Animal &
Grassland Research
& Innovation
Programme

Improve your milking skills

....and get more from your cows

Produced by Teagasc in collaboration with FRS and AHI

Teagasc
Agriculture and Food Development Authority

frs network

AHI
Animal Health Ireland.ie

Introduction

It is the responsibility of the herd owner or herd manager to train themselves and/or persons milking cows to the highest standard. The purpose of practising an efficient milking routine is threefold:

1. To ensure that the product harvested is of the highest quality possible
   Don't lose sight of the fact that you are producing a food product

2. To ensure that the work practices employed are safe for both milker and cow

3. To ensure that the time spent milking cows is efficiently spent - 10 minutes less time spent for each milking adds up to over two hours saved per week

Certified Milking Training

Teagasc, FRS and AHI have collectively developed a Certified QQI Level 6 milking course aimed at developing your skills as a milker and to ensure that milkings are conducted to the highest quality standards.

This two day course is unique as it brings together the theory elements of milking and the practical implementation of the theory through on-farm instruction. The tutors for the course have been specifically trained and course content approved by experts in the area of milking best practice.

Course Content:

- Preparation for Milking
- The Milking Routine
- Cluster Attachment
- Milk Quality and Washing up
- Mastitis Prevention and Drying-off
- Heat Detection

Full details of the course can be found on www.frstraining.com/milkingcourse or by calling 1890 20 1000. Or visit www.teagasc.ie and www.animalhealthireland.ie

Are you satisfied with your current milking routine?

When you milk cows, twice a day, seven days a week, you probably know all there is to know about milking routine. But are you putting all that you know into practice? It does no harm to recap on the main points relating to milking routine once in a while to make sure that you are not missing out on anything really obvious. Getting your milking routine right can be good for you, your cows and your farm business.

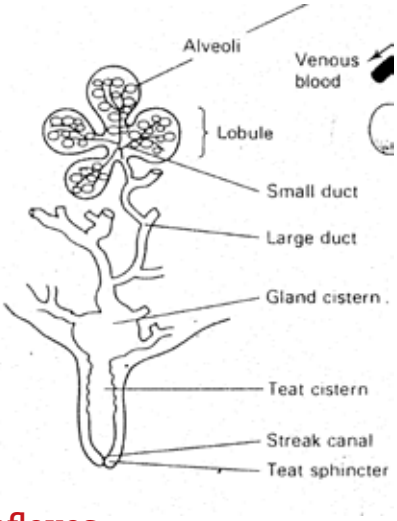
Take a few moments to complete the following questionnaire and identify whether you have a good milking routine. Only tick 'yes' to those statements that you can answer with 100% honesty.

	Yes
I wear clean nitrile disposable gloves for all milkings	
I fore strip all cows, at every milking	
Clusters are attached within 90 seconds of teat stimulation	
Cows are prepared in batches of 4-6 and clusters attached in the same sequence	
I change hands to attach the clusters depending on which side of the parlour the cows are standing	
Cups are attached in a circular motion	
I regularly check the skin coverage achieved after teat spraying/ dipping	

Your milking routine could be improved if you weren't able to tick yes to all seven questions listed above.

Udder Structure

Each quarter of the udder is separate from the other three. Think of the inside of each quarter as a bit like a cauliflower. The florets on the outside are the sacs (alveoli) where the milk is actually made. These are linked by ducts which connect the alveoli to the udder cistern (gland and teat cisterns combined), which is essentially a storage chamber. Just before milking, only about 20% of the milk is in the cistern. This is the only milk that can be extracted mechanically by vacuum without the cows help. The other 80% is held in the sacs and ducts. It takes a combination of stimuli to create the reflex actions to make them contract, squeezing the milk down into the cistern from where the milking machine can do the rest.



Reflexes

The most powerful of these reflexes is the one built into the cow's biological system to release milk when she is suckled. Physical stimulation of the teat and udder causes oxytocin to be released into the bloodstream. This makes the udder sacs and ducts contract.

In addition, cows' reflexes become stimulated by the senses of sight, smell and hearing so their familiarity with routine events like sight of the milker, the noise of the vacuum pump and music in the parlour and the smell and noise of feed contributes to this conditioned reflex.

It also helps to know the timing of these reflexes as this can have a large impact on milking routine. Milk is released from the udder cistern as soon as the cluster is attached but it takes 60-90 seconds between stimulating the teats, the release of oxytocin and milk let down from the alveoli.

If a cow is nervous or becomes stressed during collection, waiting in the collecting yard or while she is in the parlour, milk let down will be incomplete. This is because adrenaline released as a result of stress, actually blocks the transport of oxytocin to the udder. Even a cow which isn't obviously distressed but slightly nervous will not release all of her milk.

