

# Successful planning of a dairy farm with an automatic milking system

by Tobias R uth, GEA Farm Technologies GmbH.

Just like in a conventional dairy farm, attention must be paid to all the generally important parameters for an automatic milking system (AMS) design. Stall climate, feeding and manure management are equally important factors as animal logistics, animal health and hygiene.

It is a peculiarity, however, that for automatic milking systems the milking cows are in a closed system on a farm. Depending on the management model, the cows have to be integrated into the system (for example heifers or cows after calving) or they leave the system for a time (for example problem cows or dry cows).

When planning a system for automatic milking it must be taken into account that the cows are milked in a 24/7 operation.

The cows are therefore permanently in their barn (except for systems with pasture) and on average are milked three times a day. Various functional areas of a dairy farm come together in an AMS barn and can be found around the robot.

A milking centre has to be arranged which can save on working time when optimally designed. 80% of the herd is routinely milked by the robot, but the remaining 20% of the cows require most of the work.

So for optimal design of a new AMS Barn (or even rebuilding) one focal point is the efficient organisation of the working and functional areas around the milking robot

## Multibox robot system

The Multibox robot (Mlone) has many advantages within AMS planning compared with the single-box systems, as it permits several different solutions.

Various sizes of herds or groups can be managed in one single system with one or several milking boxes. From the technical point of view operation, service and regular control are only necessary for one system, no matter whether it involves one

or five boxes. Future expansions can be easily achieved using forward-looking planning. Here, for instance, the structural foundations for four milking boxes could be built although the operation starts just with three milking boxes.

A complete working and milking centre could be realised with the Mlone at its heart. Through the use of automatic sorting gates the cows can be separated into various functional areas near to the robot. The animals of several boxes are only guided by a single return lane and could thus be sorted into one selection area. This means huge advantages in terms of logistics and labour efficiency.

## Automatic sorting of cows

The use of automatic sort gates in an AMS primarily helps the people in saving time and work. In conjunction with suitable herd management software, the operator/manager is in a position to guide the cows into specific areas based on defined characteristics or to sort them out completely.

This is of particular use if you bear in mind that it is a 24/7 operation and that the operator/manager is only present in the barn at certain times. With automatic pre-selection, which decides whether a cow is due for milking or not, unnecessary visits to

the milking robot can be avoided. The loading on the individual milking boxes is thus optimised and the waiting area not overburdened.

An automatic post-selection has the special advantage that conspicuous cows or cows that must be sorted out for special actions or treatment are placed exactly where they can be worked upon: in an extra area near to the robot. If problem cows need to be additionally sorted into a special needs area, it is advisable to plan direct access back into the waiting area.

Like this you can easily guide problem cows manually to the milking boxes and, where necessary, milk them by hand under supervision. The areas should be built following the cows need in her respective lactation phase, for example a straw box for the special need cows.

With the use of sort gates the operator/manager does not therefore necessarily have to run into the barn to look for cows.

This is time consuming and means unnecessary stress for the rest of the herd in front of the robot. If, for instance, a veterinarian visits the farm, he can deal directly with the relevant cows, because these have been especially sorted out for him during the day.

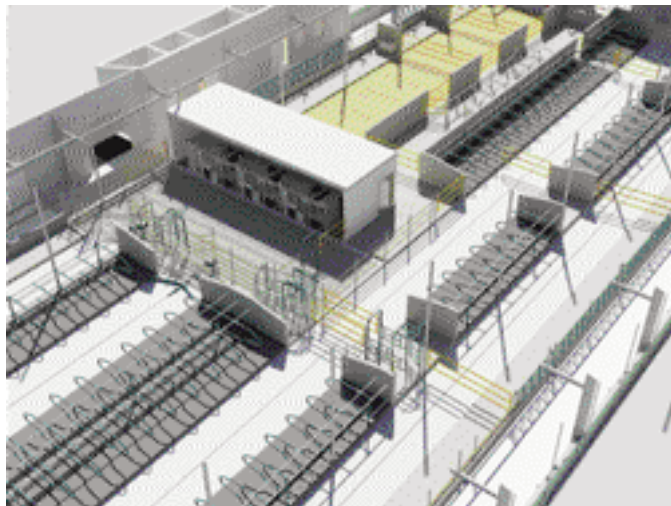
From Fig. 1 it is clear that an AMS barn can be divided into three essential main areas: the 'normal' barn area for feeding and resting, the milking centre with its functional areas and the interface area between the milking centre and barn.

