

Precision dairy technology

Computerised bail feeding systems

What is the technology?

Computerised bail feeding systems are designed to allocate different amounts of grain and concentrate supplements to individual cows in the milking herd each time they are milked. They can be installed in both rotary dairies and in end exit and rapid exit herringbone dairies. A computerised bail feeding system may be integrated with milk meters if these are also installed in the dairy.

How does it work?

As each cow enters the dairy each milking, she is identified from her ear tag or collar using a reader connected to the herd management software program. This software program controls the feed dispensing system, allocating pre-set amounts of one or more feeds to the cow which are dropped in front of her in the bail at

the start of each milking. The cow then eats this allocated feed while she is being milked.

- › In a rotary dairy, the feed dispenser system comprises one or more feed heads mounted above the bail at cow entry onto the platform. A clutch driven auger draws feed from a given silo and the prescribed amount is then dropped in the bail for that cow. Sensors determine the bail position and cow position.
- › In a herringbone dairy, an auger draws feed from a silo down each side of the parlour and a dispensing system drops the prescribed amount of feed into the given bail for the particular cow. Sensors enable starting and stopping of the auger to deliver the set amount of feed to each cow.

Multiple feed heads, which may draw different feeds from several silos, can readily be installed in rotary

dairies. These systems enable varying combinations of two or more grain/concentrate products to be allocated to each cow.

Feeding more than one feed type can be done in herringbone dairies, but it is often more difficult than in a rotary dairy.

Why use a computerised bail feeding system?

Individual cows within any dairy herd differ from each other in many ways, including their genetic merit, age, days in milk and body condition. In many herds, there is also a mix of breeds and genetic strains. Each cow also occupies a different position within the herd's social hierarchy, which can impact on her milking order, and therefore her grazing behaviour and pasture intake in pasture-based systems.



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Responses to grain/concentrate supplements therefore vary widely between cows in a herd. This variability offers the potential to use concentrates more efficiently, by feeding individual cows different quantities of grain/concentrates rather than feeding all cows at the same 'flat' rate.

What are the potential benefits?

Potential benefits from using a computerised bail feeding system to feed cows grain/concentrates individually or in groups include:

- › increased milk production
- › increased herd feed efficiency, and therefore reduced feed cost per unit milk
- › better management of body condition of early and late lactation cows
- › improved herd reproductive performance
- › reduced herd health problems (such as ruminal acidosis, laminitis, heat stress) and culling rate
- › ability to better manage specific cows

Is it as simple as feeding individual cows to production?

Most dairy farms using computerised in-shed feeding systems set them up to allocate grain/concentrate supplements based on each cow's milk production and number of days in milk. Some farms also allocate concentrate supplements based on each cow's current bodyweights or body condition scores. Furthermore, some farms have separate 'feeding tables' set up for their first calvers and their older cows.

However, a recent [scientific review](#) commissioned by Dairy Australia of worldwide research conducted to date into the effects of individual feeding of concentrate supplements to pasture-based dairy cows indicates that these approaches are rather simplistic, and that it is uncertain whether they provide a significant advantage over flat rate feeding when examined on a whole herd basis. This is because of the many factors which, in combination, determine an individual cow's response to a particular supplementary feed in a pasture-based production system, including the quantity and quality of pasture eaten per day.

This review identified many cow and system-level parameters which could be important in determining the ideal daily grain/concentrate allocations to individual cows in a pasture-based system. They include:

- › milk protein and milk fat yields
- › breeding value for milk or milk component yield
- › days in milk/stage of reproduction
- › pasture intake, grazing behaviour and substitution rate
- › nutrient contents of the pasture and supplements
- › cow rumen function
- › environmental conditions (temperature, humidity, windspeed)
- › cows' walking distance and terrain
- › cows' milking order and arrival time back on pasture after milking, which can impact significantly on the quantity and quality of pasture eaten

The quantity and quality of pasture eaten by the cow each day could have a major influence on the amount of grain/concentrate supplements required for optimum productivity of individual cows. If/when sensors become available which can act as reliable indicators of individual cows' pasture consumption and substitution rate, and an intelligent decision support system has been developed which can process and interpret all the incoming data, this will be a game changer for computerised bail feeding systems.

