental Effects on Dairy Calves

By: Alexis Thompson, University of Kentucky Dairy Challenge Student

Dairy calves are expected to double their birth weight within the first two months of life. They are the future of a dairy herd, and future herd's performance is therefore based on growth and health especially during the first 2 months of life. The uncontrollable factor in calf rearing is the environmental temperature, but producers can control the amount of effect it will have. Ideally, calves need a clean, draft-free but well-ventilated environment to grow.

Heat Stress

Summer and spring calves must contend with heat stress. All calves begin to experience heat stress as the temperature climbs above 70° F.

- Ventilation: Proper ventilation can reduce build-up of hot, stale air in calf housing and can remove excess heat, moisture, and harmful airborne organisms without a draft. Fans aid in circulation of air if calves are housed indoors. If housed in hutches outside, hutches with ventilation doors should be open and the rear of the hutch elevated. By raising the rear of the hutch 8 inches, calves have a lower respiratory rate and the temperature and carbon dioxide concentrations within the hutch are lowered.
- Shade: Shade reduces the amount of sun exposure to calves. There needs to be about 2.5 to 3 square yards of shade per calf. However, the area must be checked frequently to prevent it from becoming damp and manure ridden. With calf hutches, shade can be provided by shade cloth or by placing hutches under a shade tree.
- Water checked 3 times a day: Cool, clean water must be provided for calves at all times. As temperatures increase, calves consume more water. Access to water increases weight gain. Hot temperatures encourage growth of bacteria and algae, so water buckets need to be cleaned daily.

- Small amounts of starter replaced daily: Calf starter quickly becomes rancid at higher temperatures. Calves do not like to eat spoiled feed and will therefore consume less jeopardizing the amount of gain they achieve. As temperatures climb, calves become less active during the day. It is ideal to encourage feed intake at night when the calves are most active and more likely to eat while providing small amounts of feed during the day to prevent spoilage.

Cold Stress

Calves born in the fall and winter have weather extremes to contend with as well. When calves are born, they only have 3 to 4% body fat, which means they are not well insulated and are more susceptible to cold stress. It is the job of the producer to provide an environment to minimize the effects of the cold on the well being and growth of the calf. Newborn calves up to 2 weeks of age experience cold stress at temperatures below about 60°F while calves over 2 weeks of age are tolerant until approximately 45°F.

- Additional clean, dry bedding: As the temperature declines, providing more bedding encourages the calves to burrow into it and stay warm. Straw works well for this purpose especially during the winter. No matter how much bedding is in the hutch, if it is wet, there is a problem. It is important to remember to clean out the spoiled bedding, add dry bedding, and that the bedding in general is clean. Most pathogens cannot survive and reproduce in cold temperatures, but it still is important to provide a clean environment.
- Draft-free ventilation: Ventilation is needed in the housing facilities but draft control is important so that the calves do not develop hypothermia or cold stress. During the winter, ventilation removes stale air and moisture. Dry calves are more comfortable, and can bear the cold weather better than wet calves. The key to draft-free is a wind block that allows air to be removed without blowing directly on the calf.
- Accessible water checked daily: Dropping temperatures means that water freezes. Calves should always have access to water, so buckets need to be ice free to encourage the calf to drink. Water along with calf starter encourages rumen development. At least once a day (and twice a day in cooler weather when water freezes), buckets should be filled with lukewarm water to encourage intake. Feed intake is directly correlated to water intake. The more water a calf drinks, the more she will eat, and the more she will grow.

The plus side of cool temperatures is that calves have their best growth as long as they do not use too much energy to stay warm. To account for the additional energy the calf uses to stay warm, additional milk replacer or whole milk needs to be fed. Calves must be encouraged to boost their feed intake so that they grow at similar rates. If the calf is not fed additional milk or milk replacer to stay warm through the winter months, growth will be reduced.

Table 1: Whole milk per day needed to meet maintenance requirements for an average newborn (90-pound) Holstein calf up to 3 weeks of age at different environmental temperatures. These amounts are to maintain the calf only and do not account for growth of the calf.

	Maintenance Diet (no weight gain)	Additional Feed (milk replacer or whole milk) Needed to Maintain Energy Intake				
Temperature (°F)	68	45	32	15	5	-5
20:20 Milk Replacer (ounces as fed)[1]	14	3.7	5.8	8.8	10.2	11.7
Whole Milk (lbs)[2]	5.5	1.4	2.1	3.2	3.7	4.3
Whole Milk (quarts)[3]	2.5	0.6	1.0	1.5	1.7	2.0

Table 2: The amount of 20:20 milk replacer (quarts) compared to milk (quarts) needed to meet maintenance requirements in declining temperatures for a Holstein calf less than 3 weeks and over 3 weeks.

