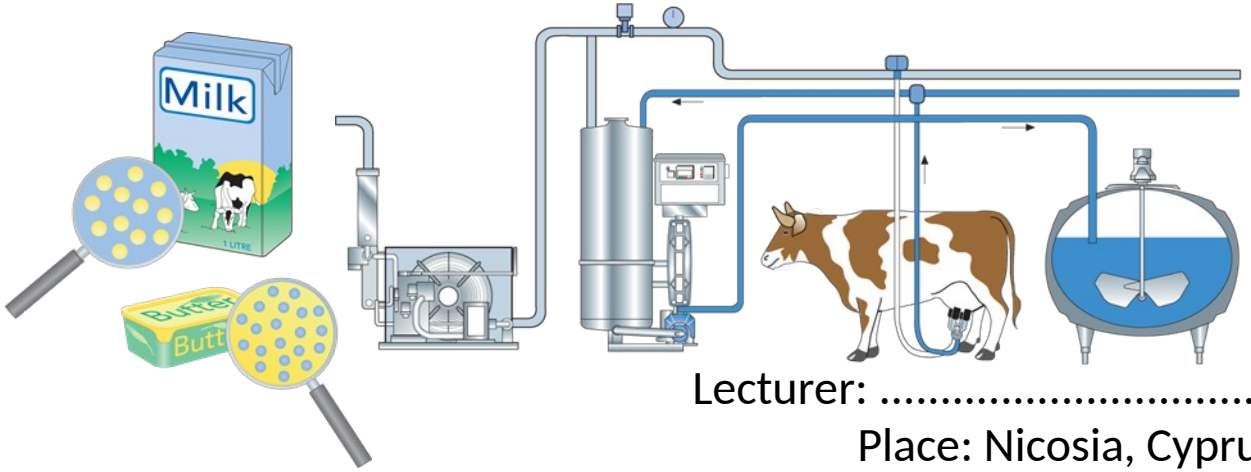
Project: Technical assistance to improve implementation of food safety standards and disease crisis preparedness

FARM HYGIENE
FARM BIOSECURITY



Lecturer: .....

Place: Nicosia, Cyprus

Project funded by the European Union within the scope of the Aid Programme for the Turkish Cypriot community, implemented by the NSF Euro Consultants Consortium

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CONTENT

- Good Farming Practices
- EU hygienic requirements for farmers (primary producers)
- Farm hygiene and farm biosecurity
- General bio-security measures
- Animal health

