

# Dairy Herd Facilities Designed for Efficient Production

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The major physical components of a dairy design are milking, feeding, treatment and waste-disposal facilities. These must be designed and located to provide animal comfort in combination with effective traffic and movement within the system for efficient day-to-day operation. The design of dairy components and complete systems depend upon certain management practices these will vary by climatic condition and herd size. Personal preference by individual dairymen may also influence the final selection of dairy design.

Two major considerations in dairy design are cow comfort and reduce labor costs. Cow comfort usually means dairy design which modifies the environment for the cow to improve production (milk and production). This would include shade for cattle in a hot climate or a partial enclosed barn for protection from cold and wind in a cold climate.

This paper will briefly deal with milking, feeding and waste-disposal of dairy design. A more detailed discussion of treatment facilities will be included.

## Milking Facility

Fifty percent of the labor requirement of a dairy farm is involved with the milking operation. The size of a milking parlor is influenced not only by herd size but also social, religious and traditional factors. Milking parlors in western United States which require 18-22 hours of daily usage would not be acceptable to dairymen in northeastern and midwestern United States where the dairyman is also involved with a farming operation.

Milking parlor performance (cows per man hour) is a direct result of the work routine of the operator. The portion of the routine which affects the parlor performance the greatest is cow preparation (pre-milking hygiene). In moderate climates where wash pens are used to clean cows before entering the parlor, cows per hour is usually greater than in a cold climate for the same parlor size and mechanization. The major difference in routine being cow preparation. Other important considerations which should be considered in comparing parlor or design is milk production level at present and future, operator level of ability and mechanization.

## Feeding Facility

As herd size has increased, the feeding practices and facilities have included fence-line feeding, commodity feeds, feed truck and wagon with scales. Cows are fed more frequently with the feed being more uniform in quality. Total mixed rations have also gained in popularity. The design of silos, commodity barns, wet-feed pits needs to be taken into consideration. Parlor grain feeding has decreased thus reducing the cost of milking parlors.

Locking stanchions are either a group lock or an individual self-lock. The majority of new installations are self lock. Locking stanchions for cows range in size from 30" to 27" and 24". Twenty-four inch lock stanchions are satisfactory if additional stanchions are added above the group capacity. Thirty inch and twenty-seven inch are the most common design. If you cannot lock up 100% of the cows at once they lose their effectiveness. Six row free stall barns need to add additional manger space in an extra wing in order to have space for all cows at the manger for lock-up. (Figure 1) Lock up stanchions are also used for breeding, reproductive treatments and pregnancy checking. Dry cow treatment, clipping and vaccination also are done in the lock-up stanchion.

Figure 1

200 Cow Free-stall barn				
Type of Barn	Size of <u>Lock Stanchions</u>	Sq. Feet <u>per cow</u>	Warm	Cold
			Climate	Climate
			Cost per <u>cow<sup>a</sup></u>	Cost per <u>cow<sup>b</sup></u>
6 Row	27 inches	100	550	804
4 Row	24 inches	107	589	860
4 Row	27 inches	113	620	908
6 Row	18 inches	84	447	675
Feed space, no Head Locks, and expanded treatment area			+ 150	+ 200
			597	875
Plus daily extra labor				
<sup>a</sup> \$5.50 per sq. ft. <sup>b</sup> 8.04 per sq. ft.				

Armstrong and Welchert 1989

## Waste Disposal Facility

Federal, state and local regulations both present and future on waste disposal will require that a dairy farm will have a system and plan which will guarantee the safety and purity of the underground water.

Dairymen will need to have had sufficient land available to dispose of all his liquid and solid waste to satisfy health regulations that they are not a point source of underground water contamination. Nitrogen is the element of concern at the present time. Veterinarians can play a significant role as advisors to their dairy clientele in providing information and directions.

## Treatment Facilities

The most neglected areas on large dairy herds are the treatment facilities. These facilities are used for both routine (daily) treatment and emergency situations. All ages of dairy cattle need a facility which will restrain them in a chute or a lock-up stanchion as a part of a routine herd health and reproductive program. These facilities must be designed to treat and move cattle safely and efficiently and must be accessible, but not interrupt the daily function of the rest of the dairy.

In 1986 a questionnaire was developed, and visits to 36 dairy farms with dairy veterinarians were made. Also owners, managers and herdsmen were interviewed on facilities and evaluated for both effectiveness and safety for the animal and animal caretakers. (Figure 2) Factors to consider when designing a treatment facility are function, location, type of construction and costs. As an example, two dairy farms of approximately the same size (850 cows) which were constructed recently both with lock-up stanchion built treatment facilities of \$30,000 and \$85,000. Was the \$30,000 facility inadequate or was the \$85,000 over constructed? The answer after interviewing the veterinarians and herdsmen was probably both.

The first thing that must be considered is the treatment facility use. Which animals are going to use it, cows, heifers or calves? This determines the type of treatments, (functions) and the size and number of animals which will be using the facility. For example, common function for a calf facility would include: vaccinate, dehorn, extra teat removal, heifers; vaccinate, brand, breed, pregnancy test, cows; physical exams, mastitis treatment, calving, hoof care, breed and pregnancy test. While some of the same functions appear for different age and size of animals a different facility is necessary.