	Conventional milk replacer (ounces powder)	Milk (quarts whole milk)		
Temperature (° F)	Less than 3 weeks	Over 3 weeks	Less than 3 weeks	Over 3 weeks
68	14	14	2.5	2.5
60	15	14	2.9	2.5
50	17	14	3.2	2.5
40	19	15	3.5	2.9
32	21	17	3.9	3.2
25	23	19	4.2	3.5
15	24.5	21	4.5	3.9
5	26	23	4.8	4.2
-5	28	24.5	5.4	4.5

[1] The assumptions are made that the milk replacer has about 4.50 Mcal ME/ kg DM and the ratio of DM to water is 1.25 lb: 4 quarts. (Dairy NRC 2001, page 227- table 10-8, DM of milk replacer =96%)

[2] Whole milk contains 5.37 Mcal/kg DM, Milk 13% DM (Dairy NRC 2001, page 226, Table 10-7)

[3] The conversion 8.64 lbs milk: 4 quarts of milk was used.

Table 1 compares the amount of conventional dry powder milk replacer to the amount of as fed whole milk per day to maintain body weight of a calf as the temperature drops. These amounts will maintain the average growth of a calf and prevent her from decreasing in weight and size. This does not take into account the additional nutrient requirement for increased growth on top of maintaining the body. Table 2 compares age and nutrient requirements. Since older calves experience cold stress at lower temperatures, they do not need additional nutrients until later than young calves.

Extreme temperatures cannot be controlled but how they affect the growth and health of calves can be. By supplying proper ventilation, water, feed, and proper bedding, the dairy calf raiser can lessen the severity of the environmental temperature.

The Prevention of Lameness in Dairy Cows by Increasing Cow Comfort
"Happy Milk Comes from Happy Cows"

By: Caroline Hohlman, University of Kentucky Dairy Challenge Student

Lameness in dairy herds often results in a loss of profit. Each incident of lameness has been estimated to cost producers $346 per year. Preventing lameness is key and when it does occur, recognize the signs early. Preventing and recognizing lameness will result in an increase of the overall dairy herd health and therefore will increase profit.

Dairy producers should identify cows starting to show early signs of lameness. A locomotion scoring system has been developed that allows a dairy producer to determine the degree of lameness in his/her herd. This system is based on the observation of a cow's posture while standing and walking and special attention is given to the cow's back posture. Locomotion scoring is an efficient system that allows a farmer to:

- Identify early signs of claw (hoof) disorders
- Monitor occurrence of lameness
- Compare the frequency and severity of lameness among herdmates
- Identify which cows in the herd require functional claw (hoof) trimming

When observing cows, they should be provided with a flat surface that ensures good footing. To prevent more serious cases of lameness, cows that score a 2 or 3 should be observed more closely and their hooves should be trimmed to prevent their locomotion score from increasing. The locomotion scores are as follows:

1 – Normal: Cow stands and walks normally with all feet placed with purpose.

2 – Mildly Lame: Cow stands with flat back, but arches when it walks. Gait is slight abnormal.

3 – Moderately Lame: Cow stands and walks with an arched back. Short strides are taken with one or more legs.

4 – Lame: Cow has an arched back standing as well as walking. One or more of the limbs is favored, but is at least partially weight bearing.

5 – Severely Lame: Cow has an arched back and refuses to bear weight on one limb. She may refuse or have great difficulty moving from lying position.

Several areas that the dairy producer can evaluate in order to minimize or prevent lameness in dairy herds include:

- Providing suitable cow comfort
- Maintenance of claw care
- Providing adequate time for transitions
- Providing a solid nutrition plan

Cow Comfort

Cow comfort is one of the important factors preventing lameness and contributes to a high producing dairy herd. Real California Milk got it right when they said that "Happy milk comes from happy cows". The more comfortable a cow is throughout the day, the more time she spends resting and chewing her cud and she is more likely to produce a greater amount of milk.

Stall Comfort

The first thing that needs to be looked at in the area of cow comfort is how comfortable the stalls are. Dairy cows should spend at least 10-14 hours lying down per day and if the stalls (both freestall and tie stalls) provided are not the correct size, the resting surface is poorly maintained, too much time is spent away from the resting area, heat abatement is not properly supplied or overcrowding exists, lying time will be reduced.

