Facility Design For Large Jersey Dairies

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ike the dairy industry as a whole, many Jersey producers are considering expansion through building a new facility or remodeling an existing one. In addition, some Holstein breeders are switching to Jerseys to take advantage of the higher milk solids content and milk price. Questions arise concerning facilities design for a Jersey dairy, but few published recommendations are available. Most Jersey producers use Holstein numbers and “fudge” to make them work for Jerseys, or they visit other Jersey dairy producers to see what does and doesn’t work. That is precisely what the authors here did – visited large dairies in the Southwest and California to see what is currently working.

Building a New Jersey Dairy

When building a new dairy, the builder should consider future needs and plans. A dairy is certainly a large investment that must be meticulously planned with goals and objectives for 15 to 20 years down the road in mind. Dairy producers must be committed to the milk market benefits from Jersey cattle for the life (15-20 years minimum) of the facility.

The first step in building a new facility is to consider parlor and group sizes. Groups should be sized to minimize time in the holding pen, preferably 45 minutes for 3x milking and one hour for 2x milking. For planning purposes, parlor steady state throughput per milking shift should be 6.5 hours for 3x milking and 10.5 hours for 2x milking. This will allow 1.5 hours for clean up and maintenance.

Table 1 provides estimates of group sizes and animal numbers for various size parlors assuming 3x milking, 45 minutes holding pen time, 6.5 hours steady state throughput, and about 4.5 turns per hour steady state throughput. Under these assumptions, a double 20 parlor can accommodate 1,217 lactating cows, with eight (8) pens of 140 healthy lactating cows each, a sick cow pen with 24 cows, a fresh cow pen with 49 cows, and a slow milking pen with 24 cows.

In any expansion or new facility, it is critical to consider dry cows and heifers. Table 1 also provides estimates of heifer and dry cow numbers for planning purposes.

Milking Cow Facilities

Dry-lot Design. Table 2 contains recommendations for sizing corrals and headlocks for milking cows housed in a dry-lot system. The recommendations in Table 2 should be considered minimums. As the herd expands in the future, facilities may be crowded beyond the initial design.

Corrals should have 2.5% to 3.0% primary slope and 0.3% to 0.5% secondary slope to allow adequate drainage. Shades should be designed to allow one lockup per animal. If 6-in-10 lockups are desired, 10% more per are very similar to his.

Milking Center. Some Jersey producers are milking in parlor stalls designed for Holsteins. Although this scenario is working in certain situations, it is less than desirable. In some cases the indexing rails can be moved to accommodate smaller animals. Stall width, however, is difficult to change. For parallel parlors, a 24’’ stall is desirable. Herringbone stall width can be anywhere from 30’’ to 45’’. Distance from the back of the stall. Some neck rails rested on top of the loop (32’’ to 34’’ high) and others were suspended from the ceiling and were 40’’ to 43’’ high. In our opinion, neck rails should be about 40’’ above the bedding for Jersey cows. Thus, a 28’’ to 32’’ loop would ideally suit Jerseys. Alley width from headlock to free stall was 12’’ to 14’’, and alleys without a feedline were 10’’ to 12’’ at the Jersey dairy farms measured for this paper.

Good facility design involves long-term planning plus painstaking attention to detail. This dairy illustrates the use of 5-in-10 headlocks mounted in 8” curbs, with 500 sq. ft. of corral space per cow. Note the proper installation of shades.

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2x milking and 10.5 hours for 2x milking. However, extensive cracks and break-out have occurred with 7” curbs when pipe in excess of 3.5” O.D. is used. A 16” cow side and 12” feed side height are commonplace. A 4” curb-height difference should be maintained.

Free Stall Design. C. A. Russell of Yosemite Dairy in Hilmar, Calif., published an article in Jersey Journal (February, 1998) that detailed a desirable free stall design for Jerseys. The recommendations in this paper are very similar to his.