Cows which don't milk out also yield less at the next milking. Recent research has found that a substance found in milk inhibits the secretion of more milk. Cows with greater volumes of residual milk in their udder produce less milk at the subsequent milking.
Efficient milk removal is also important in the prevention of mastitis because milk left in the udder is an excellent nutrient source for any bacteria which manage to invade. The last portion of milk removed from the udder also contains the highest butter fat.

Milking Routine

The milking routine from start to finish has an important bearing on the efficient and hygienic removal of milk from the udder. Milking starts when you begin collecting the cows from their housing or the field.

The importance of routine cannot be over emphasised. Cows are creatures of habit and the more you can make each day exactly the same as the previous day the more relaxed and productive they'll be. So good milking technique begins by following a predictable routine.

The nine components of an efficient milking process are as follows:

1. Parlour preparation;
2. Row filling;
3. Preparation for milking;
4. Preparation in batches and maximising milk let down;
5. Cluster attachment;
6. Cluster removal;
7. Teat disinfection;
8. Row exit;
9. Parlour hose down.

When employing an efficient milking routine, milkers can achieve somatic cell count (SCC) and total bacterial count (TBC) levels of less than 100,000 and less than 10,000 cells per ml respectively and milking row times of less than 9 minutes.

1. Parlour Preparation

Before the cows are brought in for milking, the parlour should be prepared for milking. Hose down the parlour and collecting yard floor and walls because this makes them easier to wash down afterwards. Check availability of teat dip (prepare if necessary), ensure that the meal hoppers, where used, are filled and that the milking plant is rinsed out and ready for milking. When this is completed, bring in the cows from the paddock or house for milking.

Droving of cows from paddock or house to the parlour should take place in a calm relaxed manner to prevent unnecessary stress on the cows prior to milking. Cows need to be allowed walk at their own pace. Rushing the cows can lead to foot injuries such as solar ulcers and other associated injuries.

Reason: Cows should have to wait in the collecting yard for the minimum amount of time before milking. Ideally, the total milking time should take no longer than 1½ hours. Prolonged waiting in the collecting yard results in cows becoming stressed and dirty before they are milked. It will increase the risk of lameness also.

2. Row Filling

Fill the rows in a calm and relaxed manner. Where possible, allow the cows to enter the row without leaving the pit as this can stress them unduly. The use of a backing gate in the collecting yard will assist greatly when row filling. At times of the year when no in-parlour feeding is practised a good backing gate properly used, will encourage efficient row filling.

Reason: Keeping stress to a minimum will ensure that milk let down occurs.

3. Preparation for Milking

Proper milking routine requires the wearing of clean milking garments i.e. disposable nitrile gloves and clean parlour apron/parlour suit. This helps prevent the spread of mastitis and ensures that the operator is clean and safe from any discharges. Rinse gloves and disinfect regularly throughout the milking. The teats should be clean and dry prior to milking. Teats should be washed and dried if dirty. A dry wipe with some paper towel is sufficient for clean teats. All teats should be fore milked approximately 90 seconds before the cluster is attached. Where pre-spraying is practised, allow 30-60 seconds contact time to elapse before drying the teats and attaching the cluster. This is to allow for bacterial kill.

Reason: Dry clean teats produce milk of low TBC and low thermoduric count. Washing dirty teats will not reduce TBC levels in the milk unless they are dried with a paper towel. Fore milking helps in the early identification of mastitis; and ensures that optimum milk let down occurs when the cluster is attached shortly afterwards.

