Design Criteria For The Ideal Robotic Milking Barn

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One of the goals of DairyLogix, and its international partners, Vetvice in the Netherlands and Cowhomes in Finland, is to design the ideal robotic milking barn using 4 criteria. Our goals are to maximize cow comfort and performance, maximize labour efficiency, optimize the use of capital and to build something that is flexible and readily expanded while maintaining its original cow comfort and labour efficiency characteristics. We work to evaluate existing barns and improve on them with each new project. The following is a series interacting design concepts we try to incorporate, with a description and rational for the direction we have chosen.

Excellent results can be achieved with either free or guided cow traffic, but when management is less than ideal, cows in guided traffic barns suffer with longer waiting times and fewer meals. With free traffic the biggest impact of poor management is on fetching and labour efficiency. While we work with designs for both, when a choice is offered we choose for cow comfort and for free traffic.

The barn layout illustrated in Figure 1. combines a dozen features we consider important in an ideal design for robotic milking. Some of the principles we value in robotic milking include:

1. The split entry holding area simulates voluntary entry for fetched cows, minimizes interference for other cows and is the least labour for the owner. This is a DairyLogix innovation now used worldwide.
2. A large open area in front of the robots with multiple escape routes gives timid cows the confidence to attend voluntarily. Locate cow brushes, pasture selection gates and computer feeders far away from this area to spread out the areas of activity and minimize stressful interactions.
3. Simple cow routing and gating that make all handling and fetching a one person job.
4. Perimeter feeding keeps cows out of the rain and sun, and reduces the risk of frozen manure in alleys. But the main benefit is that cows never have to cross a feed alley, making grouping, and access to the handling area much more convenient. 6 Foot (1.8 meter) wide walkways on the ends of the barn facilitate convenient feed push up. Perimeter feed delivery outside the barn is popular in Finland.
5. Flexible groups with a choice of 60 or 120 cows per group. Smaller groups make fetching easier, and make it possible to split a herd by age or stage of lactation, but larger groups reduce waiting times and decrease stress associated with maintenance work and wash cycles.
6. Maximum comfort for fresh and lame cows in a pack area with voluntary access to the milking robot. This pack is combined with the calving pens so all bedded areas are in one convenient place.
7. Practical separation systems which make flexible use of space that is available to other groups when not in use. Using a 3 way sort on one robot and a two way sort on the other, cows can be separated from both into one handling area. By moving gates and temporarily crowding the dry cows a large group of cows can be sorted when needed for herd health work.
8. Strategic use of each robot to offer access to special groups of fresh and lame cows, separated cows, and/or close up heifers. With two robots there is access from the bedding pack and the separation area. When there are no separated cows, close up heifers and cows can have access for training.
9. Direct access for all groups to a centralized handling area. This layout permits simple handling of cows separated from both robots over the last 12 to 15 hours, as well as one man handling of cows fetched from any group. Handling cows in robot barns is a unique challenge because there is no

opportunity for short term sorting. Headlocks are also problematic because when cows are never away from feed it is more difficult to entice them to all come to the manger at once.
10. Strategic placement of computers, equipment storage, water and hydro, in the handling area.
11. All milking robots face the same way, so no retraining is needed when cows go from group to group. In a field survey of 11 herds with two robots in one group, 39% of cows used both robots 40 to 60 % of the time, defined as "cross use" and 20% of cows used either one or the other robot more than 90% of the time defined as "selective use". In a comparison of layouts it was found that selective use was lowest when all robots faced the same way (Gelauf et. al. 2009).
12. Open alleys through the length of the barn for convenient materials handling. Since cows never leave the barn, all tractor work is very disruptive and should be avoided, but in a sand bedding option, wide alleys, straight lines through the barn, multiple crossovers and free traffic are recommended.
Last but not least there are several ways that this layout can be expanded from 2 to 3, 4, 6, or 8 robots by mirroring the barn and adding robots on the center cow platform, while retaining the convenience of central handling and simple cow movement. More detailed information about these layouts and other aspects of robotic milking barn design can be found at www.dairylogix.com.

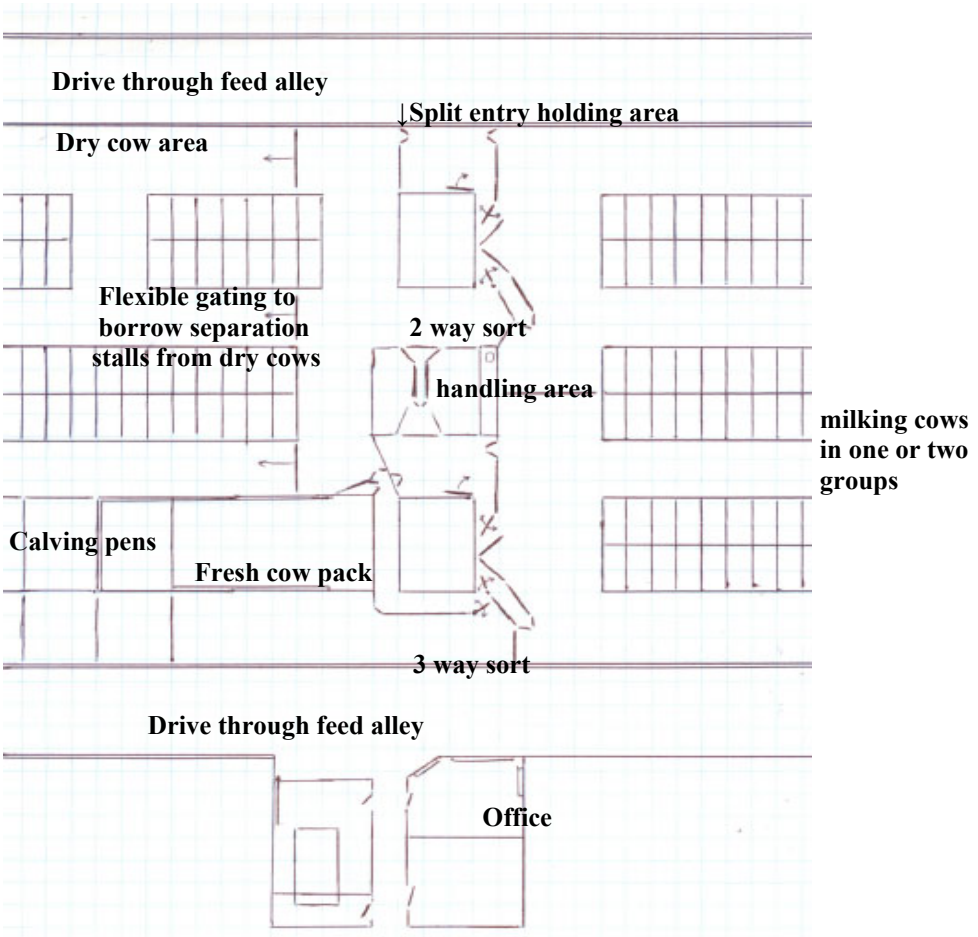

Figure 1. The robot and handling area of a 2 robot barn.

Reference: Gerlauf, J.S, G.J. VanderVeen, and J. Rodenburg 2009, "Preference Behaviour of Cows Choosing a Robotic Milking Stall, in Abstracts of the 2009 European Association of Animal Production,Wageningen Press.