

SUCCESS FACTORS FOR AUTOMATIC CALF FEEDING
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Introduction

Although keeping milk fed calves healthy and growing is always challenging, most dairies have become very good at raising calves to weaning in individual hutches. But bringing milk, calf starter, and bedding to these calves individually demands a lot of labour. Most studies report that caring for pre weaned calves takes 6 to 10 minutes per calf per day. manual feeding also comes with a fairly inflexible schedule and since hutches are outside this can also be an unpleasant job in inclement weather. Traditionally, these calves were limit fed milk or equivalent milk replacer at 10 to 12 lbs. (4 to 5 litres) per calf per day and calves were weaned at 6 to 8 weeks of age or when starter intake reached 2 lbs. per day. This type of raising program typically lead to rates of gain of about 1.5 lbs per day. In recent years it has become very clear that higher levels of milk feeding in the first 6 weeks can support better calf health and results in growth rates of 2 to 2.5 lbs per day, so that these calves more than double their birth weight by 56 days of age. This faster growth rate is associated with about 1500 lbs. more milk in first lactation per 1 lb. increase in daily gain in the first 12 weeks of life. To achieve these growth rates Holstein calves need to consume 20 to 25 lbs (9 to 11 litres) and perhaps 28 lbs. (12 litres) in cold housing during the winter months. Many calves will not drink this much in just two feedings per day, but hand feeding the more often adds even more labour. While individual housing is very effective in limiting the spread of disease from the calf to calf, calves raised in isolation for the first two months are stressed when they first go into group housing and this stress results in a period of slower growth. Research has shown that calves housed in groups bawl half as much at weaning then individual housed calves. They also eat more starter earlier and as a result dip in growth rate in the first few weeks after weaning is much smaller.

Group housing can offer a good alternative to hutches or individual pens and can address many of the issues described above. Some herds house calves of similar age and size in group pens and use a "mob feeder" to limit feed a quantity of milk or replacer to the group twice per day. In large herds this saves a substantial amount of labour, but particularly when calves vary in size and age, there will be a lot of variation in growth rate. In this system there will be a percentage of calves that do not double their birth weight by 56 days and these calves will not have the production benefits of accelerated growth after calving. Having more, smaller and more uniform groups can avoid this problem but increases labour to where there is no saving compared to hutches. Other herds use mob feeders to provide acidified milk or milk replacer free choice from two to three days of age until weaning but with unrestricted access to milk, calves eat little or no starter and

are often set back quite severely at weaning. This system can give very satisfactory results to 4 to 5 weeks of age, but very high milk and water consumption in weeks 6 through 8 make it difficult to keep these pens dry resulting in high feed costs and bedding costs as well. In both of these systems managing calf health is complicated by the fact that individual feed intake cannot be monitored, and particularly with free choice feeding there is no way to tell if a calf is drinking.

Benefits of Automatic Calf Feeding

Automatic calf feeders can offer whole milk, waste milk or milk replacer in quantities that are programmed and monitored for each calf, delivered from one common nipple per pen. Studies from Europe have shown that this can reduce labour associated with calf management by 30% compared to feeding in hutches or pens. One New York herd reduced labour for pre weaned calves from 8.1 to 3.5 minutes per calf per day. In a 100 cow herd raising 50 heifers per year weaning at 8 weeks, or 214 hours per year. At \$12 per hour that is \$2580 giving a 17 % return on investment on a \$15000 feeding system. In terms of the potential to offer higher feeding levels to promote faster growth, Holstein calves will drink 8 to 12 liters per day from well managed automatic feeders, in 4 to 8 meals spread throughout the day and night. Calves can be fed as much as they want for the first 6 weeks to maximize growth, but can be weaned gradually over 14 days. The socialization provided by the group housing also promotes early starter intake and teaches the social skills need to compete with other calves. hence weaning is much less stressful and the rapid growth continues uninterrupted. But the risk of calf to calf transmission of disease is definitely higher. Although there are many success stories with these feeders, there are also numerous complete and utter disasters.

