

## **Pros and Cons of Centralized Calving**

J.F. Smith<sup>1</sup>, J.P. Harner<sup>1</sup>, M.J. Brouk<sup>1</sup>, and S. Mosley<sup>2</sup>

<sup>1</sup>Kansas State University, Manhattan, KS and <sup>2</sup>Double A Dairy, Jerome, ID

### **INTRODUCTION**

Producers with multiple dairy operations are inquiring about centralized calving as a method to improve and streamline their dairy enterprise. Dairies are interested in consolidating far-off dry cows, close-up cows, and calving (currently at multiple sites) to a centralized location. The interest results from evaluation of the current operations where multiple skilled employees are required at different sites, inadequate facilities exist, and expansion opportunities are available for the lactating cow herd. Owner/operators recognize management of new born calves is an important component of centralized calving and provides long term benefits. The management protocols for the dry cows, pre-fresh cows, fresh cows, and calves must be defined prior to and accounted for in the design phase in an effort to develop an efficient centralized calving facility. Some of the advantages and disadvantages of centralized calving include:

#### Advantages:

- Development of a team of skilled employees who specialize in dry cows, fresh cows, and calves;
- Taking advantage of the skills of key employees;
- Development and implementation of consistent protocols;
- Increased value of employees who have unique skills in handling dry cows and calves;
- Common benchmarks for monitoring performance and detecting problems;
- Centralized management during the transition period;

- Potential to milk more cows by relocating dry cows; and
- Replace under-sized special needs facilities.

#### Disadvantages:

- All your eggs are in one basket – must have excellent management team;
- Break down in management protocols impacts all the dairies; and
- Health problems have the potential to impact more cows and calves.

### **DESIGN CONSIDERATIONS**

Centralized calving facilities are site-specific and depend upon total number of lactating cows. While no specific data is available, it appears that an efficient centralized calving facility should receive dry cows from combined dairy operations which house a minimum of 8-10,000 lactating cows. One of the objectives in developing a site is the ability to have a skilled team in place 24/7. Efficiency and benefits seem to occur when a minimum of 25 cows are calved per day. Processing a fresh cow requires approximately 1 hr of labor and an additional hour of labor is required/calf. These times vary depending upon established protocols.

There are a number of issues to consider when designing a facility for centralized calving including:

- Dry-off protocols, frequency, and number of lactating cows

- Grouping strategies through the transition period
- Cow flow and time of movement between groups
- Calving procedures and time of movement
- Protocols being followed immediately following calving – both for fresh cows and calves
- First milking procedures and protocols, including handling of colostrum
- Fresh cow flow and time of movement off-site
- Type of milking facility, if fresh cows remain on-site
- Calf housing, movement, and type of facility
- Protocols for receiving calves and time of first feeding of colostrum
- Other facility requirements such as office, veterinary room, storage, employee break room
- Facilities to manage colostrum harvest and processing
- Transportation of fresh cows to milking sites

It is important to consider the following decisions for each group of cows or calves housed at a centralized calving facility:

- Expansion strategies
- Type of housing for different groups
- Heat stress abatement or cooling strategies
- Winter management and protection from wind
- Calf housing
- Cow and calf processing facilities and procedures
- Sanitation/manure management
- Access to water and feed
- Availability of bedding materials

- Feed center and feed supply
- Adequate water supply for drinking, processing, cleaning, cooling, etc.

### **Groups of Cattle and Grouping Strategies**

The size and number of cow groups on a centralized calving facility are critical. Factors affecting the number and types of groups are largely associated with maximizing cow comfort, feeding strategies, calving procedures, and labor efficiency. When planning for the calf component of the facility it is important to realize that the total number of cows calving will be equal to 115 to 118 % of the lactating cows that the centralized calving facility will support.

Dairy facilities often are not able to implement management strategies with known best management practices. The current available facilities often hinder the management team from implementing critical management strategies. For example, the dairy team may not be able to separate mature cows and heifers due to the number of pens or under-sized facilities. The facility limits implementation of this known *best management practice* and may impact milk production of cows and heifers throughout their subsequent lactation.

It is important to realize that these group sizes in a centralized calving facility have been increased to account for fluctuations in calving and cow and heifer numbers. If these pens are sized for static or average numbers, there will be a considerable amount of time when the facility would be over-stocked. Over-stocking cows prior to or after calving can have negative impacts on milk production and cow health.

