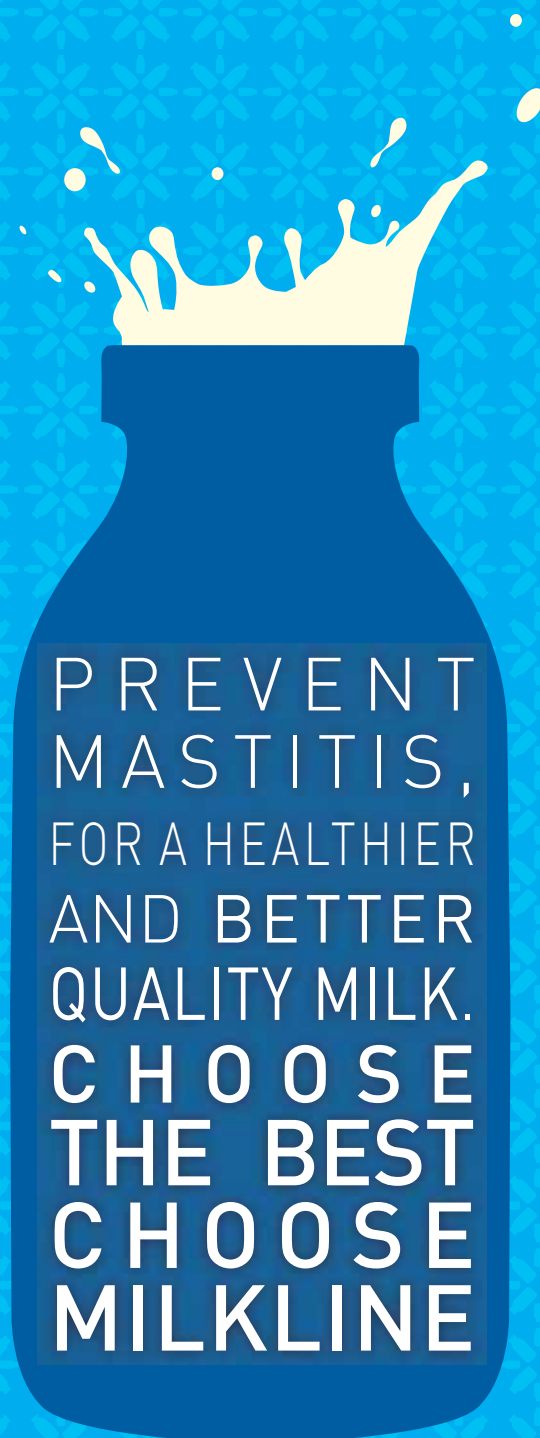


A GUIDE TO THE PREVENTION OF **MASTITIS**

GET A CLEAR UNDERSTANDING
OF UDDER HEALTH



MILKLINE[®]



One of the most dangerous enemies of the dairy cow is mastitis, an inflammation of the mammary gland. The disease is rather recurrent in dairy farms, and causes considerable economic losses, besides causing distress to the animals. With the innovative technological products of the hygiene line, Milkline is a landmark in the market for prevention and care of this disease and of all issues concerning health and cleanliness in dairy farms related to the milking cycle.

The final consumer demands a pure and flavorful product, but the milk and dairy industry also require breeders to guarantee actual results that comply with current regulations. With almost 40 years of experience, today Milkline is a leader in its field, offering clients integrated solutions, reliable services and premium quality products.

A GUIDE TO THE PREVENTION OF MASTITIS

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For several years now, because of the structural conditions and the increasing intensity of milk production, the incidence of mastitis is higher in conjunction with major economic losses.



These losses are mainly due to lower milk production, discarded milk, veterinary costs, and a lower sale price.



Effective prevention and mastitis control, from managerial, hygienic and therapeutic intervention, are the key to solving this problem.



