# The Art of Seeing

## YOUNGSTOCK PROGRAMS

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Most calf raising problems are related to management-induced or nutritional stress. In trouble-shooting these problems, the eyes, ears, and nose of the veterinarian are generally more useful than laboratory tests and etiological diagnoses. For most of us in practice, it takes two to three weeks from the time we send samples to a diagnostic lab until we get results. Most problems can be solved before we get the results, and many will have gone away by themselves. Etiologic diagnoses are often of limited value when the disease process is characterized by multiple organisms, or when we always get the same results. For example, calves that die because of colostrum deprivation or underfeeding of calories will yield various etiologic agents from the intestines and other organs. A diagnosis of pneumonia caused by *Pasteurella multocida* is not very illuminating; most pneumonic dairy calves have *Pasteurella* involvement. It is more important to figure out what factors are causing the calves' resistance to this commensal organism to break down. In both cases, the etiologic diagnosis adds nothing to our knowledge; we already knew that young calves were dying or that older calves had pneumonia. The predisposing factors are usually colostrum deprivation, stressful housing, crowding, weaning stress, improper feeding, or coccidiosis.

Diagnostic pathology and laboratory analyses do, of course, have a place in diagnosing calf problems. Fecal flotations to find coccidia and total serum protein testing with the refractometer are extremely useful. When well-managed operations have exceptional problems and the cause is not obvious from on-site observation, the help of the diagnostic lab can be invaluable. But it is only useful if a knowledgeable observer has looked at the operation, decided on a list of possible diagnoses, and guided the selection of the samples to be submitted. Just telling the client to take a calf to the lab sight unseen rarely yields any useful results, because it is often the wrong calf! It is tempting to use the laboratory as a way to stall the client (until the results get back) because we do not want to take time to look at the operation in depth. It is always easier to blame a microorganism for a problem than it is to look the client in the eye and tell him or her that things need to be done differently.

I have organized this article around a set of useful rules for calf-raising.

*I. The most important element in a calf raising program is the person raising the calf.*

A corollary of this is that systems that appear at first sight to be fairly risky can be made to work well by the right people. However when systems fail, the consultant should probably suggest the most forgiving system as an alternative. For example, indoor climate-controlled housing can be made to work on some farms. But in general, the outdoor hutch is a more forgiving system (although it has its own disadvantages) and is more likely to be successful.

It is important to get a sense not only of the competence of the calf raiser but also of his or her status on the farm. On large dairy farms such tasks as delivering colostrum to calves on time require the co-operation of many people, most of whom do not raise the calves. Does the calf raiser have the support of management so that colostrum can be harvested, stored, and fed properly? Does his schedule allow him to collect colostrum and milk before incubation of bacteria has occurred? Does management treat calf raising as an important part of the operation, or as a necessary evil or nuisance? Does the calf raiser have the supplies and equipment that he or she needs? When supplies run out, are they replaced in a timely fashion? Do the calf raisers have time to do an adequate job of cleaning their equipment and of caring for sick calves?

Good calf raisers love calves and love their work, and the love shows when they talk about the animals in their care. They know their calves and will tell you about particular ones. When they are standing in front of a

hutch, they touch and play with the calf. The calves should be people-oriented. They should come up to see you (except perhaps right after feeding, when they like to rest). Calves that are handled roughly or which associate people only with being poked with a needle will cower in the back of the hutch.

**The observations of an experienced calf raiser are very important in reaching a diagnosis of a problem. These observations should not be discounted because they are not couched in veterinary terms.**

*II. Reduce the infection load on the calf.*

Clearly the assault of pathogens on the calf's immune system starts at birth. Where are calves born? Are newborn calves allowed to drown in cold mud, get chilled, of bake in the sun? Calves that experience excessive environmental stress after calving are almost impossible to raise. How clean is the calving pen? Ideally, of course, we would like to see a well-bedded individual calving pen for the calf's sake. This goal may conflict with the goal of maintaining the feed intake of the periparturient cow, because it is difficult to do a good job of feeding cows in individual pens on large dairies. If the calving area is less than ideal, for example, a dry manure pack, then the calves should be removed from the cows as soon as they are dry. Leaving calves in a group of closeup cows increases pathogen exposure. Observe the closeup pen and try to judge how long calves are left there. Leaving the calf with the cow is not an adequate colostrum delivery program for Holstein calves, particularly for the offspring of primiparous dams, who rarely take much interest in their calves. It may be helpful to have a few calf hutches next to the closeup pen so that the calves can be separated from the cows and fed colostrum before they are picked up by the calf raiser.

