Dollars and Sense of Excellent Calf Management

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TAKE HOME MESSAGES

1. **Excellent calf management must include attention to goals, protocols and monitoring.**
2. **Both outcome and process goals need to include measurable standards.**
3. **Overall and work-site protocols provide guidance to ensure jobs get done correctly, on time, each time.**
4. **Gathering and summarizing information on outcomes, processes and protocol compliance is essential for monitoring.**
5. **Assessing cost effectiveness of management decisions is an essential part of an excellent calf management program.**

DEFINING EXCELLENCE

What distinguishes "excellent" calf management from that which is just "good?" In my opinion, it is the amount of attention paid to goals, protocols and monitoring.

Outcome Goals

All calf-rearing programs have the goal of keeping calves alive. These calves should be healthy and transition quickly from liquid to solid rations. Everyone wants to see thrifty calves that are well grown out.

However, it is not the outcome goals themselves that help us define excellent calf management. Rather, it is the measurable standards or minimum thresholds that we set. For example, good calf management may tolerate death losses of eight, ten, or higher percent.

In contrast, an excellent program aims much lower; losses certainly want to be less than five percent, and two percent is a cost effective attainable standard. This means adopting an external standard (i.e., two-percent) for performance.

Alternatively, excellent programs may use internally set standards as well. On one hand, many calf-rearing programs record treatments for sick calves. These records are used only for individual calf diagnosis and treatment.

On the other hand, excellent management means that these treatment data are (1) summarized regularly, and (2) used to evaluate the rates of illness and effectiveness of the treatments. Once illness or morbidity rates are known for the dairy or ranch, then internal standards may be set. For example, if the current morbidity rate for scours (calf diarrhea) is ten percent, then the calf-rearing program may set the standard for next year at one percent less than this year.

Process Goals

In addition, excellent calf management programs define and set standards for process goals. Process goals focus on getting jobs done so that the desired outcomes will happen. For example, delivering clean, wholesome colostrum to newborn calves is a critical job for ensuring low mortality and healthy calves. A process goal for this job defines "clean" in quantitative terms.

The standards may come from an external source (e.g., dairy magazine article, newsletter) or from internal data collected over months or years. The other three colostrum related process goals deal with timing, quality, and quantity.

Additional process-oriented goals may deal with newborn care, feeding, health care, and housing.

Protocols

Getting a job done correctly at the right time, each time is a continuing management challenge. A number of dairy management consultants have promoted and supported development of overall protocols for significant dairy processes (e.g., reproduction, feeding, milking, calf care). Often, the managers work these out.

In addition, it makes sense to me for the workers in the trenches to have directions on a job-by-job basis available where the work is done. These “work-site” protocols can provide step-by-step reminders, as well as key standards for performance.

To see a series of three checklists for work-site protocol development at www.atticacows.com, click on Calf Facts, and scroll to “Selecting sanitation protocols for preweaned calves,” “Setting up sanitation protocols,” and “Training employees for sanitation protocols.” Sample work-site protocols in English and Spanish for cleaning milk handling equipment are appended.

Monitoring

Monitoring is a multi-layered job. It is important to key one’s eye on outcomes. How many calves are alive rather than dead? How well are the heifers growing? How well are the heifers milking once they calve?

How well are the processes working? Knowing how well the colostrum management program is working is important, too. Is the colostrum clean? Are calves getting an adequate number of antibodies in their blood to protect them from being clinically ill? How often do calves need to be treated for navel infections?

For these proceedings I have selected six process checklists for use on your ranch or dairy. Each checklist focuses attention on critical control points for the job. At the website www.atticacows.com, I have 17 such checklists. Once at the site, type “checklist” in the search box to get a full listing of them. They are in pdf format for ease of downloading and printing.

Let’s use the example in your proceedings of feeding milk or milk replacer to preweaned calves. Each of the eight items highlights a procedure that, if performed properly and consistently, defines an excellent calf management program.

Are the work-site protocols being followed consistently? How warm is the milk being fed to calves? Are the proper chemicals in the correct amounts being used to clean milk handling and feeding equipment?

Monitoring, therefore, means gathering and summarizing information on outcomes, processes and protocol compliance. If you have a management team that meets regularly, it may make sense to report periodically on these three areas. Or, as part of my colostrum quality control program, I do the following: summarize and review these data with an outside consultant two or four times a year.