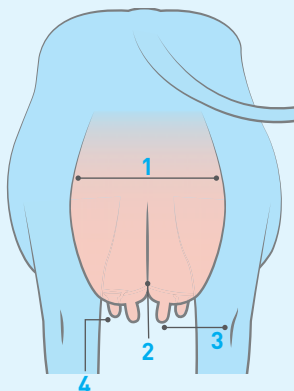
THE AIM OF THIS GUIDE IS TO SUPPLY USEFUL INFORMATION ABOUT THE CAUSES AND CONSEQUENCES OF MASTITIS AND ALSO TO GIVE SOME ADVICE IN PREVENTION AND DETECTION OF THE DISEASE IN A TIMELY MANNER.

THE UDDER

The udder is a milk-producing gland characteristic of mammals. The udder of a cow is made up of four mammary glands, two for each side, called “quarters”. Each quarter is an independent functioning entity, with its own secretory tissue, cistern, and teat.

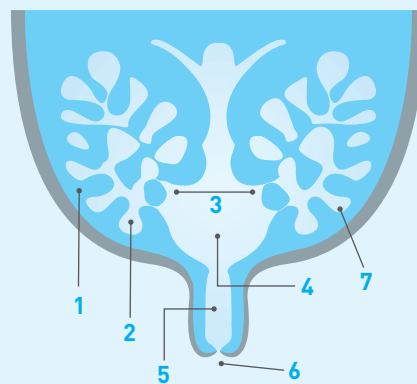
The mammary gland is composed of a complex network of alveoli, consisting of secretory cells which are enclosed by myoepithelial cells. These cells contract in response to milk ejection letting milk flow from the small alveolar ducts into the larger galactophorous ducts, to reach the milk cistern and flow into it and then into the teat canal.

Ideal udder conformation



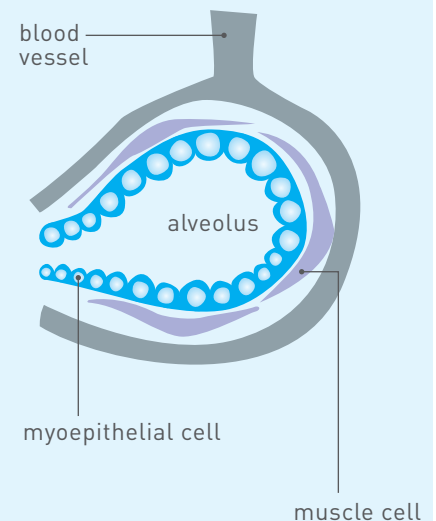
- 1 - well tucked, well-suspended and balanced udder
- 2 - very strong ligament with marked median groove
- 3 - ideal distance between udder base and hock
- 4 - optimal position of the teats

Udder section



- 1 - connective tissue
- 2 - glandular tissue
- 3 - ducts
- 4 - gland cistern
- 5 - teat cistern
- 6 - teat canal
- 7 - alveolus

Mammary alveolus



IN DAIRY COWS, THE CISTERN VOLUME CAN STORE ONLY 20% OF THE WHOLE MILK YIELD. 80% OF THE MILK PRODUCED REMAINS IN THE ALVEOLI UNTIL THE MYOEPITHELIAL CELLS SQUEEZE IT INTO THE DUCT.

THE MASTITIS

The mastitis is an inflammatory infection of the mammary gland which is generally caused by bacteria. This pathology reduces the milk quality and yield, and also causes premature culling of the animals.

MASTITIS SYMPTOMS

PRESENCE OF BACTERIA IN MILK

INCREASE IN THE NUMBER OF WHITE BLOOD CELLS IN MILK

CHANGES IN MILK COMPOSITION (higher pH and conductivity of milk)

VISIBLE INFLAMMATION OF THE UDDER (ONLY CLINICAL MASTITIS)



DIFFERENT FORMS OF MASTITIS

SUBCLINICAL MASTITIS

When infected with subclinical mastitis, a cow does not show any visible signs of infection (subclinical mastitis, in fact, is not detectable by visual examination of the cow or of the milk). Subclinical mastitis is characterized by changes in milk composition, which can be detected only through laboratory tests, such as the somatic cell count test (SCC) and bacteriological examination. Cows with SCC values above 200,000 cells/ml are considered to have subclinical mastitis. The main factor in causing economic losses due to subclinical mastitis is a decrease in milk yield.



