

# Robotic Milkers – A Producer’s Perspective

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## ■ Take Home Messages

- ▶ A robot farmer’s day starts later than the average dairy farmer and the daily milking tasks are more spread out throughout the day.
- ▶ Some cows do not get milked voluntarily and need to be brought to the robot. These are the “chase cows” and this is done twice a day.
- ▶ Flexibility in your work day, decreased labour and more milkings for high producing cows are the biggest advantages of robotic milking.
- ▶ The biggest disadvantage of robotic milking is that you are always on call and you never know if your work is done for the day.
- ▶ Some tasks, such as treating cows, can take longer to accomplish than in a parlour setup.
- ▶ Not all cows are well suited for the robot.
- ▶ To maximize the efficiency of the robot one needs to increase milkings per day, minimize milking duration, and decrease robot down time.
- ▶ Sire selection and training new heifers present new challenges.
- ▶ Cow traffic to and from the robot is a big part of robot success.
- ▶ It is hard to make any conclusions on whether mastitis and herd somatic cell count are affected by robotic milking.
- ▶ There are extra costs that one has to be aware of when milking with robots.

## ■ Introduction

I farm alongside my dad and my brother Poul. My brother and I run two separate farms and my dad helps out on both. We split up the farms officially in July 2009 but we continue to do much together. We milk about 110 cows

on each farm.

My brother runs the older, original farm and I run the farm that we built in 1997. In 2001, on the farm that I run, we traded our 4 year-old double 4 parallel parlour for 2 Boumatic robots which had the Lely milking arm. It was the only available robotic milking machine sold here at the time and we had a good relationship with the local dealer. My brother continued to milk in a parlour.

There were several reasons why we decided to opt for robotic milking:

- ▶ Labour: We did not have labour issues at the time but foresaw that with the changing times finding the right employees for the right price was not going to get any easier. At that time we had 2 full time employees.
- ▶ Flexibility: We liked the idea of not being tied to specific milking times.
- ▶ Increase in production: We had heard and read that cows could get milked an average of three times a day. We figured that as the average production per cow increased so the need to milk them more often would too.
- ▶ Challenge: In the end, it was probably my dad who pushed for it the most as he enjoys a challenge. We knew that being one of the “guinea pigs” in Western Canada would present its challenges.

After a big renovation of our barn, we started to milk our cows in the robotic milking station. We began with about 30 cows. I remember pushing the cows in and wondering how they would ever go in voluntarily. It took a few weeks for the cows to get the hang of it, but they did get used to it and went in on their own.

There was a steep learning curve for man and beast. We learned how to avoid problems as best as we could and changed many things in the barn to maximize the number of milkings. Together with the local dealer, we did the best we could, but in 2005 we decided not to continue with the Boumatic robots. We were the last ones in Canada to have them in operation.

We then had to ask ourselves the questions: “Do we continue on with robots or do we go back to milking in a parlour? Can robotic milking really work?”

My wife and I went to Quebec to visit some farms there that milked with the Delaval VMS (Voluntary Milking System). We saw there that it could work and that the farmers were quite happy with them. We decided to cut our losses, move ahead and purchase the Delaval VMS.

In July of 2006, we started milking with the VMS. The cows adjusted very quickly. Many cows did not even need “persuading” the second time going in.

In just a few weeks, the cows were getting milked almost 3 times a day. It took close to a year to get the bugs worked out as it was also a new thing for the local dealer as well, but overall it went quite smoothly.

In 2007, my brother built a new barn for 1 robot and then in 2008, he renovated his old barn and put in a second robot, which replaced the parlour. All of the cows on both farms are now being milked with robotic milkers.

## ■ Life as a Robot Farmer

Here is what a typical day looks like:

6:45 am	In the barn Warm up the calf milk Check the computer for which cows need to be “chased” Chase those cows and clean a few freestalls Feed calves Help or chase the remaining cows in the holding area Push up the feed and lock the headgates
8:00 am	Breakfast
9:00 am	Clean freestalls Cow work – AI, treat, dryoff, etc.
3:00 pm	Feed milk cows
3:45 pm	Clean freestalls
4:30 pm	Warm up the calf milk Check the computer for which cows need to be “chased” Chase those cows Feed calves Help or chase the remaining cows in the holding area
6:00 pm	Supper
10:00 pm	Check barn Hose down robots if necessary

For dairy farming a 6:45 start is pretty good. When I get to the barn the first thing I do is warm up the calf milk. Waste milk is diverted automatically to my calf barn and as the cows are milked 24 hours a day this can happen any time. The milk may have been sitting there for many hours and therefore needs to be agitated and warmed up before feeding.

