

The "ABCDEFGs" For Healthy Calves

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Introduction

Raising healthy calves is a challenging job as dairies try to minimize death and disease losses and raise quality replacements for the herd. According to the August 30, 2004 Minnesota DHIA Calf Report, the yearly death loss for calves from all DHIA herds is 11% from first lactation heifers, 6.5% for second lactation cows, 8.3% from third lactation cows, all calculating out to a 8.3% death rate from all lactating animals. Management factors do influence the illness and death rates of calves. However, producers do not have to accept high rates as routine. Preventing disease in newborn calves gets them off to a good start, reduces death losses, and is cheaper than treating sick animals. The two diseases that cause the greatest morbidity and mortality in young calves are *Scours and Pneumonia*. These diseases can have lifelong impacts. Even if a calf survives a disease or sickness, what is its potential for reaching proper weight at the proper time for calving and being successful in the dairy herd?

There is no single best way to raise calves, as all sorts of combinations of feeding, housing and management can be successful in the right hands and on the right farm. A system that works well on one farm may fail on another. A calf raising management plan must include all factors which are interrelated, such as nutrition, health care, growth, labor efficiency, capital and operation and maintenance costs. However, thrifty calves cannot be raised efficiently in poor facilities with inadequate animal husbandry. By understanding the scientific principles of calf growth, nutrition, health and behavior, producers can develop a management system that is successful on their own farm. Therefore, the only solution to address calf raising problems is for producers to review the "fundamentals" of calf management. The following "ABCDEFGs" are important considerations for that evaluation. If followed, they will greatly decrease the exposure of the calves to disease organisms and improve their health, survivability and growth rates. They can be applied to every calf raising situation on every farm, whatever size operation.

Attention to Detail

When it comes to raising dairy calves, close attention needs to be paid to all calf management practices. And, it takes a truly concerned attitude and a "caring eye" to see that a dairy calf's every day needs are being met. Pay attention these details:

- *Consistency.* There should be consistency of newborn protocol and daily calf management, no matter who is the calf caretaker on a particular day. Work from youngest to oldest animals when doing chores.
- *Vaccination program.* It should be periodically evaluated as producers should not depend on vaccination alone to solve disease problems.
- *Water.* There needs to be fresh, clean water easily accessible and available at least twice daily.
- *Control flies.* Keep ventilation inlets and windows screened at all times for an enclosed facility.
- *Biosecurity.* Control and monitor all livestock, equipment, and people entering the calf facility.
- *Colostrum.* Protocols should include manual feeding of high quality colostrum to each calf as soon as possible.
- *Calving Area.* The use of individual maternity stalls and regular removal of bedding between calvings helps to decrease the incidence of calf diarrhea.
- *Calf temperature.* Regular use of a rectal thermometer helps detect sick calves with fevers early. Normal body temperature is 101.5°F.
- *Designated Worker.* Calf management work should be handled by the same person(s) every day to limit the possible transmission of disease from calf to calf and from other animals to calves.
- *Calf stress.* Changes in routine will stress calves; and animals that are stressed are more likely to get sick. Feed changes, housing changes, and crowding can impose severe stress on individual calves and can contribute to digestive upsets and scours. Management techniques such as ear tagging, dehorning, transporting or the improper handling of calves by caretakers will cause stress.
- *Isolation.* Calves need to be separated from each other so there can be no physical contact between them. Isolate sick and diseased calves, feeding them last. Isolation allows for individual observation of animals in the crucial pre-weaning stage of development.
- *Maternity pens.* New bedding should be used for every calving. The calf needs to be removed from the cow, manure and urine immediately.
- *Infection sources.* Be on the lookout for the infection sources. Usually the source of infection is feces. Occasionally, water, feeding utensils, rodents, birds, pets, or people can be the source of infection for calves.
- *Minimize feed and water spillage.* Use buckets that are sufficiently large to minimize feed spillage. Place buckets at the proper height to minimize wastage. This helps control flies as well.
- *Nutrition.* During the preweaning period, calves are usually consuming a very high-quality liquid diet. Problems can arise when quality standards are overlooked in the grain and forage portion of the diet during that time. Good nutrition can also be easily neglected between weaning and 6 months of age. Research shows that the consequences of improper nutrition during these critical stages of growth can cause these animals to have, on average, a 4½-

month delay in age at first calving, a reduction in growth rate, and they are at increased risk of being culled as a cow,

- *Work with your local Vet.* Seek advice from your local veterinarian in planning your disease prevention and treatment program.