CLINICAL MASTITIS

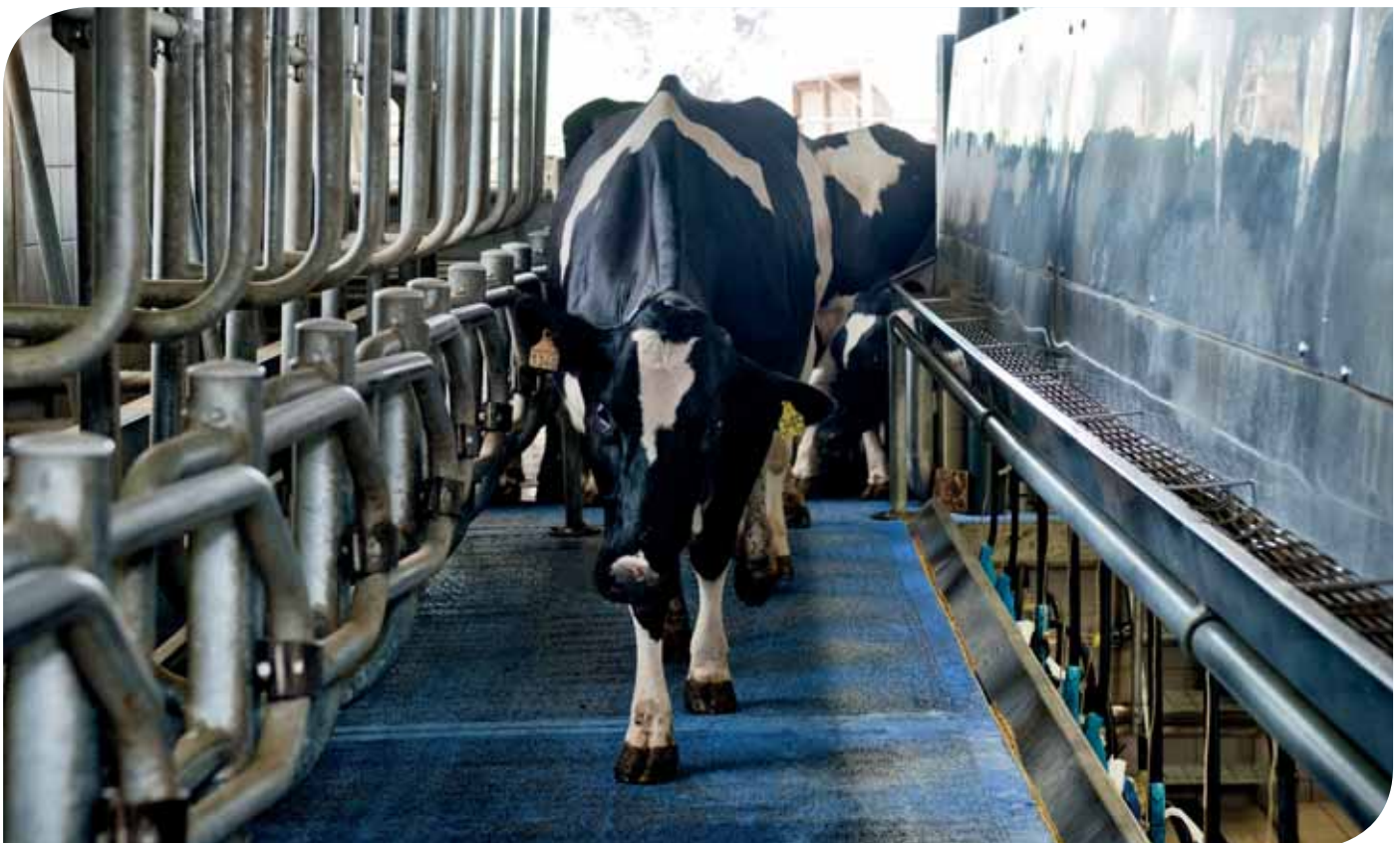
Clinical mastitis presents visible alterations in milk quality-quantity (such as the presence of flakes, fibrin clots or serous milk) and/or in the udder (swelling, redness, pain, reduced or no milk secretion). In this case the cell count can reach even millions of somatic cells/ml. Acute clinical mastitis causes a systemic involvement such as fever, anorexia, drop in production, no rumination, etc.