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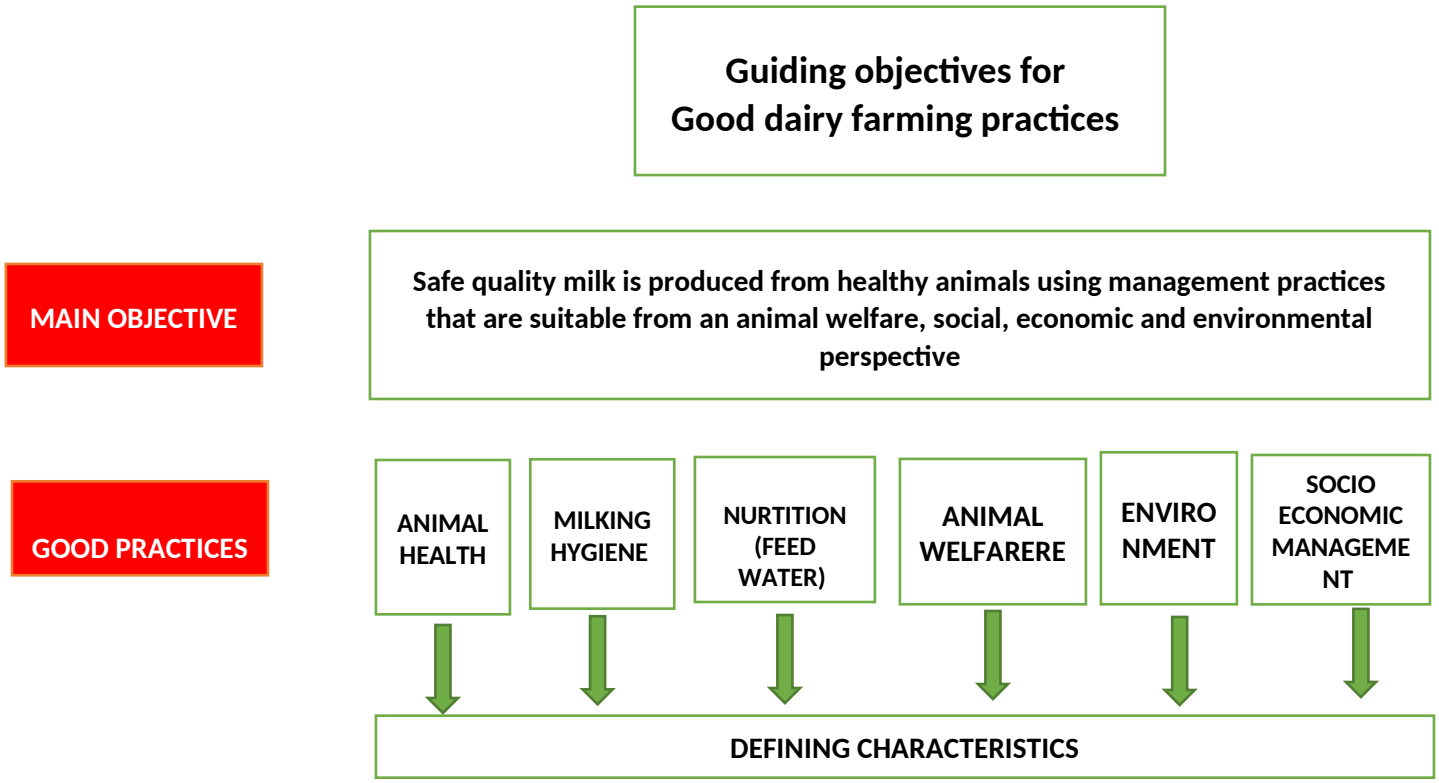
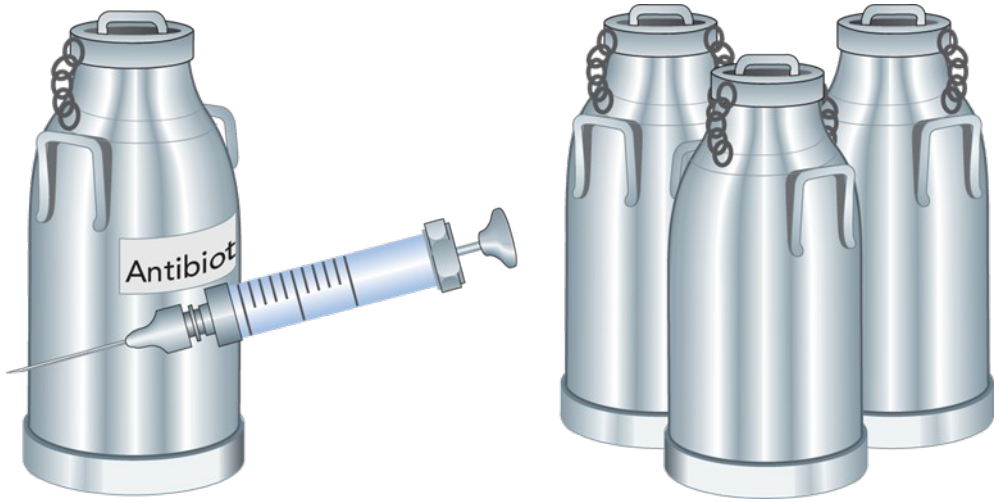
Good Farming Practices



FARM HYGINE AND FARM BIOSECURITY

High production from healthy animals not suffering from any kind of disease



Mastitis is the most common and costly disease in dairy herds

FARM HYGINE MILK CONTAMINATION

- Milk can be contaminated at any point in the milk production process
- It is the responsibility of the food business operator (milk producer) to identify these points and implement control measures to protect milk from contamination
- Raw milk is primarily intended for processing into dairy products which meet specified standards. Therefore, the quality and safety of raw milk is important in the production of high-quality milk products.