4. Preparation in Batches and Maximising Milk Let Down

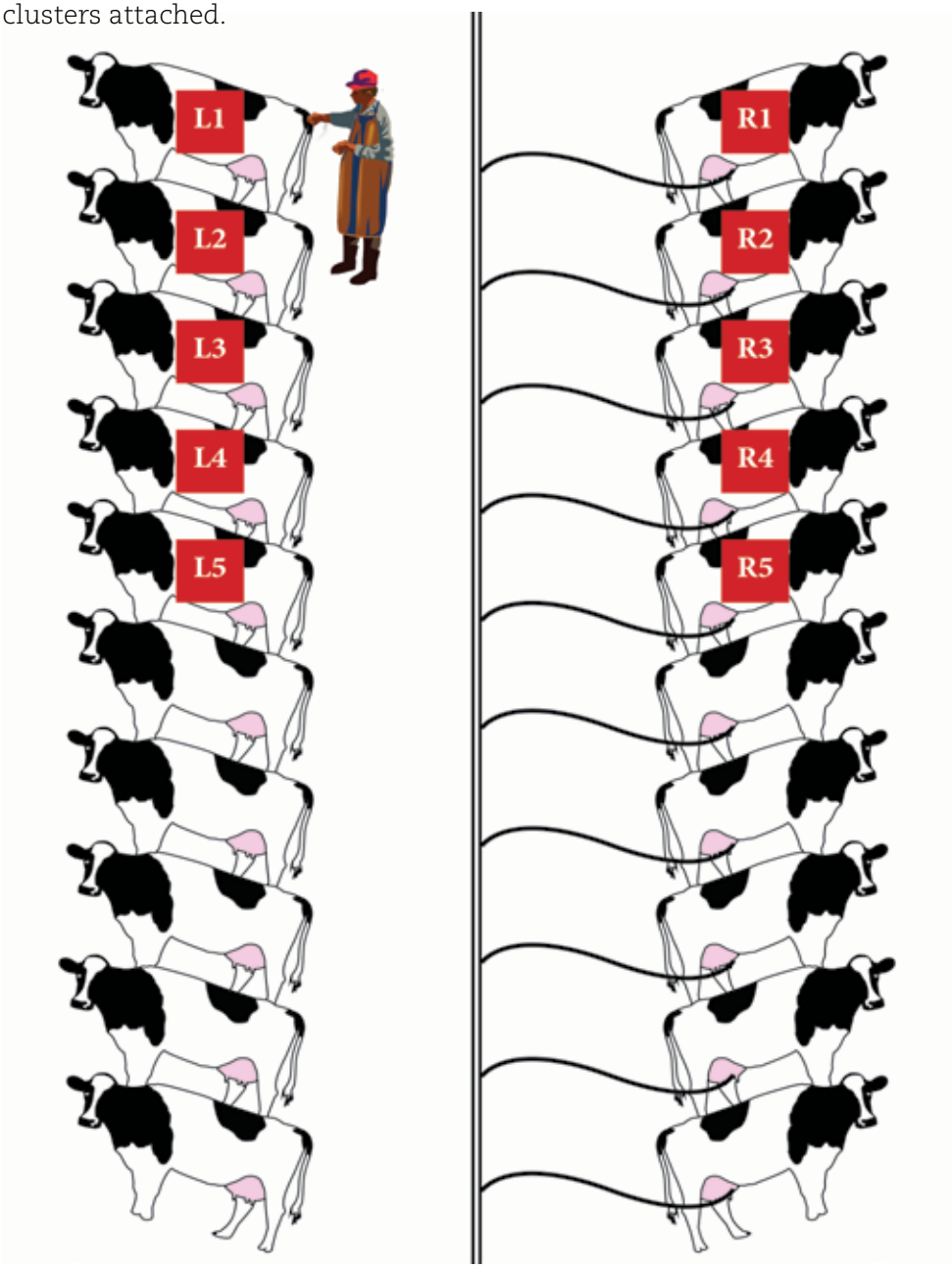
Preparation of cows should take place in groups of 4-6 starting from the front of the row and working downwards towards the end of the row. (*See Fig. 1)*

Preparation of each cow takes place first, followed by cluster attachment to the same group in the same sequence.

