

Freestall Dairy Facilities *in Central Texas*



Freestall housing is an option for many traditional drylot dairies in Texas.

Sandy Stokes and Mike Gamroth*

Many traditional drylot dairy managers in Texas are faced with a dilemma: should they remain a drylot operation or should they confine animals in freestall barns. The practice of confining animals in freestall barns could be necessary because of environmental regulations regarding pollution and runoff, the need to continue herd profitability, or both.

Drylot dairies are best suited to areas with dry climate conditions. Climate conditions are measured as a moisture deficit (rate of evaporation minus rainfall) for a year. The lower the moisture deficit, the

muddier the soil conditions become.

Drylot dairies work well in areas with moisture deficits greater than 50 inches per year. In these semi-arid regions, periods of mud can be quite short and vary widely year to year. Areas with less than 20 inches of moisture deficit are better suited for confined housing.

The difficult decision between drylot or freestall facilities develops in areas in which the moisture deficit falls between 20 and 50 inches. These areas, such as Central Texas, are considered "marginal" in exposure to mud.

This further reduces the moisture deficit and increases exposure to mud.

When animal excretion levels contribute to the moisture deficit, the decision to invest in freestall housing becomes more difficult in borderline moisture deficit areas such as Central Texas.

Also, the short time periods in which rainfall occurs provide significant challenges to lot maintenance, cow comfort and production of high quality milk in drylot dairies. Figure 2 shows the average seasonal precipitation, in inches and as a percentage of yearly totals, in Central Texas from 1990 to 1998.

Freestall housing is not a new technology. It has been common practice in the upper Midwest and northeastern United States for many years. However, the transfer of those facility designs to the southern U.S. has required modifications for climate and larger herd sizes. Ten dairies in Central Texas were surveyed recently for infor-

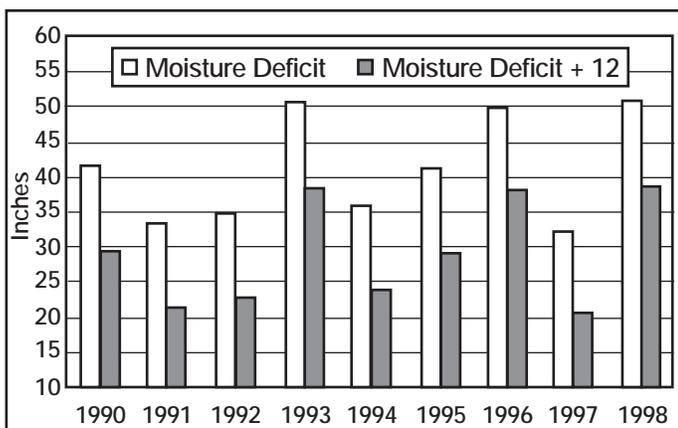


Figure 1. Moisture deficits in Stephenville, Texas (1990-98).

Figure 1 illustrates a 9-year trend in moisture deficit in Stephenville, Texas. The graph also charts "moisture deficit + 12." This represents the moisture deficit plus an additional 12 inches of precipitation accumulating in drylots with areas measuring 600 square feet per ani-

*Extension Dairy Specialist, Texas A&M University System, and Extension Dairy Specialist, Oregon State University.

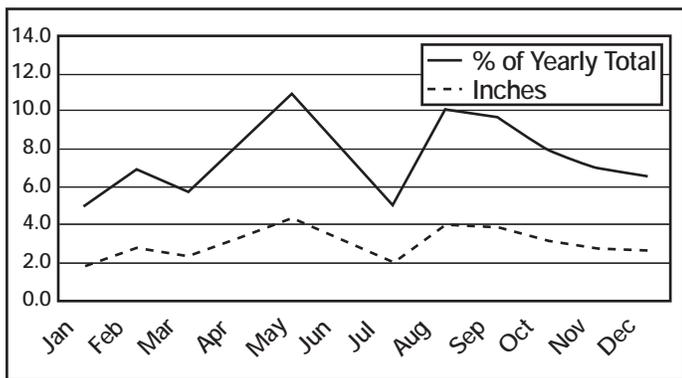


Figure 2. Seasonal precipitation trends in Central Texas (1990-98).