Bedding

Bedding plays a significant role in calf comfort. Bedding management is important during the critical early preweaning stage of a calf's life. A generous, dry bed of fluffy material for calves can provide a cushioned resting surface, help calves stay clean, act as a moisture absorption media, decrease the risks of contracting disease, and reduce stress. Some points to keep in mind include:

- Bedding should always be replaced between calves.
- Carefully select bedding.
 - Straw promotes the greatest fly population, sawdust, shavings, sand and gravel the least. Sawdust is less optimal for maggot growth due to the poorer absorption of liquid, reduced availability of organic matter, higher degree of lignification, and other factors. Sand and gravel bedding tend to become compacted and unsanitary after a few weeks of calf occupancy. The addition of fresh straw over soiled bedding will keep the calf comfortable, but will increase the moisture holding capacity and fermentation potential of the pack.
 - There is a difference in particle size between shavings and sawdust, and the selection can impact animal comfort and productivity. Therefore, it is important to use a reputable supplier as a source for your bedding.
 - Generally, overall average daily gain and dry matter intake of calves do not differ due to bedding type, given proper management of all bedding types.
- Do not remove bedding and manure by walking and using equipment between animal groups and pens. In this process, personnel and equipment can become the source for spreading infection.
- If the base under the bedding allows drainage, bedding can simply be added every few days to provide a dry bed for the calves. If the base is concrete or some other solid material, then the soiled, wet bedding must be removed at least weekly and replenished with clean bedding.
- Soiled bedding should be removed from the pens and fresh bedding added as often as necessary to maintain a clean, dry bed.

Cleanliness

Dirty calves become sick calves. Maintaining a clean environment decreases the number of bacteria and other pathogens which the calf's immune system must overcome. Energy used fighting muddy conditions, excessively hot conditions, or high numbers of bacteria is energy which is no longer available for growth and maturing. An ideal calf environment needs to be easy to clean.

- Colostrum, milk replacer, dry feed and water sources should always be clean. They should be located outside of the pen to minimize contamination by urine and manure and to keep spilled liquid feed and water away from the bedding material.
- Clean, wash, disinfect and dry out individual hutches, stalls or pens between calves. The ground should be scraped to a fresh level of dirt with all affected organic matter removed.
- Wash hands in a sterilizing solution before handling individual calves.
- As always, wear clean clothes and boots when working with calves.
- Deliver the calf on to a clean plastic sheet rather than into the bedding. Wipe the mouth and nostrils free of mucus with a clean cloth (milk filter pad).
- Keep maternity pens clean, sanitized and freshly bedded. Special care needs to be taken to remove all manure, soiled bedding, or other debris from previous birthings. Each cow entering the maternity pen contributes bacteria and infectious agents.
- Clean teats on the cow before the calf nurses or remove calf from the mother and maternity area immediately after it is born.
- Help prevent spread of Johne's Disease. Dairy animals infected with Johne's disease usually acquire it as calves. Johne's disease is transmitted when calves ingest contaminated feces or colostrums. Reduce the risk of animals developing the disease by focusing on newborn calf management.

Dry

Calves are more comfortable when dry. Viruses and bacteria don't grow as well in a dry environment. Calves can stand lower temperatures provided they are protected from the elements and their pens are kept dry.