Dollars and Sense

Estimating the economic consequences of achieving goals is important although not always easy. See the attached sheets entitled, "Feeding Colostrum: Dollars and Sense" and "Dipping Navels: Dollars and Sense." Using conservative dollar values, I have analyzed the impact of these two processes. [These sheets are also available at www.atticacows.com, click on Calf Facts and scroll to the appropriate title.]

In summary, an excellent colostrum management program is worth at least $4,500 per 100 cows; a consistent navel dipping program is worth at least $800 per 100 cows.

Even rough estimates of both benefits and costs of individual calf rearing procedures can be made using methods similar to those in these analyses. These estimates allow us to better gauge the profitability of setting standards. We may find that we have set them either too high or too low.

Standards set too high

Our mother taught us that cleanliness is next to Godliness. So come hell or high water, our calf feeding equipment is going to be "clean."

One definition of clean is for a tube feeder, bottle or bucket, when rinsed with sterile water, to have no bacterial growth on a culture plate. This is possible. But, is it really necessary?

As Dr. McGuirk's work has shown, most bacteria in relatively low numbers have little effect on enteric health (as high as 100,000 cfu/ml). It is only fecal coliforms in relatively low numbers that cause calf diarrhea (as few as 5 to 10,000 cfu/ml can increase the incidence of scours among calves one to two weeks of age).

Thus, the expenses beyond those of "normal" sanitation (for example, extra rinsing, extra chemicals, changing clothing, extra scrubbing, filtering air) are unlikely to be returned in improved calf survival, health and growth.

Standards set too low

One aspect of newborn care is to reduce exposure to adult cow pathogens found in feces, contaminated bedding and even the air. We try to have calves born into a clean dry environment. We plan to move newborns away from adult cows [essentially pathogen factories] soon after birth.

Our procedures may call for a herdsperson to be sure cows are in a clean dry place when they calve. And, he or she promptly dips the navel, feeds colostrum and moves the calf within one or two hours after birth. This happens when the herdsperson is present during the day.

However, when that person is not working, are the calves are on their own until the next morning? Our monitoring may be showing significantly different rates of survival, sickness and rates of gain for calves being born during the day and those unfortunate to be born at night.

In a case like this, we have an opportunity to quantify our benefits of setting higher standards for newborn care (comparing day and night outcomes) and to estimate potential costs of extending equally good care from the daytime into the night hours.

Resources

In both English and Spanish, Dr. Jim Quigley's Calf Notes are at www.calfnotes.com. These notes can be searched using key words. In addition, they are collected in categories such as colostrum feeding, milk and milk replacer feeding, calf starter, health management, weaning and housing. There are 111 of them that are also listed in numeric order.

Sam Leadley's short management articles are in the Calf Facts section at www.atticacows.com. Most are in English, and there are a few in Spanish and French. These resources may be searched using key words or roots of words (for example, "blanket" will find all resources with the word "blanket" while "blank*" will find all resources with the character string "blank" including words like blank, blanket and blankets). All 95 articles are arranged in alphabetical order by title.

At www.das.psu.edu/dcn/CALFMGT/ there are a number of useful resources including pictures of rumen development in calves fed different rations. For a series of calf care protocols from birth through weaning, see the resource "Calf Track training system."

The Purdue site www.ansc.purdue.edu/dairy/calves/calfpub.htm is a collection of calf management articles from universities all over the United States. The Babcock Institute site, www.babcock.cals.wisc.edu/, features over fifty articles from the University of Wisconsin faculty on a broad range of calf management topics. Once at this site, click on SEARCH; enter "calves" in the search box.

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WASHING MILK CONTAINERS

1. RINSE

USE LUKEWARM WATER. Do not rinse with hot water. Rinse off dirt and milk residue.

2.WASH

USE HOT WATER. Add soap and bleach. Brush all surfaces. Scrub off remaining milk residue. Keep water above 120° (49° C) at all times.

3.RINSE

Use warm water. Add acid. Rinse containers. Do not rinse off the acid. Leave it on the bottles and pails while they dry.

4.DRY

Allow the bottles and pails to drain and dry. Do not stack pails inside each other. Do not sit pails upside down on a concrete floor.