Area	Opportunity	Challenge
Efficiency of space	Decreased travel distance	Increased animal density
Labor	Increased automation	Increased labor requirement
Manure management	Decreased run-off to capture	Wetter product
Cow comfort	Environment control Eliminate seasonal mud	Cooling during periods of heat Increased time on concrete

mation on management and design features of southern freestalls. Survey results showed that, just as every dairy operator has his own management style, several aspects of freestalls vary in their impact on each individual dairy (see table above).

Space, Travel and Investment

Open lots averaged 500 to 600 square feet per cow; freestall barns required only 100 square feet per cow. Even with outside exercise lots, the freestall system used about half the space of an open lot. Therefore, on a 1,500-cow dairy, space may be reduced as much 40 acres. Confined housing also reduces daily travel distances to and from the milking parlor.

Example: A 480-cow drylot dairy uses four pens with 120 cows per pen. Providing 600 square feet per cow gives a four-pen area of 540 x 550 feet (Fig. 3a). Cows in this system average 3,240 feet of travel each day in a 3x milking routine (twice the length of the drylot, three times daily). In converting to freestall housing, the producer now has two options: build a facility for the same number of cows (simple cow conversion, Fig. 3b), or expand herd size while using the same land area (Fig. 3c). The first option reduces travel approximately 44 percent. The second option also reduces travel by about 34 percent. Because some of this travel occurs during periods of summer heat or muddy weather, less travel means less energy is consumed by the cows. This should help stabilize milk production.

Costs for open lot systems constructed in 1997 averaged \$400 per cow. Freestall investment averaged \$700 per stall, ranging between \$400 to \$1,000. Differences depended on whether outside contractors were hired (some dairies did much of the work themselves) and on whether existing feed lanes were used. A shell for a freestall barn cost about \$4.50 per square foot; concrete floors and curbs added about \$1.50 per square foot; stall loops, lock-ups and other fencing averaged about \$1.00 per square foot.

Labor

Some studies indicate an even trade of labor and maintenance between open lots and freestalls. Producers in Central Texas, however, reported a 20 percent increase in labor charges per cow per year. Maintenance of freestalls averaged 2.4 minutes per cow per week compared to 2.0 minutes per cow per week in drylot. Most freestall labor was associated with bed maintenance.

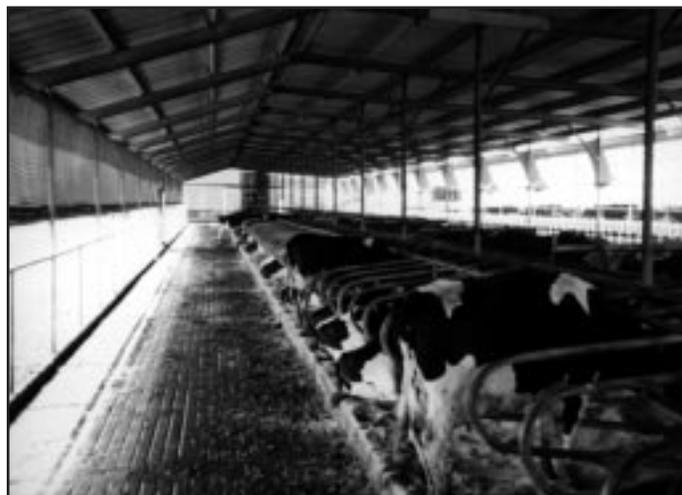
Bedding rate and frequency varied with the producer. Sixty (60) percent of producers bedded stalls on a weekly basis, 30 percent bedded every other week, and 10 percent bedded on a 3-week schedule. Bedding schedule appears to be independent of bedding material

and is more a factor of management preference. Poor bed management makes cows reluctant to use freestalls; they actually prefer to lie in the scrape alley. When this happens, cows

become dirty and have mastitis “flare ups.” In addition, lack of a good bedding layer can increase the amount of cow movement in the stall and lead to entrapment under a partition.