## Cow Facilities

The facilities are used for cows and fresh heifers. A combination of chutes and lock-up stanchions for both large and small numbers of animals is the most common.

Figure 2

Survey of 36 Arizona Dairy Farm Treatment Facilities  
1986-87

Facility	Herd Size		
	<350	350 - 750	>750
Cow chutes	1	1	2
Length of chute	40 - 50 ft	50 - 70 ft	50 - 80 ft
Cows in chute	3	7	8
Individual sick pens	2 - 3	4 - 5	5
Large sick corral	25 - 40 cows	50 - 60 cows	100 cows
Fresh cow corral	40 cows	60 cows	100 cows
Dry cow corral	1	1 - 2	2 - 3
Stanchions in corral	50%	100%	100%
Catch cows at parlor	50%	30%	25%
Mastitis Treatment	90% Parlor	95% Parlor	90% Parlor
Vet Visit/month	1	1	1
Pregnancy check	50% Pen	100% Pen	100% Pen
Reproduction Problem	40% Pen	95% Pen	97% Pen
Calf Chutes	50%	100%	100%
Heifer Chutes	50%	100%	100%

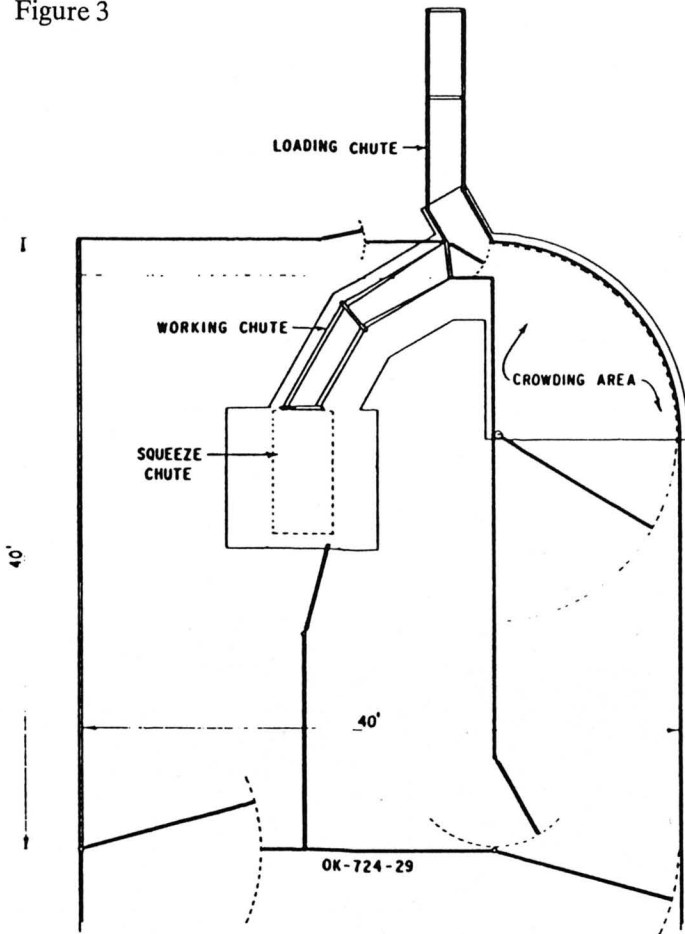
Armstrong and Marcus 1988

Function will be dry cow treatment, vaccination, calving, hoof care and reproductive care. Figure 1 would indicate that cow treatments are done in a chute situation with the exception of reproductive care which usually is done in lock-up stanchions. Location of the chute should be close to the milking parlor for several reasons, first, cows can be sorted at milking time and held in small pens near the chute area for examination and treatments. Data (Figure 2) from the survey would indicate as herd size increases, sorting of cows at milking time is less, still a significant number are sorted, to justify the location near the milking parlor. Second; usually the medication, hot water and telephone are available in this area. Traditionally the chutes and treatment lane for dairy cattle have been a straight lane holding 3-8 cows depending upon herd size. The beef industry has utilized a curved or horse-shoe design for years. Recently a few have been designed in the large herds in the southwest with enthusiastic acceptance by the individual utilizing them for cattle treatment. (Figure 3) Design of the chute area should pay close attention to drainage, lights, floor surface, man escapes and shade.

## Heifer Facilities

Lock-up stanchions are commonly used in the breeding age groups for reproductive treatment and pregnancy checking. A chute arrangement which will allow for working a complete group of animals will reduce labor costs for

Figure 3



Midwest Planning Service

heifer treatment as noted in the Arizona survey (Figure 1). These facilities are not common in smaller size dairy farms (less than 350 cows).

### Calf Facilities

Lock-up stanchions are desirable in the age group of animals after weaning for vaccination, dehorning, and health treatment. The use of a chute for calves is not necessary if all calf pens have lock-up stanchions. Design of a chute should include the ability to change the size of the chute or lane. This can be done by varying the angle on the side walls of the lane and chute. Although the Arizona survey would indicate that a chute area for calf treatment is only found on larger dairy farms the investment will reduce daily labor requirements for calf restraint and treatment.