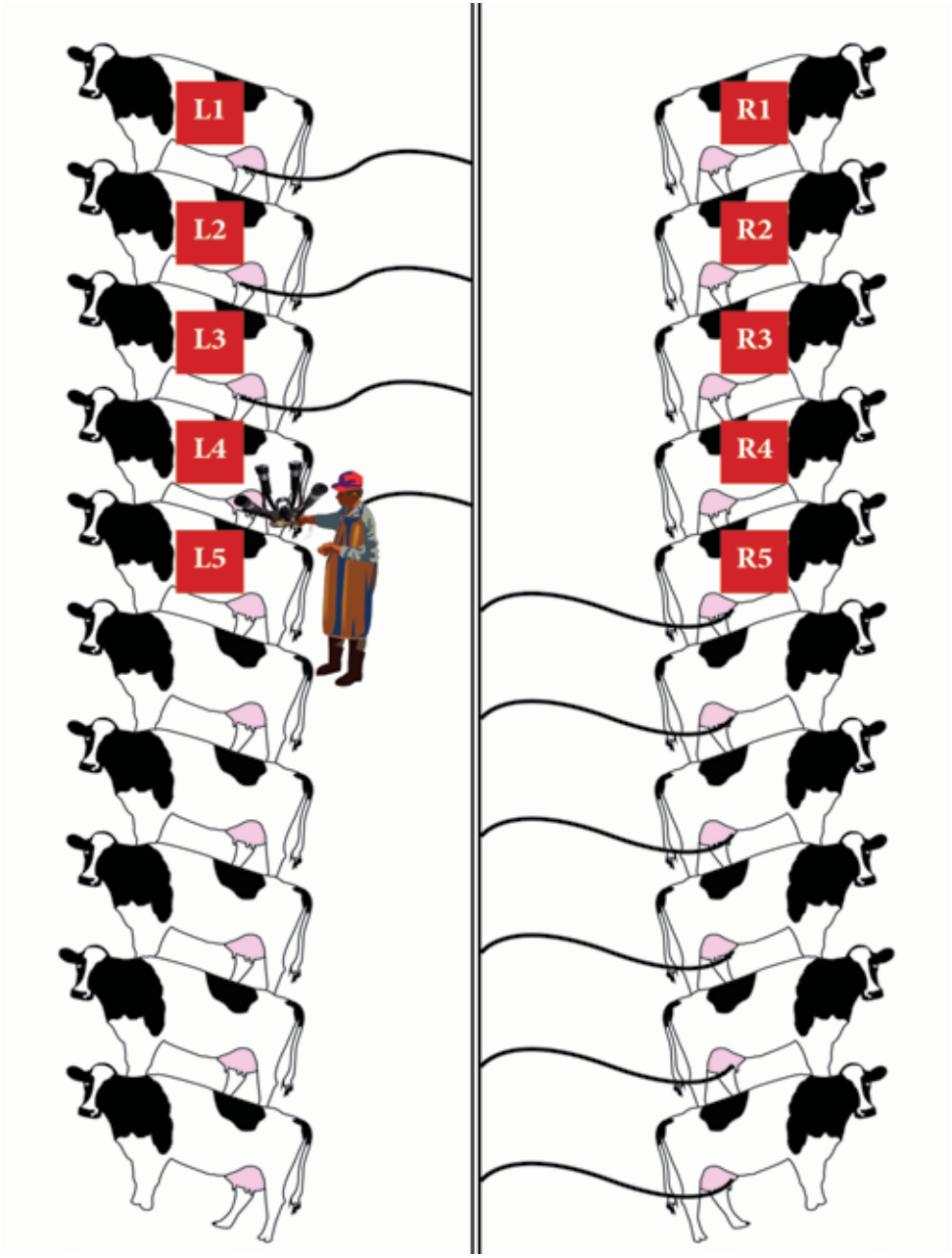
Reason: Establishing this routine makes milking more efficient because an interval of approximately 90 seconds will elapse between preparation and cluster attachment ensuring that optimal milk let down occurs. It also reduces the amount of walking up and down the parlour– in one study by a factor of 2½ times.