Manure Management

When cattle are confined to barn floors, there is less risk of rainfall traveling through manure areas and contributing to uncontrolled runoff. Even with outside exercise lots, the area exposed to runoff is less. Rainfall subject to contamination can be controlled through roofing and gutters. In water deficient locations, roof runoff can be collected, diverted or used elsewhere on the dairy. In an area that receives an average of 30 inches of annual rainfall, confined housing reduces the collection storage area needed by approximately 4.7 million gallons (approximately 23,000 cubic yards of earth). Construction of a collection storage area would be a one-time cost; on-going costs for pumping and management of lagoons must be considered as well.



Manure management might include flooding the scrape alley with water.

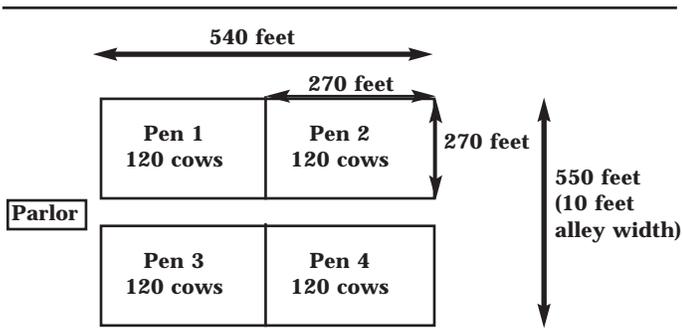


Figure 3a. Example layout of a drylot dairy.

One freestall for all 480 cows @ 100 square feet per cow = 500 x 100 feet size

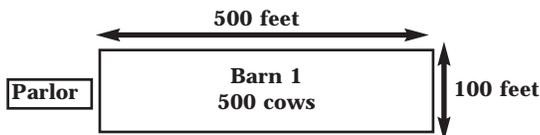


Figure 3b. Drylot conversion into a freestall barn: Option 1.

Expansion of all pens to freestalls: site now houses 1500 cows.

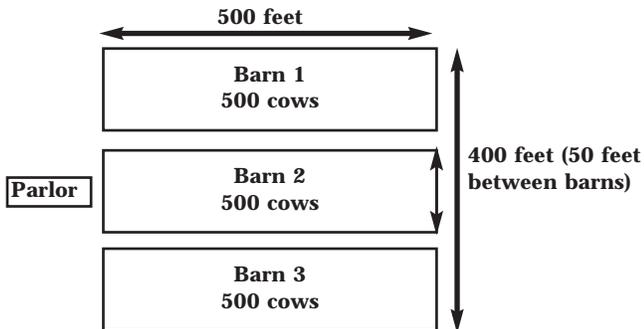


Figure 3c. Drylot conversion into a freestall barn: Option 2.



The amount of stall use is an indication of cow comfort.

It is important to remember the goal of any housing system is to provide comfortable lounging. It is difficult for cows to remain on concrete constantly. Therefore, the amount of stall use provides a quick visual assessment of cow comfort in a freestall barn.

Cow comfort can affect culling rate and income from cull cows. Culling rates tend to decrease in the freestalls; initial culling rates averaged 49.4 percent and decreased to 37.1 percent after moving into freestall barns. Additionally, body weight of cull cows might increase. One dairy estimated this increase to be approximately 150 pounds per cull cow. Assuming an average body weight of 1,400 pounds per cow, this would increase cull cow income about 10 percent.

Cows are cleaner in a freestall system during inclement weather because stall condition is less dependent on weather than are open lots. Docking or trimming tails could be necessary to keep cows clean in a flushed freestall barn. With good bed management and high stall use, many producers in freestall barns have reduced use of wash pens.

While bedding must be maintained throughout the year in a freestall system, it takes less bedding to maintain a lying area in a freestall than in an open lot. Lying space in a stall averages 32 square feet per cow (4 feet x 8 feet stall), whereas lounging space under shade in drylots averages 40 square feet per cow. Traditionally, bedding is not needed in open lots during most of the year. However, a substantial number of drylot dairies recently have begun bedding shade areas for cow comfort. Bedding requirements must be calculated on an individual basis. Bedding use in freestalls in Central Texas averaged 30 pounds of material per cow per day, with a range from 15 to 42 pounds.