Observe also the facilities available for managing dystocias. If it is not easy to isolate cows that need help, restrain them, and help them, it is likely that it is not being done in a timely fashion. One person should be able to accomplish these tasks unassisted. Equipment (calf puller, chains or straps, halters, water hose, lights, chute) and supplies (disinfectant soap, lubricant, iodine, calcium, IV hose, needles) should be handy to the work area. Poor obstetrical management will have a bearing on the vigor and health of the calves that are raised.

Decreasing the pathogen load on the calf after birth involves reducing the contagious load by minimizing calf-to-calf contact and the environmental load by keeping equipment and feed clean.

Minimizing calf-to-calf contact involves keeping calves in individual hutches that do not allow calves to suck or lick each other. Nipples, bottles, and milk handling equipment should be clean. Calves should not share air space with older animals and, in most climates, are best housed outdoors unless excellent indoor facilities are available (such as a modern veal house). Hutches should be cleaned and bedding should be changed between calves. I do not emphasize the use of disinfectants on hutches. If the grossly visible dirt is gone and the hutch is exposed to the sun for a few days, it is usually adequate.

Minimizing the load of environmental pathogens means keeping feeding equipment and hutches clean and changing bedding when necessary. It is very important also to minimize the opportunities for pathogens to grow in colostrum and milk that will be fed to calves. This means either feeding or cooling it promptly after milking. When calf raisers report problems with overnight deaths of apparently healthy calves during the first days of life, contaminated colostrum or milk that has been allowed to incubate should be the first suspected cause.

*III. Deliver an adequate amount of high-quality colostrum in time.*

The colostrum program is the most important factor affecting mortality of young calves. The need for and the general outlines of an effective colostrum program are well-known to most practitioners. Space will not permit the description of a complete program here. An effective colostrum program requires co-operation between the milkers, the calf raiser, and the herdsman or other person who supervises calvings. Colostrum programs on large dairies seem to fail periodically. Monitoring the success of the program by bleeding a sample of young calves periodically and checking total serum proteins is an important part of the veterinarian's role in a calf-raising program.

**It is important that everyone understands the difference between true colostrum and transitional milk. If all calves are fed 3 to 4 liters of clean, true first-milking colostrum withing six hours of birth, regardless of whether the colostrum is tested or not, the program is close to optimal.**

It is important not to design such a perfect and cumbersome colostrum program that people can't sustain it. Testing with the colostrometer is a good teaching tool, but it seems to be difficult for people to sustain on dairies. Colostrometers break easily and often the measurements are made at the wrong temperature. The presence of a colostrometer on the dairy tells you at least that someone is aware of what good colostrum is. If people are using the colostrometer, they should be instructed on the effects of temperature and foam on the readings.

Look for a refrigerator or freezer in which colostrum can be stored. A large bucket of warm colostrum placed in an old refrigerator with four inches of ice around the freezer will remain warm for hours and will grow a lot of bacteria. It is better if colostrum is frozen in nipple bottles or plastic bags. A dairy that relies on fresh-harvested colostrum exclusively will eventually experience a period where there are lots of calves born and not enough colostrum available to feed them.

*IV. Provide shelter from the elements.*

Calf hutches should be designed for the climate and the management system of the farm. While outdoor hutches are desirable because they increase the separation of calves and prevent pathogen transmission between calves, they do subject the calf to environmental stress.

Environmental effects can be mitigated by management. In cold weather it is essential that calves be provided with bedding. Newborn Holstein calves do not have much body fat to insulate them from the cold. In Central California in winter, when calves are housed on the ground, the addition of dry bedding can have almost magical effects on calf performance in the winter. Bedding is difficult to maintain well in wet weather (when it is most needed) and becomes a site of fly breeding in the summer. Bedding should be absorbent and should also supply insulation to the calf. Shavings are easier to manage than straw and tend to stay cleaner longer, but because they are expensive they are often put out in a thin layer that provides little insulation from the cold ground. Calf hutches with wooden slats over an air space eliminate bedding problems but are very cold in the winter. Hutches can be fitted with movable baffles that allow air movement and cooling when open but allow the hutch to be closed up in cold weather.

Ideally, calf hutches should be under a shade in the summer. In the winter, shade is not desirable, because it eliminates the warming effect of the sun. Shade cloth that can be rolled up in the winter is a good compromise. Solid (metal) shades provide more shelter from the rain but do not allow solar warming. The back of the hutch should face South in summer, and the opening to the North, to allow the calf maximal shade and to prevent the sun from shining into the front of the hutch. On the other hand, solar warming is desirable in winter, and the hutches should be turned to face South. Tethering calves to hutches, rather than having a fenced area at the mouth of the hutch, allows the calf more flexibility to seek shade. In rainy areas, it is helpful if the grain bucket can be mounted inside the hutch to prevent the grain from getting wet.

