

Kentucky Dairy Notes

June 2013



Marketing Considerations for On-Farm Dairy Processing **Jeffrey Bewley, Brianna Goodnow, and Elizabeth Chaney**

Last month, we discussed major considerations for starting an on-farm processing enterprise. This month, we will discuss marketing considerations.

How important is marketing for on-farm processing?

Having a great product does not mean someone necessarily wants to buy it. Marketing is essential to the success of an on-farm processing enterprise. In order to determine the feasibility of a potential business endeavor, examining exactly what (and who) one's target market is can help determine the potential of a business. This includes answering questions such as:

- Are there any possible competitors in my target market area?
- Will I sell retail or wholesale?
- Who might be interested in my product?
- What geographical area do I want to target?
- What are consumers willing to pay for my product?

Market placement can either make or break a business. Some useful programs and publications for answering these questions include:

- PRIMER for Selecting New Enterprises for Your Farm
http://www.uky.edu/Ag/AgEcon/pubs/ext_aec/ext2000-13.pdf Through a series of worksheets, this publication examines the profitability, resources, information, marketing, enthusiasm, and risk of ideas.
- Selected Resources for Developing Value Added Products in Kentucky
<http://www.uky.edu/Ag/CDBREC/varesources.pdf> This document provides a wealth of information and resources.
- The SCORE – Small Business Mentoring and Training <http://www.score.org/> This program is a support network to learn essential small business management skills.

How do I assess what the market is?

Before pursuing and creating an on-farm dairy processing enterprise, estimating the demand for a product(s) through test markets is extremely beneficial. This is usually accomplished by having another established value-added farmer sell a small number of test items in their market to see how the market responds. The following groups are helpful in working for market research and test marketing:

- The Kentucky Center for Agricultural and Rural Development (KCARD) consults with emerging or existing businesses on critical questions related to incorporating, financing, management, marketing, accounting, and legal concerns. KCARD is a valuable service that can be used to ensure a more secure market.
<http://www.kcard.info/>
- The National Sustainable Agriculture Information Service also has detailed information on how to approach a potential market. Their publication, Keys to Success in Value-Added Agriculture, contains information from farmer testimonials. (<http://attra.ncat.org/attra-pub/summaries/keystosuccess.html>)
- The Kentucky Department of Agriculture (KDA) has a Division of Business Development which can help with market development. (<http://www.kyagr.com/marketing/agribusiness/index.htm>)

In a Penn State publication titled, Get More from Your Milk: Increasing Profit through Value-Added Products, (<http://pubs.cas.psu.edu/freepubs/pdfs/xa0019.pdf>), six steps are outlined for finding a target market:

1. Find out what market you are interested in (retail, groceries, restaurants, specialty food stores, a farm store, community supported agriculture, or the farmers market).
2. Look at the population data of the market area you have in mind, looking at this larger picture can be helpful. U.S. Census data or the local chamber of commerce has this information.
3. Take this population number and estimate what percentage might be interested in your product. Do this by thinking about location boundaries (county or zip code), demographics, and price sensitivity (take a look at income data as a benchmark).

4. Talk with managers of similar, potential markets to see if their customer patterns match.
5. Create an analysis for each target market to estimate total sales in a given time period and with different sales scenarios – this can be easily done in a spreadsheet.
6. Total the sales estimates and update your spreadsheet documents accordingly as your involvement with these markets change through time.

What is the demand for value-added dairy products?

Consumer interest is usually the first signal that on-farm processing might be a path to pursue. Perception of a superior product drives its value. The unique story behind a product drives its perceived benefits. Since value-added products have a higher value to consumers, they often also have a higher retail price. Attributes used to differentiate between products include organic, local, natural, grass-fed, pasteurization technique, fair-trade, kosher, allergen-free, and humane treatment. More information on becoming a U.S. Department of Agriculture certified organic dairy can be found through the Kentucky Department of Agriculture (<http://www.kyagr.com/marketing/plantmktg/organic/>).

Although the USDA does not have a certification system for defining a product as natural, those that are free of hormones and antibiotics, are considered natural. Certification systems for local products such as KDA's Kentucky Proud (<http://www.kyproud.com/>) also exist.