DEFINITION	SOMATIC CELLS	BACTERIOLOGY	CLINICAL
HEALTHY QUARTER	← 100.000/ml	Negative	Absent
LATENT INFECTION	← 100.000/ml	Positive	Absent
INFLAMMATION	Between 100.000 and 200.000/ml	Negative	Absent
SUBCLINICAL MASTITIS	→ 200.000/ml	Positive or negative	Absent
CLINICAL MASTITIS	→ 200.000/ml	Positive or negative	Present

MAIN BACTERIA CAUSING MASTITIS

	CONTAGIOUS	ENVIRONMENTAL	OPPORTUNISTIC
MAIN MASTITIS PATHOGENS	Streptococcus agalactiae, Staphylococcus aureus, Mycoplasma bovis, Corynaebacterium bovis	Streptococci different from Str. agalactiae (Str. Uberis, Str. Bovis, Str. Canis, Str. Faecalis, etc...) Coliforms (E. Coli, Klebsiella spp., Enterobacter spp., Citrobacter spp., etc...)	Coagulase-negative staphylococci (CNS)
INFECTION PROCESS	These bacteria are spread from infected animals to healthy animals and from infected quarters to healthy quarters of the same cow through the milk. The infection is almost exclusively spread through milking which spreads infected milk residues from sick to healthy cows via the milking machine and incorrect milking procedures (use of the same cloth or paper for more animals, contaminated operator's hands, etc...).	These pathogens are sourced from the environment (bedding). Penetration of bacteria into the teat canal most often occurs during the first 30 minutes after milking when the patency of the teat canal allows penetration of microorganisms into the teat canal. Cows should not be permitted to lie down for a 30 minute period post-milking.	These bacteria are found on the udder and teat skin and establish infection by taking advantage of possible problems related to anatomical, physical and immune defenses of the mammary gland. These infections can also originate from faults in mechanical milking (vacuum fluctuations, over-milking), improper preparation of the udder before milking, insufficient teat disinfection after milking, inconsiderate and excessive use of antibiotic treatment during lactation.



MASTITIS COSTS

The mastitis is still a major cause of economic losses on dairy farms.

DIRECT LOSSES:

- A** Reduced milk yield.
- B** Reduced milk nutritional value.
- C** Lost premiums on milk price or penalty.
- D** Reduced yield of dairy products.
- E** Treatment costs.

INDIRECT LOSSES:

- A** Negative effect on reproductive performance (prolonged interval from calving to conception; risk of reduced fertility and pregnancy loss, delay of cow's first ovulation).
- B** Higher need for forced culling.



ENVIRONMENT

The environment and barn environmental conditions play a strong part in spreading the mammary infections. In order to reduce the risk of mastitis, it is necessary to maintain optimal cow health status by reducing environment bacterial load, possible pathogen-animal contact, and minimizing the negative effects of the environment on the animals and their immune defenses.



THUS IT IS NECESSARY TO:

- A** Maintain the proper microclimate.
- B** Avoid heat stress.
- C** Divide animals into groups.
- D** Adjust herd size to the capacity of the structure, avoiding overcrowding.
- E** House cows that are sick or that are ready to calve or have just calved separately.
- F** Maintain the barn environment clean, dry and comfortable, often changing the cow bedding.

NUTRITION

A well-balanced nutrition is a key factor for the health and wellness of the cow, and thus for the udder defense mechanism.