FARM HYGINE AND FARM BIOSECURITY

- BIO-SECURITY - Biosecurity is focused to reduce and prevent the introduction of diseases or pests of animals on a farm, and to minimize the spread of diseases or pests within a farm;
- FARM HYGINE - Raw milk shall be produced under conditions that minimize contamination from the animal, environment, personnel, feeds, equipment and related facilities.

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EU HYGIENIC REQUIREMENTS FOR PRIMARY PRODUCERS

853 ANNEX I PRIMARY PRODUCTION specific hygiene rules for food of animal origin, ANNEX III - SECTION IX: RAW MILK

CHAPTER I: RAW MILK - PRIMARY PRODUCTION

I.HEALTH REQUIREMENTS FOR RAW MILK

II. HYGIENE ON MILK PRODUCTION HOLDINGS

A.Requirements for premises and equipment

B.Hygiene during milking, collection and transport

C.Staff hygiene

III. CRITERIA FOR RAW MILK for raw cows' milk:

Plate count at 30°C (per ml) < 100 000, Somatic cell count (per ml) < 400 000 other species: Plate count at 30°C (per ml) < 1 500 000

Raw milk fails to comply the FBO must inform the CA and take measures

GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimise the transfer of pathogens by:

- **persons**
- **vehicles**
- **equipment**
- **water**
- **feed**
- **animals** and

any other means from one stable to another and from one farm to another.

GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimize the transfer of pathogens by:

People: Create a visitor policy. Issues to consider are:

Signs indicating where visitors are to report, rules to be followed while on the farm, a specific area for visitor parking, maintain a record of visitors (name, address, company name, purposes of the visit, signature), do not allow pets of any kind onto your property, do not allow visitors to bring food onto the farm

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GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimize the transfer of pathogens by:

People:

• train employees (e.g. to detect disease in animals, job procedures, emergency plan, routine hygiene procedures).

• Implement appropriate personal protection equipment (clothing, gloves, etc) for visitors and for employees

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GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimize the transfer of pathogens by:

Housing and equipment

- All animal housing must be designed and maintained so as to prevent the entry of animals and birds and limit the access of vermin as far as is practical
- Entry to sheds must only be made through entrances with a footbath containing a suitable disinfectant. Footbaths the contents replaced as required

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GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimize the transfer of pathogens by:

Housing and equipment

- Perimeter fencing to prevent contact between animals and reduce disease transmission. This will establish a clearly defined bio-security zone.
- Critical storage areas such as the milk room and feed storage areas should be lockable and should have limited entry (prevent access to the top of bulk storage tanks, entry and discharge points of exterior liquid tanks).
- All pesticide containers should be secured inside a locked building whether they are empty or full.

GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimize the transfer of pathogens by:

Housing and equipment

• Clean and disinfect equipment properly (special attention should be devoted to equipment used on ill animals, dehorners, hoof knives, and clippers, nursing bottles and feeding buckets);

use your own equipment rather than borrowing them;

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GENERAL BIO-SECURITY MEASURES

The implementation of bio-security measures aims to minimize the transfer of pathogens by:

Vehicles

- It is best to have only one entry/exit road from the farm.
- The main entrance to the production area should be clearly marked (e.g. bio secure area, no entry unless authorized) and must have a lockable gate.
- Clean and disinfect all vehicles carrying livestock between shipments (the inside, outside, and tires).

GENERAL BIO-SECURITY MEASURES

Vehicles

- Avoid the transfer of manure, dirt, mud, or other organic material via vehicles.
- Locate holding pens for animal pickups near the road and away from the barns or livestock areas.
- Use only clean well-bedded trucks to move livestock to avoid introducing diseases and to avoid injuries during transport.
- Thoroughly wash and disinfect of livestock hauling trucks, trailers, manure loaders and spreaders, tractors, portable livestock chutes or other implements of husbandry shared with neighbors which could spread disease from one farm to another.

