Automated drafting systems

1. Introduction

Drafting of cows can be a trying and time-consuming exercise, especially if a large proportion of the herd is to be caught. Automated drafting systems consist of a race, sorting gate and identification system and controller.

2. Interpretation and relevance to Australian Conditions

The accurate sorting of cows into groups is an integral part of herd management on farms. This task has been made more difficult as herd sizes expand and labour availability is reduced. Automated systems that are affordable and work accurately and consistently are very valuable assets to the milk harvesting system.

3. Relationship to CowTime goals

Automated drafting systems can improve the flow of activities and productivity of milking. Staff can focus on the task of milking without being distracted by the need to draft cows as they leave the dairy. Having a system that works well without operator involvement reduces operator stress and the stress on the cows.

4. Features of automated drafting systems

Consistent cow flow is critical to the success of auto drafting so it is preferable the system is installed a short distance away from the dairy exit (where the cows can be distracted by milker activity). Some systems require each cow to be stopped for accurate identification. Others allow a constant walk-through with cows being identified as they pass by. The two different systems have different effects on cow flow from the dairy.

Siting considerations

Raceway design, cow travel paths and yard locations all require careful consideration if the automated drafting is to be a success. The race should be a minimum of two cows in length (4000mm), and a constant single-cow width (760-820mm) for the length of the race.
Variations to cow travel paths should be minimised with the drafting path being the same as the exit path. Holding pens that are parallel with the exit race will also assist cow flow.

Cow identification

Automated drafting requires electronic identification (EID) of the cows. The EID requirements of the drafting system must be compatible with the EID requirements of other automated activities in the dairy if the full potential of the system is to be realised.

System controller

The system controller may be a computer (separate "processor") or programmable logic controller (PLC). When the drafting system is an integrated module of the herd management system, a single controller can be used for all the automated activities.

Integration with the herd management system will allow cows to be drafted automatically on pre-set criteria. Information can be collected from the cows automatically (eg cows detected in oestrus through the use of pedometers or information from a milk metering system) or be typed in manually (eg cows scheduled for vet checks or follow up treatments).
Many systems allow the drafting criteria to be tailored for the farm, thereby allowing individuals, groups of cows or any cow meeting a particular criterion to be drafted. This feature is handy because it can remove or reduce the need to program the drafting requirements just prior to each milking.
Recent advances include the use of hand-held computers to record information in the paddock that can then be up-loaded automatically to the system controller prior to each milking.

Drafting gate design

Several gate designs are used in automated drafting systems. They include single gates, where one gate is moved to switch the cow path from exit to holding pen and twin gates, where two gates are moved in counter directions to switch the cow path. Both can be utilised with success.

Cow path variation can be minimised by good gate design. The 'straight-ahead' or 'out-the-side' choice has a larger variation in cow path than a system using a left or right choice (see Figure 1).

The drafting gate must also be designed to stop cows forcing the gate and prevent cows getting jammed. The drafting gate must also activate fast enough to draft the desired cows without catching those not required. These features often require adjustment after installation on individual farms.

Operating requirements

Some form of energy is required for the actuation of the gate, whether it is controlled by a system controller or by the milker. Electricity, air, vacuum, pressurised water or hydraulic oil systems can be used. A particular drafting system will be designed to use particular energy sources. It will be necessary to ensure that a suitable drive can be provided for the drafting system and that the controller can communicate with the drafting unit.

Drafting sequence

Not all automated drafting systems use the same sequence of events to draft a cow. Electronic 'eyes' can be used to detect cow position within the system and blocking gates may be used to prevent following cows from entering the drafting unit until the drafted cow is clear.

Blocking gates can (but not always) interrupt cow flow, as can noisy operating actions and poor directional visibility. Cows like to follow one another by sight and the drafting gates should ensure good forward visibility to encourage cow flow.

Other considerations

The drafting system may operate at one of a number of levels, from manual to fully automatic, depending on the options installed. The unit should be equipped with a manual override to allow milkers to take control in the unlikely event of a malfunction. Catching of non-programmed cows should be via the milker entering the cow's number with a keypad – preferably in the pit.

Manual operation of automatic drafting systems is discouraged because this tempts owners to install the system near the dairy where milkers can see what is happening. Activity in the milking shed tends to distract exiting cows which can disrupt cow flow and the drafting process.

Regardless of the drafting system chosen it should be constructed to withstand the rigours of cow handling. A well-designed and well-built drafting system will give reliable service for many years.

5. Potential challenges with implementation

Poor EID function reduces the reliability of the system and may result in cows being missed, depending on system defaults. Operators must have confidence in the system and minimum acceptable standards should be discussed and agreed before any purchase is finalised.

The behaviour of the cows as they exit the dairy greatly influences the results achieved by automatic drafting systems. The facilities rely on cows behaving calmly and predicably. Agitated or fearful cows are very difficult to draft, manually or automatically.

6. Robustness of this information

This information is generic in nature and specific information about particular commercial products is best sourced from industry suppliers backed up by testimonials from farmers who use their products.

7. References and further reading

Product brochures from On-Farm Electronics, Packo Fullwood, Westfalia Landtechnik.

CowTime Guidelines for milk harvesting - Chapters 5 & 9. edited by Klindworth, D. et al (2003). Available on the CowTime website www.cowtime.com.au

Quick Note 3.2: Checklist for making changes to milk harvesting infrastructure

Quick Note 5.6: Electronic ID (EID) systems for cows

Figure 1:
In the left side-draft diagram (A) the drafted cow must turn 30° to enter the holding yard. In the right diagram (B) all cows veer 15° with a left veer for drafting or a right veer for exit.