**Table 1.** Recommended groups and facilities for cows housed in a centralized calving facility.

<b>Group</b>	<b>Avg. Time in Facility</b>	<b>% of Lactating Herd</b>	<b>Housing System</b>
Far-off dry cows	28-42 d	10	Freestalls or loose housing
Close-up cows	21-28 d	6	Freestalls or loose housing
Close-up heifers	21-28 d	4	Freestalls or loose housing
Maternity cows and heifers*			Loose housing
Fresh cows**	1-30 d		Freestalls or loose housing
Fresh heifers**	1-30 d		Freestalls or loose housing
Calf housing***	24 hr		Hutches, crates, or small pens

\*Each pen should be sized for 70 % of one day's calving. Need a minimum of 2 pens.

\*\*If fresh cows are moved 2 times/d, these pens would be sized at 70 % of one day's calving.

\*\*\*If calves are to be moved once/d, pens should be sized at 130 % of one day's calving. If calves are to be moved 2 times/d, pens should be sized at 70 % of 1 d calving. If bull and heifer calves are co-mingled, a minimum of 2 pens will be needed. If bulls and heifers are separated, a minimum of 3 pens will be needed.

### Protocols and Procedures for Calving

One critical issue associated with transition facilities is management of cows prior to and after calving. Recent research suggests dairies should develop strategies to avoid moving cows 7 d prior to calving. To accomplish this goal, it is critical in the design phase to develop facilities to avoid moving cows the week before calving. There are 2 ways to accomplish this goal. Cows may be housed in a loose housing system prior to calving and allowed to calve in the same area. This option may increase your investment per cow. A second option moves cows to a calving area at the time of calving. In freestall housing, moving cows at the time of calving reduces the housing cost/cow by housing close-up cows in freestalls versus bedded packs. In dry lot dairies we can take advantage of both options by calving cows in the lots when the weather permits or moving them to a protected calving area during periods of inclement weather.

### Traffic Patterns

There are a number of traffic patterns that need to be considered when designing the facility. Some of these traffic patterns include:

- Transportation of dry cows to the facility
- Transportation of fresh cows back to the dairies
- Removal of bull and heifer calves
- Manure removal
- Feeding
- Commodity storage and delivery
- Bedding
- Cow movements/group changes
- Hoof trimming
- Milking and treating fresh cows
- Removing milk from the facility

Efficient centralized calving facilities carefully try to minimize or avoid conflicts between these traffic patterns.

## **Animal Movement**

Labor efficiency associated with centralized calving occurs when an employee is able to easily move animals throughout the facility. Ideally one person should be able to move cows to different locations in the facility. This becomes a critical design factor. For example, if we are going to house close-up cows in freestalls and move cows to a maternity pen at the time of calving the maternity pens need to be located so that one person can move a calving cow into the maternity pen. If we are going to use dry lots for close-up housing, back fences on the feedline may be necessary to ease movement of cows that have calved or that need to be moved to the maternity pen. In dry lot housing it can be difficult for one person to move a cow throughout the facility.

## **Dry Lot Housing Systems**

Transition facilities using dry lots should be designed based on providing a minimum of 600 sq ft of space/cow. The feed line should be designed based on providing 30 in of bunk space (4 in 10 headlocks) / cow and include a back fence. A 15 ft feed apron with headlocks and a back fence allows an employee to release a cow from a headlock and easily move her to another pen or provides restraint for treatment. The dry lots should provided a minimum of 40 sq ft of shaded space/cow and a 10-12 ft tall wind break with design criteria of 12-24 in of length/cow. The water troughs should allow for a minimum of 10 % of the cows to access water at any time and the water system must be capable of providing 25 gal/day/cow. Adequate drainage is accomplished by grading pens such that the slopes are 2 to 3 %, either single or double sloped pens. Another consideration is inclement weather, when bedding is

necessary. The bedded area should provide a minimum of 32 sq ft of space/cow at a depth of 6 to 9 in. Bedding material must be stored in close proximity to the facility for quick response during winter storms. Consideration must also be given to removal and storage of the bedding after the weather has passed.