LAVANDO LOS RECIPIENTES DE LA LECHE

1. ENJUAGAR

Use agua tibia. No enjuague con agua caliente. Hay que sacar la mugre y el residuo de la leche.

2. LAVAR

Use agua caliente. Añada jabón y cloro. Hay que fregar todas las superficies, sacando el residuo de la leche que quede pegada. Mantenga el agua arriba de 120° F.

3. ENJUAGAR

Use agua tibia. Añada ácido. Enjuague los recipientes de la leche con esta solución. No enjuague esta solución acídica de los recipientes. Hay que dejar el residuo de esta solución en las botellas y las cubetas mientras se secan.

4. SECAR

Deje que las botellas y las cubetas escurran y se sequen. No hay que dejarlas volteadas sobre el piso de concreto o metidas una dentro de otra.

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NEWBORN CALF CARE

GOALS

1. **Help the calf to adapt to her new environment.**
2. **Help the calf maintain good health.**

LIVING OUTSIDE THE DAM

Help get a dry hair coat.

The dam will usually lick off the calf. We can finish the job with a couple of bath towels. Our goal is a fluffy hair coat that helps the calf adapt from 102° F. inside the dam to outdoor temperature.

In freezing weather, a clean draft-free warm place will help finish the manual-drying job. Examples would be a clean hutch with a heat lamp, a clean warming box with a heater.

Help the calf stand up.

If she is not up in the range of 15 to 30 minutes, provide assistance. By just helping her stand up we have jump-started her metabolism about four times the resting rate.

Help her get a good first meal soon after birth.

She needs lots of energy to adapt to this world outside her dam. Colostrum contains twice as much dry matter as whole milk. It is high in both fat and protein to meet the calf's immediate needs after birth.

KEEPING HEALTHY

Help her keep away from adult cow manure.

As little as one teaspoonful of manure in her gut prior to colostrum feeding can be fatal.

Help her keep pathogens out of her umbilical cord.

Dip the navel with 7 percent tincture of iodine. Navel dipping:

(a) cleans off the outside of the umbilical cord and the navel opening,
(b) kills residual bacteria on the outside of the cord, inside the open end of the cord, and at the navel opening, and
(c) dries the umbilical cord tissue discouraging pathogen movement up the cord and into the liver.

Help her build adequate immunity through transfer of her dam's colostral antibodies into her blood.

Feed an adequate amount of good quality colostrum as soon as possible after birth. If the calf is unable to nurse use an esophageal tube feeder. If good quality colostrum is unavailable add an effective colostrum supplement.

There is no substitute for early feeding.

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FEEDING PREWEANED CALVES: Colostrum

How do your procedures measure up? Do they provide the opportunity for your calves to grow into their genetic potential?

Let's consider procedures for feeding colostrum. Compare your routines with the standards in this checklist. When making this evaluation I like to use these scores:

1=never, 2=seldom, 3=often, 4=usually, and 5=almost always.

_____ 1. All feeding equipment that comes in contact with colostrum is scrubbed after every use.

_____ 2. When periodically cultured for bacteria, colostrum as fed to calves is not contaminated with environmental bacteria thus reducing septicemia and scours. Very highly contaminated colostrum may also substantially reduce the rate of antibody transfer as well.

_____ 3. Colostrum contaminated with mastitis and blood is discarded.

_____ 4. Colostrum quality (antibody concentration) is estimated and the best quality available fed to heifer calves. While only a very rough guide to quality, a Colostrometer® may be used to exclude the lowest quality colostrum. Feeding more of poor quality colostrum is not an effective substitute for a good quality product.

_____ 5. Colostrum is fed to heifer calves no more than four hours after birth and to at least one-half of the heifer calves within one hour after birth. One-half of a heifer's ability to absorb antibodies is gone within six hours; three-quarters of this capability is gone within twelve hours after birth.

_____ 6. Plenty of good quality colostrum is fed. Average and large calves are fed four quarts within the first six hours. Smaller calves are fed proportionately less but still more than two quarts.

_____ 7. When only low quality colostrum (low antibody concentration) is available, an effective colostrum supplement is also fed to boost its antibody content.

_____ 8. When possible, fresh or refrigerated colostrum is fed rather than frozen colostrum. Thus, the calf gets a full dose of maternal immune cells as well as the maternal antibodies.