I check the computer to see which cows have not been milked for at least 12 hours. These are my “chase cows”. Most of the time they are the same cows. There are various reasons why the chase cows are the chase cows.

- ▶ They may be new to the barn and still be apprehensive about going to the VMS to get milked. New cows or heifers learn the system within a few

days but some may take a few weeks before they consistently visit the VMS on their own.

- ▶ Some cows become lame and become chase cows until their feet problems are diminished.
- ▶ Cows in heat may also not visit the robot as they normally would.
- ▶ As cows approach the end of their lactation some cows slow down in their visits significantly. This can be 1-2 months before dry off.
- ▶ And then there are those cows which are healthy and not apprehensive but will not go to the robot on their own.

The amount of chase cows varies from about 2 to 15 depending on the aforementioned reasons. I lock these cows in a holding pen and most often they go into the robot on their own. I leave to do other work, like feeding calves, and then check back periodically to see if any cows need “persuading”. At the end there may be a new heifer or two that need to be pushed and “encouraged” to go in.

At 8:00 in the morning I will push up the feed, lock the cows and then go for breakfast. I do this because many cows are still laying in the freestalls. Rather than chase every one of them up to clean the freestalls, I allow them time to get up on their own. After breakfast the majority have “woken up” and are locked in the headgates, and then I can easily clean all the freestalls. In the afternoon, after I have fed the cows, most cows will be at the feedbunk and I have easy access to the stalls to clean them again.

## ■ Advantages

### No Milking

Obviously the biggest advantage is no more scheduled milking. Some people have questioned whether I “lose touch” with my cows and do not know them as well as opposed to handling them in a parlour. I do not think that this has been an issue. I am amongst my cows various times a day while cleaning the freestalls and when I chase them to the robot. The computer program also alerts me to any deviations that the cows may have. Normally it’s the same cows that are on the chase list and when an abnormal cow is on the list I take note and give her individual attention.

### Flexibility

A robot farmer is not tied down to specific milking times. When there are not a lot of problem cows to deal with, the “milking” chores can be completed in

45 minutes. We do try to keep the “milking/chore” time somewhat regular as the chase cows and calves need somewhat regular milking and feeding respectively. Other milking tasks such as changing filters and cleaning the robots can also be done any time of the day.

## **Labour Savings**

### *Less Employees*

By not having to milk in a parlour there are labour savings. It is hard to define exactly how much labour we are saving. My brother and I share employees and we farmed together as one farm until recently, so I will explain it in the context of both farms.

When we milked with parlours we had two full time employees. Now, with robotic milking we still have 2 employees, but one employee works half time and the other works about three quarters of what she used to. So that is a decrease of about three quarters of a full-time employee or thirty-eight percent reduction in employee costs. My dad is also not involved with the dairy end of things anymore either. For us, in order to milk 110 cows, 1.25 persons are needed to work comfortably.

### *“Friendlier” Working Hours*

The length of the working day is also shorter than it used to be. No one has to get up very early in the morning. Our days start at close to 7 am and end at 6 pm. This saves two people from getting up at five am (or earlier). And in the case of milking 3 times a day, it saves one person from milking late at night.

## **Extra Milkings**

The cows in my barn get milked an average of 2.7 times a day. This means that some cows get milked more than 3 times a day and some less than 2. This is a big advantage for high producing cows that get milked between 4 and 5 times a day on average. Some low producing cows may even prefer to get milked less than 2 times a day and may need to be chased twice a day in order to maintain 2 times a day milking.

## ■ Disadvantages

### Alarms

The biggest disadvantage of robotic milking is that you are never done. You never know when you are going to get a call from a robot that it is not milking. These alarms are almost always a nuisance unless you are in the barn already. This was definitely much more of a problem in the first four years. Sometimes I would get a call every other night for weeks on end. Over the past few years however, alarms have not been an issue. I average about one per week and about one nightly call per month.

Like with any equipment, things can break or go wrong: bolts break or loosen, gaskets tear, air hoses leak, string wears out, rubber wears out, and manure gets into the wrong places. If the robot cannot milk a cow for any of these reasons, it will send out an alarm. Most of the alarms are easy and quick fixes but some take time to figure out and fix.

