FrontLine
TECHNICAL INFORMATION FOR TODAY'S FEED PROFESSIONAL

Automatic Calf Feeders — Frequently Asked Questions

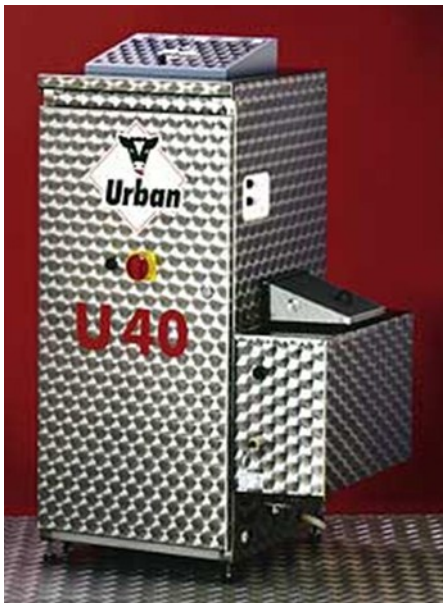
Automatic calf feeders have grown in popularity in recent years due to numerous benefits such as reduced and/or redistributed labor costs, labor flexibility, and improved ability to deliver a higher plane of nutrition. However, use of automated technology and housing calves in groups presents unique challenges. The goal of this article is to address commonly asked questions and highlight the most important considerations when getting started with an automatic calf feeder.

How many automatic feeder options are available?
There are a number of feeders available that differ in design, features, complexity, and price, but the principles of feeding calves in groups remain the same. Here is a partial list of available feeders:

Förster Technik – National distributors include:

- DeLaval (http://www.delaval.com/en...)
- GEA Farm Technologies (http://www.westfalia.com/us/en...)
- Lely (http://www.lely.com/en/feeding/calf-feeder/calm)

Holm & Laue (http://www.holm-laue.com/)



Urban (http://www.urbanonline.de/home1.html)

Biotic (http://www.biotic.com/)

Milk Products
The Milk Replacer Source™
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When housing calves in groups, what are the most important areas on which to focus to get calves off to a good start?
Although the areas of focus with regard to calf health are the same whether calves are housed individually or in groups, group-housing can reveal weaknesses in newborn calf care programs that otherwise wouldn't be problems if a calf was housed individually.

The goal of any newborn calf program should be to maximize passive immunity (colostrum) and minimize ingestion of pathogens from the environment. Group-housing undoubtedly increases the risk of pathogen transfer from calf-to-calf simply because calves are in contact with one another. Some areas that demand greater focus are:

- Calving pen management (time the calf spends in pen, frequency of cleaning)
- Colostrum management (quality, quantity, quickness of harvest and feeding, and cleanliness)
- Temporary housing cleanliness (hutches, pens, transport vehicles)

What about ventilation for calves housed in groups?
Another area that requires greater focus with group-housed calves is ventilation and air quality. Recent research at the University of Wisconsin-Madison found that the most important factors related to the incidence of respiratory disease in cold weather were:

- Amount of bedding, or the ability of calves to nest
- Presence of solid dividers between calves to prevent nose-to-nose contact
- Airborne bacteria counts – the higher the count the higher the incidence

Obviously, it is impossible to prevent nose-to-nose contact in group housing. Therefore, facilities should be designed/ retrofitted with the intention of maintaining adequate air exchange as well as providing fresh air at the calf level to prevent airborne bacteria buildup. Fresh air can be provided by positive pressure tube systems, but they must be properly designed in order to provide adequate amounts of air without drafting the calves. Likewise, sufficient bedding to keep calves dry and warm is also critical in group housing situations.