*V. Assure adequate caloric intake during the preweaning period.*

Underfeeding of young calves is a common problem even in comparatively mild climates like that of Central California. Dietary requirements for preweaned calves are not well defined, but it is clear that the maintenance energy requirement rises when calves are chilled, overheated (sweating and panting take energy), or sick. Underfeeding problems are often compounded by stressful housing that does not provide adequate shelter from cold or moisture. The calf is born without enzymes that allow it to digest grain; until the rumen is functional, the young calf is dependent on the nutrients in the liquid feed for maintenance and growth.

Compare the body condition of newborn calves with those three weeks of age. Do not be fooled by fuzzy hair. Palpate the lumbar spine. Most calves are born with a body condition score of 3-3.5. While some loss of condition occurs even in superbly managed facilities, underfed calves lose condition rapidly and are often in the 2-2.5 range by three weeks of age. If the calves are standing, reach into the hutch and give them a push to assess their strength. Underfed calves are weak and do not resist being pushed. Another sign of underfeeding is that calves will huddle in the back of the hutch and not respond to human presence. Healthy, vigorous calves will come to the front of the hutch to investigate when you come by, especially around feeding time.

Underfeeding is often compounded by poor mixing of milk replacer powder. Fat is the primary source of energy in milk replacer. The fats used to substitute for milk fat often have a higher melting point than milk fat. In order to emulsify fat in water, the water must be hot. Water should be at 140 F before mixing starts. Mixing should be vigorous. If an old bulk tank is used to mix the milk replacer, the old agitator should not be used for mixing; the action of a bulk tank agitator is far too gentle for effective mixing. Milk replacer should be served to the calves at about body temperature. If it cools further, the fat may separate from the liquid and remain as a residue on the walls of the container.

For growth and maintenance in cold weather, calves require at least a gallon and a half of whole milk daily until they can sustain themselves on grain. Transition milk and excess colostrum should be saved for feeding to the youngest calves, since they are higher in energy than whole milk. Since a 20% fat, 20% protein milk replacer contains only about 80% of the calories of whole milk, even more milk replacer needs to be fed than whole milk. However the tradeoff is that feeding a lot of milk can delay the transition to solid feed and complicate weaning. **The most successful calf raisers I work with feed whole milk more or less *ad libitum* for about three weeks, and then gradually cut back the amount to encourage the calves to eat solid food.**

*VI. Encourage consumption of solid feed.*

One aim of a replacement calf rearing program is to encourage early rumen development by maximizing consumption of solid feed. It is my opinion, based on unpublished data from a colostrum trial, that healthy, vigorous calves that have received adequate colostrum eat grain sooner and in larger quantities than colostrum-deprived calves. Calves that are fed adequate milk calories are active, curious, and bored, and are more likely to stick their heads in the grain bucket than depressed, underfed calves.

Small amounts of grain should be presented to calves during the first week of life. The amount presented should be about what the calf can consume in a day. Stale grain should be removed daily and fed to older, weaned calves. Inspect calf grain buckets to make sure grain is clean, dry, and palatable. Calves seem to prefer coarse mixtures of whole grains and pellets to powdery feeds; pellets are also used successfully by many raisers. Calf Manna or milk replacer powder placed on top of the grain can encourage consumption. I have little direct experience with bottle feeding of grain pellets; I have heard both good and bad reports from the field.

**If calves are to eat dry feed, they must have water. Clean water should be provided to calves at all times. It is suprising how many calf raisers expect calves to grow and thrive with only the liquid contained in the milk. This amount is marginal in cool weather and woefully inadequate in hot weather. Some raisers believe that feeding water causes scours. Hutches should be checked to make sure that water is available and clean.**

*VII. Minimize weaning stress.*

Birth (and the transition to life outside the uterus) and weaning are two stresses that all calves must face. Stressful procedures, such as vaccinating, dehorning, and castrating, should be spread out over the preweaning period rather than concentrated at weaning time.

Calves can be cut back to once a day milk feeding at about 40 days of age. This will encourage solid feed consumption. Milk feeding should not be stopped until a calf is eating several pounds of grain daily. While superior managers can make early weaning work, it has been my experience that in most cases weaning calves younger leads to more health and performance problems after weaning. In fact, when a farm is having problems with respiratory or other disease in newly weaned calves, one way to help fix the problem is to keep calves in the hutches longer. My impressions in this area may be biased by the fact that generally people wean early when they have large numbers of calves being born and great demand for hutches. So early weaning is combined with other factors that tax the ability of the calf raiser to cope. A very forgiving system is to cut calves back to once daily milk feeding at about 40 days, discontinue milk at about 50 days, and remove calves from hutches at about 60 days.

