Cow Flow

The Cafre dairy unit has been designed to best meet the education and training needs of agriculture students and the dairy industry, to enable the delivery of knowledge and technology transfer and to comply with all relevant legislation and animal welfare recommendations.

This is one of a series of technical notes aimed at farmers and students. The notes are designed to provide the level of technical detail required to assist farmers in adopting technologies and practices demonstrated in the new Greenmount Campus dairy unit on their farm business.

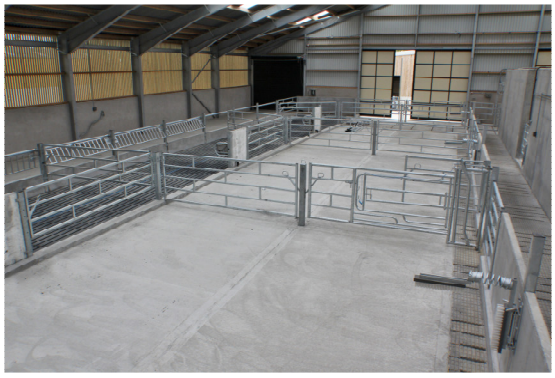
Cow behaviour
A basic understanding of animal behaviour is important when designing dairy cow housing. Cows remember painful and frightening experiences and cattle with previous experience of quiet, gentle handling and movement will be less excitable in the future.

Cows rely heavily on visual stimulation. While they have a wide field of vision, they are poor judges of detail and distance. They also have poor depth perception which explains why they are reluctant to enter dark or shadowy areas.

Cows have a tendency to move towards light but are sensitive to harsh contrasts of light and dark within housing facilities. Consistency of lighting throughout a building is as important as level of illumination. Cattle are less sure footed on downward slopes and prefer to move up gradual inclines rather than steep slopes.

The CAFRE dairy unit has been designed to allow easy movement of animals throughout the entire area with the minimum of stress and effort to the stock. Floor surfaces have been specified to provide good hoof grip. High levels of natural light have been incorporated within the design and good levels of artificial lighting are provided throughout the building for the winter period to avoid areas of shadow.

Maternity Wing
The transition between the dry period and the early part of lactation is a stressful time for dairy cows. Cow management at this time should aim to minimise this stress while providing cows with optimal comfort and reduce the disease challenge faced by the cow and new born calf.



The policy adopted within the Cafre dairy unit involves moving cows from the dry cow cubicle area to the **pre-calving pen** in the maternity wing 5 days before calving. Cows are moved in groups of 2 or more at a time when possible to minimize the stress and bullying that may take place when cows

are mixed and re-establish a group pecking order.

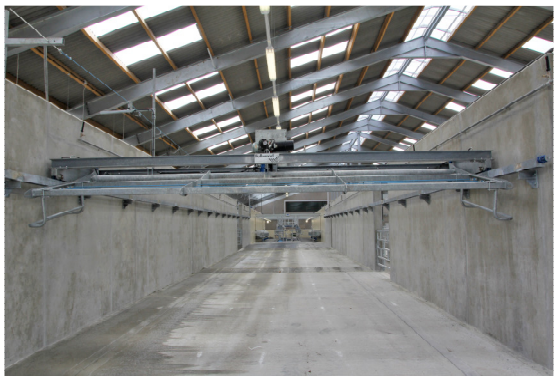
On the point of calving, cows are moved from the pre-calving pen to an individual calving pen via the access passageways within the maternity wing. The individual calving pens are cleaned out and disinfected between calvings to provide an optimal calving environment. The calving pens are equipped with gates fitted with head locking yokes to restrain a cow requiring calving assistance.

The calving pen gates also facilitate milking cows in the calving pen immediately after calving to provide 3-4 litres of colostrum to be fed to the new born calf. Within 12 hours of calving the new born calf is moved to an individual pen in the adjacent calf house and the cow is moved to the post calving pen.