## **Calving and Fresh Pens**

Current recommendations provide 100 sq ft of bedded area/animal in the calving pens. A minimum of 2 pens are required, which provides 1 pen for calving while the employees remove soiled bedding and re-bed the other pen. Pens are each sized based on allowing space for 70 % of the average daily calving. A facility designed for 40 calvings/day would have 2 calving pens each with 2,800 sq ft of bedded area (40 x 0.7 x 100). During extreme calving periods, it may be necessary to utilize both calving pens. Water space is provided along a fence line and bale feeders may be used. Design must provide for efficient procedures to bed and remove the bedding from each pen. Approximately 100 lb of bedding are required/calving space (100 sq ft, 6 in deep, and 2 lb/cu ft of space) /day. Assuming the pens are bedded 200 d/yr, approximately 10 tons of bedding is required/calving space. Chopped dry straw provides cow comfort and cushioning during calving.

Protocols are needed for procedures to remove down cows. All pens and transfer lanes must be accessible by equipment for removal of down animals in a humane manner. Protocols are also necessary for procedures developed to assist a cow having difficulties during calving. A small veterinary area with a recovery pen should be considered as part of the overall design process.

The fresh pen has similar space requirements as the calving pens. The main difference is the feedline should provide 30 - 36 in of bunk space/pen capacity. Also, mature cows and heifers are housed in separate pens prior to movement to the dairies. Bedding requirements and protocols for animal handling must also be developed.

### **Hoof Trimming/Dry-Off**

Producers must determine where cows will be processed at dry-off. Hoof trimming and dry-off require properly designed facilities to minimize worker and animal stress during this process. Animals must be moved in a safe, but efficient manner and thought must be given to animal welfare issues. Individual operations will need to determine where and how these procedures will be performed. Options available include performing these procedures at the milking facility, performing procedures at the centralized calving facility, or drying off cows at the milking facility and trimming cows at the calving facility. If these procedures are to be performed at the calving facility they cannot interfere with the cow, vehicle, and people flow associated with the calving process. It may be advantageous to locate a dry cow processing facility at a different location than the maternity facility or the centralized calving facility. Locating the dry cow processing area in a different location also allows this facility to serve as a receiving area for purchased animals.

### **Milking and Processing Fresh Cows**

Efficient centralized calving facilities will probably average 30 - 50 cows calving/day. Designing the facilities to milk and treat fresh cows is essential. It must be easy for an employee to move a fresh cow into the process area for treatment and

milking. Adequate facilities need to meet the calving demand, while allowing fresh cows to be processed quickly after calving. Our experience indicates one milking stall/10 cows calving in a 24-hr period.

### **Transportation of Fresh Cows to Milking Facilities**

Another issue with centralized calving is to determine when cows are moved back to the milking facilities. One model moves cows back to the milking facility shortly after calving and first milking. The second model provides housing for the fresh cows for several days or weeks before returning cows to the milking facility. If the fresh cows are housed at the centralized calving facility for more than one milking then an appropriately sized parlor that meets milking regulations and guidelines is required. It is critical that the transportation protocols for movement of fresh cows to the milking facilities are developed and adhered to by employees at all dairy sites and employees of transporting firm. Some factors contributing to stress on fresh cows included hauling distance, cows/load, time on trailer, time of day, etc. These should be minimized in development of fresh cow welfare protocols.

### **Housing Options and Cow Comfort**

Depending on the climate a number of housing options exist for the different groups of cows. Freestalls, bedded packs, dry lots, and combinations of these different types of facilities are all options. Maintaining cow comfort for all groups of cows is essential. Steps need to be taken to minimize heat stress, including shade and cow cooling, which is especially true for close-up cows, maternity, and fresh cows. Cow cooling strategies need to match-up with the local climate. In many climates,

cold stress is a significant problem. Mechanically ventilated facilities can significantly reduce cold and heat stress.

### **Calf Care and Colostrum Management**

Healthy calves are an important part of the future of the dairy operation. Some recent studies indicate that as much as 25 % of the variation in first lactation milk yield may be associated with the rate of growth during the first 8 wk of life. In addition, adequate passive immunity transfer is associated with lower treatment cost, reduced disease, and increased calf performance.

Getting a calf off to a fast start begins in the first hour following birth. In the first hour, following birth of the calf, the following should occur: navel dipped, calf removed from calving pen, calf tagged, pasteurized colostrum fed, calf hair coat dried, vaccinations or other treatments administered, and the calf moved to individual or group housing. Having labor devoted to these processes is difficult and expensive if there are only a few calves born each day. This often results in variation in the timing and quality of calf care. This variation can lead to a slower start to calves and ultimately lower potential milk yield in heifers.