A free-stall should provide adequate space for lunging and lounging and should be sized for the largest cow in the herd. An indication that the neck rail is in the wrong position is the occurrence of perching throughout the herd. The definition of perching is when a cow stands with her two front feet in the free-stall, but her hind feet are stationed

in the alley. If a dairy producer walks through his/her free-stall barn and observes that perching is a common problem, it may be time to reevaluate the cow comfort of the stalls and make some changes.

Along with the proper dimensions of the stall, the bedding that the producer provides for the cows also is very important. The type and depth of bedding used in the free-stalls is a crucial factor that contributes to optimizing the comfort of the herd. Cows prefer to lie in stalls that are soft, dry and provide adequate amount of cushion.

Several types of bedding exist for producers to choose including:

- Sand
- Saw dust
- Rubber mattresses
- Rubber mats
- Water beds

However, there are certain beddings that trump others. Sand is actually considered the gold standard for cow comfort in a free-stall if managed correctly whereas concrete is looked down upon as one of the worst bedding options possible as it lacks the cow comfort that sand supplies. Sand has been proven to:

- Increase lying time of the cows
- Decrease the incidence of lesions and baldness on hocks
- Provide cows with good footing (both in the stall and alley – provides traction)
- Decrease the incidence of lame cows
- Decrease incidence of clinical mastitis due to a decrease in the exposure of environmental pathogens

Standing Time

Cows spend the remaining 10-14 hours eating, socializing and in the holding pen waiting to be milked. Concrete, especially uneven concrete, is very hard on the cow's hooves. Decreasing the time cows spend standing on concrete is important. For example, upon designed a dairy facility, it is beneficial that the walk from the free-stalls is a minimal distance away from the holding pen. The time spent in the holding pen should be less than 3 hours per day for the last cows milked. Possible ways to decrease the amount of time they spend on this surface would be the installation of rubber, non-slip mats. These may provide the cows with a grip so that injuries due to slipping decrease as well as give these cows a softer surface to walk on.

Heat Abatement

Lack of heat abatement is another area of cow comfort that needs to be analyzed by the dairy farmer to decrease the incidence of lameness. Once a cow's environment reaches a temperature and humidity index of 68, they are considered to be experiencing heat stress. This will result not only in a decrease in milk production, but an increase in the amount of lameness. In order to keep cows cool a farmer should:

- Place several large fans in the barn to circulate air and provide adequate air movement. Fans should be present in holding pens as well.
- Install sprinklers to wet down cows to the skin (wet cycle <2 minutes, dry cycle 10-15 minutes) with large droplet size of water
- Install shade screens to keep cows out of the sun, in areas not covered, i.e. uncovered feed bunks
- Good ventilation should be provided via properly designed ridge vents and open side walls

In addition to keeping the cows cool, it is important that these facilities are kept clean. Build up of manure and water from the sprinklers in the alleyways leads to slick surfaces that cows are unable to get good traction on. This leads to unconfident footing, slipping and falling and thus the incidence of injuries increases. Alleyways should be scraped at least twice daily to minimize the amount of injuries that are caused by slipping and falling. Clean alleyways also decrease the incidence of mastitis if there are alley rats present. An alley rat is a cow that chooses to lie down in the alleyway rather than in a stall. If the alleys are dirty, manure will cover her teats thus making mastitis a greater possibility.

Conclusion

Lameness in dairy cows can cause economic losses. However, there are several ways that the effects of lameness can be minimized by initiating certain preventative measures. Cow comfort is one of the most important areas that a dairy producer can look into in their attempt to decrease lameness throughout the herd. In the long run, these simple changes can lead to a greater profit as well as the most important idea of all: "A happy herd".

Grazing-an Alternative Forage Harvesting Strategy for Dairy Cows

By: Taylor Reiter, University of Kentucky Dairy Challenge Student

With increasing feed prices, many dairy herds are considering transitioning to grazing. The quality and availability of grazed forages is more variable than stored feed, thus requiring a different management style. Grazing forages offers several benefits, but also has several unique factors one must consider when implementing a

grazing management program. When grazing, dairy farmers need to be concerned about the amount of forage available for grazing this week, as well as what will be available in the next two weeks. Energy is the hardest nutrient group to get into dairy cows and can be a challenge when grazing high-producing dairy cows.