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FEEDING PREWEANED CALVES: Milk Replacer

How do your procedures measure up? Do they provide the opportunity for your calves to grow into their genetic potential?

Let's consider procedures for feeding milk replacer. Compare your routines with the standards in this checklist. When making this evaluation I like to use these scores:

1=never, 2=seldom, 3=often, 4=usually, and 5=almost always.

_____ 1. All feeding equipment that comes in contact with milk is scrubbed after every use.

_____ 2. Equipment sanitation procedures meet these standards:
- prewash rinse between 105-110°F;
- chlorinated, soapy hot water wash consistently over 120°F and includes manual brushing;
- acid rinse between 50-100°F
- equipment dries between uses.

_____ 3. Milk replacer is stored so that it remains both clean and dry to promote good mixing and reduce scours.

_____ 4. Milk replacer is mixed at the temperature recommended by the manufacturer to promote even distribution of fat and reduce denaturing of proteins.

_____ 5. Milk replacer is 100-105°F when drunk by the calves to promote intake and favorable feed conversion.

_____ 6. Milk replacer is fed regularly at the same time daily according to the same routine preferably by the same caretakers to promote good eating habits and favorable feed conversion.

_____ 7. When periodically cultured for bacteria, the milk replacer mix as fed to calves is not contaminated by environmental bacteria thus reducing scours.

_____ 8. For farms feeding waste milk, when periodically cultured for bacteria, the waste milk as fed to calves is not contaminated by environmental bacteria thus reducing scours and improving feeding conversion rates.

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Washing Milk Containers
Checklist

1. **Are the containers rinsed before going into the wash water?**

   Organic compounds destroy the bacteria-killing power of chlorine in the wash water. Dirt and milk are organic compounds. Most of them will rinse off easily before washing.

   High temperatures change milk proteins. It makes them stick to surfaces. We don't want milk protein, especially whey, to stick to milk containers. Thus, we try to rinse the protein off the containers before we wash them in hot water.

   ALWAYS USE LUKEWARM WATER. Do not rinse with hot water.

2. **Are the containers washed in hot soapy water with chlorine? Are they brushed vigorously?**

   Milk fats, proteins and sugars are sources of food for bacteria. We brush container surfaces vigorously to loosen these solids. These milk solids are suspended in the wash water.

   If wash water temperatures fall below 120° (49° C) the suspended solids will stick to container surfaces. Do not put containers into wash water below 120° that contains suspended milk solids. The containers will come out dirtier than when they went into the water. KEEP WASH WATER ABOVE 120°.

3. **Are the containers rinsed in an acid solution after washing?**

   Even with the best rinsing and washing, small amounts of milk solids remain on containers. Small numbers of bacteria remain there, too. An acid rinse lowers the surface pH. Most bacteria grow poorly in very acid conditions.

Pipeline acid at the rate of about 1 ounce per 5 gallons (30 ml per 19 liters) of lukewarm water will lower container surface pH adequately. Acid/sanitizers used for manual cleaning or bulk tanks dilute at about the same rate. They are preferred for this step. They keep the pH lower longer than milk line acid.

4. Are the containers allowed to completely dry between uses?

Bacteria require moisture in order to grow. If we dry our containers between uses the rate of bacterial regrowth slows down.

Avoid stacking pails inside each other until completely dry. Never sit freshly washed pails upside down on a concrete floor. That creates a bacterial incubator (warm, damp, dark).

RATE YOURSELF

	YES	NO
1. I rinse my milk containers in lukewarm water before washing them.	____	____
2. I wash my milk containers in water above 120° F (49° C)	____	____
3. I use soap and chlorine in my wash water.	____	____
4. I rinse my milk containers in an acid solution after washing.	____	____
5. I allow my milk containers to completely dry between uses.	____	____

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CALF WEANING CHECKLIST

1. **How long has she been eating starter grain?**

   Has she been eating starter grain for at least 3 weeks?

   Start counting days on grain when she regularly cleans up a measurable amount daily. That's roughly 1/2 cup.

   Assuming she has access to water, after a calf begins to eat grain she takes about three weeks of fermentation in her rumen to develop papillae. They are tiny finger-like growths on the inside of the rumen wall. They are essential for absorbing nutrients from rumen fermentation.

2. **How much starter grain is she eating?**

   Is she eating 2 to 2 1/2 quarts (that's about the same as pounds) daily?