Figure 1: Stepwise preparation of cows in batches

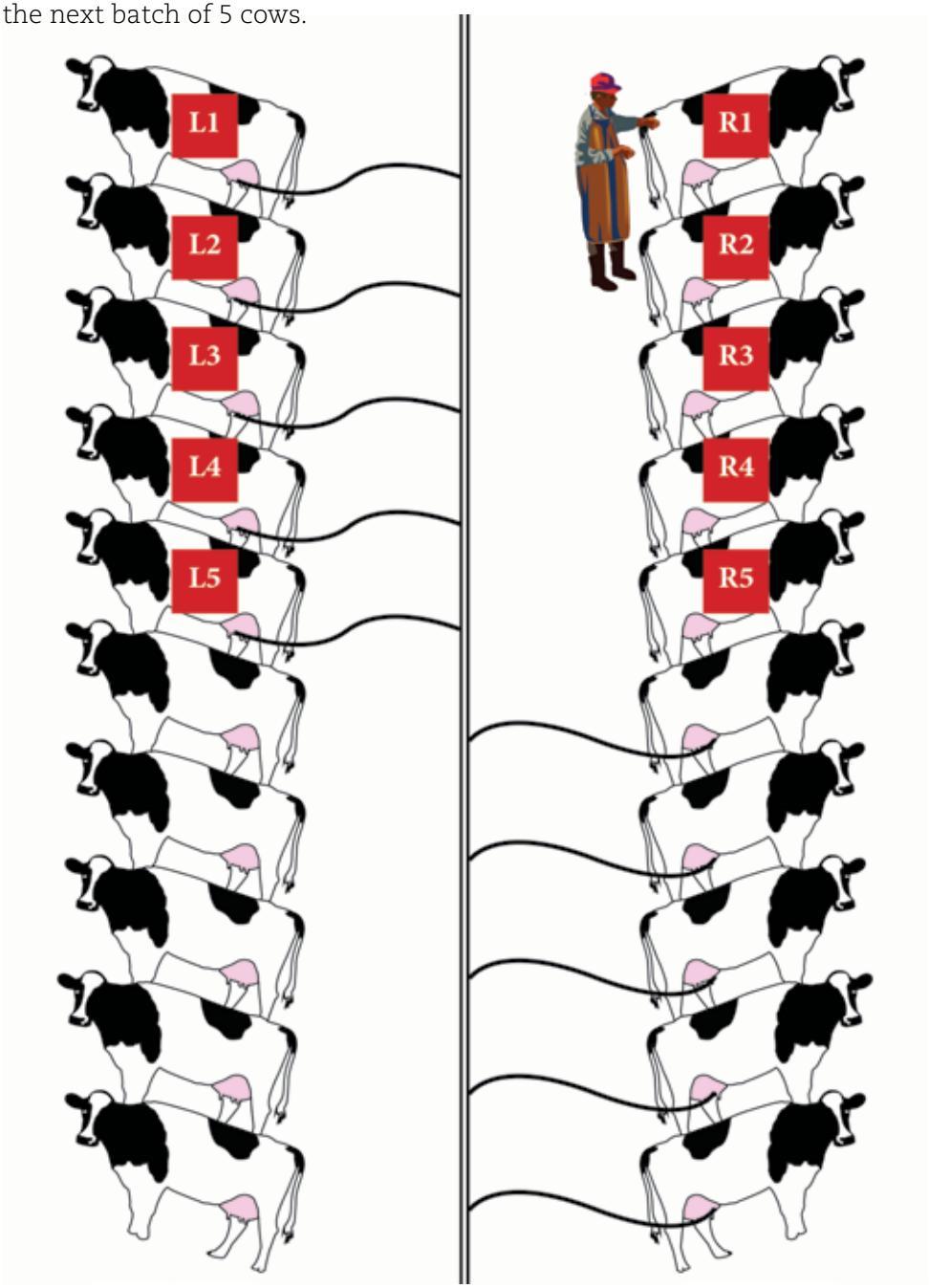
Step 1:
Milker prepares a batch of 5 cows for milking starting with cow L1 and preparing in sequence down to cow L5. The RHS row of cows has the clusters attached.



Step 2:
Milker transfers clusters in order from R1 to L1; R2 to L2 etc. until cluster is attached on L5.



Step 3:
Milker disinfects the batch of cows on RHS starting with cow R1 and disinfecting in sequence down to cow R5. He then repeats steps 1-3 with the next batch of 5 cows.



5. Cluster Attachment

When attaching the cluster, keep the pulse and milk tubes on the cow exit side of you ensuring that they are not in the way when moving to the next cluster. Hold the cluster with the hand closest to the cow exit side (usually the hand nearest to the dairy). This means that you will change hands to hold the cluster depending on which side you are attaching the cluster. (*See Fig. 2*) Kink the tail of the liner when attaching to the cows teat and also guide the teat into the liner with your finger. Attach the liners in a circular motion starting with the one closest to the thumb of the hand holding the cluster. (*See Fig. 3 & 4 for left hand & right hand rows respectively*)

Make sure that the cluster hangs on the cow properly. Good cluster alignment is where the long milk tube hangs in line with the cow's back bone when applied between the back legs and at 90 degrees to the back bone when applied in front of the back leg.

Reason: Changing hands will help ensure that the risk of repetitive strain injury is minimised and that you have a better reach when attaching the cluster. Making sure that the cluster hangs on the cow evenly will help to ensure that all four quarters are milked out completely.

Figure 2: Milker position when attaching cluster to left hand and right hand rows

