BEST PRACTICE GUIDE ON
CALVES AND YOUNG STOCK
AND THE USE OF SENSORS TECHNOLOGY

This guide aims: *A major aim of this guide is to provide the information to the farmers about the sensors and precision tools for calves and young stock*

Calf feeding system

How important is to use automatic calf feeding systems?

Automatic calf feeders have grown in popularity in recent years due to numerous benefits such as:

- reduced and/or redistributed labor costs;
- labor flexibility;
- improved ability to deliver a higher plane of nutrition.

When choosing an automatic feeder, the farmer has to get ensured to opt for a unit that gives as much flexibility as possible, reliable and appropriate power supply.

Certain machines have the capability to feed whole milk or a combination of whole milk and milk replacer powder. More systems also enable use of pasteurized waste milk in addition to milk replacer. It is also enabled the treatment of calves with either dry or liquid medication.

Which is the basic principle of operation for a calf autofeeders?

The essential features of autofeeders include a feeding stall and feed box which contain a device enabling electronic identification of calves. Most new systems utilize the radio frequency identification (RFID) ear tags. The nipple is connected via a flexible tube to a mixing bowl where defined amounts of powder and water are mixed as prescribed by the system (Biotic Industries, USA).

-the calf is identified electronically;

-the milk diet is freshly prepared and pumped to the teat in a matter of seconds;

-the tubing to the teat is rinsed after every visit, plus an automatic wash cycle is run twice a day;

-a valve prevents others from stealing a calf's milk ration, so every single calf gets the quantity of milk it needs, an added second mixer bowl allows simultaneous feeding of two calves.
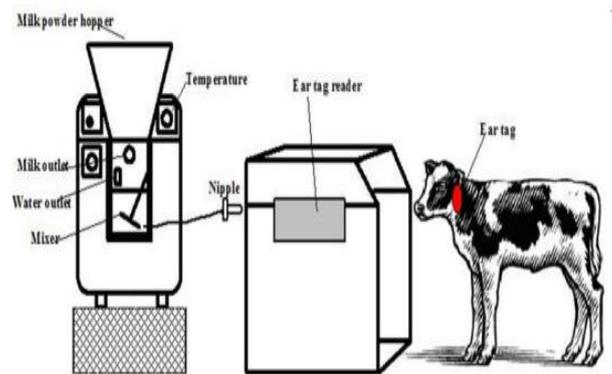

Figure 1. Source: DeLaval

Reason for installing automatic calf feeding systems

- Labor efficiency;
- Calf health;
- New facility.

Table 1.Type of automatic calf feeding systems

Company	Type	Characteristics
DeLaval (Sweden)	DeLaval calf feeder CF150X	Combines a milk station with a totally integrated concentrate station
	DeLaval calf feeder CF500+ and CF1000+	Stand-alone control or a DeLaval herd management connected to the control system; it is available in milk, powder and combi version
	CF 1000+ Concentration Station	By adding it to CF 1000 calf feeding system, it can measure how much concentrate each calf eats and it can reduce automatically the milk ration for calves
Lely (The Netherlands)	Calm automatic calf feeder	The correct portion and concentration of feed throughout the day, resembling the natural behavior of the calf
GEA (Germany)	DairyFeed J C400+, V600+ and V640+ calf feeders	Can be used as a fresh milk, milk powder or combined machine; can hold up to 35 kg of powder, but can be expanded to 50 kg with a stainless steel bowl
	Concentrate Calf Feeder DairyFeed J 1000	Feeding can be regulated for each calf individually; ideal portions of the concentrated feed can be delivered in a targeted way.
Förster-Technik (Germany)	VARIO smart	Provides high-performance components and can reliably feed up to 120 animals simultaneously at up to 4 suction points
	Compact smart automatic feeder	Preparing and administering feed for up to 50 animals, which makes it ideal for family farms
Urban (Germany)	MilkShuttle; CalfMom	Calf milk mixers, concentrate stations; monitors the health of the calf

Young feeding system

How important is automated feed delivery systems for young stock?

Photo 1. Automatic feeding of the calves (www.holstein.ro)

Using automation to optimize feed management is a profitable investment for the herd's health, reproduction and productivity. The feeding systems provide graduated levels of automation for feeding concentrate and minerals; or for preparing and distributing total mixed rations (TMR). Concentrate and TMR systems can be separate or combined. Before deciding to buy a computerized feeder, the farmers must consider:

- the maximum number of animals that will use the system;
- the benefits of automation.