GENERAL BIO-SECURITY MEASURES

Water supply

- Drinking water must meet appropriate standards
- All surface water (dam, river etc.) must be treated before being used as drinking water
- Treated water supply must be kept in a closed system from the point of treatment to the drinker
- If water storage tanks are used they must be clean and have a lid to prevent entry of dead or living material
- Follow a regular cleaning schedule of water troughs and tanks
- Drainage - the production area should be adequately drained to prevent accumulation and stagnation of water

GENERAL BIO-SECURITY MEASURES

Feed

• Know the source and quality of purchased feeds.

• Feeding systems must wherever possible be closed to ensure that feed in silos and feed delivery systems are protected from access and contamination by wild birds and rodents.

• Feed spills should be cleaned up without delay to prevent the congregation of wild birds, rodents, etc.

• Do not feed table scraps, human food products, or garbage to farm animals.

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GENERAL BIO-SECURITY MEASURES

Bedding material

- Bedding material should be stored protected from weather and ideally also from vermin.
- Purchase and transport of bedding material should be verified (the bedding material should not have previous to the purchase had contact with livestock).

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GENERAL BIO-SECURITY MEASURES

Manure and waste

- A dead animal disposal method must conform with applicable environmental compliance requirements (closed containers, timely disposal)
- Use separate equipment for handling manure and for feed operations
- Remove manure frequently from holding areas (to prevent completion of life cycles of intestinal parasites in animals and insects)
- Control the fly population (flypaper, biological control methods, insecticides, traps)

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BIO-SECURITY

Have a vermin control **p**rogramme in place

Integrated Pest Management

Biological, chemical and physical control methods

GENERAL BIO-SECURITY MEASURES

Other measures

- The use of electronic security devices such as motion detectors around fertilizer and fuel tanks, door alarms on buildings, video cameras, and alarms linked to an off-site security monitoring system should be considered.

- Computer files or data systems should have restricted access. Electronic communications should be secured, and virus protection installed. Back-up files should be stored off-site.

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GENERAL BIO-SECURITY MEASURES

Other measures

- Maintain good inventory records of equipment and chemicals such as fertilizers and pesticides in case of theft, fire, flood. Good records may be indispensable to emergency personnel.

- Create a good emergency plan in writing, including evacuation plans for all buildings, chemical inventory and where the chemicals are located, utility locations and procedures for shutting them off, employee procedures during an emergency.

In case of an outbreak of a notifiable disease, additional (more stringent) bio-security measures need to be taken.

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ANIMAL HEALTH

Good dairy farming practices for animal health is intended as a resource for good dairy practices in the following areas.

- ✓ Animal health
- ✓ Prevent entry of diseases into the farm
- ✓ Regularly check animals for signs of diseases
- ✓ Keep sick animals isolated

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ANIMAL HEALTH

Animals that produce milk need to be healthy and an effective health care programme should be in place.

Establish the herd with resistance to disease.

Of particular relevance is the animals' ability to adapt to climatic extremes, feed quality, local parasites (especially ticks) and their acquired resistance to endemic disease.

The demands on the animals also vary with the farming system and type of production PDO Products halloumi/hellimi cheese.

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ANIMAL HEALTH

Vaccinate all animals as recommended or required by the local authority.

Vaccination is a useful tool to limit the impact of disease by increasing the immunity of the animal population to specific pathogens.

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BIO-SECURITY

Use all chemicals and veterinary medicines as directed.

Observe the specified withholding periods.

Store chemicals and veterinary medicines securely and dispose of them responsibly.

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ANIMAL HEALTH

- ✓ Milk must come from animals that are in a good general state of health.
- ✓ Milk from animals showing signs of **udder disease must** not be used for human consumption.
- ✓ Milk from animals undergoing medical treatment must not be used for human consumption before the end of the prescribed withdrawal period.
- ➢ Prevent entry of disease onto the farm /farm bio-security.
- ➢ Certificate for health status of the animals from registered farm
- ➢ Procedures for Isolation (…)
- ➢ Herd health management programme - TBC , B

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REEKORD KEEPING / DOCUMENTATION

There shall be a system of documentation. The records of important information shall be kept for two years for the purpose of traceability.

