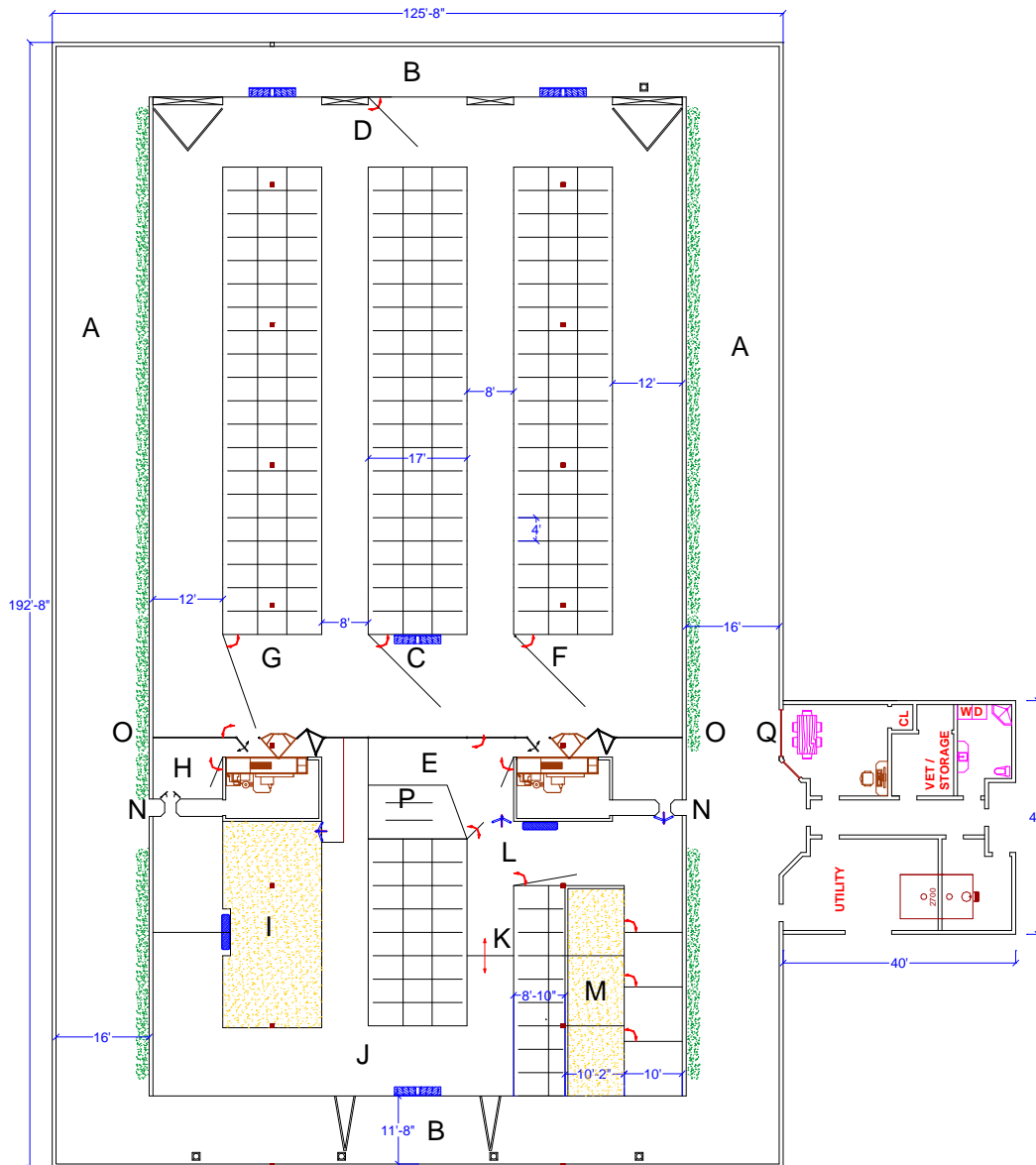


The Vetvice-DairyLogix Robotic Milking Barn Concept

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Robotic milking is rapidly being accepted in Europe and in Canada, as an economical option for herds of 120 to 480 cows. Experience has shown that while robotic milking can work in any freestall or pack barn, there are numerous aspects of design that will impact on labour efficiency and cow behaviour. The Vetvice and DairyLogix design teams working both in Europe and Canada, have decided to join forces on a project intended to determine the ideal design for a robotic milking barn. As producers adopt these design concepts, it is our goal is to evaluate the performance of these barns with the objective of continued improvement. We will not rest until we can recommend the right location for every stall, every gate and every electrical outlet in this concept barn. We also hope to incorporate detailed plans for future expansion and variations to suit individual preferences.

Fig. 1. A 120 version of the Vetvice-DairyLogix concept



Because cows of all ranks must voluntarily approach and use the milking stalls a large open space with a width of 20 to 24 feet in front of the stall encourages high traffic. Since cows never leave the barn, cleaning alleys with mechanical scrapers, a flush system or slatted floors is much less intrusive than tractor scraping. Because cows are never routed to a parlor, cow movement from group to group at calving or dry off requires logical routing. Holding pens for fetched cows should be designed with a split entry to the robot so that they are exclusively used by fetch cows. Many management issues are as yet unclear for this relatively new technology and hence the plan is designed to maximize flexibility. For example in larger herds cows can be grouped in groups of 60 with a single robot or larger groups with multiple robots, and groups can be structured randomly or by age or stage of lactation. Since there are so many unanswered questions, and since the barns we build today will be in use for several decades, flexibility in design, is an important attribute for robotic milking barns. Fig. 1 is a version of a basic Vetvice-DairyLogix concept layout of a robotic milking barn for 120 milking cows and dry cows that combines many of the desired attributes as well as the flexibility to allow different grouping strategies.