Bedding materials are categorized as either organic or inorganic. There are many traditional and nontraditional materials in each of these categories. Bedding materials in Central Texas range from all-sand to all-organic and varying combinations. Organic materials used include manure solids, compost, gin trash or hulls (usually rice or peanut).

Initially, sand was the material of choice; however, some producers have changed bedding to all organic material or a combination for logical reasons. Organic

Manure management in a freestall can be quite different from drylot management. In a flush system, water content of manure is much greater. If sand is used for bedding, the end product will have more sand. Manure handling systems might include solid separators, settling basins or both to avoid filling lagoons with solid material. Eighty (80) percent of Central Texas producers surveyed use settling basins; 30 percent manage manure through a separator or a sand trap prior to entry into settling basins. These producers spent an average of \$36,000 on additional manure handling equipment in their freestall systems.

Cow Comfort

Ensuring cow comfort is both an opportunity and a challenge of freestall systems. Poorly designed and maintained freestalls can reduce cow comfort and increase animal stress. To achieve an advantage over open lots, time must be spent on bedding management, hoof care, heat detection and the general environment of the barns. Most managers need about 1 year to adjust to the more intense management required in a freestall system.



Bedding materials can be sand or organic materials like compost or gin trash.

material causes less wear on equipment and bedding material is less expensive. Sand fills lagoons quickly and is more difficult to manage.

With increased animal density in well-lit facilities, heat detection and health monitoring can be easier. However, poor hoof care, slippery freestall alleys and lack of attention can make these management concerns more difficult. Unsure footing in crowded, slippery freestalls can reduce expression of heat in cows. Use of sand (as complete or partial bedding material) appears to provide additional footing in alleys around beds.

Heat detection can be improved by practices such as tail chalking and date reminders marked on the hip of the cow for easy visual identification. Use of exercise lots with breeding pens also can increase observation of heat. Barn modifications, such as wider rear alleys, can increase cow activity and enhance heat detection in confinement.

What does it all mean?

In a controlled freestall environment, more milk production is likely and less production fluctuation through the year is possible. Several studies have projected freestall systems increase production by 5 to 8 pounds of milk daily. However, Central Texas data were quite variable. Records from herds that had been in freestalls more than 1 year suggest an increase in production. It was concluded that response to change is not immediate. A transition period is necessary before production begins to increase.

Producers and lenders both question how much increased milk production it takes to pay back a freestall investment. The precise answer remains unclear.

Earlier studies in Florida and Texas show that freestalls are cost effective in comparison to drylot housing. These studies suggest freestalls net about \$35 per cow-year return in higher production, better milk quality and feed savings. Extra income is projected to exceed extra costs in 6 years out of 10.

Using a simple cash flow spreadsheet, two break-even scenarios were evaluated: a new dairy with the choice of a drylot or freestall facility, and an existing drylot dairy converting to freestalls. For both situations, the following items were assumed:

- \$400 per cow for a drylot investment,
- \$700 per cow for a freestall investment,
- \$12.50 cwt (hundredweight) milk, 1,000 cows,
- \$15 per cow additional repairs for freestalls, 9 percent interest, and a 10-year loan.

For the new dairy, the additional \$300 per cow (freestall over drylot investment) was considered. Using the above assumptions, it would require an extra 600 pounds of milk per year (1.8 pounds per day) to cover the principal and interest of the loan on the facility.

For the existing drylot facility considering conversion, the full \$700 would be added for freestall investment and would require an additional 1,100 pounds of milk per year (3 pounds per day) to pay back facility investment.

Summary

In most situations, Central Texas dairy producers will find it profitable to manage cows in freestall housing. For some producers, however, it may be more profitable to continue with open housing. The decision should be based on the probability that the advantages of freestalls would overcome problems associated with open lots. The decision must be made while considering individual circumstances.

Produced by AgriLife Communications and Marketing, The Texas A&M University System
Texas AgriLife Extension publications can be found on the Web at: <http://AgriLifebookstore.org>

Educational programs of the Texas AgriLife Extension Service are open to all people without regard to race, color, sex, disability, religion, age, or national origin.