Consumer demand for higher quality food, specialty foods, and health food products are market drivers. Trends show that people continue to buy more specialty products relative to mainstream products in every market category. Fluid milk trends show the market for organic milk is growing, although organic milk is a very small percentage of total milk sales. Other characteristics are also attractive to consumers such as rBST (recombinant bovine somatotropin) free.

Specialty cheeses have seen a significant market boom in the last decade due to increased publicity for cheeses through restaurants that add value to individual menu items made with a specialty cheese. The media also has increased interest in specialty cheeses through programs focused on travel, food, and cooking.

Ice cream has a wide array of target markets and characteristics because two large consumer interests are represented: healthy desserts and indulgence desserts.

Yogurt is an important market with a reputation as a healthy snack that aids digestion. Convenience, through drinkable and frozen yogurts, has also increased demand for this product. Certain consumers eat yogurt more than others, particularly women, children, Hispanics, and Asians.

How will I sell and distribute my product?

How a product will reach consumers is important to consider before beginning to manufacture it. The target market will dictate distribution channels. Many market opportunities are available for value-added dairy products. However, getting into these markets is not as simple as it may seem. Some options include:

Farmers Markets

Many farmers markets exist all around the country. A directory of Kentucky farmers markets is available at the Kentucky Department of Agriculture website <http://www.kyagr.com/marketing/farmmarket/2012FarmersMarketDirectory.htm>. Entry and space rental fees vary among markets.

Retail

Local, value-added products have a small, but strong niche market in many specialty grocery stores and some regional and national grocery chains. Larger markets require larger quantities of a product, so cooperative efforts among a few dairies are sometimes beneficial in pursuing this kind of market.

On-Farm Sales

Setting up a farm store or stand and offering on-farm sales is another option. On-farm sales are often coupled with agritourism, and farms often offer lunch options, farm tours, and sell a small variety of products in the farm store. Populations, family income, and road traffic near the potential distribution point are important factors to consider in the decision to start an on-farm store. The Kentucky Department of Agriculture has a Division of Agritourism that has more information on establishing a farm store or stand. It is available online at <http://www.kyagr.com/marketing/agritourism/index.htm>.

Community Supported Agriculture (CSA)

In a CSA program, individuals contract with a farmer to receive a weekly or bi-weekly basket of products from the farmer for a fixed price over the course of the growing season. Many farmers have expanded their CSAs to include value-added products like dairy, eggs, and meat in order to add more value to the baskets and to carry the market through the winter. As a result, an existing CSA program may be a viable market option for some. The location of existing CSAs is available through <http://www.localharvest.org>.

Institutional Buying

This involves direct contracts to sell products to an institution, such as a school, university, hospital, nursing home, business, or restaurants. This type of market may be seen as a more secure situation, because of contracts.

How can agritourism supplement my on-farm processing enterprise?

According to the Kentucky Farms Are Fun website (<http://www.kentuckyfarmsarefun.com/>), agritourism is defined as, "The act of visiting a working farm or any agricultural, horticultural, or agribusiness operations for the purpose of enjoyment, education, or active involvement in the activities of the farm or operation."

Many farms only do agritourism, while others combine agritourism and an on-farm processing venture. Agritourism is an excellent way to educate the public on the importance of agriculture and involves considerable public interaction, people skills, and relationship building skills. Some events may involve school tours, individual tours, or hosting community events. Establishing this relationship with a community helps to increase rural economic development dollars and develop community support for agriculture.

Agritourism can be a very profitable, fulfilling addition to a farm when properly managed and planned. Farms should be presentable to the public. When bringing the public onto a farm, the correct insurance and liability coverage is important. Interacting with the community, the insurance company, and even those who have agritourism businesses in different areas is key and very helpful in planning one's operation.

How should I interact with customers and suppliers?

When owning and operating a business, working with the public is inevitable. Business owners must interact with customers, employees, suppliers, or investors and effectively communicate with each one. For some farmers, this can be a favorite part of owning a business, and for others it can be the worst. Most farmers do not have to work with people on a daily basis, and this can be a huge adjustment for them.

Representing the product is very important and critical when working with customers. When selling a product, entrepreneurs must know the type of consumer the product attracts. Be prepared to answer questions about the product's origins, production process, attributes, and strengths and weaknesses compared to competitors. Being able to establish that relationship with the customer and make them feel that they need the product is something very important to making the sale. When deciding on marketing strategies, capitalize on a product's attributes and stress those when marketing the product.