They shall cover the following items:

•The information on production management i.e. history of each dairy cow (keeping cow history record throughout the animal life), feed and water, farm management, animal heath, production records and test results of raw milk quality.

Computerized record-keeping systems

•Records must be permanent. Notes on a whiteboard or similar that can easily be removed are considered not to be of a permanent nature.

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Mastitis management

Adequate measures must be taken to control insects, rodents and birds on the premises to avoid contamination.

Animals must be isolated if they are infected, or suspected of being infected, with any disease transmitted to man through milk.

All staff engaged in milk production must be trained in food hygiene, health risks and use of equipment.

Appropriate records must be kept on feed supplies, veterinary products, disease that may affect the safety of the milk, and any results of samples and checks made on animals or their products.

Sufficient potable water must be available in the milking area for hand washing, udder and teat washing, and for rinsing and cleaning equipment.

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MILKING HYGIENE

Contamination of raw milk at the farm occurs during milking and handling. The sources of contamination include:

- The milking animal
- Personnel - Personnel hygiene
- Equipment
- Environment
- Water

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MILKING HYGIENE

- Prepare animals for hygienic milking
- Use suitable, well maintained and clean equipment for milking and milk storage
- Avoid contaminants in milk
- Harvest milk under hygienic conditions
- Minimise spoilage of milk after harvesting
- Refrigerate and store milk under hygienic conditions

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MILKING HYGIENE

A high standard of cleanliness should be maintained at all times in housing areas to decrease soiling of the udder and so protect udder health. The housing area should:

- be designed to provide good drainage and ventilation and to avoid animal injury;
- be of suitable size and designed to cater for the size of the animal and the herd; and
- have adequate loose bedding which is maintained in a hygienic condition.

All stalls and beds should be kept clean and dry (eg. by replacing the bedding frequently). Regularly clean or scrape passageways to remove manure.

MILKING HYGIENE

Ensure milking area is kept clean

The milking area should be designed to allow it to be kept clean and tidy. It should:

- be easy to clean;
- have a clean water supply;
- have waste handling facilities; and
- have sufficient temperature regulation, ventilation and light.

Construct holding yards to enable a high standard of cleanliness to be maintained.

MILKING HYGIENE

Ensure the milkers follow basic hygiene rules The milker should:

- wear suitable and clean working clothes
- keep hands and arms clean especially when milking
- cover cuts or wounds and
- not have any infectious disease transmissible via milk

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MILKING HYGIENE

Ensure milking equipment is cleaned and when necessary, disinfected after each milking

Establish a routine to ensure milking equipment is clean before each use. If mobile milking equipment is used, this may mean cleaning between each use.

Use chemicals approved for the cleaning and/or disinfecting of milking equipment. Use water of suitable quality heated to the required temperature. Milk contact surfaces should be disinfected as required and in accordance with national recommendations and regulations.

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MILKING HYGIENE

Preparing the udder for milking:

- removal of rough dirt from the udder with tepid water;

- disinfecting the udder with a disinfecting solution;

- drying the udder with paper towel/tissue;

The first milk spurt should be always milked in a separate container (same container for all cows).

Preparation of milking equipment:

a) before milking:

• Disinfecting the milking machine, preceding immediately to milking, with a disinfecting solution;

• Disinfecting the milk collecting containers with a disinfecting solution, prior to milking;

MILKING HYGIENE

b) after milking:

• immediately after milking, the milking machine and other containers used during milking, should be rinsed with lukewarm water until the water becomes clear (until clean and pure water is seen);

• After that, an alkaline solution should be prepared (50 - 70 g./10 l. water) and used to wash and rinse the entire equipment. Its temperature should be 60-70 ºC. Proper cleaning brushes should be used for the washing, and no sponges. The rubber parts of the milking machine should be cleaned in the same manner.

• After washing with an alkaline detergent, the entire equipment should be rinsed with a gushing water to ensure elimination of any alkaline detergent residue.

This procedure should be repeated every day!