How soon can calves be placed in a group with an automatic feeder?
The answer really depends on the history and health status of the calves, as well as personal preference of the calf raiser. Some raisers prefer to get the calves into groups as soon as 3 days of age, while some prefer to wait until 10-14 days of age. Some examples of how different types of calves might be managed differently are:

- **High health status, home-raised calves** – these calves are found on dairies with low death loss and low clinical disease incidence. In this case, once the calves are aggressively drinking milk or milk replacer from a bottle, these calves could be placed into a group, as soon as 3 days of age.
- **Sale-barn calves** – these calves are likely to break with scours and may be significantly stressed due to transport and other stressors. In this case, feeding calves individually for 10-14 days would be advisable to get the calves through the initial bout of sickness prior to grouping.

Many operations' calves will fall in between the above categories. The important criteria to consider are the calf's general health and aggressiveness during feeding, as well as the overall incidence of clinical (treatable) scours. If calf health is a concern, it may be worthwhile to hold off on grouping until the calf is healthy. In the meantime, the root cause of the scours problem should be identified.

How many calves can be assigned to a feeding station?
Depending on the type of feeder, one feeder can have between 1 and 4 feeding stations. Typically the maximum per station is 30 calves, but several operations use 25 as an upper limit. The square footage of the pen is also a limiting factor for determining stocking density.

What is the space requirement for group-housed calves?
At a minimum, 30 square feet per calf. It is a good idea to subtract out the milk feeding station and area taken up by feed bunks when calculating square footage. If this is done, the remaining space is true resting area for the calves to utilize.

The automatic feeder settings are in metric units, what are the critical conversion factors?
Several of the feeders were developed in Europe, so manuals and settings are in metric units. Therefore, powder feeding rates are expressed in grams, and milk or milk replacer solution is expressed in liters. Some helpful conversions are:

- 1 lb = 454 grams
- 1 gallon = 3.8 liters
- 1 liter = 1000 mL = 1000 grams (for water)

What are the key settings to evaluate when programming the automatic feeder?
Several feeding programs are being used successfully throughout the industry, and just like with individual calf feeding, the program must fit the goals of the operation. For example, a producer interested in pushing the calves for maximum early growth would want to use a program that delivers high amounts of milk or milk replacer through the feeder. Conversely, a custom heifer raiser paid on a per head per day basis would be more interested in feeding moderate amounts of milk or milk replacer to get the calves on to dry feed sooner. Economics and desired growth rates will influence this decision. However, it is common that powder will be fed at rates greater than 1.5 lbs/calf/day because if milk availability is limited, excessive competition among hungry calves can lead to suboptimal growth and health.

There are 4 variables to consider when designing a feeding program:

1. ***Period length, in days***

- A feeding program can be designed to have several periods differing in length. Example periods may be a ramp-up period to allow for acclimation to the machine and training of calves, a longer period where calves have full access to maximum desired volume, and a ramp-down period to accomplish weaning from the liquid diet.

2. ***Powder concentration, in grams/liter***

- Common mixing rates are 120-170 grams/liter
- Solids percentage is calculated differently with the automatic feeders.
    - If a machine is set to mix 145 grams/liter, basic chemistry principles would say that the solids percentage is 14.5% (145 grams dissolved in a final volume of 1000 mL = 145/1000 = 14.5%).
    - However, with the machines, the powder is added to a volume of one liter of water, so solids % of 145 grams/L is actually 12.66% (145 g + 1000 mL water = 1145 g solution; 145/1145 = 12.66%).
    - The equation to calculate solids percentage is:
        *((powder mixing rate in grams/L)/(powder mixing rate in grams/L+1000))*100*

3. ***Total quantity fed, in liters/day***

- Typical volumes fed daily are 6-12 liters/calf, depending on goals of operation.
- *Example:* If powder is mixed at 145 grams/liter, and calves are allowed to consume 6 liters/day, total powder intake is 870 grams (6 L * 145 g/L), or 1.92 lbs (870 g/454 g/lb).

Table 1. Solids percentage of common powder concentrations used in automatic feeders, and total powder intake if fed at 8 L/calf/day.