Dealing with objections is also another huge part of working with the public. Unhappy customers can come along for many different reasons. Dealing with and understanding how to communicate with these customers is just a part of business. This is particularly true when the possibility for foodborne illnesses exist. On-farm processing enterprises must have a contingency plan for dealing with recalls or illness outbreaks. Remember that the only bad objection is the one that is not heard. Objections should be considered as constructive criticism. Make sure to understand the objection and try to change that person's perspective of the product. Objections cannot only be from unhappy customers, they can be from customers who feel as if they may not need the product, may not have the money, or simply may not want it. In each of these situations, a seller should work toward persuading the customer but know when to quit and always avoid arguments.

When owning and operating a business, an owner is going to work very closely with their suppliers. These suppliers are responsible for the inputs that go into making a product. Lines of communication with suppliers should always remain open. Suppliers should be treated well for everything they contribute to the business. Working with the public can be as simple as knowing how to communicate effectively. One should always be confident when talking to a customer, supplier, or employee. Business owners should value everyone who plays a role in the production and selling of a product. Having the ability to work with people is a very important aspect no matter what business one is in.

Colostrum Management for Dairy Calves

Michelle Arnold

During gestation, the placenta of the cow effectively separates the blood of the fetus from that of the dam and prevents any transfer of protective immunity while in the uterus. Therefore, the calf is born completely dependent on the absorption of maternal antibodies from colostrum after birth. A calf's gastrointestinal tract is designed to temporarily allow the absorption of large molecules including antibodies ("immunoglobulins") from the small intestine. This is called "passive transfer" and only occurs during the first 24 hours after birth. Although colostrum contains several different types of immunoglobulins (immunoglobulin G or "IgG", immunoglobulin A or "IgA" and immunoglobulin M or "IgM"), IgG accounts for roughly 85% of the total volume. IgG absorption is most efficient in the first 4 hours of life and declines rapidly after 12 hours of age. At 24 hours, the gut is completely closed and there is no immunoglobulin absorption into the circulation after that time. These absorbed antibodies must be consumed in order to protect the calf from disease organisms until its own immune system becomes functional.

"Failure of passive transfer" of immunity (also called "FPT") occurs when a calf fails to absorb an adequate quantity and quality of immunoglobulin. It can be diagnosed with a blood sample drawn between 24 and 48 hours of age; calves are defined as having failure of passive transfer if the calf serum IgG concentration is less than 10mg/mL. FPT has been linked with increased calf morbidity (sickness), mortality (death), and a reduction in calf

growth rate and feed efficiency. It is estimated that of the calf deaths occurring in the first 3 weeks of life, approximately a third are due to inadequate colostrum intake. Early and adequate consumption of high quality colostrum is considered the single most important management factor in determining health and survival of the neonatal calf. The long term consequences include delayed onset of puberty, decreased first and second lactation milk production, and an increased culling rate of heifers in the first lactation. According to the 2007 National Animal Health Monitoring System survey, approximately 19% of dairy heifer calves in the US had failure of passive transfer. There are 4 key factors that contribute to the goal of successful passive transfer of immunity:

1. Feeding high quality colostrum with a high immunoglobulin concentration (>50 g/L of IgG);
2. Feeding an adequate volume (4 quarts) of colostrum;
3. Feeding colostrum promptly after birth (within 1-2 hours and by 6 hours maximum);
4. Minimizing bacterial contamination of colostrum by proper udder preparation, collecting the colostrum in a clean container, and proper storage in a refrigerator or freezer within an hour.

In order to achieve the four important factors listed, it is necessary to examine each one individually and determine what practices can be used by producers to reach this goal.