IT SHOULD BE UNDERLINED THAT:

- A** Dry cow's diet should not be particularly high in calcium.
- B** High intakes of sodium and potassium during the dry period predispose cows to udder edema.
- C** During early lactation, alterations in energy metabolism can reduce the performance of the innate immune system and cause ketosis and mastitis.
- D** Selenium and Vitamin E deficiency reduce cow's immune defenses.
- E** Copper supplementation reduces the incidence of mastitis after calving and also the disease severity.



MILKING

MILKING MACHINE

A milking unit that is capable of meeting the requirements of both the animals and the farmers is critical in achieving proper milking procedures and reducing the risk for mastitis. All the milking unit components must work efficiently, from the teat cup liners (the component that comes directly into contact with the cow's teat) to the vacuum pump.



THUS IT IS FUNDAMENTAL THAT THE MILKING MACHINE IS:

- A** Capable of maintaining a stable vacuum level during milking even at variable and high milk flow rates.
- B** Properly adjusted (vacuum level, pulsation parameters, etc...) so that it is not aggressive to the teat.
- C** Easily cleaned and disinfected.
- D** Regularly undergoes testing and replacement of rubber parts, pulsator and vacuum control valves.
- E** Regularly undergoes maintenance in order to prevent machine stops and malfunctions which may damage the cows and milk quality.

Malfunctioning, incorrect use and improper cleaning of the milking machine may affect the milk quality and the susceptibility to mastitis.

PROPER MILKING PROCEDURE

An appropriate milking routine is essential to milk cows quickly and efficiently, guaranteeing their wellness and at the same time reducing the risks for mammary infection.

A PROPER MILKING ROUTINE SHOULD INCLUDE THE FOLLOWING OPERATIONS:

BEFORE MILKING

1 REGULARLY MONITOR UDDER HEALTH



Evaluate the teat sphincter status at least once a month.

2 PLAN MILKING SEQUENCE



- Start milking healthy primiparous cows
- Continue with healthy pluriparous cows (all the healthy cows anyway)
- Then milk postpartum cows and heifers
- Finally milk infected cows

3 ENSURE HAND HYGIENE



Before milking, operators must preemptively wash their hands with a suitable disinfectant product. However, they must always use disposable gloves during milking in order to prevent the potential spread of pathogens.

4 ELIMINATE THE FIRST SQUIRTS OF MILK



- Detect anomalous or mastitis milk
- Prevent anomalous milk from getting into the tank
- Clean and lubricate teat canal and sphincter
- Eliminate flaking cells or potential microorganisms
- Accelerate oxytocin release

5 CAREFULLY CLEAN TEATS



Clean and disinfect the teat before milking (pre-dipping) with a suitable product.

6 CAREFULLY DRY TEATS



Prior to attaching the milking unit, dry the teats with single use paper towels or individual cloth towels (to be laundered and dried after each milking) in order to prevent the risk of chemical contamination of milk and liner slips. Never use the same paper or cloth towel for more than one cow.

DURING MILKING

7 CHECK VACUUM LEVEL



Always check that the vacuum and pulsation system are working correctly at the start of each milking.

8 ATTACH MILKING MACHINE IN ACCURATE AND TIMELY MANNER



- Attach milking machine within 90 sec from beginning of teat preparation procedure
- Prevent air from entering the liner during attachment (with a 90° bend in the short milk tube) because this may cause teat contamination

9 CHECK THE CORRECT POSITION OF THE MILKING UNIT



Check milking unit alignment and if necessary adjust it to prevent liner slips.

10 AVOID OVER-MILKING AND ENSURE PROPER REMOVAL OF THE MILKING UNIT



- When milking is completed, the milking unit needs to be removed immediately, in order to prevent over-milking and possible damages to the teat end
- Always cut off the vacuum supply before removing the milking unit to prevent both stretching of the teat and air admission into the bowl, which may spread unwanted bacteria

AFTER MILKING

11 DISINFECT THE TEAT (POST-DIPPING)



Disinfect the whole teat thoroughly with a specifically designed product in order to remove bacteria on the teat skin before they penetrate inside and to enhance teat skin conditions.

