

Milking cows



Good practices in agriculture: social partners participation in the prevention of musculoskeletal disorders.

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Introduction

Everywhere in Europe cows can be found. Statistics indicate that there are more than 24 million dairy cows in the European Union (Eurostat, 2008). So milking cows is a representative task for the agriculture sector. Milking cows is an activity that can last for several hours for the larger herds, two or even three times a day, even although milking one cow would not take more than about 10 minutes. It can be done in many different ways, depending on the availability of up-to-date milking installations or not. Most commercial milking enterprises now rely on pipeline machine milking systems but there are still some farmers who practise hand milking because they do not have a pipeline installed. This is usually done in a tie-stall barn.

It is evident that many musculoskeletal disorders (MSD) can be attributed to milking, due to awkward postures, duration of the task and repetition. An overview of the MSD risks, depending on the task and the type of parlour is presented briefly below.

TASKS	MILKING SYSTEMS*					
	tie stalls; manual milking	tie stalls; pipeline system	abreast parlour	tandem parlour	herring- bone parlour	rotary parlour
cow entry / moving to cow	A	A	O	O	K	L
udder cleaning / taking foremilk	B, C	B, C	B, C	B, C	B, C	B, C
hand / manual milking	C	–	–	–	–	–
releasing cluster	D	D	D	D	D	D
attaching cluster / teat cups	E	E	E	E	E	E
removing cluster	O	O	O	O	O	O
teat dipping	F	F	F	F	F	M
cow exit / moving from cow	A	A	O	O	D	O
moving milk in churn	G	–	–	–	–	–
filtering milk	H	–	–	–	–	–
transferring milk to bulk storage	G	–	–	–	–	–
cleaning floor	J	J	J	J	J	J

* The automatic milking system is commented separately.

A	<i>MSD risk if milker has to lift / carry heavy equipment.</i>
B	<i>MSD risk if milker has to reach for paper towels / cloths in an awkward location. Disposal of the dirty towels must also be considered.</i>
C	<i>MSD risk from repetitive hand (wrist and finger) movements. Not necessary if machine with cluster being used.</i>
D	<i>MSD risk if milker has to reach activation control (switch) in an awkward location.</i>
E	<i>MSD risk depends on weight of cluster and how far milker has to reach to the udder.</i>
F	<i>Small MSD risk but increased if milker has to reach a long way to teats.</i>
G	<i>Some MSD risk as churns may contain 25 kg of milk.</i>
H	<i>MSD risk from milker holding one churn to pour contents into another.</i>
J	<i>MSD risk if use of cleaning equipment requires stooped posture and/or removal of material from stall / parlour.</i>
K	<i>Some MSD risk if milker has get out of parlour to let batch of cows in.</i>
L	<i>If not automated, not usually the responsibility of the milker.</i>
M	<i>If not automated, may be done by a different person standing where the cows exit from the parlour.</i>
O	<i>Expect negligible MSD risk (often automated in more advanced pipeline systems).</i>

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In farms across Belgium, Poland, Sweden and UK, farm visits were organised, resulting in several good practices being observed to prevent MSD when milking cows.

In this brochure, some general good practices in hand milking, tie stalls, parlour and robotic milking systems are presented first. Then, some more specific good practice options are given for the following subtasks:

- Udder cleaning
- Attaching clusters
- Teat dipping
- Cleaning floor
- Cleaning manure

Finally some recommendations are presented on how to practice correct working techniques.

This brochure doesn't claim to be totally complete regarding all possible good practices to prevent MSD during milking cows, but is the result of more than 20 farm visits and meetings with farmers. There is no affiliation to commercial organizations or products in presenting these good practices.

We would like to thank all farmers that collaborated to this study and we hope that all other farmers might learn from their practices to prevent musculoskeletal disorders in the future!



1. General good practices

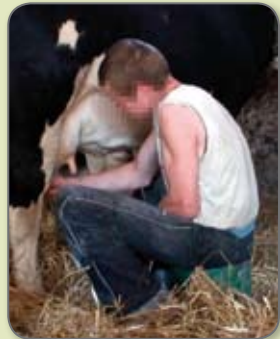
1.1. Hand milking

Milking cows by hand is becoming an exception nowadays, with pipeline milking being by far the most common. However, in smaller, older farms, we may still find this hand milking task. A lot of squatting is done also when performing preparatory milking tasks (e.g. cleaning udder). Such body positions are uncomfortable and can create fatigue.



Solution

Use of a milking stool, fastened with a belt to the hip, or use of a small bucket as a chair. Although slightly better than using no stool at all, this kind of task still involves high load especially in the knees and lower back, due to an unavoidably uncomfortable body posture. Notice also the importance of a safe contact surface between the chair and the stall floor.



One of tasks related to milking cows involves filtering milk. When doing this, milk is poured from one container to another. Usually the milker puts one on the floor and pours milk from the other. Carrying out the task this way gives an unsuitable working height and causes a poor working posture, which imposes bending in the back. Such a body posture creates a strong risk factor of development of MSDs. Milking containers with milk giving combined weights exceeding 25 kg increases significantly the load in the back.