Colostrum quality is considered to be high if the IgG level is greater than 50 g/L. One recent study found that the average Holstein cow's colostrum was 76 g/L, but the samples ranged anywhere from 9 g/L to 186 g/L. Many factors come into play in quality colostrum production including breed, age, vaccination status, length of the dry period, season of the year, amount of colostrum produced, and the time it was collected. Although several of these factors are beyond a producer's control, the most important of these is the time of collection. **To collect the highest quality colostrum, producers should aim to milk the cow within 1-2 hours after calving with a maximum delay of 6 hours. The concentration of IgG is highest immediately after calving but decreases over time.** It is important not to pool colostrum from multiple fresh cows. Large volumes of low quality colostrum may dilute smaller volumes of high quality colostrum. If a cow produces more than 18 pounds at first milking, the chances are less than 50 percent that it will contain sufficient immunoglobulins. Secondly, with pooled colostrum there is a greater risk of exposing multiple calves to disease pathogens if all of the colostrum is mixed together and fed to all of the newborns. Watery or bloody colostrum or colostrum from a cow with clinical mastitis should not be used. Additionally, cows with a dry period of less than 45 days often have poor-quality colostrum as well as those animals that experienced poor nutrition or heat stress during the dry period. Older cows tend to have more IgGs than first calf heifers, as they have been exposed to a greater number of pathogens during their lifetimes. There are several tools available for use on the farm to differentiate high and low quality colostrum although none of them are exceptionally accurate. A colostrometer is an instrument that can estimate the IgG concentration by measuring specific gravity (a specific gravity > 1.050 approximates IgG concentration > 50g/L) but the readings are affected by factors such as milk fat content and temperature. A commercially available kit (Colostrum Bovine IgG Quick Test Kit, Mid-land Bio-Products, Boone, Iowa) will give a positive or negative result within 20 minutes but will not give an actual IgG concentration.

Feeding an adequate volume is essential especially when colostrum quality cannot be assessed. An average 90 pound Holstein calf should receive a minimum of 100g of IgG in the first feeding or 10-12% of her body weight. **Researchers have found that 85% of colostrum samples will be of high enough quality to provide greater than 100 g of IgG if calves are fed 4 quarts in the first feeding.** The typical amount in a normal sized calf bottle is 2 quarts so two full bottles must be fed. If possible, feed an additional two quarts to all calves 12 hours after birth. One study illustrated this by measuring serum IgG levels of calves at 24 hours of age. Those fed 4 liters (4.2 quarts) of colostrum at birth and 2 additional liters (2.1 quarts) at 12 hours had an average serum IgG level of 31.1 mg/mL as compared to calves fed 2 liters at birth then 2 additional liters at 12 hours which had an average serum IgG level of 23.5 mg/mL or 24% lower.

The most important factor affecting absorption efficiency is the age of the calf. **The aim is to feed all calves within 1-2 hours after birth and by 6 hours at the latest.** This is best accomplished by removing the calf from the dam within 1-2 hours of birth then hand feeding a known volume of colostrum using either a bottle or esophageal feeder. It is generally accepted that either method of feeding achieves acceptable results as long as a sufficient volume is consumed. In the You-Tube video at <http://www.youtube.com/watch?v=GLHOe6xInJg> entitled "How to use an Esophageal Feeder", Dr. Sheila McGuiirk, DVM, PhD gives an excellent presentation on how to administer colostrum to calves via an esophageal feeder. Calves should not be left on the cow to nurse as these animals experience an exceptionally high rate of failure of passive transfer, mostly due to the delay in suckling. Recent studies have found 46%-61% of calves fail to suckle in the first 6 hours after birth. Reasons for this delay include a low, pendulous udder, large teats, or poor mothering ability. Calves born in very cold weather or those experiencing a difficult, prolonged birth definitely need to be hand fed promptly due to their delayed ability to stand and nurse.

Minimizing bacterial contamination is important for two main reasons: 1) bacteria bind up the immunoglobulins in the gut so they do not pass into the bloodstream (decrease efficiency of transport) and 2) contaminated colostrum is one of the earliest potential exposures to infectious agents that cause diarrhea and septicemia such as *Salmonella*, *Mycoplasma*, and fecal coliforms as well as the organism which causes Johne's disease *Mycobacterium avium* subspecies *paratuberculosis* (MAP). Colostrum should have a total bacteria count of <100,000 colony forming units (cfu)/mL and <10,000 cfu/mL total coliform count. Preventing bacterial contamination includes avoiding colostrum from known infected cows, avoid pooling, proper collection from a prepped udder into a clean container, and proper storage. If not fed immediately, it should be frozen or refrigerated within the hour. Frozen samples may be used for up to one year provided there is no freezing and thawing. The IgG in colostrum is considered stable in the refrigerator for approximately 1 week although bacteria counts may reach unacceptable levels if not cooled quickly enough. Refrigerating colostrum in small containers surrounded by frozen water bottles will quickly cool colostrum and decrease the growth of bacteria. The addition of the preservative potassium sorbate is also an option to aid in halting bacterial growth. An excellent tool to reduce bacterial contamination is pasteurization at 60° C [140° F] for 60 minutes. This is a lower temperature and a longer time than typical milk pasteurization but, is necessary to maintain the IgG activity while still eliminating important pathogens. Immunoglobulins are sensitive to very high temperatures so a warm water bath, rather than a microwave, should be used when thawing frozen colostrum.