- Check the calf bedding to see if it is constantly wet. Get down with the calf and check it carefully.
- After calf is born, rub it dry with clean cloths. Do not use bedding or feed bags.
- Hutches should be designed to keep calves dry. Drainage for water and urine is important. It is even better if the hutch area and outdoor area slope slightly away from the hutch.
- If hutches are located directly on the ground or other solid surfaces, deep bedding with frequent changes should be provided to keep calves dry.

Environment

The calf's environment includes the type of housing, space available, the quality of the air, and the surfaces with which the animal comes into contact with. Calves are surrounded by disease-producing organisms in their environment and if present in large enough numbers they will cause illness. Keep in mind the following:

Adequate ventilation

- Many different types of structures can be successfully used in raising calves provided they are well designed for ventilation and managed properly.
- Proper ventilation means moving air and the system needs to provide fresh air to remove organisms from the environment. It means less dust, eliminating noxious odors, remove excess moisture during winter, excess heat in summer, a cleaner environment for animals and people, and longer lasting buildings.
- Improper ventilation can cause a build-up of ammonia and other noxious compounds that may impair a calf's immune response, cause respiratory problems, make the calf more susceptible to pathogens and reduce feed intake and conversion rates.
- A small investment in switches, thermostats and timers may well pay off so the environment is always controlled, even when workers are not around.

Control Drafts.

- A calf's environment must be free of drafts as too much air movement can chill the calf and rob it of energy needed for growth.
- During the colder season check for drafts and make repairs or building adjustments to keep chilling breezes off the calves.
- If calves are housed outdoors, they should be able to move out of the elements and away from drafts.
- Calf hutch design should allow steady air movement without draft. Hutch needs to have proper orientation with slope of the land, path of the sun, and direction of the prevailing wind.

Temperature

- Optimal thermal comfort range for the calf is 50° in still air. This environment promotes maximum performance and provides the least stress for the calf. A reasonable comfort range is 50°F to 85°F.
- As air temperature falls below 50°F, the calf must divert food energy from production or growth to produce additional metabolic heat and maintain body temperature. This ultimately leads to a reduced feed efficiency. Cold stress has also been shown to decrease the rate of absorption of colostrum in newborn calves.
- A temperature above 85°F will increase respiration rate, induce sweating and raise body temperature. Thus food intake is reduced, thereby lowering heat production generated by digestion and absorption of nutrients. This decreases the growth rate in calves. Warmer interior air also results in additional evaporation of free moisture and increased production of manure gases.
- Other environmental factors such as humidity, wind-chill factors, and moisture due to rain or mud, can affect the upper and lower critical temperature of the calf's environment.
- Under conditions of low outside temperatures and high humidity, supplemental heat may need to be provided in tightly closed, insulated buildings to reduce temperature fluctuations inside the building.
- Calves can be housed in hutches even in severe cold, although special diets are required to provide adequate protein and energy.

Shade

- Provide shade from direct solar radiation. Heat-stressed calves will go off feed, become hyperthermic, and may even die.
- Once older calves are grouped together, make sure there is enough square footage of shade for all calves. Check the shaded area frequently and prevent it from becoming a damp, manure-laden breeding ground for disease.

Control Humidity

- Optimal relative humidity is around 65-75% for calf housing.
- Humidity makes calves damp and sick, and damages equipment. Removing excess moisture provides a drier, less desirable climate for organisms and speeds up their die-off rate.
- Moisture removal is most critical in the winter when temperatures are lowest and relative humidity is highest as warm air can carry and remove more moisture than cool air.
- In the breathing process, a calf can give off almost 2 gallons of water each day in the form of water vapor. If allowed to accumulate around the calf, this water vapor will raise the relative humidity, and this moisture will condense on the walls and bedding and on the animal's hair coat. When the calf's hair coat gets damp and loses its insulative value, the young calf cannot maintain thermal equilibrium and can literally be chilled to death at temperatures considerably above freezing.