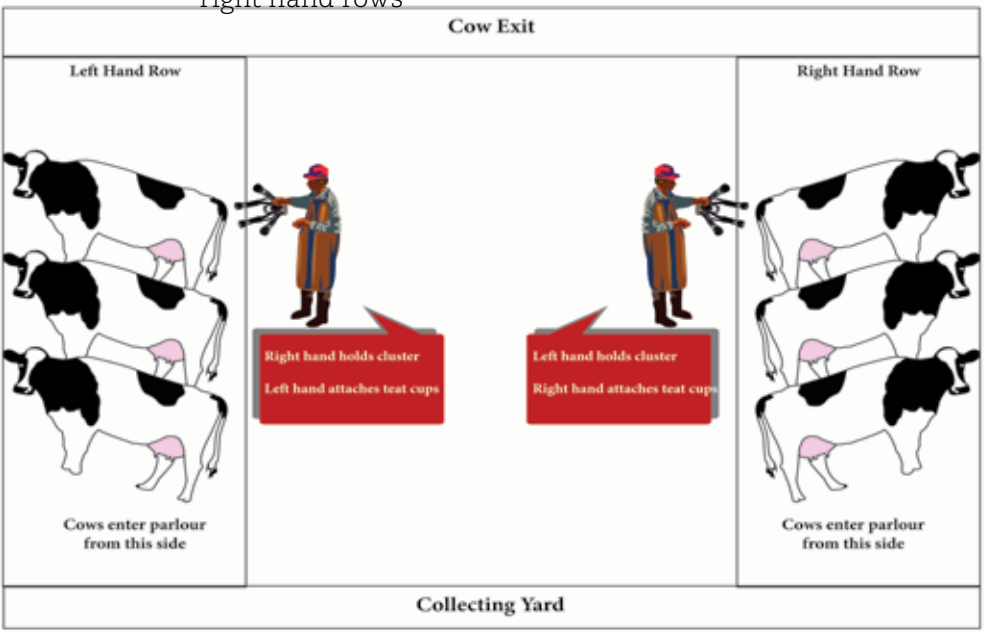


Figure 3: Cluster Attachment Left Hand Row

STEP 1

Cluster held in right hand

STEP 2

First teat cup to attach is the one beside thumb of hand holding cluster

STEP 3

Second teat cup is one in front of the first teat cup attached

STEP 4

Third teat cup is one next to the second teat cup

STEP 5

Fourth teat cup is one next to the first teat cup attached

Figure 4: Cluster Attachment Right Hand Row

STEP 1

Cluster held in left hand

STEP 2

First teat cup to attach is the one beside thumb of hand holding cluster

STEP 3

Second teat cup is one in front of the first teat cup attached

STEP 4

Third teat cup is one next to the second teat cup attached

STEP 5

Fourth teat cup is one next to the first teat cup attached

6. Cluster Removal

Manual cluster removal should commence when a single stream of milk is visible in the claw piece. This minimises the risk of over milking. Remove the cluster without causing air blasts. Turn off the vacuum by kinking the long milk tube close to the claw piece or using the button on the claw piece and allow the cluster to become limp on the udder (2-3 seconds before attempting to remove the unit). Always ensure that the air bleed hole is not blocked as this may slow down air ingress and thus cluster removal. The cluster should be detached with the hand that you intend to attach it to the next cow (the hand on the cow entry side of the parlour). If automatic cluster removers (ACRs) are installed in the parlour make sure that they are removing the clusters at the proper flow rate.

Reason: Allowing the unit time to become limp on the udder minimises the risk of an air blast occurring when clusters are being removed, reducing the risk of both mastitis and teat end damage occurring.

7. Teat Disinfection

When a batch of 4-6 units has been removed, teat spray or dip the batch of cows in the same sequence. Ensure that at least 15 or 10 mls of the spray or dip respectively are applied evenly to the teats of each cow after milking. Ideally this should be done as soon as possible after cluster removal. Goal: cover the entire teat from tip to top. Contact your local Teagasc Advisor or Co-op advisor for a list of suitable teat disinfectants to use.

Reason: Aiming to get complete coverage of the teat will kill the maximum number of bacteria, and use a disinfectant containing an emollient to improve teat condition.

8. Row Exit

In larger parlours, the milker may open the row exit gate while removing clusters and teat spraying/dipping the last couple of cows in the row. This will also ensure that smooth entry into and out of the milking parlour takes place and minimises the filling delays that can occur between rows. Maximising the use of natural light will facilitate improved cow flow through the parlour. Where the jetter cups are positioned on one side of the milking pit, always ensure that the last row is milked on the opposite side. This protects the milker from possible injury by the cows when attaching the clusters to the jetter cups when the plant is being prepared for washing up.

9. Parlour Hose Down

Parlour hose down should take place after the last row of cows has left the parlour and plant sterilisation has commenced.

Reason: Prompt washdown will ensure that faecal contamination of the milking premises is minimised. This minimises the risk of contamination of the milk produced.