The selection gates come into use in this interface. Depending on the type of barn the waiting area in front of the milking boxes is planned with the appropriate pre- and post-sorting gates. The size of the milking system and the optimum cow logistics are decisive factors in the exact design of this area.

The cows have to reach the robot day after day of their own free will and without any disturbance. For this reason the transfer out of the 'normal' barn area to the milking boxes is a highly sensitive area while planning.

*Continued on page 25*

**Detailed view of an Mlone barn model.**



Continued from page 23

It makes a significant contribution to whether the system is accepted by the cows or not. In principal one pre- and one post-sort gate would be necessary for a basic system.

## Optimum design parameters

For the barn primarily the general rules apply which bring about an optimum, healthy barn climate. Attention must be paid to the factors of light, air and water just as much as in conventional barns. It is good practice for animal health and hygiene that the freestalls are always dry and clean. The design of the alleys should be hoof friendly. As the cows should reach the robot of their own free will planning should be made using generous dimensions.

The cycle of the cows between lying, milking and feeding should be undisturbed, that is to say that the animal traffic should not be restricted by building construction.

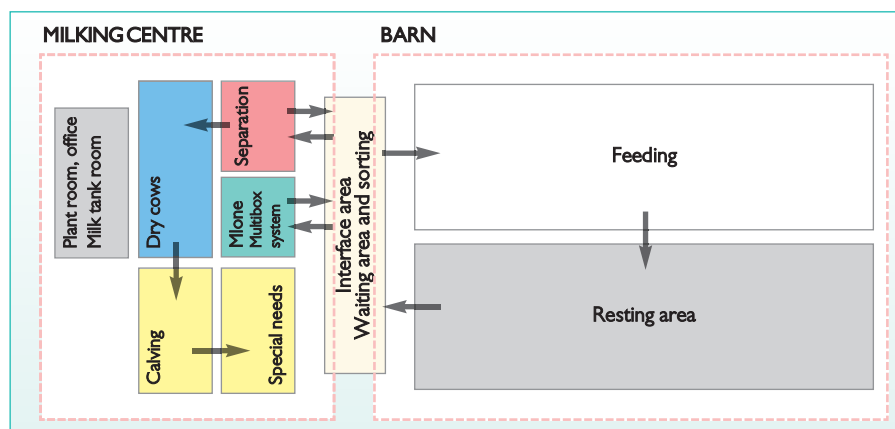
The feedlot/freestall ratio should not exceed 1:1.5 for conventional feeding, but could be 1:2 for automatic feeding.

The robot with its adjacent rooms (for technical, milk tank and office) must be set up in frost-free conditions in the barn (depending on the climate region) and the view of the milking boxes should be clear for the cows. The service area of the robot should be able to be reached comfortably where possible.

Below are some basic requirements for the essential areas within the barn which are necessary for an efficient AMS:

### ● Alleys:

The normal alleys must be at least 3.0m and the feed alleys at least 4.0m wide. That means that low ranking cows can avoid boss cows in the wide alleys. Dead ends should be also avoided where possible. The length



**Fig. 1. Functional diagram showing the main areas of the Mlone barn concept: barn, milking centre and the connective interface area.**

of the alleys should not be too long in relation to the type of barn, as a long distance to the robot causes a negative impact on the milk efficiency.

### ● Crossovers:

The crossover with drinking troughs should be wide enough so that weak cows can also pass without any problems. The first crossover should be near to the robot, otherwise it is recommended to set a crossover after every 20 freestalls.

### ● Waiting area:

Five cows must be able to wait in front of every milking box so that cows do not feel threatened through skirmishes. This means a net depth of the waiting area of 5.0m (excluding all gangways). The width depends on the size of the multi-box system.

### ● Separation area:

The separation area should be laid out for at least 10% of the herd. As cows may have to wait for some time, water and feed must be available in addition to a resting area. A technical must is self-locking safety feed fences for inseminations, checks and other special cow actions or even the access to a

palpation rail. From here the cows should be able to be brought to other areas or out of the AMS barn.

### ● Special needs area:

In the straw box at least 10m<sup>2</sup> per cow should be planned. A direct access to the waiting area is optimal so that cows can be guided directly to the robot without disturbing the routine operations. Due to regular cleaning, it should be next to an outside wall.

### ● Office, plant room and milk tank room:

For the work on the PC an office must be located near to the robot from where the various areas can also be monitored visually. Short and optimal working paths between the working areas assist both internal and external personnel in their daily routine work and are immensely time-saving if they are well planned.

The size of the plant room and milk tank room depends on the technical specification of the complete system. Compact arrangements of the rooms and a short distance to the multi-box system assist to improve economic installation and piping. ■