Cows remain in the **post-calving pen** for approximately 5 days. Gates are provided to easily move cows from the post calving pen into the collecting yard for milking in the herringbone parlour. After milking the cows are returned to the post-calving pen along the maternity wing passage to the right of the milking parlour as shown in the accompanying diagram **Maternity Wing Milking Cow Flow**. After approximately 5 days cows are moved from the post-calving pen to the start-up group in the cubicle house after evening milking in groups of 2 or more cows when possible to minimize stress and bullying.

Collecting Yard

The collecting yard in the Cafre dairy unit measures 35.0m x 6.5m, a total area of 227.7m^2. The recommended collecting yard area per mature dairy cow is 1.6m^2. The capacity of the collecting yard is thus 140 cows plus space for 32 cows in the herringbone milking parlour at the start of milking. The capacity of the collecting yard is sufficient to accommodate the complete herd if managed as one group during the summer grazing period.



The collecting yard is fitted with an up-and-over backing gate. The use of backing gates in collection yards is a useful tool, if used correctly to improve cow flow. A backing gate can speed up the time spent milking, which not only releases time for other husbandry tasks and maintenance, but minimises the time that cows have to stand involuntarily.

However, backing gates must be used sensitively and electrified backing gates are not recommended. Cows are very sensitive to electrical current and standing on concrete on often wet floors aggravates the problem. In addition, the animals getting the shock are not usually those the herdsman is requiring to move. This increases stress, will often lead to cows scrambling around and slipping and increases the incidence of lameness.

In preparation for milking, the first group of cows to be milked is brought into the collecting yard. The backing

gate is then dropped into position behind the first milking group allowing the second of milking cows to be brought into the collecting yard. This minimises the need to move groups of cows once milking has commenced.

Cubicle Building

When a housing system is designed, it is important to understand the social hierarchy within a dairy herd. There will be a number of dominant animals and a number of subordinate animals. The majority of animals fall between these two camps. When a dominant animal meets an animal who has no established position in the herd hierarchy, there will initially be some aggressive interaction. One animal will emerge as the dominant animal. When the subordinate animal next meets the dominant animal, she will move away from any potential conflict.

The cubicle design has been designed to allow subordinate animals to move away from dominant animals without conflict. Cubicle passageways which end in dead ends mean that to escape a dominant animal, a subordinate animal must walk past her. All passageways should provide a subordinate animal with an option to avoid aggressive interaction.

Cows in the Cafre cubicle building can be managed in up to 4 separate groups. Each separate area has been designed to avoid blind passages and allow cows to readily move between the feeding and lying areas. The grooved rubber floor material on the 4.0m wide feed standing passages provides adequate space for cows to feed and also provides loafing space for cows to demonstrate oestrus behaviour.

The central cross passage in the building allows groups of cows housed in the South end of the building to be easily returned after milking to their allocated housing area without the need to pass by another group of cows. The cross passage also allows cows needing veterinary treatment or required for routine student skills training to be moved from the upper groups in the cubicle building to the handling facilities.

Cow Dispersal

When a side of cows exits a milking parlour there needs to be an unobstructed flow of cows out of the building so that milking is not impacted. The speed of cow flow away from the parlour will be improved if the floor surface provides good hoof grip. When cows are sure of their footing, they will walk confidently. Where the dispersal area requires cows to walk singly in a race, the cows should be funneled gradually towards the race entry. It is normal practice to funnel cows through a funnel with an angle of approximately 30^0. Cows will also follow a contrast in lighting, moving from shaded to better lit areas.