Routine monitoring of the colostrum program allows producers to identify and correct problems to avoid failure of passive transfer in their calves. There are multiple tests available at veterinary diagnostic laboratories to measure blood serum IgG levels (such as radial immunodiffusion or the zinc sulfate turbidity test), but the expense and inconvenience of sample submission makes continued compliance difficult. A simple, rapid, and inexpensive on-farm tool that can measure serum total solids (STS) is the hand-held refractometer. The STS is a reasonably good estimation of serum IgG but works best on a herd or group level basis rather than the individual animal. It is recommended to collect blood samples from a minimum of 12 clinically normal (not scouring) calves between 24 hours and 7 days of age. The goal is for 80% or more to exceed an STS of 5.5 g/dL and 90% to exceed 5.0g/dL. Interpreted at the group level, STS results accurately reflect the proportion of calves that have FPT and may trigger an investigation into the flaws within the colostrum program.

Lastly, producers must be prepared when clean, high-quality colostrum is not available to a newborn calf. The use of a colostrum replacement product offers a convenient method to improve passive immunity by mixing a powdered commercial product containing bovine IgG with water and feeding the calf. A colostrum replacer contains a minimum of 100g of IgG per dose, protein, minerals, vitamins, and energy and is designed to be fed when no maternal colostrum is available. This should not be confused with a colostrum supplement product that is designed to be fed *in addition to* and after natural colostrum. Colostrum supplements are significantly less expensive than replacement products because they contain less than 50 mg IgG per dose and have no added nutritional value. Calf managers should use supplements as an extender, to fortify poor-quality colostrum, or when inadequate amounts of fresh or frozen colostrum exist.

In summary, milking the cow within 1-2 hours after calving then feeding the calf the correct amount (4 quarts) of high-quality colostrum immediately (at 1-2 hours of age) are the recommended best management practices for optimal calf nutrition, health, and survival. Colostrum (the milk produced from the mammary gland in the first 24 hours after birth) contains immunoglobulins that, when absorbed by the calf's gut, help protect the calf from common disease challenges. The passing of this protection from dam to calf is called passive transfer. Research has clearly shown that calves with adequate passive transfer grow better, have lower mortality and health cost, and as adults have improved first and second lactation milk production, when compared to calves with failure of passive transfer. Producers should pay close attention to this critical phase of a calf's life through exemplary colostrum management.

Reducing Environmental Stressors to Improve Dairy Cow Comfort Bailey Smith, Barbara Wadsworth, and Donna Amaral-Phillips

A pressing, and often-overlooked matter that poses a significant challenge on most of today's dairy farms is maintaining cow comfort. There are a wide variety of environmental stressors that must be taken into consideration in a dairy operation, and they have a direct impact on the production level of the cows. Some of these stressors include; heat stress, poor ventilation, improper stall/feed-bunk design, and not having adequate access to water. Conditions such as these are not only stressful to the cows, but also greatly affect their physiology and productivity. Fortunately, there are practical and economical solutions available to deal with these issues.

Ventilation/Reducing heat stress:

When addressing dairy cow heat stress problems, one must first realize that the thermal neutral zones for

cows are very different than for that of people. You must also realize that heat stress is a function of temperature as well as relative humidity. In areas such as Kentucky that are known for their hot, humid summers, heat stress is much more of a pressing concern than cold stress. As the temperature heat index (THI) approaches 68, dairy cows begin to experience decreases in milk production caused by heat stress. At a THI of 55 to 60 the negative effects on reproduction can be seen. It has been found that, on average, cows experience these effects at least one day in all months of the year other than December and January. Based on these facts, it is apparent that a dairy producer needs to focus on developing facilities to decrease the effects of heat stress rather than cold stress. Listed below are some practices that could be employed in order to reduce some of the effects of heat stress.

