Application of feeding strategies with automated systems

There is an undeniable connection between cow milk production performance and feeding strategies. Parameters such as feed frequency, animal grouping, feed and mixing quality will make the difference between achieving average production and having an exceptional herd.

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This article looks at how feeding automation on a farm can help producers to implement their desired feeding strategies to achieve their production goals.

Farms equipped with an automated feeding system would classically have the following elements:

- A kitchen area where bunkers, auger, mineral and other containers are placed. The mixing process takes place in a stationary mixer or inside the feeding wagon. The feeding wagon has the main task of transporting the mixed feed to the different animal groups.
- Depending on the size and logistics of the farm, a feeding system configuration is selected.
- The feeding process is controlled by a central process control where all the necessary information to apply the desired feed strategy is stored. The information such as feedstuff, rations, feeding groups, locations and feed frequency is introduced by the user in the feed management software. This action takes place every day in the same manner.

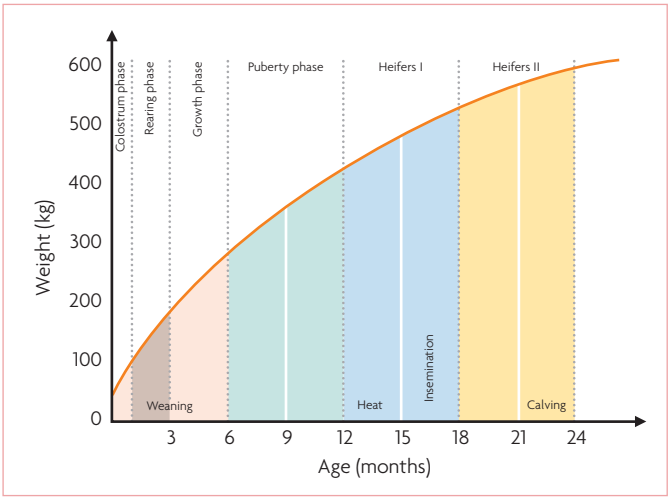
Different areas can be improved with implementation of automation in the feeding strategies.

Heifer feed management

Heifers are the cows of the future. In the past, research has shown that feed management has an impact on lifetime productivity. According to a study from Gardner, Smith and Park animals fed with a precision feeding plan grew faster compared to a control group. This was reflected in 22.2 months at the time of calving versus 24.6 months in the control group. A parallel study showed that the investments in a ration and forage plus supplementation cost were similar.

The implementation of precision feeding practices requires significant resources in terms of feed, time and installations and represents 50% of the cost of breeding a heifer and the larger investment will not return until the time of calving.

Fig. 1. Expected growth rate of young stock.



Animal grouping for optimal performance

Depending on the size of the farm the animals can be divided into different groups according to their nutritional needs. In a conventional setting the number of groups has a direct relationship with the amount of working hours since each group will receive their own ration. The more groups a farm has, the more time it will take to feed the animals.

This context makes animal grouping an impractical strategy when feeding conventionally. On the other hand, with an automated feeding system, the labour factor is minimised to filling up the equipment in the kitchen.

Accordingly, in GEA's experience, this task takes approximately 30 minutes regardless of how many groups the user has.

This allows the user to divide the animals into different lactation stages, dry cows and young stock groups.

All the groups get their own feeding plan. This allows the cows in production to achieve their milk production targets, dry cows to prepare for the next lactation and heifers to grow at their expected rates.

According to Penn State University it is recommended that heifer groups have a similar age and maximum weight variation of 90kg before breeding. After breeding the variation can be increased up to 136kg between the animals per group.

On this subject, the GEA automated feeding system is designed to prepare small mix batches that facilitates feeding the different groups.

Frequent feeding promotes feed intake, rumen health and reduces animal competition

Another recommended feeding strategy is to increase the number of times that the animals are fed during the day.

As a ruminant, the cow needs to be able to provide a good environment for the rumen's micro-organisms.