MILKING HYGIENE

• Once to twice a week, an **acid solution** should be prepared (50- 70 g./10 l. water) and used to wash the whole equipment. The solution's temperature should be 60-75º C. Proper cleaning brushes should be used for the washing.

Controlling the milking machines:

• Introduce periodical inspections of the number of pulsations (normally 50-60/minute) and vacuum in the teat cups (normally 48-50 Pa). The rubber part of the teat cups should be replaced after being used 2500 times, or after 6 months. Milk manipulation after milking the milk should cooled at 4ºC.

Dairy cows testing for presence of subclinical mastitis: Once a month, farmers should conduct dairy cows testing by using quick detecting tests for subclinical mastitis presence, and provide adequate treatment to the diseased cows.

Cleaning and Sanitation

SANITISATION

Sanitation is the reduction of microbial contamination of the food contact surfaces to a level considered safe, from public health points of view. Chemical substances which prevent growth of micro-organisms are known as antiseptics while those which cause death are called “disinfectant “, “germicide”, or “sanitizer”. Sanitizers are the compounds or type of antimicrobial that kills or cause irreversible inactivation of at least 99.9% of all bacteria, fungi and viruses present on surface.

Cleaning and Sanitation

It must be kept in mind that milk producers are always obliged to maintain high hygienic standards.

It is important to note that equipment should also be **clean from bacteriological point of view**.

The equipment surfaces should therefore be first thoroughly cleaned with chemical detergents and then disinfected.

Cleaning agents and disinfectants shall be food grade quality and should be handled and used carefully and in accordance with manufacturers' instructions.

Cleaning and Sanitation

Cleaning shall remove the milk residues and dirt and it can be carried out separately or by using the combined methods, such as heat, scrubbing, turbulent flow and vacuum cleaning or other methods that avoid the use of water, and chemical methods using appropriate cleaning agents.

Cleaning & Sanitation of milk production farm should be done for all equipment and frequency should be based on the run time, CIP validation outcome.

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Cleaning and Sanitation

What is Dirt?

•the word “dirt” simply means “unwanted matter”

•a “clean” room will most likely be too “dirty” for a surgical operation

In the food industry, the word “dirt”, indicated also as “soil”

is usually referred to:

•residues of food products, old and chemically and biologically modified

•residues of food constituents (sugars, fats, protein)

•scaling coming from water hardness.

MILKING HYGIENE

Why Cleaning?

All equipment machines are supposed to be able to fill commercially clean/sterile food without re-infection.

In order to perform this function, all machines undergo a pre-production process before the using operation starts.

Pre-disinfection (sterilization) implies that certain conditions of concentration, temperature and flow are created in all the parts of the machine that come or may come in contact with the food, so that all the micro-organisms originally present on those surfaces are killed.

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MILKING HYGIENE

When Something Is Clean?

Soil can be removed to several different extents, consequently, an object can be “clean” to several degrees.

The several degrees of cleanliness listed below are in some way progressive:

- **Mechanically Clean**
- **Chemically Clean**
- **Microbiologically Clean**
- **Sterile**

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MILKING HYGIENE

TIME

Any step in the cleaning process should last long enough to achieve the desired results.

- the detergent solutions need some contact time with the soil
- the detergent solutions need some contact time with the soil to efficiently act on it
- the soil will require time to be carried away to the desired extent by mechanical action

MILKING HYGIENE

CIP CLEANING-CLEAN-IN-PLACE CLEANING

Clean-in-place (CIP) is a method of automated cleaning the interior surfaces of pipes, vessels, equipment, filters and associated fittings, without major disassembly.

CIP is commonly used for equipment such as piping, tanks, and fillers.

CIP employs turbulent flow through piping, or spray balls for large surfaces.