Centralized calving offers the opportunity to increase the labor efficiency and standardization of calf care protocols. Economic studies have indicated that a great deal of the variation in labor cost associated with calf rearing is due to differences in labor efficiency. As the number of calves involved and the facilities change to handle calves more efficiently, the labor cost/calf is reduced. With centralized calving, up to 40 calves may be born each day opposed to 10-15 on 2 or 3 separate farms. The increase in

calf numbers allows the farm to allocate labor to calves 24 hr/d and 7 d/wk. Typically, when calving on individual farms, labor to care for the calves is not consistent and often there are periods during the day that sufficient labor is not allocated to adequately care for the calves. With centralized calving, labor can be allocated on a 24-hr basis to ensure that calf processing, feeding, and care are given in a timely and cost efficient manner.

Colostrum management is critical if adequate passive transfer of immunity is going to occur. Centralized calving can improve colostrum management. Colostrum should be tested, pasteurized, and cooled immediately following harvest. Many times there is not a sufficient labor force to feed calves colostrum immediately following harvest. In some cases the colostrum has been held at room temperature or stored under refrigeration, but in large containers which cool very slowly. This allows a perfect environment for bacterial growth. With up to 40 births each day, cows will likely be milked in groups of 4 - 8 throughout the day. If the milking times for the fresh cows are at set times, the colostrum can be quickly collected, tested, pasteurized, and cooled. In addition, colostrum from cows with Johnes or other diseases can easily be discarded. Working with small groups of fresh cows several times each day can improve the adherence to protocols for handling, testing, and cooling colostrum.

The cost of pasteurization is sometimes a barrier to adoption. Some studies suggest that to be cost efficient, about 30 calves are needed. With centralized calving, there are enough calvings each day to make colostrum pasteurization cost effective. Generally, batch pasteurization of colostrum is preferred over high temperature short-time methods due to the possibility of solids

accumulating on the heating and cooling plates of the high temperature short-time pasteurization equipment. Smaller, automated batch pasteurization equipment can be utilized that allows a quantity of colostrum to be deposited into the vat for automatic pasteurization and cooling. The colostrum will be held cooled until it is removed and placed in containers for feeding. These containers are then transferred to a cooler until utilized. After the batch is emptied, an automated cleaning system can clean the unit prior to the next batch. These factors help insure that quality colostrum is available for each calf. In addition to improving the management of colostrum storage and handling; the timely feeding of colostrum within 1 hr of birth should also improve.

Centralized calving also improves the efficiency of moving calves to the calf rearing facility. Calves are typically housed at the calving facility only for 24 hr or less. Calves should be removed twice each day, approximately every 12 hr. If the calf is fed colostrum prior to or just after arriving at the calf pen, the next feeding should be 12 hr later. If the calf rearing facility is located a short distance (less than 1 hr drive) and the calves are fed milk shortly after arrival to the calf rearing facility, this should be adequate. However, if there is going to be more than 14 hr between the feedings and there is an increase in the stress on the calves due to the hauling time; it may be necessary to feed the calves a second time prior to departure to the calf rearing facility. This may require an additional pen in which calves can be placed after the second feeding. In this case, a total of 5 calf pens will be needed to allow 2 pens each for bulls and heifers and an additional pen for cleaning. The floors in the calf pens should