The ideal pH in the rumen is around 5.5/6.0. Ruminal micro-organisms do not adapt well to changes in the pH level and an efficient way to maintain the pH in the rumen is to provide feed all day long.

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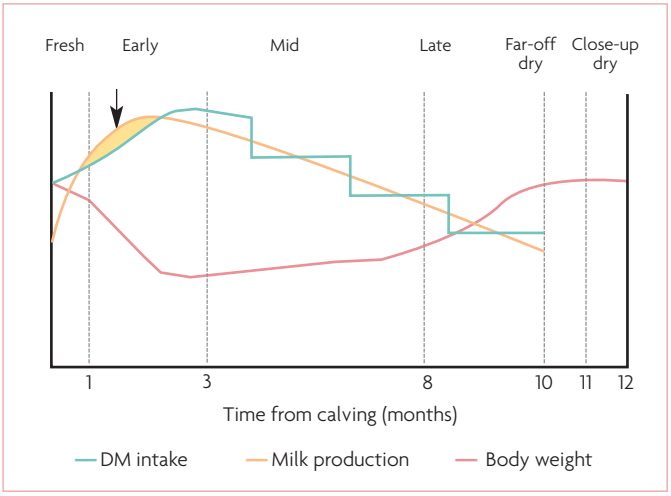

Fig. 2. Lactation curve, dry matter intake and body weight during the lactation phase.

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Cows also have a tendency to sort against low particles, therefore eating an unbalanced diet that will negatively influence the rumen pH. Several papers show that increasing the frequency of feeding will reduce the variation of pH during the day.

Once the mix ration is distributed to the animals the degradation of the nutritional value starts.

In addition, the cows that do not have access to the feed bunk at delivery time will not be able to maintain a proper feed and nutrient intake, and will not be able to maintain their production. It is a common practice to push-up the feed to allow all the cows to have access but this will not ensure the quality of the ration provided to the cows.

According to DeVries et al, 2009, cows had more equal access to feed throughout the day when the ration was distributed more frequently.

Lower ranked cows were also not moved as much and as often meaning that they were able to feed more often and have better access to feed. Cows also tend to distribute their feeding time more evenly during the day when fed more frequently.

As mentioned previously, in a conventional setting this would be a labour intensive activity. When feeding automation is implemented in the farm the feed frequency is going to be limited to the number of animals in a group. The aim is to get enough volume in a mixing batch to have a homogeneous mix.

Feed quality and good mixing

Feed preservation in a conventional setting is a challenging topic due to the fact that a mixed ration will be exposed to temperature and air for hours increasing the feeding degradation, especially during the summertime.

As soon as the forage is taken out of the silo, degradation starts. This process can be slowed down when feed is stored in an intermediate container such as a bunker.

Then the feedstuff will be mixed as needed during the day. In this context, having a kitchen area provides a significant advantage.

The quality of the mixing is going to determine whether the cows ingest the correct amount and proportion of nutrients for milk production, reproduction and health. Using an automated feeding system provides great flexibility to the user on how to mix the feedstuff considering the quality of the cut, preferred order and mixing one or more times in a batch.

To optimise and speed up the mixing process, it is recommended that the forage is cut in the field.

In addition, the order the feedstuff is added to the ration will help with good mixing. As common practice, GEA automated feeding users mix in the following order:

- Dry forages.
- Grains.
- Concentrates.
- Minerals and vitamins.
- Ensiled forages.
- Molasses and water at the end.

Use of reports to improve feeding practices

Depending on the farm setting as TMR, PMR or PMR and grazing the user has different key performance indicators.

One of the main advantages of an automated feeding system for implementing a feeding strategy is the recording of the activities. In this sense, the daily activities such as amount of feed distribution per group, mixing time and feed consumption will be reported for later analysis.

This information, combined with the milk production reports and/or weight gain reports from the heifers, provides feed efficiency information that can be used to do real time changes in the feeding plan.

Finally, feeding automation applied to the complete herd provides feed consistency, precision and substantial labour savings according to your feeding strategy. ■

References are available from the author on request

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