   If a 150-pound calf eats this much starter grain daily she can meet her maintenance needs and grow 1 pound a day in 50° weather. Bigger calves need more for maintenance. Higher growth goals require more. Colder weather conditions require more.

3. **How regularly is she eating grain?**

   Is she eating at least a minimum of 2 quarts daily? That is different than an average of 2 quarts that may vary from less than a quart one day to 3 quarts two days later.

One characteristic of rumen maturity is regular feed intake. Irregular intake is associated with acidotic rumen conditions and undesirable digestion. Calves with greater rumen maturity tend to even out their grain intake (assuming they have free-choice access to starter grain and water).

4. **Is the calf generally healthy and growing?**

   No matter how it is done, weaning is stressful for a calf. Even if calves continue to grow at weaning, the rate of growth falls off for about 5 to 7 days after weaning.

   If a calf's immune system is in any way depressed (scours, respiratory illness, navel infection, dehorning, change in housing, exceptionally hot or cold weather, poor bedding), it's good management to delay weaning until conditions change.

RATE YOURSELF

	YES	NO
1. Nearly all my calves have been eating grain for at least three weeks before I <u>begin</u> weaning them.	___	___
2. Nearly all my calves are eating 2 quarts of starter grain a day before I wean them.	___	___
3. Nearly all my calves are eating enough starter grain every day before I wean them.	___	___
4. If a calf is stressed (depressed immune system) I wait until she has recovered before I wean her.	___	___

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TRANSITION CALF FEEDING MANAGEMENT CHECKLIST

1. **Does the transition calf ration contain at least 18 percent crude protein?**

   The growing calf needs lots of good quality protein for muscle and immune system development. Usually the rate of post-weaning feed intake can be encouraged by continuing the same grain mix as was fed in the pre-weaning housing. In winter, a 180 lb. Heifer needs 7 pounds of grain mix daily to have enough protein for maintenance and growth in excess of 1.5 pounds a day.

2. **Does the transition calf ration contain mostly grain and limited amounts of roughage for the first week after weaning?**

   Most just weaned calves have been living on grain and water (and in some cases a limited amount of milk). Before they can digest and use the nutrients in roughages like a cow, they need to grow a large number of fiber digesting microbes in their rumens.

   This growth period is about 10 to 14 days. During this time they continue to live on protein and energy from grain. By eating a limited amount of roughage in addition to grain they encourage the multiplication of ruminal fiber digesting microbes.

3. **Does the transition calf ration have enough energy per pound for both maintenance and to meet the farm's growth goals?**

   The relative size of a transition calf's rumen to her body size is still small compared to an adult cow. By feeding an energy dense ration to these small growing heifers, we compensate for this relatively small rumen.

   That's why grazing heifers consuming high protein grass do so much better when a high-energy grain mix supplements the grass. That's why confined transition heifers consuming free choice high protein hay do so much better when supplemented by a high-energy grain mix.

4. **Does the feeding program focus on feeding the rumen microbes rather than the heifer?**

As transition heifers grow older changes in their ration are almost the rule rather than the exception. Often these changes involve introducing a new roughage source.

For example, changing from dry hay to haylage. Or, changing from haylage to a mix of corn silage and haylage. Or, changing from grazing grass to stored feeds in the fall. The microbial mix that most efficiently digests each of these roughages varies from one to another.

Introduce small amounts of a roughage that is going to be in the next ration a week or two before the change takes place. That is, before the transition age heifers have to depend heavily on the new roughage as their sole source of nutrition.

RATE YOURSELF

	YES	NO
1. **The transition calf ration contains 18 percent crude protein.**	____	____
2. **Transition calves are fed free choice starter grain for the first week after moving into group housing.**	____	____
3. **Transition calves are fed free choice grain and limited hay the first two weeks after moving into group housing.**	____	____
4. **Transition calves are fed a ration with an energy density of at least 3.0 Mcal of ME per Kg of DM until they are about four months old**	____	____
5. **Changes in roughages are preceded by feeding limited amounts of the new roughage for a week or two prior to the overall change.**	____	____

Reference: National Research Council, Nutrient Requirement of Dairy Cattle. 2001. Chapter 10 "Nutrient Requirements of the Young Calf" Table 10 "Daily Energy and Protein Requirements of Weaned (Ruminant) Calves."

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