The Future Herd cows walk over a 24mm rubber floor fitted across the parlour exit and funnel around the wall

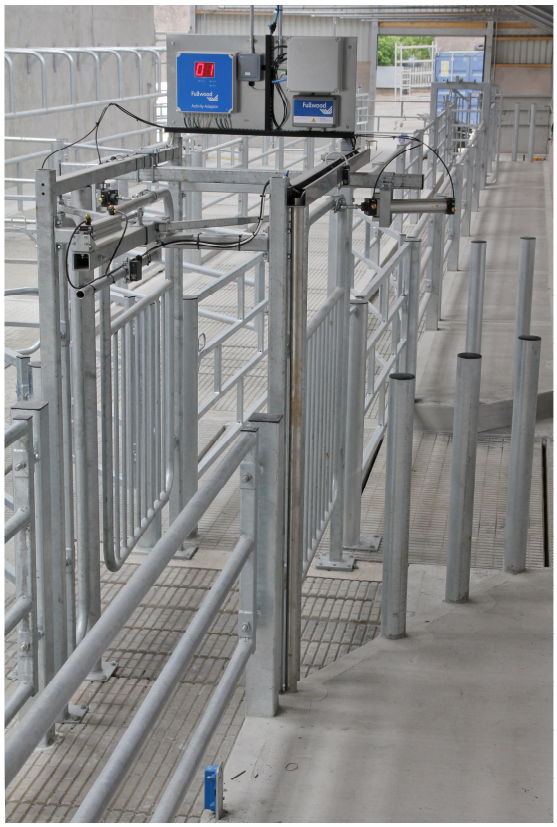
of the bull pen to enter one of two similar dispersal races. Six days of the week cows exit over Race 1 that contains a Vink automatic hoof washer. The hoof washing action is triggered by cows breaking an infra red beam in the race as they approach the hoof washer. One day per week the cows will go through Race 2 that contains an automated stainless steel single stage footbath. Both races sit over a slurry channel with the uprights grouted into the flooring units. The flooring units are grooved to provide enhanced hoof grip for the cows.

The panels that form the races sit flush with the uprights to give an unobstructed cow flow along their length. Where the two dispersal races converge, the cows walk over a dynamic weighing platform. This weighs each cow as she walks across it. As the cow leaves the platform she is identified by her leg pedometer on an antenna and her weight is recorded on the parlour computer as she enters the auto shedding gates.

Automatic drafting gate

Automatic drafting allows groups of cows to be directed back to their allocated housing are or cows requiring individual to be efficiently segregated into a holding pen with minimal stress on the animal or labour input from the farmer. The 3-way automatic drafting gate in the Cafre dairy unit is positioned just before the central cross over passage of the cubicle house. The cow is drafted automatically according to her pre determined setting in the parlour computer. The CAFRE selection criteria for the drafting gates specified 99%+ accuracy of the shedding process. The drafting gate can divert the cows in three directions:

1. To the right - through the central return passage to the cubicle house.
2. Straight ahead - to the main return passage. (Crush race on herd test days)
3. To the left - into the segregation pen for treatment



Segregation pen

From the automatic drafting gate, drafted cows initially walk in the same direction as their herd mates, collecting in a large pen for routine health treatments, veterinary inspection or for student training purposes. Drafted cows have access to water while they wait to be treated. The segregation pen can be subdivided. From these pens the cows can be moved to the hoof trimming crush, the bull pen for natural service, the herringbone crush or the handling race.

The floor surface is finished with hexagonal grooves tamped into the curing concrete. After use, the area is volume washed. An open drainage channel aids cleaning.

Slatted Return Passage

During milking, cows that do not require attention return to the cubicle house through the 2.5m wide slatted return passage directly from the auto shedding gate. Before milking this area is wetted with the overhead sprinkler and is cleaned with the robot scraper. The floor surface is constructed from concrete slats manufactured with a grooved finish for improved hoof grip.

Loading bay

Cows destined for transport off the farm can be loaded onto the cattle trailer through an external sliding door and gates positioned at the end of the handling facilities area between the herringbone crush and the handling race. The 2.5m wide passage reduces attempts by cows to turn around ensuring efficient loading onto the trailer with minimal stress to cows and stockmen.