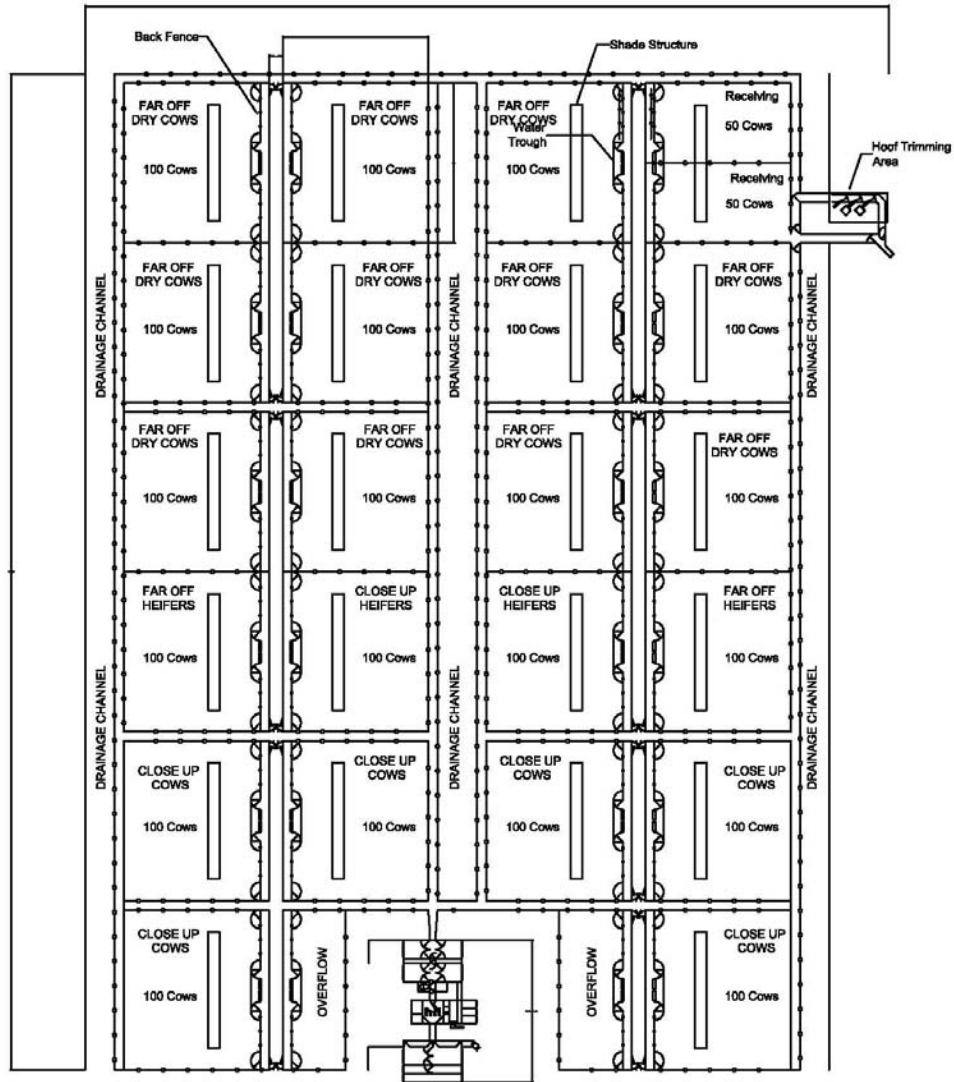
be heated to help reduce moisture in the pen, warm the calf, and increase the drying rate of the hair coat following birth. The pens should be well-bedded and be cleaned between each group of calves. For disease control, an all-in all-out protocol should be followed, if a calf has just arrived at the pen and is still wet when the others are removed from the pen; it should be transferred to the clean pen and loaded with the next group of calves.

Centralized calving may increase calf performance and reduce cost in the following ways:

- Improved labor efficiency
- Improved handling, testing, cooling and storage of colostrum
- Pasteurization of colostrum is more cost effective
- Improved timing of colostrum feeding
- Improved timing of administration of calf treatments and care
- Improved efficiency of calf housing