Housing

- Large-group pen housing increases the odds of more respiratory disease.
- Large-group pen housing increases the odds of diarrhea in calves and increases the severity as compared to those in individually housed pens.
- Because there is a difference in the disease resistance of calves of different ages, it is highly recommended not to allow older and younger calves to have physical contact during the first 3 to 4 months of age.
- Group post-weaned calves by age and size with 3 to 5 animals per group. When animals reach about 4 months of age, groups of 6 to 12 are acceptable. This approach lessens the competition of calves for feed.
- For calves, it is natural behavior to lie close together. Therefore, it is likely that the increased risk of respiratory disease in calves kept in large-group pens mainly arises from close contact between many calves of different ages.
- Good calf housing facilities should be in a completely separate area, away from the main dairy housing barn and be ventilated independently, free of drafts.
- Convenient manure removal and access to bedding supplies is important to aid in keeping the environment clean and the air quality good.
- Open front structures with individual pens should be designed so they can easily be cleaned with a skid-steer loader or small bucket tractor. In cold weather, a plywood cover can be placed over the rear portion of the pen to minimize drafts and to preserve heat produced by the calf. In warm and hot weather, a removable panel at the rear of the shelter can be opened to provide additional air exchange.

- Select structures with vertical or nearly vertical sidewalls to minimize runoff from dropping into the shelter. Move the pens further inward if precipitation is blowing into the structure.
- A shelter should be oriented to take advantage of prevailing winds in the summer and allow sunlight penetration in the winter.
- Hutches
 - Hutches should allow for maximum air flow with protection from the sun in the hot summer months, but should allow solar heating with protection from wind and drafts in the cooler winter months.
 - Locate hutches far enough apart to prohibit intermingling of calves.
 - Design hutches to keep calves dry and protected from environmental conditions.
 - Hutches should allow for convenient access to feed and water, permit ease of cleaning and sanitation and an opportunity to offer good observation and access potential for the calf manager.
 - The "super calf hutch" or "counter slope barn" designs are suitable for calves after weaning for grouping, and convenience in feeding and cleaning.
- Greenhouses
 - Proper temperature and air quality within a greenhouse structure is critical and must be maintained. Someone must be continuously monitoring the condition inside the greenhouse throughout the day so adjustments of the natural ventilation components to provide an acceptable animal environment can be made.
 - Move pens away from the sidewalls if there is a problem with precipitation blowing in.
 - Use a well-graded stone base to promote drainage.

Feeding Utensils

Time must be allowed during the calf chore routine for washing and sanitizing the calf feeding equipment. Milk, feed, and water buckets are breeding grounds for organisms that cause calf diseases. Any utensil used for feeding calves must be cleaned after each feeding to prevent problems. If calves are fed with bottles, nipples, or pails that have been only "rinsed-off" the previous feeding, then there is the potential of feeding them all kinds of harmful bacteria. A good wash-up job means low bacteria concentrations on feeding equipment each time it is used. That means clean, wholesome and nutritious feed and healthy calves. Take the following steps to reduce feeding utensils as major sources of contamination:

- Thoroughly clean and disinfect all feeding utensils after every use. Even the best immune system of the calf cannot overcome excessive contamination.
- Feeding buckets should not have scratches (plastic) or other rough surfaces that allow bacteria to reside in them.
- Provide "fresh" calf starter, milk replacer and water every day.