Mixing Rate, g/L	Solids, %	Total Powder Fed @ 8 L/calf/day, lbs
120	10.72	2.12
130	11.50	2.29
140	12.28	2.47
150	13.04	2.64
160	13.79	2.82
170	14.53	3.00

4. ***Meal size limitations, in liters/visit***

- The beauty of automatic feeders is that they allow calves to have several meals daily, just as they would if nursing the cow. Meal size limitations are part of the feeding program, and along with total quantity fed daily, determine how many meals calves are allowed.
- Most programs allow for programming the minimum and maximum volume allowed per visit to the feeder. It is important to allow for variable meal frequency because some calves will eat small meals and some calves will eat large meals.
- *Example:* If a calf raiser wants to feed 8 liters per day, and would like the calves to be able to eat between 4 and 8 times daily, the settings would be:
    - Minimum meal size limitation = 1.0 L/visit
    - Maximum meal size limitation = 2.0 L/visit
- In general, younger calves should have a low minimum meal size (0.5-1.0 L) so they can eat several times a day. Once calves are growing and starting to eat grain (e.g., 3 weeks of age), the minimum meal size may be increased so they eat fewer milk meals and spend more time eating grain.

What type of milk replacer is best for automatic feeders, instantized or dry blended?
This question is asked often and the answer is debatable. Instantized milk replacers mix into solution with less effort than dry-blended milk replacers, but mixability is not as important as automatic feeders are equipped with mechanical mixers that rapidly and completely mix milk replacer powder. Both types are being used successfully. Ingredients used in the formulation (i.e., dry vs. liquid fat) is likely more important than the manufacturing process. The key is to find a milk replacer that:

- Is consistent from bag-to-bag and batch-to-batch
- Feeds through the machine without bridging in the hopper or causing build-up of residue in the mixing bowl or lines leading to the feeding stations
- Recommends a mixing temperature (found on the feed tag) that is appropriate for the automatic feeder. In most automatic feeders, milk replacer mixing temperature is the same as feeding temperature, or around 105-110°F. Therefore, milk replacers that recommend hot mixing temperatures (~150°F) should NOT be used. Instead, use milk replacers that are directed to be mixed at ~110°F.

What milk replacer formulation should be used with automatic feeders?
Housing calves in groups can increase the pathogen load experienced by a calf. Therefore, certain feed additives or milk replacer ingredients may benefit group-housed calves. Here are our recommendations:

- ***Milk replacer protein source*** – either all-milk or plasma are ideal. Plasma proteins may be especially beneficial in group-housing situations due to the potential to improve gut health.
- ***Crude protein level in milk replacer*** – Ideally, the protein level would be at least 24% in order to promote frame growth considering powder feeding rates are going to be higher than most conventional programs. As powder feeding rates increase, the amount of protein required for optimal frame growth increases as well.
- ***Additives*** – there are numerous options, but MOS, direct-fed microbials, essential oils, and other nonmedicated additives may support health of group-housed calves.

What options are available for delivering additives and medications?
Many of the feeders have optional equipment available for adding dry or liquid supplements to the calf's diet. This equipment adds cost to the feeder, but feeding flexibility is greatly improved as medications and additives can be targeted toward the age of calves where the most benefit will be realized. For example, the machine can be programmed so a MOS or DFM supplement could be fed only to calves less than 3 weeks of age. The supplement feeders have also been used to automatically feed electrolytes to calves observed to have scours.

Can whole milk be fed through automatic calf feeders?
Certain machines have the capability to feed whole milk or a combination of whole milk and milk replacer powder.

How often should the machines be cleaned?
The automatic feeders must be maintained regularly, and a major part of regular maintenance is keeping them as clean as possible. Buildup of milk or milk replacer residue can be excellent growth media for bacteria and can impede on normal machine function. Most feeders have automatic wash cycles that should be set to wash at least daily, if not twice daily. The tubing leading to the feeding stations should be cleaned regularly (e.g., weekly) to avoid buildup, and replaced as necessary. Consult with the automatic feeder companies to obtain specific recommendations for their machines.