Solution

Changing the method of pouring milk by using a small table does not decrease in the stress on the shoulders, but it strongly diminishes the loading in the back. This solution can also be recommended during cleaning of a milk container.



Using small table in order to adopt a better work posture during straining out milk or cleaning containers.

1.2. Tie stalls

✓ Milking rail



Installation of a milking rail in the tie stall to ease the transportation of the milking equipment.

1.3. Parlour systems

✓ Adjustable floor

In a herring-bone parlour the milker is located in a pit. In a rotary, the cows are often on a platform, elevated above the normal floor level where the milker stands. This is already better than when milker and cows would be on the same level. However, milking is still performed in an upright standing or slightly stooped position and for usually 3 to 4 hours. The fixed floor is not adjustable to the height of the milker and, depending on the milker's stature, this may prevent adoption of the most appropriate working posture.



Solution



Installation of a floor in a rotary milking parlour which is adjustable to the height of the milker.

Comments

An adjustable floor is a good solution when there is only one milker in the parlour. It is more complicated to adjust to a correct working height if there are two milkers of different body height milking at the same time. If the working height is adjusted by a milker standing on a platform or in a depressed area of floor (a pit), this may create a trip hazard.

✓ *Perforated rubber matting*

In the rotary parlour the milker stands at the same location on a floor of concrete or tiles for up to several hours. The floor is not flexible and therefore hard to stand on. Furthermore, it might even be slippery. In the herring-bone design, the milkers do not stand in the same location as they have to move along the pit to access the (stationary) cows. Nevertheless, perforated rubber matting could be a benefit here too.



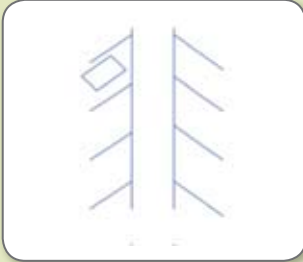
Installation of a perforated rubber matted floor on the existing floor of concrete or tiles in the parlour. This will decrease the physical load on the lower extremities and reduce leg fatigue – furthermore it could be used to provide a non-slip surface, assuming the milker wears suitable footwear.

1.4. Advantages and disadvantages of milking parlour designs

A 50° herringbone parlour

Advantages: high capacity, short walking distances, easy expansion.

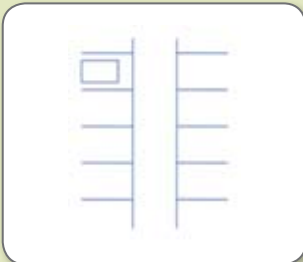
Disadvantages: slow milking cows keep the whole row waiting.



Side by side or abreast parlour

Advantages: short walking distance, highest capacity per m², accessibility of the udder, good positioning of clusters.

Disadvantages: contact with the cows, cow has to turn 90°.

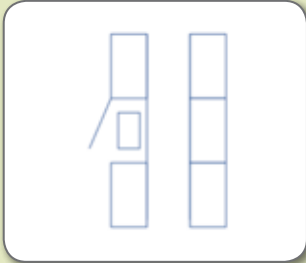


Milkers generally seem to prefer to attach clusters from behind rather than from the side. Where parlour design demands a side approach, the milker could protect his/her forearm by wearing a protective guard.

Tandem parlour

Advantages: individual approach, accessibility and visibility of udder.

Disadvantages: more space needed and approaching the cows from the side.



Carousel – rotary milking parlour (farmer at the inside or outside)

Advantages: highest capacity, shortest walking distance and the cows can be oriented to face inward or in the direction of travel.

Disadvantages: space consuming.



Robot – Automatic milking system

Advantages: no physical load, more quality time, detailed overview cows.

Disadvantages: Expensive, method of milking, lay-out of barn important, no contact with cows, cows summer and winter in barn.



The daily physically demanding work load of milking is eliminated. However, difficult and unsuitable working postures can occur if cows need milking-assistance in the robot. Cleaning the robot also includes demanding postures.

2. Specific tasks in the milking parlour

2.1. Udder cleaning

One of the tasks during milking involves cleaning the dairy cow's teats, which is usually done with a cloth. The cloths are often kept in a basket placed on the parlour floor. The milker has to bend down to pick up a cloth every time an udder has to be cleaned (one cloth per cow is used).

Paper towelling can also be used. But when the paper roll or bucket is located at a fixed place (e.g. at the entrance of the parlour), the milker has to continuously walk back and forth for every new cow. Furthermore, the position of the paper roll is not always between hip and shoulder height.



Solutions

- Centralised paper roll



Roll of paper localised.



Paper or cloths placed in a bucket.



Paper or cloths on cart.

- Stationary location



Clean towels conveniently placed for milker to easily pick up. Suitable for rotary parlours where the cows come to the milker, rather than the milker moving to the cows.



In an automatic milking system the robot cleans the udder automatically by brushing the teats.



In a rotary milking parlours the bucket with moistened paper is attached to a convenient central unit at the desired height.