Some operations leave calves in hutches for 90 days or longer. In my opinion, little is gained by doing this. It is difficult to provide enough feed and water to these older calves to meet their needs. Their copious defecation makes a big mess of the hutch, which is too small for the calf. It is hard to keep these older calves clean and dry. They should be out in a pen with other weaned calves.

Calves that have grown up in hutches can be helped to find food and water. The pen for newly weaned calves should not have self-locking stanchions. A feed trough should be available inside the pen so that calves can find it. Water tanks should be small so that water remains fresh and clean. Newly weaned calves are often afraid of concrete and of flush alleys, and this fear may keep them away from the feed, also. Pens for young calves should provide shade. After about six months of age, shade is optional in California, although it should probably be provided on humane grounds.

*VIII. Wean into small, uniform groups.*

Weaning from milk and the introduction to group life are two of the predictable and unavoidable stresses in a calf's life. The young calf is asked to leave the shelter of the calf hutch and compete for food with herdmates. Milk and grain have up to now been presented to the calf in buckets. Now the calf must figure out how to eat through stanchions. The environment for the newly weaned calf should be as uncompetitive and calf- friendly as possible.

In order to minimize the effects of competition, calves leaving the hutches should be put in small, uniform groups. Ideally, these groups should include only about ten calves of the same size. Many dairy farms have limited calf facilties and throw the newly weaned calves into a big pen with established calves which are much more effective competitors for food.

**A common sign that calves are overcrowded or that younger, weaker calves are being made to compete with older, healthier ones is the 'big calf, small calf' symptom, where there are large, sleek calves interspersed with runty ones of the same age.**

*IX. Feed a coccidiostat to weaned calves.*

When unthrifty calves and excessive respiratory disease are seen in weaned calves, the adequacy of the prophylaxis for coccidia should be assessed. All calves in group pens should be on a coccidiostat. Manure in pens of weaned calves should be monitored for consistency and blood.

*X. Maintain breeding efficiency.*

Age at first calving depends on breeding efficiency as well as growth rate. An efficient heifer raising program must include facilities and a routine for heat detection and breeding. This may be as simple as bulls in the corrals. If artificial insemination is to be done, then adequate facilities for heat detection , restraint, insemination, and pregnancy diagnosis are necessary.

*XI. Monitor the program.*

Ideally, the growth of calves should be followed as carefully as the milk yield of cows. This would mean weighing calves periodically and keeping records. On large dairy farms, monitoring a meaningful sample of growing animals rapidly becomes an enormous job, because it means finding and either weighing or measuring specific calves. The snapshot method can be used, where a cross-section of calves, say every tenth calf that locks up in the stanchions, is measured on a given day. When this method is used, even on large dairy farms, one finds that the data points for a given age group are based on a small number of animals, so that the average for that age is greatly affected by outliers. The snapshot method also confounds effects from different parts of the replacement heifer cycle. For example, if heifers that are a year old are found to be too small, but three-month-old heifers are of adequate size, one could conclude that the fault is in the nutrition of the older animals, whereas it could have been that they were delayed in growth when they were younger and are now being fed adequately.

For monitoring purposes, it is useful to divide the life of the replacement heifer into three parts: birth to weaning, weaning to breeding, and breeding to calving. The first period determines the overall health and vigor of the calf, but it is difficult to make meaningful gains in growth rate in very young calves. The third period is fixed in length; gestation cannot be accelerated. The period that is susceptible to intervention, then, is the middle period. Performance in this period depends on nutritional management and reproductive management. Heifers must conceive on time in order to calve on time.

**It is extremely useful to put the calf's birthday, or at least its birth month and year, on its ear tags. This allows visual monitoring of calves' progress through the program and allows outliers to be noticed quickly.**

Progress from birth to weaning can be monitored by watching weaning age and weight. Healthy, growthy calves can often be weaned earlier.

Progress from weaning to breeding can be monitored by watching ear tag birthdays, height, and body condition score of calves. If we know two of the three growth-related variables—body condition score, height, and weight—we can predict the remaining one. Calves with adequate skeletal growth that have good body condition (3-3.5 on a 5 point scale) are doing fine. An experienced observer can tell growthy, healthy calves from skinny calves with big hay bellies. The desirable height for breeding for the breed in question can be marked on stanchion poles in the prebreeding pen. Watching the age of the calves when they attain the desired height can tell you how the program is doing.

Heifers have a tendency to get fat after puberty. Postbreeding heifers should be monitored visually for size and body condition score. Preparturient heifers should be monitored for body condition score, likely age at first calving, and udder edema. If space permits, springing heifers should not be fed with closeup cows; they do not need the anionic salts to prevent milk fever and aggressive grain feeding of these heifers can lead to excessive udder edema and consequent mastitis and blue bag. Periparturient heifers should also be watched for signs of prepartum mastitis. Heifers with excessive udder edema or mastitis may be milked before calving.