MILKING HYGIENE

CIP CLEANING-CLEAN-IN-PLACE CLEANING

Whether **CIP cleaning** or **cleaning-out-of-place**, to achieve a sanitary clean, the basic cleaning principles of TACT—Time, Action, Chemical and Temperature—must be understood. The four cleaning factors define the result of the cleaning process

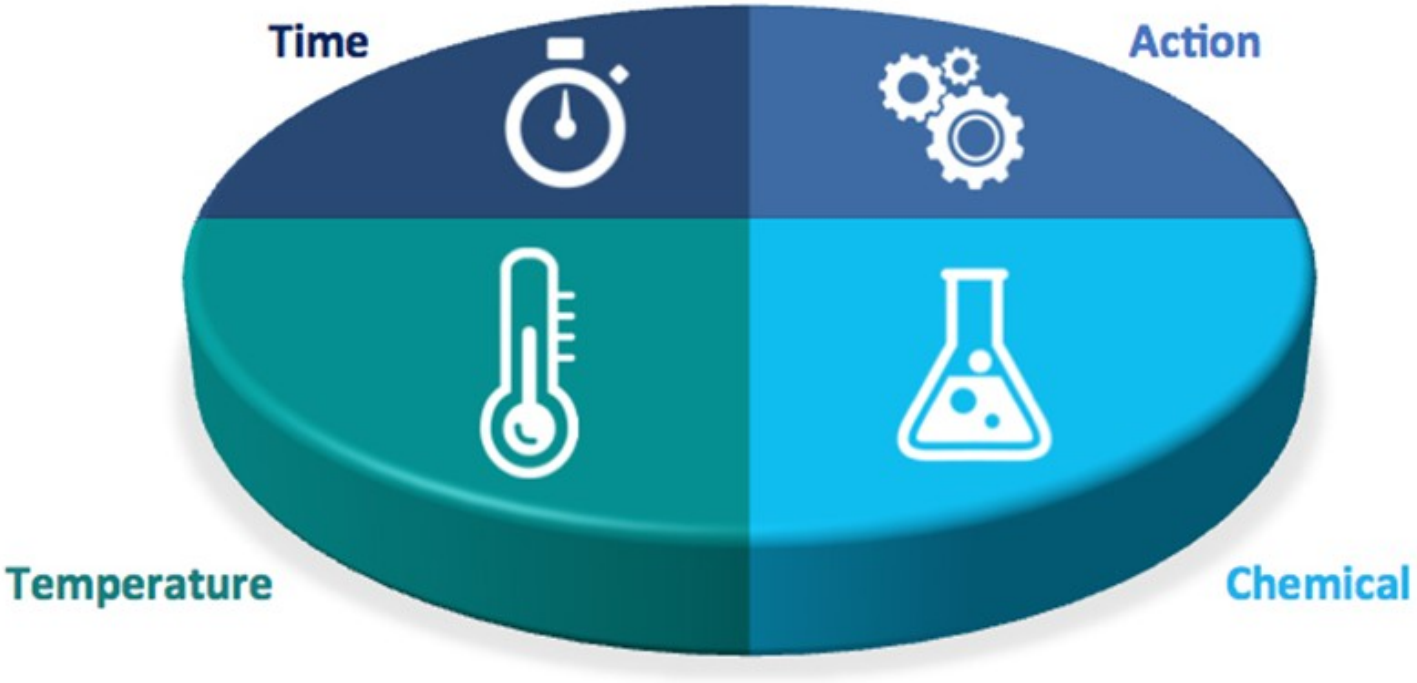
1. T**ime**
2. **Action**

3.Chemical

4.Temperature

MILKING HYGIENE

CIP CLEANING-CLEAN-IN-PLACE CLEANING



MILKING HYGIENE CIP CLEANING

Every CIP cleaning cycle has its own unique set of parameters, so there's really no such thing as a "typical" CIP cycle. Steps are included in most cleaning cycles:

MILKING HYGIENE

Cleaning-Out-of-Place (COP)

is a method used when parts cannot be cleaned-in-place and must be disassembled from the process. Typical process parts cleaned-out-of-place in parts washers and cabinet washers include hoses, clamps, fittings, scale buckets and other disassembled process components.

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MILKING HYGIENE

Cleaning a dairy farm equipment require more time to get the solution to the right temperature.

There is a need to run several chemicals in a cycle such as a caustic wash to remove dairy proteins and fats, an acid wash to remove the milk stone, and a sanitizer.

MILKING HYGIENE

Step 1: pre-rinse - important step in the CIP process.