Barn Orientation: There are many factors that must be taken into consideration when deciding how to orient a barn, which houses cows. The direction is typically characterized by the direction of the ridge running along the roof of the barn. In order to maximize the use of natural ventilation, it is favorable that it be oriented so that the majority of the winds in the warmer months are perpendicular to the barn's ridge. You must also take into account the effect of sunlight penetration into the barn. This can cause unused areas of the barn due to the increased heat caused by the sunlight. Having eaves that extend out past the barn sidewall, and orienting the barn in a way that prevents sunlight penetration during the summer months can help to reduce this problem. Barns with a north-south orientation have greater sunlight exposure than one that is oriented east-west. Stall usage in barns located on the east and west outside walls of north-south oriented barns are especially impacted by this solar radiation. Decreasing the effects of sunlight is crucial for heat stress abatement. An east-west oriented barn provides this necessary protection more effectively than one oriented north-south. It is important to note that it is not always practical to orient a barn in this manner, due to the topographical profile of the land. On a farm with rolling hills, the orientation of the barn should be directed in a way to minimize the effects of solar radiation as much as possible.

Ridge Vent: Ridge vents are an opening in the roof of the dairy barn used in order to facilitate natural ventilation. In order to maintain adequate cow comfort, dairy cows should be exposed to a continuous supply of fresh, clean air. Having a vent in the roof of the barn allows for there to be a constant exchange of air, which helps reduce the amount of heat, dust, gasses, odors, airborne pathogens, as well as moisture from inside. The idea behind this practice is that hot, moist air will rise and exit through the roof of the barn. It has been found that the steeper the slope of the roof, the better the results. A general rule of thumb that has been developed in order to help a dairy farmer make a decision on barn design, is that the slope of the roof needs to be at least 3 inches of rise (height) for every 12 inches of run (length). Ridge vent size should be based on the width of the building, and have at least 3 inches of opening for every 10 feet of barn width.

Sidewalls: Open sidewalls in a dairy cattle barn facilitate airflow. No obstructions should be placed in front of the sidewalls that would prevent winds that facilitate natural ventilation. A dairy farmer should strive for sidewalls that are 14-16 ft high, and are at least 75% open in order to take full advantage of the benefits. In order to compensate for potential rain entering the barn, an overhang of 3 to 4 feet should be provided. It is important to note that natural ventilation can also be supplemented with mechanical ventilation in order to further reduce the effects of heat stress.

Fans/sprinklers: Fans and sprinklers should be thought of as a form of supplemental cooling only, and when used in conjunction with appropriate ventilation can significantly increase cow comfort during hotter parts of the year. Fan placement should be strategic, and when incrementally installing them throughout a facility close attention should be paid to which part of the operation receives them first. The holding pen should always be on top of the priority list. In addition to that you would want to focus on; close-up dry cows, calving area, fresh cow area, and of course the milking herd (high group then low if present).

-Proper placement of the fans should also be taken into consideration when looking at these different areas. Fan placement in the milking herd barn is especially crucial due to the fact that it can encourage cows to rest in the free-stalls, and stay at the feed bunk longer. Improper placement could result in unfavorable behaviors such as resting in the alleyway. Ideally, fans should be placed over the feed alley, as well as each individual row of free-stalls. The spacing of the fans should be longitudinally down the barn, and a general rule of thumb used is to not space them any more than 10 times the diameter of their blades. For example, a fan with a blade diameter of 3 feet should be placed no more than 30 feet away from another 3-foot fan. Wider spacing will result in the cows not being sufficiently cooled. Fans should be hung vertically, and located high enough off the ground to not interfere with the cattle. They should also be tilted slightly downward at a 20 degree angle, aimed at the bottom of the next fan in its line. This ensures you are getting the maximum cooling effect from available fans.

-By coupling the cooling effects of fans with sprinklers, you can take full advantage of evaporative cooling effects during the hotter months. The idea behind this practice is that the sprinklers create water droplets that wet the cows hair and skin, and the fans force air over it causing the water to evaporate, thus cooling the cow. The droplets must be large enough to adequately wet the skins surface, and has to be applied in a manner to allow time for them to evaporate. These systems should ideally be located in a shaded area where cows are most likely to experience heat stress, such as the holding pen or feed-bunk. Fans should run continuously when cows are present, while sprinklers are on timers with variable intervals based on the temperature. This "on" "off" cycle allows there to

be sufficient time for the water to evaporate, and subsequently decreases water usage.