The Recipe

Producers who are successful with automatic feeders generally follow a fairly standard recipe. Because there are greater disease risks in this system, it is essential that you start with a calf that has excellent immunity. That means clean well bedded calving pens, dipped navels, early feeding of good quality colostrum, etc. etc. for the newborn calf. Testing colostrum quality, and developing good protocols for handling and storing colostrum promote better health in all calf raising systems. Calves should be moved to the calf barn as soon as they are dry and housed in an individual pen for at least the first three feedings of a measured amount of colostrum. These calves should be fed with a nipple bottle and if they are sucking well they can go "on the robot" at two the three days of age. Starting them this early may mean the odd calf gets in trouble and end up back in a single pen, but labour savings decline quickly if you feed them individually for longer than 3 to 4 days. There are herds in Ontario that put calves on the feeders at 1 week to 10 days but these farms are feeding 20% of their calves by hand and don't see much labour saving. Small herds should use one feeder with two independent nipples each of which can handle up to 25 calves. Do not use a single nipple with a hinged separation panel, because older calves will push out smaller ones causing stress and limiting the intake of the youngest calves. Ideally the younger group should be smaller, and have a smaller age range. A group of up to 14 calves from 3 days to 3 weeks and a group of up to 26 calves from 3 weeks to 8 weeks seems to be about the limit for this approach. But adding new calves daily and moving them over and weaning weekly means these pens are in constant flux. For larger herds, all in all out systems that group all the calves born in one week and raise them to weaning together tend to work best. These pens can be cleaned with no calves present and rested and/or disinfected between groups. In either approach training the new calf to drink from the nipple, and careful monitoring of daily number of meals,

number of unrewarded visits, meals and volume consumed. While stocking rates of up to 50 calves on a two nipple system are possible, fewer animals always means less competition for the nipple and less risk of disease and less work for the operator. As labour costs increase relative to the capital cost of these systems it is likely that dairies will put fewer calves on each machine.

In terms of feeding level, if you are not committed to accelerated growth rates then do not buy automatic calf feeders. Experience is very clear that calves receiving less than 8 to 10 liters of milk (18 to 22 lbs.) per day are hungry and hungry calves are the ruin of automatic feeders. Calves that have access to 10 to 12 liters of milk per day fed at 3 liters per feeding will drink and rest and groom with little interest in displacing other calves, and with little interest in cross sucking. Although actual drinking times are longer for calves fed more milk, access to the nipple for less aggressive calves is better because the aggressive calves are satisfied and not causing stress with unrewarded visits. In older groups that are in the weaning stage, there will be more "displacements" and unrewarded visits but healthy calves in the older groups should be well equipped to deal with this competition. With high feeding levels and large meals you can also pick out sick calves because they are drinking less than they did yesterday, and/or visiting less often, whereas calves on low feeding levels don't decrease their intake until they are much sicker. For accelerated growth a strategy that allows calves to drink close to as much as they want up to 6 weeks of age, followed by gradual weaning works quite well. For example you could start at 6 liters, and program the feeder to increase it linearly to 12 liters over a two week period, then allow up to 12 liters consumption daily for the next 25 days, and then decrease it linearly to 0 at 52 days on the system.

A long trough (12 inches per calf) with fresh palatable calf starter and good access to potable water will also reduce stress at weaning. Using a plastic trough for starter feeding is preferable to floor feeding since it reduces the chances of manure contamination. Nipples and the surfaces around them should be cleaned daily and there needs to be a protocol in place to check the feeding line, and powder outlet daily for obstruction, and calibrate the feeder once a week. The area under and around the feeder should be designed to drain liquids away so moisture from cleaning does not increase humidity in the barn.

Cross sucking

Cross sucking is a cause for concern because it results in mastitis and blind quarters when heifers join the milking herd. Inadequate meal size, low total feeding levels, inadequate energy density, and poor access to starter and water contribute to this problem. A good herdsman will be on the lookout for this on a daily basis, and while nose rings are not attractive they do work.

The Environment.

Good calf barns for group housing will provide a clean dry place to rest and lots of fresh air with no drafts. The minimum space per calf in these barns should be 30 square feet of bedded area. Summer bedding should promote a dry environment and avoid providing a breeding ground for flies. Shavings are the bedding of choice in hot weather, but when the temperature drops below 50 degrees Fahrenheit for newborns, or 32 degrees for 1 month old calves, they need bedding for "nesting" and/or calf blankets to keep warm. Since milk fed calves produce a lot of urine and not much manure, clean looking bedding is often still so wet that it stresses calves. Sitting in the pen yourself can be a very good way to test this and become more responsive to it. Providing drainage below the bedding layer with tile drains under 18 inches of coarse gravel has been suggested as an aid to keeping pens dry.

Ventilating calf barns requires a different approach than ventilating barns for older cattle. because calves produce very little heat "hot air rising" cannot be counted on the replace stale air efficiently. Natural ventilation still makes the most sense, but supplementing it with positive pressure tube systems that provide 4 air changes per hour is recommended.