Being on call 24-7 and carrying your cell phone with you wherever you go is something you (and your family) have to get used to.

### Treatment

While robotic milking saves time on milking the cows it does take longer to do some tasks, Drying off and treating quarters used to be done during regular milking in a parlour, and now timing and luck play a factor. If you are lucky the cow you want to treat has been milked not too long ago. If the cow is locked in the headgates I will treat her there. If the cow was milked, for example 3 hours ago, she would need to be milked again. I have two options: 1) I could chase her to the robot, wait while she gets milked and then treat her right in the robot where I prefer to do it; or 2) I could sort her into the sort pen the next time she does get milked and then hopefully treat her within a short time after milking.

Udder treatments take more time and can now be dragged out over the course of the day.

### Unfit Cows

Some cows are not fit for robotic milking. The biggest factor in determining whether all the teats can be milked is rear teat placement. When the rear teats are too close the laser cannot differentiate between the two and has problems attaching. Sometimes the robot will after several attempts just milk one or depending on the teat size milk both teats in one cup. This problem can escalate over the course of the lactation because as the production

decreases the rear teats get closer.

Another factor that makes some cows poor candidates for robotic milking is the length of the teat. Cows with very short teats have more trouble attaching especially when the rear udder is higher. The laser will have trouble “seeing” these teats.

Character also plays a role in how well a cow does with robotic milking. Cows that kick at the machine may not always be milked out well. The farmer is not always there to assist and after several attempts the robot gives up and releases the cow back into the barn without being properly milked. Heifers may be “kicky” for a little while and then settle down. Some cows continue to be kicky and other measures need to be taken like putting on hobbles for a few weeks or months

### **Decrease in Production**

I used to milk twice a day and my production went up when I started with robotic milking. Obviously, this is not just due to the robotic milking but increasing the milkings from 2 times to 2.7 times does have some effect. However, my brother milked 3 times a day in the parlour and since he started with robotic milking, his production has decreased somewhat.

## **■ Challenges**

There have been many challenges that we have faced over the past 9 years. One of the biggest challenges is to maximize the efficiency of the robot. This is done through increasing milkings per day, minimizing milking duration, and decreasing the down time of the robot.

### **Increased Milkings**

The cows get milked an average of 2.7 times per day. This number can fluctuate throughout the year as factors change. We have been as high as 3.0 times per day and as low as 2.4. Nutrition plays a big part in how often the cows visit the robot. We have experimented with the amount and quality of the pellet dispensed in the robot. About a year ago we added a flavour and smell ingredient that was really attractive to the cows and the number of milkings has stayed more consistent as a result. Cow traffic as discussed later also affects the number of milkings.

### **Minimizing Milking Duration**

The average length of milking one cow from start to finish is about 7.5

minutes. It is important that this time be as most efficient as possible. For example, if the average milking time is 8 minutes instead of 7.5 minutes and you multiply that by 150 milkings in a day, that equals 1 hours and 15 minutes extra or you lose 10 potential additional milkings (3 to 4 possible cows).

There are various things that can be done to minimize milking duration. 1) The robot needs to be well maintained and kept clean. 2) The udder hair on the cows needs to be singed regularly so that the robot laser can differentiate easier between hair and teats. 3) The genetics of the cow, as I will discuss later, also plays a role in the milking duration.

## **Decreasing Robot Down Time**

The robots should have as much time as possible available to milk. This means wash time and other down time needs to be minimized. The robots do a complete system wash 3 times a day and this takes about 40 minutes to complete. The latest robots are much quicker than this. I try to plan the washes so they do not interfere with peak milking times.

Also, if there is an alarm, the robot is not milking and I try to get there as soon as possible. If there is a problem with the robot arm the farmer can keep milking manually in the case of the Delaval VMS but not with a Lely type arm.

## **■ Sire Selection**

As mentioned before, not all cows are ideal for robotic milking. There are various traits that I specifically look for when selecting sires.

## **Rear Teat Placement**

As previously mentioned, the most important trait to keep in mind is rear teat placement. Cows with teats too close can become a problem and often take more time to attach. Teats that are too wide are also not recommended because they get too close to the rear legs and the laser has a hard time finding them as well.