Energy Efficiency on Dairy Farms

Summary

- Benchmark your farms energy costs against other farms. The average cost of electricity usage on Irish dairy farms is €5 per 1,000 litres milk produced
- Check the electricity unit cost against the best unit rates using a cost comparison website
- Use night rate electricity for water heating and the morning milking. Night rate hours are from 11pm to 8am during winter time and 12 midnight to 9am for summer time
- Use the Dairy Energy Decision Support tool to gain farm specific recommendations on energy efficiency projects

Introduction

The average cost of electricity usage on Irish dairy farms is €5 per 1,000 litres milk produced. There is a large variation in that figure – from €2.60 to €8.70 per 1,000 litres produced, or from €15 to €45 per cow per year. These figures suggest that there is potential for many farmers to reduce their electricity usage by making some changes to how they produce milk. Teagasc estimates that the average farm could save €1,800 per year through altered management strategies and the use of energy efficient technologies. These costs exclude VAT and network charges. The main drivers of energy consumption on dairy farms are milk cooling (31%), the milking machine (20%) and water heating (23%). A more detailed breakdown of energy consumption is illustrated in Figure 1.

Calculate your energy costs

A simple calculation can be made to approximate on-farm electricity costs. Firstly, add up the total electricity charges over a year excluding standing charges, VAT and PSO levy; these figures can be found on the electricity bill. Multiply by 100 to convert from euro to cents. Next add up the total number

of litres of milk sold to the processor over the same period. Dividing the electricity cost in cents by the number litres will give the cost in cent per litre. The average three bedroom house in Ireland uses approximately 5,000 units of electricity per year. This can be deducted to account for domestic usage if the dwelling house in on the same meter as the farm.

Night Rate electricity Vs Day Rate electricity

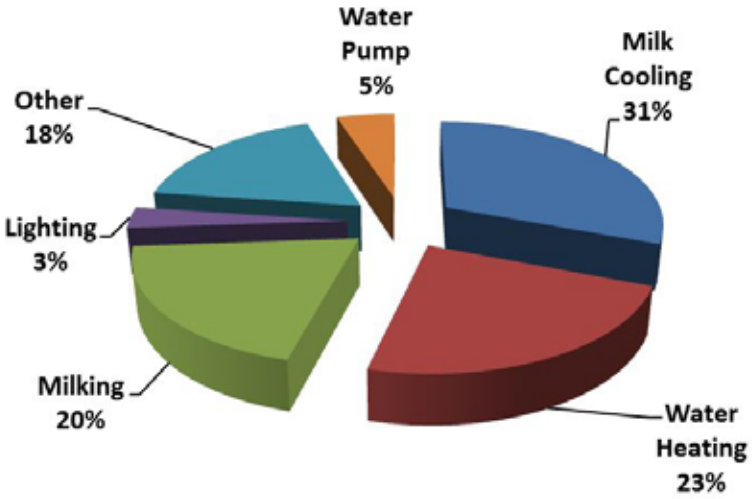
Night rate is charged at ~€0.08 per KWh, and day rate is charged at ~€0.16 per KWh; exact costs vary by the electricity supplier. Checking your pricing and tariff structure against the best available rates can also yield significant savings. The cheapest supplier could be 20% less than the most expensive supplier.

A price check can be carried out using a pricing comparison website such as www.bonkers.ie. All you need is information about your present tariff, annual usage and night rate usage in order to make comparisons and calculate possible savings. If you decide to switch suppliers, it is important to read the small print. Check the standing charges and termination charges.

Key points about night rate electricity

- Night rate hours are from 11pm to 8am during winter time and 12 midnight to 9am for summer time.
- Where appliances are required to operate during night rate hours (e.g., electrical water heaters), digital time clocks with battery backup should be used.
- Analogue timers without battery back-up will become out of sync in power failures
- Note: There is no charge from ESB networks to install a night rate meter. The meter standing charges increase from approx. €0.46 per day to €0.60 per day after moving to night rate electricity. This means that a minimum of 1.5 units of electricity would need to be used each night to offset the extra charges.
- A typical dairy water heater uses approx. 1.5 units of electricity per hour and takes about 6 hours to reach full temperature.

Figure 1: Average component consumption on 60 commercial dairy farms



Dairy Energy Decision Support

Teagasc has partnered with Cork Institute of Technology and the Sustainable Energy Authority of Ireland under the Research Development and Demonstration funding programme to deliver an on-line decision support tool to aide farmers in making decisions around energy efficiency. The tool is available to use at http://messo.cit.ie/dairy

This online Dairy Energy Decision Support tool can be used to gain farm specific recommendations tailored to your situation (e.g. farm size and grant eligibility), seek out energy efficiency projects that deliver a return in 5 years or less.

Conclusions

Calculating the energy costs of your farm in cents per litre of milk produced is a useful exercise to benchmark efficiencies against national averages. Farms with energy costs of greater than €8 per 1,000 litres milk produced will benefit from investing in energy efficient technologies (such as plate cooling), whereas farms below the average electricity spend of less than €5 per 1,000 litres would benefit from cost reducing measures such as moving consumption to night rate electricity (e.g. for water heating and morning milking) and moving to the least cost supplier.