12 ENCOURAGE COWS TO STAND AFTER MILKING



Provide fresh feed and abundant water so that the cows can stand for at least 20-30 minutes after milking. Allow time for the teat sphincter to close completely before it comes in contact with contaminated bedding.

13 WASH AND DISINFECT THE MILKING MACHINE



- Wash the outside of milking machine
- Prewash with potable cold or lukewarm water (30-35°C) without recirculation
- Wash with detergent and disinfectant, with recirculation to be performed at the recommended temperature for the product used
- Rinse pipes; warm potable water without recirculation is recommended
- Remove teat cup liners from the jettets to allow drying

14 MAINTAIN THE MILKING MACHINE REGULARLY



- Replace filters after every milking
- Replace liners and pipes periodically
- Call MILKLINE qualified personnel

PREVENT WITH MILPROP4C

As a direct consequence of the damage caused by mastitis to the glandular tissues of the udder, besides an increased count of somatic cells and lower concentration of milk components such as lactose, casein, total solid, and fat content and minerals (calcium, phosphorous, potassium), a higher concentration of sodium and chlorine is observed. The concentration of ions in a solution can be determined by measuring its conductivity.

This is why the inflammation status of the mammary gland can be recognized by measuring milk conductivity. There are a number of possible ways to measure conductivity. Among these, the measurement of single quarter conductivity is the most reliable, because it enables the comparison of values for a single animal which, under normal conditions, should be the same.

MilproP4C is capable of measuring single quarter conductivity. This way, it provides an indication about which of the four quarters could be infected and how severe the infection is. Values ranging between 4 and 5, shown on the display, indicate a potential infection of the udder to be confirmed in subsequent milkings.

Besides, **MilproP4C** is capable of providing single quarter values based on udder milk flow. When conductivity is low, milking of that quarter is automatically stopped. This system prevents the risk of over-milking, and stopping at the right time.

CHOOSING MILPROP4C, YOU WILL IMPROVE THE HEALTH AND PRODUCTIVITY OF YOUR ANIMALS AND CUT DOWN THE OVERALL COSTS OF YOUR BUSINESS.