This plan includes 120 freestalls in 6 rows with drive through feed alleys on the outsides of the barn. This layout allows the cows in the main freestall area to be handled as one group with no gates or as two groups with gates at both ends of the center double row of stalls. Both robots face the same way to encourage cows to use both without confusion or additional training. Ontario field experience suggests a large open area in front of the milking stalls enhances cow movement in the barn. This open area also makes it easier for cows to negotiate an exit route to either resting or feeding areas regardless of the orientation of the milking stall. With 4 foot wide freestalls, a 12 foot crossover at the end of the barn and a 20 foot open area in front of the milking stalls, these plans provide 2 feet of manger space per cow for 56 cows per side along the drive through feed alleys at A. Since ideal handling methods for these barns are poorly defined and since headlocks may well play a role in future management schemes, it is tempting to widen the crossover an additional 4 feet to provide space for one headlock per freestall. Feeding from two drive through alleys, on the outside of the barn is more work than a center drive through but makes it possible to handle the herd as one group and makes cow movement between groups and work among the cows more convenient. The outside drive alleys also keep rain and sun out of the cow area. Narrow cross alleys B at the ends of the barn permit workers and small equipment to travel around the perimeter of the cow area to push up feed. If alley scrapers are used, manure drops at the end farthest from the milking stalls and a place to “park” scrapers out of the traffic area can be incorporated under this alley. If slatted floors are used, the 24 foot post spacing is compatible with under the barn manure storage.

Gates at C and D can be used to divide the herd into two 60 cow groups. To fetch cows into holding area E, close gates C and F and clean the freestalls in a counter clockwise direction, keeping fetched cows ahead of you. Close gate D when you come to it and complete cleaning stalls in this half of the barn. Repeat this in the other half of the barn, by closing gate G and opening D as you pass it. Once the fetched cows are in the holding area, all gates can be opened. Since the holding areas E and H are only used to house fetched cows, access to the milking boxes for other cows via the “split entry” is unrestricted. High ranking cows from the main milking groups are kept out of the holding areas reducing stress for the usually more timid fetched cows. Note there is a gate in the holding area behind each milking stall which can be used to direct and “squeeze” an inexperienced cow into the milking stall.

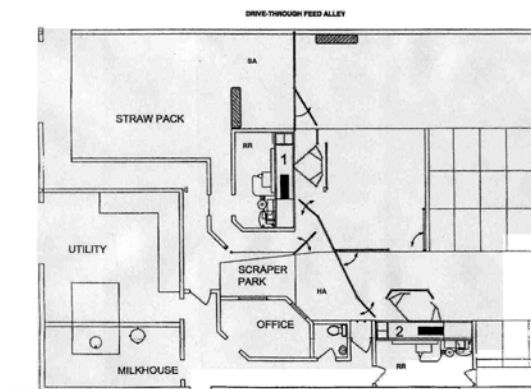
A bedding pack for fresh and lame cows at I has access to the milking stall beside it through holding area C in Fig. 1 and F in Fig. 2. With a post milking sort gate, these cows are returned to the pack. Far off dry cows housed in the freestalls in the center area J have manger access beside the cows in the bedding pack. A movable gate in the interior alley at K separates far off dry cows from close up cows in area L, which eat at the manger behind

the other milking stall. The close up cows have free access to the milking stall beside them for lead feeding and training purposes, and a post milking selection gate will return them to their pen area. At calving, close up cows can be moved into one of three bedded pens in area M.

Clean access to the milking stalls is via a bridge with a 36 inch gap at N .To segregate and restrain a cow for individual handling, she can be fetched into the holding area, and post selected through the milking stall. If the bridge at L is gated, the segregated cow can be restrained in a headlock at O, treated and released back to the main barn. Handling and especially hoof trimming could also be incorporated at P, a spot that is readily accessible to all cow groups. Cows can be easily moved from group to group through a lactation cycle, and all feeding is along the two mangers on the sides of the barn. The bedding pack and calving pens can be cleaned from the end of the barn. The office gives a good view of both the area in front of the robots and the calving area. With a sliding window at Q and a turntable for the computer screen and keyboard, clean and dirty access to the computer can be provided.

The principles demonstrated in these plans can also be applied to larger herds. To double the herd size, three options are suggested. It is possible to mirror image the barn on the end used for dry cows and create a barn with 4 robot rooms located at the corners of a central handling area. Moving far off dry cows to another facility would keep the central handling facility more compact. This option leaves all the grouping possibilities intact, but it does require clean out of the bedded areas from the side of the barn. Back to back milking stalls with no separation and handling facilities, combined with another barn with at least one milking stall set up for training and handling is a second option. If the choice is made to work with a minimum group size of two milking stalls and 120 cow groups, Fig 2 provides a configuration combining two same sided milking stalls. Fetched cows collected in holding area HA are milked in milking stall 1. Separation cows milked in stall 1 are sorted into Separation area SA, and can access the holding area and milking stall via a lane behind the robot room. Cows separated in milking stall 2 sort into the holding area, are subsequently refused in milking stall 1 and directed into SA

Fig. 2 An ideal layout for two milking stalls in a single group of cows..



In Fig. 3 this configuration is used to double the length of each end of the barn, and add a single robot room with two back to back milking stalls.

Fig. 3 An illustration of a barn for 240 milking cows with 2 robots per group.