Nevertheless, at the moment many dairy farmers with computerised bail feeding systems find them very useful for:

- › lead feeding their pre-calving transition cows through the dairy;
- › ramping up fresh cows' daily grain/concentrate allocations gradually over several days to better adapt their rumens and reduce ruminal acidosis;
- › preventing milker feed being dropped in empty bails or being fed to cows that go round the rotary dairy a second time;
- › feeding grain/concentrate to mixed breed herds and herds with a very wide range in cow bodyweights; and
- › feeding their year-round calving herds, which comprise cows at all stages of lactation and levels of production at any given time.

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Potential issues

If you are considering the purchase of a computerised in-shed feeding system, you should consider whether the technology is appropriate for your herd and feed management practices, both now and in the near future.

A computerised in-shed feeding system may be useful for a farmer with a split or year-round calving herd who feeds a moderate to high level of grain/concentrates and is committed to using a bail feeding system for the near future.

However, for a farmer who has already invested in, or intends to invest in, a feed pad and ancillary infrastructure and equipment which enables them to feed supplements in a partial mixed ration (PMR), a computerised in-shed feeding system is likely to be of limited use. Recent research at Ellinbank indicates that it is better for cow rumen function and ruminal acidosis control to mix grain/concentrates with hay, silage and other supplementary feeds in a PMR fed twice daily than to provide the grain/concentrates in the dairy. In a PMR feeding system most of the grain/concentrates are delivered through the PMR and only about 1 kg grain/concentrate are delivered through the bail at each milking, mainly for contentment. Thus there is little opportunity to take advantage of a computerised in-shed feeding system.

Most bail feeding systems require a separate PC with an internet connection. So if your dairy doesn't already have an office area with PC and internet, you may need to add these to your budget.

When appraising a computerised bail feeding system, factors other than price should also be taken into account, including:

- › compatibility of the cow ID system with other equipment
- › reliability and ease of servicing
- › ease with which the system can be upgraded
- › support provided to set up the system, learn to use it and troubleshoot any problems

If your cow ID system performs poorly for whatever reason, so too will your computerised in-shed feeding system.

Suppliers and cost

Several companies supply the hardware and software components for computerised in-shed feeding systems. The cost to install a system can vary widely depending upon its functionality, what equipment you already have in place, and what options you want. Most systems can be installed within 1–2 days.

Suppliers of in-shed feeding system hardware and software components include, but are not limited to:

- › AfiMilk (distributed by Dairy Management Solutions dmsafimilk.com.au)
- › Boumatic's SmartDairy Management Systems (distributed by Daviesway) daviesway.com.au
- › EasyDairy's EasyID system easydairy.com.au
- › GEA Farm Technologies' Feed dispenser PF21 gea-farmtechnologies.com

- › DairyKing's Swiftflo feeding system (distributed by Daviesway) daviesway.com.au
- › DeLaval's ALPRO Optifeed system delaval.com.au
- › FEEDTECH Agri-Matic controller and drive head feedtech.com.au
- › Feed-o-matic feeding systems feedomatic.com.au
- › JANTEC Systems jantecsystems.com.au
- › Waikato Milking Systems (distributed by Daviesway) daviesway.com.au

Further information

More detailed information on the likely benefits of individualised supplementary feeding of dairy cows in pasture based systems is available in the following scientific review, commissioned by Dairy Australia:

Hills, J.L., Wales, W. J., Dunshea, F. R., Garcia, S. C. and Roche J. R. (2015). 'Invited review: An evaluation of the likely effects of individualized feeding of concentrate supplements to pasture-based dairy cows'. *Journal of Dairy Science* 98, 1363-1401. This paper is available at the Journal of Dairy Science website: <http://www.sciencedirect.com/science/article/pii/S0022030215000156>. This publication may also be obtained from the Dairy Australia library: <http://www.dairyaustralia.com.au/library>.

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