Stall/feed-bunk design:

Free-stall design: Proper free-stall design has a significant impact on dairy cow health and performance. Due to the fact that this is where these cows will be spending the majority of their time, we want it to be as stress-free and comfortable for them as possible. Cow comfort is defined as minimizing the stressors the cow experiences while maximizing milk production and animal well-being. The purpose of a free-stall is to provide the cow with a clean, comfortable, dry resting place, that is large enough to accommodate a natural resting, rising, and resting motion. By having an appropriately designed free-stall, you eliminate the risk of the cows resting in unfavorable, dirty places such as the alleyway, which can cause issues with hygiene as well as lameness. Typical dimensions are based on cow size, and can be seen in the table below:

Animal Weight (lb)	Total Stall Length (in):		Length (in):		Width (in):	Height (in):		
	Closed Front	Open Front	Brisket Tube or Board	Neck Rail	Center to Center	Top of Partition	Neck Rail	Brisket Tube or Board
900-1100	90-96	78-82	64-66	62-64	41-43	42-44	42-44	4-6
1100-1300	96-102	80-86	66-68	64-66	43-45	44-46	44-46	4-6
1300-1500	102-108	90-96	68-70	66-68	45-48	46-48	46-48	4-6
1500-1700	108-114	96-102	70-72	68-70	48-52	48-52	48-52	4-6

Source: Graves et al. 2005.

As you can see, the dimensions of the stalls are based on the weight of the animal. It is ideal to design all stalls to accommodate the largest animal within your herd. By doing it this way, you never have to worry about there being a cow that is not comfortable in the stalls, and having to deal with all of the associated problems (lameness, hygiene, hock abrasions, etc).

Feed-bunk design: The main purpose of dairy cattle facilities is to provide a comfortable environment that will allow for cows to meet their natural behavioral and physiological needs. There are many factors to take into consideration when talking about the feeding environment that can potentially influence the cows access to feed, including the amount of feed-bunk space available for each animal, as well as the actual design of the feeding area. Inadequate space per animal can cause there to be aggression issues, and some cows not getting an adequate amount of feed. It has been shown that an increase in feed-bunk space can cause an increase in feeding activity across the herd, as well as less aggressive behaviors being observed. For the milking herd, it is ideal to provide at least 24" of feed bunk space per cow. The barriers that separate the cows from the feed (ex: headlock), can also influence feeding behavior. These barriers were designed with the intention of allowing cows equal access to feed, but some of these designs can actually limit the cow's ability to freely access feed. It has been found that the use of headlocks compared to a post and rail type barrier can effectively reduce aggression at the feed-bunk, as well as improve access to feed for socially submissive cows during peak feeding times. The height of the neck rail also plays an important role in cow comfort. Bunks should be designed to allow for at last 19-21" of throat height, and neck rails should be located at least 48" off the actual cow platform. The table below shows the appropriate dimensions for a post and rail feed system throughout the animal's life based on their weight and age.

Animal Weight (lb)	Age (months)	Throat Height (in)	Neck Rail Height (in)
300-500 lb	6-8	14"	28"
500-650	9-12	15.5"	30"
650-800	13-15	17"	34"
800-1200	16 +	19"	42"
1200 +	Mature cows	21"	48"

Ultimately, the farmer will have to decide if any of the above recommendations will fit their individual situation. Reducing the environmental stressors discussed takes planning, as well as intensive management. Not all farms can utilize these solutions in a manner that would be well suited for their operation. With proper management and ample planning, these solutions can be achieved practically and economically on a farm with the goal of maximizing profitability.



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June 1st

Ownership Deadline for Kentucky & youth dairy animals, and 4-H Livestock Educational hours deadline

June 19

UK Dairy Research Showcase
10:00 AM-1:00 PM Barnhart Building, UK Campus

June 25

State 4-H Dairy Judging Contest
UK Coldstream Dairy
Registration Deadline: June 14th

July 1-3

KYFarm Start Virginia Dairy Farm Tour

July 30-31

Kentuckiana Dairy Exchange Trip