- It is better to have adequate feeding utensils to be able to clean and disinfect between uses, especially on sick calves. If nipples or buckets are shared by multiple calves during a feeding, they must be disinfected between calves.
- Use a thorough cleaning and washing procedure such as the following:
 - Rinse containers before going into the wash water. Use lukewarm water for rinsing. Hot water makes the milk proteins stick to the surfaces.
 - Then, use water as hot as possible, at least 120°F.
 - Expose the equipment to chlorine and soap as long as possible. The greater the length of time the equipment is exposed to chlorine the greater the oxidation process (chlorine kills bacteria by consuming oxygen). If must pour from pail to pail, always let the solution sit in each pail as long as possible before pouring into the next pail.
 - The stronger the concentration of the solution, the faster the oxidation process. Recommendation is 1 cup of fresh household-strength bleach in 5 gallons of very hot water. If there is calves with scours – use 1 ½ cups to 5 gallons.
 - Dump nipples into the solution.
 - Fill the bottles with it.
 - Use a wash acid at a rate of about 1 oz/5 gal of lukewarm water to rid containers of any possible remaining milk solids. Lowering the surface pH prevents most bacteria from growing in very acid conditions.
 - Allow containers to completely dry between uses.
 - Avoid stacking pails inside each other until completely dry.
- Remember that most of the places where calf feeding equipment is stored are ideal places for bacteria to grow – moist, no sunlight, with poor air exchange. Research shows that in these conditions bacteria can reproduce at the rate of at least once an hour and often twice in the same time. Never sit freshly washed pails upside down on a concrete floor.
- If nipples or buckets are shared by multiple calves during a feeding (not as many nipples as calves to be fed), they must be disinfected between calves. Do not use a dairy chlorine sanitizer for this as the milk residue left on nipples during feeding will inactivate the chlorine, which result in an ineffective disinfection. Use chlorhexidine (3oz/gal) for disinfection during feeding.
- Sanitize balling guns and stomach tubes, which go into the calf's mouth. The use of a common esophageal feeder for tubing newborn calves with colostrum and sick calves with fluids is strongly discouraged. Chlorhexidine (3oz/gallon) is an effective disinfectant for treatment equipment.
- Leftover grain from individual calf buckets should not be fed to other calves in individual housing nor to any calf under 6 months of age.
- Store grain for calves in locations where rodent infestation can be prevented. Grain delivered in bulk should be put into a metal bin from which it is electrically augered as walk-in grain rooms tend to be feeding stations for rodents.
- Prevent manure contamination of the feed, feed area, and feeding utensils (make sure boots, handtools, skid steers and equipment are clean).



Growth Success

Dairy producers need to judge the success of their calf raising not only by the percent survival to weaning and beyond, but also by the growth rates of the calves. This is because the growth rate of dairy replacements ultimately affects the timing of puberty, which affects the age of first freshening, and even first lactation milk production. Calf diseases set the calf back in regard to growth rate and often create chronic conditions that will never allow the animal to reach its full genetic potential. Previously sick (but recovered) calves more than likely will lag behind healthy herdmates by weeks or even months. In addition, if their illness was severe enough or long standing, permanent damage and/or chronic pain may be present which will ultimately result in these animals becoming economic liabilities. Properly raised calves will be healthy, vigorous, and ready to freshen between 22 and 24 months. Consider these points:

- Heifer target growth curves are available by breed. Producers should be measuring (record heart girth & withers height in inches), weighing (use scale or regular tape measure), and checking height (use yardstick or altimeter stick with parallel level bar). Calculate average daily gain (ADG) & percent of weight-gain goal for each heifer and averages for group. Graph the frequency distribution of heifer calf weights above and below optimum by age. There are several computer programs for this.
- Results of heifers calving too small:
 - Increased dystocias & maternal complications/death
 - Increased calf deaths
 - Decreased production of heifers (energy demands for growth vs. production)
 - Rule of thumb (Holsteins): *For each lb of body weight less than 1250 lbs at first calving, milk production is decreased by 6 lb milk per lactation.* For example, a heifer weighing 1050 lbs at calving (200 lb less than 1250 lb goal) would produce 1200 lbs less milk that lactation.
- Results of heifers calving too late:
 - Decreases lifetime milk production of the animal.
 - There will be a decreased number of heifers for replacements. This limits culling ability. Thus, an increased number of replacements must be purchased.
 - The increased days needed for growth results in increased heifer rearing costs prior to her first entry into the milking herd.

Conclusion

Heifer calves need to be managed to insure they come into the milking herd as soon as possible and become strong, healthy high producing cows for the future profitability of the dairy operation. A large part of the solution to raising healthy

calves is to remember the "ABCDEFGs." Using these fundamentals for everyday calf management will help minimize calf illness and deaths on the dairy farm.

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