Most stalls in use are 42” wide, and 6.5’’ to 7’’ long. For first lactation heifers, some producers find 39’’ stalls more desirable. However, 39’’ stalls will limit the pen flexibility by accommodating only first lactation heifers. Loops should be 8” to 12” off the bedding. Loops on most dairies we visited were 32” from the top loop to the ground. Wider loops are necessary for higher neck rail placement if neck rails are to be attached to the loops. Wider loops also allow side lounge space. Neck rails and brisket boards should be 54” to 60” from the back of the stall. Some neck rails rested on top of the loop (32” to 34” high) and others were suspended from the ceiling and were 40” to 43” high. In our opinion, neck rails should be about 40” above the bedding for Jersey cows. Thus, a 28” to 32” loop would ideally suit Jerseys. Alley width from headlock to free stall was 12” to 14”, and alleys without a feedline were 10” to 12” at the Jersey dairy farms measured for this paper.

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Panel to the brisket area is the limiting factor. For 900- to 1,000-pound cows, this should be 55" to 60".

The milking parlor should be located to avoid excessive cow walking. Forced walks are defined as the distance from the holding pen entrance to the corral. For free stall barns it is the distance from the holding pen entrance to one-half the length of the free stall barn.

If a wash pen is utilized, it should provide 10 sq. ft. to 12 sq. ft. per cow. Wash pens effectively clean cows when nozzles are spaced 5.5' apart in one direction and 6' in the other. The holding pen should pro-

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Waterers

Lactating dairy cows, particularly in a semi-arid climate, require large quantities of water. The importance of abundant, fresh, and clean water cannot be overstated.

Cleaning waterers regularly (at least weekly) will ensure clean, fresh water. To facilitate easy clean-out, waterers should be constructed so that dumping or emptying is simple and quick. Shallow (10” to 14” deep), rapid-filling troughs also contribute to a clean, fresh, water supply. In hot climates, use concrete or fiberglass tanks. Water temperature should not exceed 86°F. Provide 3’ of trough space per cow in a group. It is also critical to make water available after cows leave the parlor, either in an exit alley or return lane. Optimally, there should be 2’ of water trough length for each cow in a side of the parlor. For example, in a double 15 parlor, 30’ of water trough as cows exit the parlor would be ideal.

It is important to remember that heifers and dry cows also require clean, fresh water. In particular, all calves, regardless of weaning status, should have free-choice access to water. In the hotter months, calves need more fluid than is supplied through milk replacer. Water intake will also encourage dry feed intake, which will promote early weaning and healthier calves.

Dry Cow Facilities

Dry cows should be managed in at least two groups: a close-up group (three to four weeks before expected due date until calving) and a far-off group (from dry off until three to four weeks prepartum). Optimally, large dairies should consider a third group for close-up heifers. Heifers housed separately will not have to compete for feed and water space with older cows and can be fed a different ration if needed.

Planning is essential to successfully designing a dairy, and proper sizing of corrals and free stalls is critical to cow comfort. Plans should encompass where the dairy will be in the next ten to 15 years, from a production and size standpoint. Allowances for future expansion should be a basic design component. Expansion of existing facilities or new construction must consider all animals, including dry cows and heifers.

Acknowledgments

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Table 2. Dry-lot design criteria for Jersey cows and heifers.

<table>
<thead>
<tr>
<th>Minimum Corral Area</th>
<th>Minimum Shade Area</th>
<th>Animal Feed Thickness</th>
<th>Headlocks</th>
<th>Platform Widths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft²/head</td>
<td>Ft²/head</td>
<td>Inches</td>
<td>Inches</td>
<td>Feet</td>
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<tr>
<td>Lactating cows</td>
<td>500</td>
<td>36</td>
<td>16</td>
<td>12</td>
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<tr>
<td>Close-up dry cows</td>
<td>500</td>
<td>36</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Far-off dry cows</td>
<td>400</td>
<td>36</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Bred heifers (15-24 mo.)</td>
<td>300-400</td>
<td>20-25</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Breeding-age heifers (12-14 mo.)</td>
<td>200-300</td>
<td>15-20</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>10-12 mo.-old heifers</td>
<td>200-300</td>
<td>15-20</td>
<td>14-16</td>
<td>10-12</td>
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<tr>
<td>5-9 mo.-old heifers</td>
<td>150-200</td>
<td>15-20</td>
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<td>8</td>
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<tr>
<td>3-5 mo.-old heifers</td>
<td>100-150</td>
<td>30-40</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Transition calves (post-weaning)</td>
<td>50-100</td>
<td>40-50</td>
<td>12</td>
<td>8</td>
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