## **Teat Length**

Teats that are too short also cause problems. When the laser goes to look for a teat, it scans up and down to find it. It may get “lost” in the udder as it searches. When the udders are hairy shorter teats may become harder to find as the laser has a difficult time distinguishing between hair and the teat.

## **Milking Speed**

When I first started milking with the robots, I took quite a few of my brother's slow milkers from the parlour thinking that it did not matter. It does matter. As stated before, average milking time can greatly affect the capacity of the robot and choosing sires that have average to faster milking speeds is something that needs to be considered.

## **Temperament**

Cows that are too nervous tend to hesitate in visiting the robot on their own and will often visit the robot when no one is around. Nervous cows are obviously harder to work with when first introduced to the robot and take much longer to adjust.

## **Reliability**

Higher reliability is a must when selecting bulls. If the offspring cannot be milked by the robot, she is of no use to me.

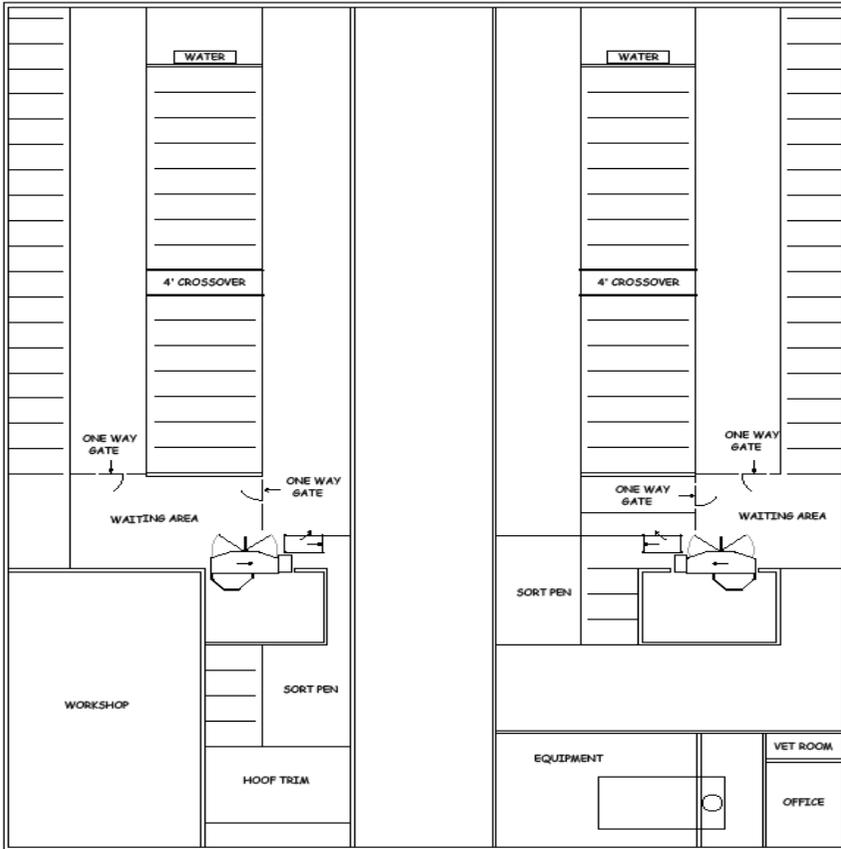
## **■ Heifers**

Heifers take more time to train than in a milking parlour. I usually put my heifers in the herd and through the robot three to four weeks before calving. This alleviates a lot of the stress and nervousness that occurs when a heifer is first milked in the robot.

The Delaval VMS also has the advantage of being able to manually milk the cow. When a heifer is first milked I will usually put a kicker on her, prep the udder and put the teat cups on by hand. Every milking I will introduce another automatic step that the robot arm does.

As in any milking system there is quite a variation in how well heifers adapt. Some heifers will catch on after a few days and visit the robot on their own. Other heifers can take a few weeks before they are consistently off the "chase list."

Older cows that I have introduced to the robot for the first time adapt quickly and within a few days are fully adjusted to being milked by the robot.



**Figure 1. Barn with 2 VMS**

■ **Cow Traffic**

As shown in Figure 1 there are 3 rows of freestalls on either side of my barn. One way gates keep the cows in the holding area once they have passed through them.

There are various traffic options that are available to implement with robotic milking. I have tested and tried numerous systems.