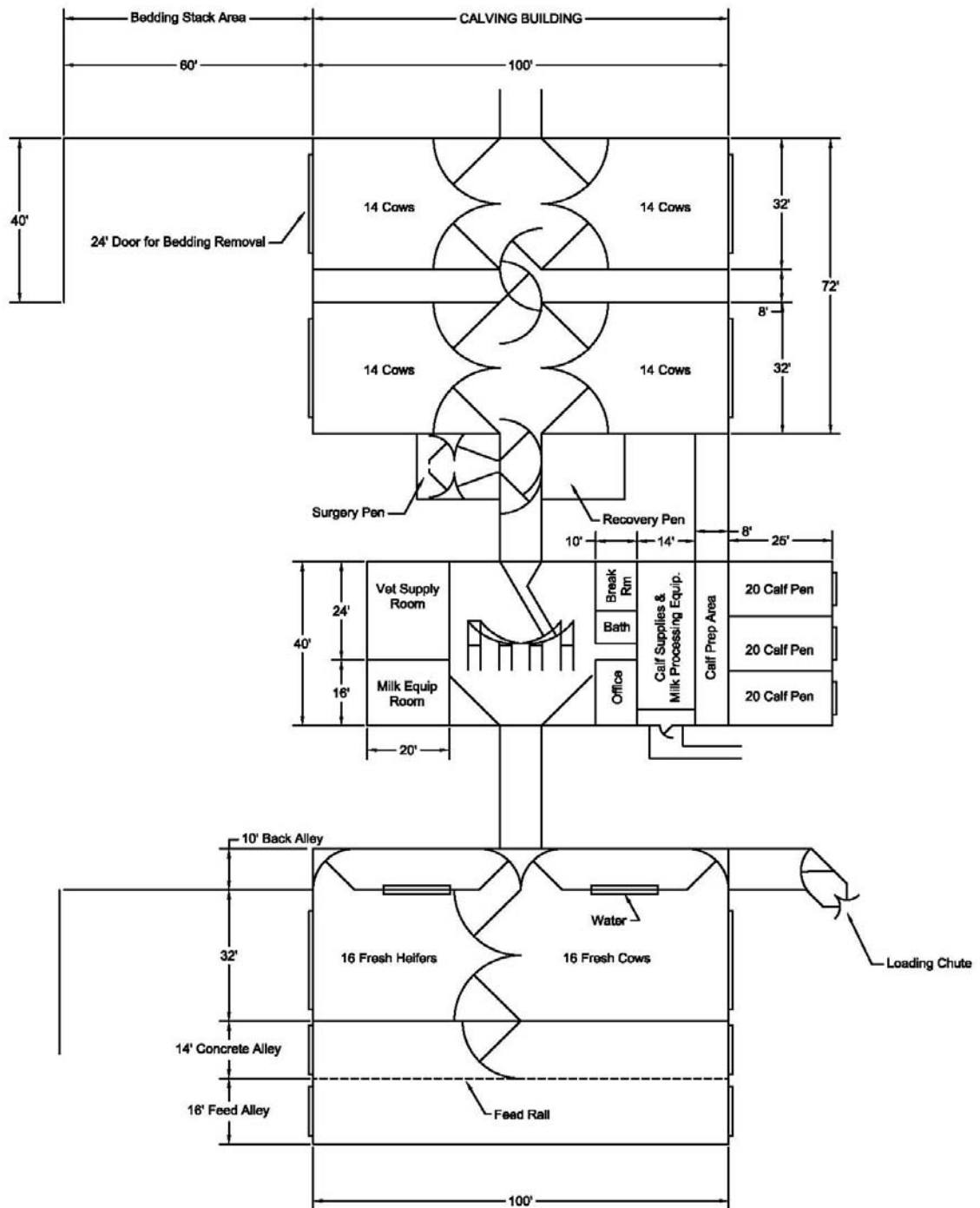
Centralized calving may increase calf risk factors in the following ways:

- Breakdown in compliance to calf protocols affects all the calves
- Breakdown in sanitation increases the opportunity for disease to spread to all calves
- Multiple calvings in the same pen at similar times may lead to mis-identification of calves
- Increased calf stress if the calf rearing facility is located a long way from the calving facility



**Figure 1.** Overall layout of a centralized calving facility designed to support a dairy with 10,000 lactating cows.





**Figure 2.** Layout of facilities for calving, processing fresh cows, and housing calves.

## **Example Dry Lot Facility**

Figure 1 is an example of a centralized calving facility utilizing dry lot housing. Centralized calving facilities could also be designed for freestalls or a combination of freestalls and dry lots. The design criteria for the facility shown in Figure 1 include:

- Supports 10,000 lactating cows
- A total of 2000 head (far-off cows, close-up cows, and springing heifers)
- 8 week dry period (5 weeks far-off and 3 weeks close-up)
- Dry-off 200 cows/week
- 100 cow pens at a minimum of 600 sq ft/cow
- 4 in 10 headlocks or 30 in bunk space
- Stocking density based on 1 animal/headlock or feed space
- An average of 40 calves/d (3 calving pens, 20 calves/pen, 15 sq ft/calf)
- 4 calving pens (14 cows/pen)
- Minimum space in calving pens is 100 sq ft/cow
- Trailer capacity – 8 cows

- Remove fresh cows 2 times/d after first milking
- One milking unit/10 calves/d @ 15 sq ft/calf
- Hoof trimming facilities to do routine trimming at dry-off
- 12' x 16' office & 24' x 16' veterinary room
- 16'x 16' colostrum processing area

Figure 2 is the layout for calving, processing fresh cows, and housing calves for the example dry lot facility. Note gates are placed to facilitate one per moving cattle.

## **SUMMARY**

Centralized calving has the potential to improve the consistency in which cows are calved and new born calves are managed. However, the pros and cons for an individual dairy operation will be different. It is important to carefully evaluate the pros and cons before constructing a centralized calving facility.