Benefits of grazing

Year-round grazing may not be feasible for parts of Kentucky, but seasonal grazing is. Seasonal grazing can save as much as $1 in cost per cwt of milk with reductions seen in forage harvest costs. The cow is harvesting her own forage, thus saving on labor and equipment. Depending on grazing systems utilized, a farmer can save yearly $75 to $150 per cow on feed in the southern US. (D.M. Ball et al) Over half of the costs associated with producing milk is associated with feed, minimizing the cost per cow will help increase profit margins.

Cows on pasture are off concrete and have the ability to exercise. A concern is that bacteria and diseases can be spread through the environment and are harder to control in pasture than a confined barn. Weather conditions and poor drainage can quickly cause pastures to become mastitis breeding grounds. However, cows on pasture can be very comfortable. They have the ability to lie on soft ground and it is considered a more natural setting.

Types of grazing

True pastures and not dry lots will always provide some level of forage for the cows to graze. To maximize milk yields, feed intake cannot be compromised. One pound increase in dry matter can lead to two pounds increase in milk yield. Utilizing high quality forage can increase the peak in the lactation curve of a fresh cow. The highest forage quality should be provided to fresh cows and high producers. Using pastures for the dairy herd means executing top pasture management. Pastures must be regularly rotated and managed to provide the best quality feed.

Many types of pasture management styles are used in grazing dairy cows. Rotating pastures allows a pasture to rest while another is being grazed. It is important to rest a pasture in order to stimulate quick regrowth and improving the amount of roots plants have. Pasture resting time depends on cow stocking density, forage type, and environmental factors. Forward grazing or leader-follower scheme is commonly used, allowing lactating cows to graze a fresh field and then followed by dry cows or heifers in the same pattern. Providing cows with high energy and nutrient requirements with a premium first graze, allows them to receive the best quality feed. Strip grazing can also be created using temporary fencing which is easily seen by cattle. Strip grazing utilizes the maximum capacity of a pasture and prevents spot grazing.

Many different types of forage can be utilized in Kentucky to maximize forage production for different times of the forage growing season. Common winter annuals that excel in Kentucky and provide grazing in early spring include wheat, rye, and triticale. Cool season crops that excel in Kentucky are tall fescue (newer endophyte-friendly varieties), orchard grass, bluegrass, alfalfa, and clover. Cool season species, other than alfalfa, provide grazing when environmental temperatures are below 75°F. Warm season forages grow best when temperatures are above 90°F and include annuals, such as sudangrass, and perennials, such as eastern gamagrass. It is important to have different fields dedicated to different season crops for grazing forages throughout the grazing season. Cool and warm season plants grow in complementary patterns. When cool season plants become dormant from June to August, warm season plants yield spikes and replaces then as the pastures being grazed.

When grazing, it is important to remember not to graze grasses down to the soil. Studies done by Dr. Ray Smith at the University of Kentucky have shown that the shorter the grass is cut or grazed, there is less stored carbohydrates, causing a longer time to regrow. Thus, the general recommendation is to start grazing when grasses are 8-10 inches tall and remove cows when they are grazed to 4 inches in height. Continuous grazing reduces the carbohydrates stored and thus can kill growth in a pasture. Depending on the stocking density of the fields, cows should be rotated according to the growth rate of the pasture. TMR or stored forages can be supplemented when grazing is limited especially in a seasonal scheme. Supplemental grazing can also be used to reduce the amount of TMR fed and lower feed costs.

It is important to manage pastures for the forage and for the animals. Adequate and clean water supply should be provided to prevent a decrease in milk yield. This can be done with portable water units, well springs, or custom water lines. It is important to regulate heat abatement using shade screens, possible sprinklers if practical, and making sure cows consume water. Standing water or ponds should be fenced off to prevent the spread of bacteria or diseases, such as leptospirosis and mastitis. Cows should also be removed from pasture one to two hours before milking to prevent off flavors in milk. When considering a pasture the distance to the parlor should be considered. A walk over a mile can decrease milk production.

Grazing can decrease feed expenses by decreasing harvest costs of stored forages. Forage quality and availability may be variable but pasture grazing can be very economical and may improve the comfort of a dairy herd.

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January 14
Free Webinar: Potential and Pitfalls for Genomic Selection
Presented by: Dr. Chad Dechow, Penn State University

January 22 & 23
Southern Dairy Conference
Atlanta, GA
http://www.southerndairyconference.com/Pages/default.aspx

February 26 & 27
Kentucky Dairy Partners Meeting
Bowling Green, KY
http://www2.ca.uky.edu/afsdairy/extension/kydairypartners