When we first started with robots we used one way gates at the back of the barn and did not have a cross over alley half way through the freestalls. Once

cows were on the laying side they were forced to go through the robot in order to get to the feed. In this way, cows were directed to the robot and the number of milkings stayed fairly consistent. The biggest disadvantage was cows and especially heifers that were not familiar and comfortable with the robot would become “trapped” on the laying side. We had quite a few heifers with LDAs in this way. We tried opening up the one way gate but the number of milkings dropped substantially.

We also tried putting in *Smart Selection Gates* from Delaval that controlled the traffic by allowing cows that were “trapped” on the laying side to go to the feedbunk if they did not need to be milked or go through the robot if they needed to be milked. This did work okay but heifers that were not used to the system still hesitated to go through the robot or the smart gate.

After many attempts at trying to control the flow of traffic we finally settled on an all open system where cows have free access to the robot, freestalls and the feedbunk. In a three row freestall barn we find that this works best. The obvious advantage is that cows have no limitations on access to the feed bunk or freestalls. There is also less bullying around the robot because there is no holding area where a timid cow becomes trapped. A timid cow often waits for the robot traffic to be down before attempting to go there on her own. The disadvantage with this system is that there are more chase cows. I chase between 2 and 15 cows two times a day. There are also times, albeit not very often, when cows can be 15-24 hours without being milked with this system. You may ask how a farmer could let this happen. For example: When I check the barn in the evening and I find that a particular cow has not been milked for 11 hours, it may be tempting to chase her to the robot to make sure she gets milked. It is best, however, to chase as few cows as possible because they get used to it and may not go as frequently on their own. Your “milking time” (when you chase your chase cows into a holding area) will get longer and longer the more cows you chase. So, this cow that is 11 hours not milked should not typically be chased and she is therefore left to go in voluntarily which she usually does. You may come back in the morning to find that she has still not been milked and it is now 23 hours since she has been milked. This may be due to various reasons such as sudden lameness, mastitis, or heat. It may also happen for unexplained reasons.

The traffic system that we have found works the best is a “Feed-first” controlled system. This we find cannot be implemented in my barn because I have a 3 row barn. My brother has a 2 row barn and a 4 row barn and it works quite well. Cows have free access to the bunk but if they want to go back to the freestalls they have to pass through a “Smart Gate”. This gate directs the cows that need to be milked to the robots and the cows that do not need to be milked to the freestalls. There are minimal chase cows. My brother chases between 1 and 5 cows two times a day. There are also no cows that can go for extended periods (i.e. 23 hours) without being milked. Milking

intervals are more consistent. The biggest disadvantage is that cows may hesitate to go through the Smart Gate and stand for too long by the feed bunk. This may be due to traffic congestion or bullying. In our observation, bullying is harder to control in a controlled traffic setting.

## ■ Mastitis

It is hard to draw any conclusions as far as mastitis goes. The robot does a fine job cleaning and preparing the cows for milking. Regular maintenance, just like with any other piece of equipment, helps the machine run smoothly and reliably.

## ■ Extra costs

With robotic milking you cannot be down for long periods of time. The robot milks just one cow at a time and once it gets behind, it takes a long time to catch up. The more cows you milk in the robot, the more critical time becomes. Having said this, it becomes critical that when the robot breaks down (and they all will at some point) you are up and running as soon as possible. This means that when you get an alarm, you get there as soon as possible and fix it promptly. It requires that you and the local dealer need an array of spare parts, so that when it breaks down on Saturday night for example, you have the parts available. We have a back up generator and a backup air compressor that have proven very useful in these situations. These “extras” are all additional costs that are needed to maximize the robotic milking time.

## ■ Conclusion

One of the most frequently asked questions that we get is “Would you do it again?” To answer that, one has to look at the reasons why we went into it in the first place. The reasons that we went to robotic milking are decreased labour, increased flexibility, increase in production, and the challenge.

- ▶ Decreased labour - We went from 2 full time employees to one three quarter time and one half time employee. Our work day is also shorter than before.
- ▶ Increased flexibility – there are still many “milking time” tasks that have to be done twice daily but we can be very flexible as to when we do them.
- ▶ Production increase – Our production went up on the farm going from 2 milkings per day to the 2.7 on the robot. Production went down on the

farm going from 3 milkings to the 2.7 on the robot

- Challenge – It has definitely been a challenge. We have had to learn and experiment a lot in the past years.

So, would we do it again? Absolutely.