Managing and Maintaining Milk Quality at Farm Level

- Establish and maintain a good washing and descaling routine, use cleaning products from the Moorepark Approved list.
- Ensure you have written procedures clearly visible in the dairy for start of milking and for the finishing up of milking and washing and descaling for all relief milkers to see.
- Use check lists so everyone can ensure all tasks are done – from turning on the bulk tank to closing the dairy door.
- Ensure you have plenty of hot water available.
- Ensure your wash troughs are adequately sized.
- Descale at least once weekly and more often in hard water areas.
- Residues must be avoided due to on-going food safety concerns.
- Have a white board in the milking parlour and clearly list all cows to be excluded from the bulk tank. Mark the cows before treatment in a way that is clearly visible to the person milking, use two methods of identification ***e.g. Spray paint, Leg bands***. Ensure they are kept out of the bulk tank for the correct withdrawal period.

Total Bacteria Count (TBC)

- Critical to maintaining low TBCs'
- Start with a good wash routine and written procedures being clearly on display in the dairy.
- Ensure you have clean cows, milkers, parlour, machine and bulk tank.
- Fast cooling, to 4^0C within half an hour of milking is recommended.
- Plate cooling will speed up cooling and is more energy efficient.
- Always use a new milk filter sock for each milking.
- If more than 12 units, hot wash at least once a day. See the wash routine options on the Teagasc website.
- Follow manufacturers' recommendations on all detergents / sterilisers – do not use extra or
- Do not stockpile detergents - Buy a maximum of three months stock of detergents at any one time and store out of direct sunlight in a cool place.
- Don't use recycled water or 'top up' the wash trough with detergent.
- Ensure your wash troughs are the correct size for your parlour – 9 litres per unit required for wash, 14 litres per unit required for rinse.
- Descale at least weekly & more often in hard water areas.
- Check that the Bulk Tank is working and washing properly – check the temperature after every single milking and look into it after each

wash, checking with a torch for build-up.
- Check that the outlet valve is being washed – a common pitfall in many dairies.
- Ensure relief milkers are familiar with all "routines"

Thermodurics

As above and also:
- Wash and dry teats (or dry wipe) at every milking
- Replace liners every 2,000 milkings
- Replace rubber ware every two years
- Don't wash clusters while on cows
- Use peracetic acid in the final rinse water
- Clip tails routinely
- Descale at least twice weekly during the summer period.
- After descaling, rinse the plant with cold water and then do a detergent wash straight away.

Somatic Cell Count
- Observe cows for signs of mastitis and high SCC at every milking
- Disinfect every teat after every milking all year around
- Wear clean gloves at every milking
- Service your machine twice yearly
- Milk record
- Segregate out infected cows and milk separately from the main herd to avoid cross contamination
- Save time and money by doing milk culturing to find out what bacteria are causing mastitis in your herd and determine which treatment will work best.

Residues

Residues in milk from antibiotics, chlorine and other chemicals are a particular concern.

Antibiotics
- Always mark cows before treating them.
- Where possible separate out treated cows and milk last.
- Record treatments and dates on whiteboards and in your medicine record books and ensure every relief milker has been shown where to find these notes before milking.
- Use a Delvo test kit to clear milk before pick up as part of your milking routine

Chlorine

Avoid residues from chlorine in your milk by:

- Changing to chlorine free detergent for the bulk tank
- Only using fresh detergent – do not buy more than 3 months stock
- Use only the products on the Teagasc recommended lists
- Ensure you are using enough rinse water

Quaternary Ammonium Compounds (QACs)

- Do not use any detergent products containing QACs
- If foot bathing – ensure cows are washed prior to milking as footbath solutions can contain QACs.

Other Issues

Dealing with a cow with mastitis and other animal treatments

Once identified, cows should be clearly marked, her ID recorded and drafted out for milking in the final row.

Reason: More time can be devoted to treating such cows and the risk of spreading mastitis via the cluster is eliminated.

Learning more about mastitis control

Further information on the control of mastitis is available on the Animal Health Ireland website www.cellcheck.ie and in their publication "CellCheck Farm Guidelines for Mastitis Control".

Also check out the milk quality section on the Teagasc website

www.teagasc.ie or www.agresearch.teagasc.ie/moorepark/milkquality

Safety

Milking operators should adhere to safe practices with animals throughout the milking.

Milking Training

Visit www.frstraining.com/milkingcourse, e-mail info@frstraining.com or call 1890201000 to find out full details on Best practice Milking Course.

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