2.2. Attaching clusters

In the linear and rotary parlour systems the milker is supporting the weight of the milking cluster (weight 1.6-2.5 kg) in one hand, while attaching the teat cups to the udder with the other hand. The arm may need to be in an extended position, lifting the milking cluster forward-upwards above the height of the elbow, and almost to shoulder height. Also, before attaching the cluster to the udder / teats, the milker may have to reach up to push on a display (probably above eye level to not cause an obstruction) to release the cluster for use. This movement is required for every cow and would be repeated 100 times for 100 cows.



Solutions

Support arm and spring-loaded long-travel arm



Installation of a support arm to avoid or reduce a demanding work task - holding and attaching the milking cluster.



The spring-loaded, long-travel arm carries the weight of the cluster so the milker has to perform only the precision task of putting the teat cups on the teats.

Especially during milking in a tie stall, the milker is lifting, holding and attaching heavy milking equipment even up to 7,5 kg (cluster+tubes+pulsator).



Solutions

- *Light-weight clusters*



Use of light-weight clusters (1.6 kg) and tubes (0.40 kg). This reduces the workload considerably.

- *Knee-level push button to release cluster*



Push button at knee level. When pushing the button the cord is released. Excessive reaching above eye level is avoided.

2.3. Teat dipping

After milking, the farmer dips the teats with disinfectant in a dip cup. This may cause continuous repetition of the same movements and awkward postures of the neck-arm region.



Solutions

Instead of dipping the farmer can spray the teats with the disinfectant in a spray bottle. This diminishes the reach distance.



Automatic disinfectant spray

Without involving the milker, the disinfectant is applied to the teat through a separate channel in the cluster before automatic cluster removal. There are possible disadvantages to this sub-system in that the line inserts for this extra facility add weight to the cluster unit and increase its length, which could make attachment to the largest udders more difficult.

A robot (automatic milking system) will automatically spray the disinfectant.



2.4. Cleaning the floor

After or during the milking process the floor has to be cleaned. This regular cleaning is traditionally done with a squeegee in tie stalls. If the handle is too short, this may cause back problems. There is also continuously repetition of the same movements.



Solutions

- Adjustable length of the handle

When cleaning the floor in parlour systems a water hose with pistol grip or a pressure washer often is used. Every two meters a water hose is hung from the roof of the parlour. In this way everywhere in the parlour can be reached. However, during prolonged use the task involves muscle strain in the arms and in the hands/wrists.



This spray head has not only a pistol grip, but when the trigger is pressed, it keeps spraying automatically until the button is pressed again. Static muscle force is diminished.



After the cow has left the automatic milking system, the robot automatically cleans the floor by spraying water.

2.5. Cleaning manure

In the barn where the cows “live”, manure is cleaned traditionally by a manual manure slide. Bending forward due to a small handle and high force can create discomfort.



Solutions



The manure can be cleaned by a power driven manure slide.



The manure can be cleaned by manure slide mounted on a mini-bulldozer.



The manure can be cleaned by an electrical manure slide. This scraper moves back and forth at regular intervals.



The manure can be cleaned by a robot scraper or a mobile barn cleaner. At regular intervals the robot starts automatically and follows a pre-programmed path.

3. Correct working techniques

Milking of dairy cows in tie stalls, linear parlours and rotary milking systems is physically demanding, and is associated with difficult working postures and movements, strenuous and static muscle loads. It is important to prepare for the physically demanding work and to help prevent musculoskeletal disorders by being physically fit, well-trained and knowing how to practice correct working techniques.

- Keep your body in good trim by regular physical exercise.
- Do not use more muscle strength than the task requires.
- Warm up and stretch your muscles before, during and after the milking shift.
- Alternate work tasks with your colleagues and take short breaks - when practicable.
- Work near your body use both hands or alternate, and avoid extending your joints to more distal positions.
- Lifting a load – bend your knees and hips, AND keep your back straight.
- Carrying a load – if possible divide the weight equally between your hands or carry the load symmetrically.
- Turning with a load - move your feet instead of twisting your back.
- Learn how to practice correct working techniques so they become natural for you.



Work near the body and not with extended joints.



Bend your knees, keep the back straight.



Move the feet – do not twist the back.

General information

This brochure is part of the project “Good practices in agriculture: social partners participation in the prevention of musculoskeletal disorders”, funded by the European Commission, DG Employment, social affairs and equal opportunities, call for proposal VP/2008/001. The Commission is not responsible for any use that may be made of the information contained in this brochure.

Goal of the project is to implement the European social partners’ agreement of GEOPA-COPA and EFFAT by developing prevention policies and good practices to reduce musculoskeletal disorders in agriculture and to disseminate the results. For the following tasks good practices are presented:

- *Milking cows*
- *Tractor driving*
- *Ground level manual crops*
- *Pruning*
- *Sorting, grading, packaging*
- *Harvesting*

Funded by:



European Commission
DG Employment, Social Affairs
and Equal Opportunities
1049 Brussels
Belgium
<http://ec.europa.eu/social>

Project coordinator:



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