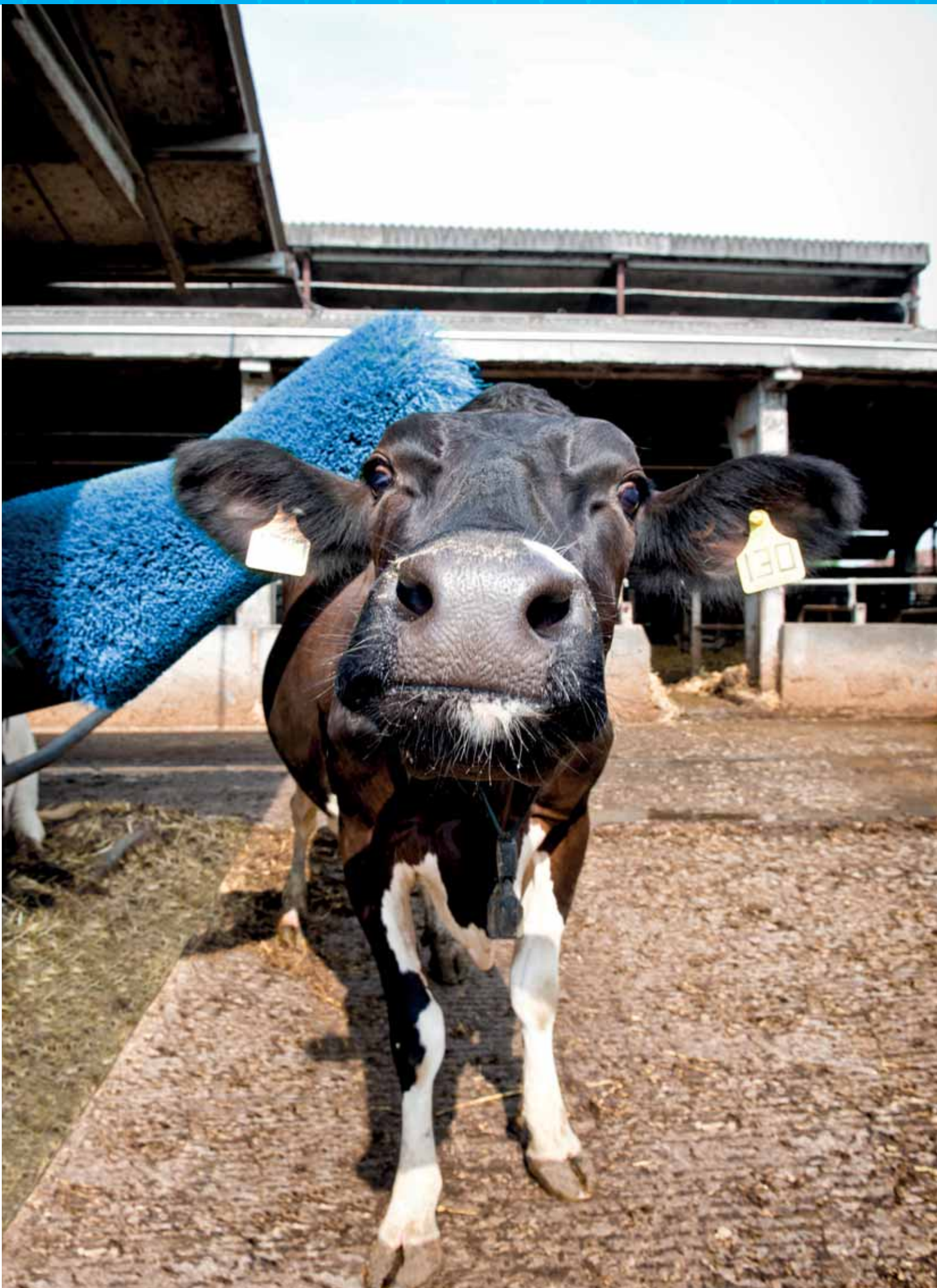


MILKLINE PRODUCTS AND PROGRAMS TO PREVENT MASTITIS

ENVIRONMENTAL HYGIENE	OPERATION	PRODUCT
DISINFECTION OF DAIRY FARM ENVIRONMENT AND MILKING PARLORS	Clean milking area (floors, walls), equipment (bedding, etc...) with foam detergents then rinse and disinfect.	MILKCLEAR FARM

MILKING HYGIENE	OPERATION	PRODUCT
CLEANING OF OPERATOR'S HANDS	Before every milking clean and disinfect the hands. Use disposable gloves.	MILKCARE MANI
PRE DIPPING	Dip teats in teat dip cup, leave for 3-4 seconds, then dry with paper.	MILKTEAT FOAM
	Use pre-wetted wipes moistened with disinfectant solution to wipe teat. Use one per cow.	MILKTEAT WET WIPES, MILKTEAT WHITE TOWEL, MILKTEAT BLUE TOWEL
POST DIPPING	Disinfect teat with filmogenic or spray products.	MILKTEAT CLOREX, MILKTEAT DEFENDER, MILKTEAT DEFENDER PRO, MILKTEAT COMPLETE
DISINFECTION AND DESCALING OF MILKING EQUIPMENT	At the end of each milking, deterge and disinfect the milking machine. Do a descale wash once a week or more.	MILKCLEAR ALKA, MILKCLEAR ALKA PRO, MILKCLEAR ACID

CHECK QUARTERS OF THE UDDER	OPERATION	PRODUCT
CHECK AND MASTITIS PREVENTION	Measure electrical conductivity per single quarter.	MILPROP4C



MILKLINE®

This document contains some extracts and quotes from:
"Nutrient Requirements of dairy cattle" - National Research Council (2001)
"Alimentation des bovins, ovins & caprins" - INRA
"Mastite bovina" - Alfonso Zecconi - Edizioni L'Informatore Agrario (2010)
"Mastite bovina da prototheca" - N. Arrigoni et al. Large Animal Review 2010
"Mastitis Council" publications

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