Which is the basic principle of operation for an automated feed delivery systems for young stock?

These systems automatically load, mix and deliver fresh feed all day, every day around the farm.
They are comprised of a kitchen where feed is automatically pulled from various bays or bins and mixed in the mixer, which then delivers it

to the feedbunk. Traveling by overhead rail, one robot can feed 40 to 700 heifers.

Over time, the software used in the system has evolved to continue to meet the needs of dairy producers.Unlimited feed types can be entered into the system's software program, and it can make very small batches of feed with accuracy.

The robot will constantly drive through the building pushing up feed. Along the way, it uses a laser to measure the height of the feed in the bunk. It makes a note of the pen that needs more feed and will mix up that ration the next time it is in the kitchen. When it leaves the kitchen, it continues on the same route by pushing and measuring, but this time it will stop to dispense the feed when it reaches the pen in need.

The robot will automatically adjust for increased or decreased intakes because its settings are based on how much to dispense at a time and how low the bunk should get before a new batch is delivered.

Reason for installing automated feed delivery systems for young stock

- reduce working time;
- well-balanced and mixed rations delivered through automated feed systems reduce feed separation as well as feed waste;lower the building costs;
- significantly lower the energy costs, especially electrical systems;
- increase efficiency and expands potentially profits.

Health monitoring

How important is monitoring the calves and young health?

Health monitoring in calves and young stock is a complex activity that requires skilled personnel, and recognize early symptoms.

The development of modern technologies based on sensors they have resulted in more easily monitor health.

An example of good practice is *Fever Tags* software, which is designed to monitor body temperature every 15 minutes.

Photo 2: (www.fevertags.com)

The fever is typically the first sign of Bovine Respiratory Disease (BRD), manifesting 24-72 hours before visual signs, depressed appetite and dehydration become apparent.

Diagnosing fever early in the disease process will lead to effective and timely treatments, thus reducing the effects of costly disease management.

Which is the basic principle of operation for fever tags?

The function of Fever tags is to monitor body temperature every 15 minutes, if the temperature is raised above 39.7°C for a period of six hours the tag will flash. The tags act as a visual sign to aid farmer.

The temperature of calf body will naturally fluctuate throughout the day in an expected pattern although it can be affected by many factors: nutrition, stress, climate and temperature.

Fever Tags technology enables constant monitoring of body temperature and alerts the farmer if its output in normal parameters. The

farmer therefore can identify and isolate the animal and confirm temperature by rectal exam.

Continuous collection of data sent directly to your phone via wifi. Cloud based data allows for 24/7 access, wireless gateway, remote locations.

Reason for installing Fever Tags

-farmers using tags fever have observed decrease antibiotic consumption by 67%;
-reduce medicine cost;
-decreased mortality in calves and young;
-reducing the cost of healthcare.

Genomic selection

How important is genomic selection?

Genetic progress in dairy cattle depends on the accuracy of genetic evaluations, the intensity of selection and the generation interval.

Genomic prediction combines marker data with phenotypic and pedigree data (when available) in an attempt to increase the accuracy of the prediction of breeding and genotypic values.

By using hundreds of thousands of molecular markers existent in DNA chain represented by SNPs (single nucleotide polymorphism), it can obtain: a significant increase in selection intensity and considerable selection accuracy; significant decrease of generation interval value, making double the genetic progress which can be obtained per generation.

Genomic selection can help breeders identify individuals with superior breeding values at a young age.

Which is the basic principle of genomic selection?

Genomic selection refers to selection decisions based on genomic breeding values (GEBV). GEBV accuracies of young bulls are almost as high as accuracies after progeny testing.

With genomic evaluations, a 60% reliability for fertility and a 70% reliability for milk yield can be reached among young bulls.

Selecting young bulls based on GEBV may reduce the generation interval on the sire of cow way (from 5.5 to 2 years) with only a small loss in accuracy.

On the female side, the possibilities of reduction are small because most cows selected as bull dams are heifers.

Further genetic gains can be made by increasing selection intensity, not only on the male but also on the female ways: elite bull dams and large numbers of calves of both sexes can be genotyped to select few of them.

The logistic costs of the breeding scheme were reduced by 92 % when progeny testing was abandoned in favor of genomic selection schemes. At the same time, genetic gain per year was doubled.

Best practice tips:

If animal improvement value can be established right after birth, generation interval in cattle can be reduced from 5 years to one month, and costs for improvement value estimate in bull can be reduced significantly from 50000 euro to 100-400 euro, in conditions where animal genotyping can reach 40 euro.