The pre-rinse cycle:

- Wets the interior surface of the lines and tanks
- Removes most of the remaining residue
- Dissolves sugars and partially melts fats
- Provides a non-chemical pressure test of the CIP flow path

Use potable plant water, de-ionized water (DI), water that has been processed through reverse osmosis (RO), or re-use the final rinse solution from the previous cleaning sequence. A Turbidity Sensor may be used to verify that the pre-rinse effectively removes all solids.

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MILKING HYGIENE

Step 2: caustic wash – (60 °C - 85 °C)

Caustic washes soften fats, making them easier to remove. Also known as caustic soda, sodium hydroxide or NaOH, the alkali used in caustic washes have a very high pH in a concentration range of 0.5-2.0%. Concentrations as high as 4% may be used for highly soiled surfaces.

Caustic is typically used as the main detergent in most CIP wash cycles. A non-foaming formulation can help reduce pump cavitation and increase efficiency. It will also prevent tanks from overfilling with foam when the system starts to recirculate.

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MILKING HYGIENE

Step 3: Intermediate rinse

Fresh water flushes out residual traces of detergent remaining from the caustic wash.

Use proper instrumentation during each step of the CIP Cycle, including rinsing, ensures proper cleaning.

• Level Transmitters and Probes monitor tank levels of wash and rinse tanks.

• Flow Transmitters ensure optimum flow for spray devices to precisely control wash and rinse steps.

• Conductivity Transmitters ensure chemical levels are hitting predetermined set point.

MILKING HYGIENE

Step 4: Final rinse

Rinse with either DI, RO, or city water to flush residual cleaning agents.

In many systems, the final rinse water may be recovered and reused as the pre-rinse solution for the next cleaning cycle. The residual heat and chemicals it retains from the final rinse will help make the next pre-rinse more effective and economical.

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MILKING HYGIENE

Step 5. Sanitizing rinse

May be required to help kill microorganisms before starting the next production run.

For many years, various hypochlorite solutions (potassium, sodium or calcium), also known as “hypo,” have been used as sanitizers in many CIP cycles.

The active ingredient in a sanitizing rinse is chlorine (bleach), which is:

- Relatively inexpensive to use.
- Very effective as a sanitizing rinse for soils that are prone to bacterial growth such as dairy products.
- Potentially harmful to stainless steel, causing staining, corrosion and pitting.

MILKING HYGIENE

Recommended procedure is :

i. Rinsing with the warm water for about 10 minutes

ii. Circulation of an alkaline detergent solution (0.5-1%) at 75^{o}C

iii. Rinsing out alkaline detergent with warm water for about 5 minutes

iv. Circulation of nitric acid solution (0.5-1%) at 70^{o}C

v. Post rinsing with cold water

vi. Gradual cooling with cold water for about 8 minutes.

STORAGE TANKS

- ✓Storage tanks must be sited and maintained so as to limit the risk of contamination of the milk.
- ✓Storage tanks must be adequately sealed to prevent physical contamination of milk.

On the visited farms, milk cooling tanks with a built-in CIP system are used.

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STORAGE TANKS

CIP programmes for circuits with pipe systems, tanks and other process equipment with no heated surfaces. The recommended procedure is :

i. Rinsing with the warm water for about 3 minutes

ii. Circulation of alkaline detergent solution (0.5-1%) at 75^{o}C

iii. Rinse with warm water for approx. 3 minutes

iv. Disinfection with hot water preferably.

CONCLUSIONS

- Dairy farmers are in the business of producing food for human consumption so they must be confident in the safety and quality of the milk they produce.
- Farm Biosecurity and Farm Hygiene ensures that the milk is produced by healthy animals and produced raw milk is safe.
- Dairy farmers are an integral part of a larger dairy food production and processing chain and that all participants in the chain - dairy farmers, suppliers to dairy farmers, dairy product manufacturers, should be part of an integrated food safety and quality assurance management system.

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THANK YOU FOR YOUR ATTENTION

Project funded by the European Union within the scope of the Aid Programme for the Turkish Cypriot community, implemented by the NSF Euro Consultants Consortium