

Hygiene management in the dairy pilot plant of agriculture faculty of Islamic Azad university– Sanandaj branch

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What are GMP and GHP?–

Well as hygienic suitability such as general hygiene and product spoilage.

So, prerequisite programs, hygienic processing measures (hurdles, treatments, etc.) and HACCP programs all together constitute GHP.

It is important to understand the differences between food suitability.

Safety requirements only relate to hazards, that is human health, and they depend on the intended use of the food (for instance, whether the product is intended for direct consumption or for direct consumption or for further industrial or domestic processing, as well as the target consumer group).

Example. Requirements for levels of Salmonella in cheese are different for cheese intended for table use than for cheese used for topping pizzas prior to baking.

GMP is the overall management of(that is,organizing,implementing and adhering to)procedures,processes,control and other precaution that:

. Excludes, prevents, minimizes and inhibits product failures in the broadest sense, and
.consistently yields safe, suitable foods of uniform quality, according to their intended use.

GHP is similar, but only concerned with hygienic matters.

GMP is concerned with the precautions needed to ensure adherence to all quality requirements and includes food safety aspects, suitability aspects and quality matters, while GHP is the

part of GMP that is concerned with the precaution needed to ensure appropriate hygiene. Hygiene includes microbiological safety as point for regulating foods entering international trade.

One of the first examples, where the new approach is being applied, is the code of Hygienic Practice for Milk and Milk Products, currently being drafted by the Codex Committee on Food Hygiene. Here, the HACCP concept is the basic management tool which allows for less prerequisite details to be specified. Further, so-called Food Safety Objectives or FSOs, a new concept in risk management, will probably replace end product specifications. When the code is finalized, it will most probably consist simply of FSOs and basic hygienic principles with explanations, and illustrated by examples on how the FSOs can be achieved under various circumstances.

-Food Safety Objectives

The new concept, the so-called 'Food Safety Objectives' (FSOs), is currently being developed within Codex as reference points or frameworks for the judgment of equivalence as to whether intended food safety levels have been achieved.

The establishment of FSOs is expected to be an important risk management activity derived from the results of risk assessments and they will enable flexibility for authorities and industry on how to manage and control food hazards.

FSOs can be qualitative or quantitative. It depends on their purpose. FSOs are not equivalent to Suitability demands relate to non-

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hazard, and depend on consumer perception, on product economy, on company image and on market preferences.

Example. Coliforms are not hazards but, when present in excessive numbers, they indicate loss of hygienic control. As per definition, a HACCP program cannot manage suitability. Therefore, suitability can only be managed by other means, including prerequisite programs.

So suitability, such as avoiding spoilage, extending shelf-life, and meeting market preferences, as well as costs, is what drives the industry in product and process development activities. Risk managers and food regulators will be well advised not to neglect this fact.

For instance, when pasteurization was introduced for application on a commercial scale in the dairy sector, it were done primarily with the objective of minimizing spoilage and extending shelf-life of drinking milk-not to obtain a safer food. Increased food safety was a consequential result.

At international level, the Codex Alimentarius has been developing GHP and GMP codes since the early 1960s. These were developed primarily to provide guidance to the food industry.

Today, a new approach is in the pipeline, mainly because Codex texts now can be used as the reference. Prior to effectively implementing HACCP, food business should already have in place various practices including ingredient and product specifications, staff training, cleaning and disinfectant regimes, hygienically designed facilities and be engaged in GHP. Prerequisite programs include a wide range of activities and events that may have an impact on an HACCP system for a specific food product (NACMCF, 1997; WHO, 1999). Briefly stated, prerequisite programs include concerns and aspects of the entire food environment before the HACCP system is initiated. They include the suitability of facilities, control of supplies, safety and maintenance of production equipment and facilities, personal hygiene of employees, control of chemical, pest control, and like. These prerequisites include GMP, and they should be brought up to acceptable standards before the HACCP system is initiated (Moberg,

1989, Sperber, 1998; NACMCF, 1998). New European Union (EU) hygiene regulations, which will apply to member states from 2005/2006, will require all sectors of the food chain expect primary producers to adopt full HACCP system (Worsfold & Griffith, 2003).

The potential difficulties of applying HACCP in retail catering businesses and smaller food manufactures have been widely discussed. Alack of financial resources and purchasing traditional maximum limits or other legal end product criteria. If it was so, FSOs would be of no use. Further, FSOs cannot be verified by direct analytical means but quantitative FSOs are useful measurements for validating safety performance by statistical means.

- HACCP _ the magic concept?

In recent years the Hazard Analysis Critical Control Point (HACCP) has been developed into a magic concept capable of obtaining better food safety (Mortimore & Wallace, 1998)

HACCP is a systematic means in identifying the hazards at any stage of the food operation, assessing the related risks and determining the areas where control is needed (Codex, 1997; NACMCF, 1997)..

Outcomes from HACCP implementation vary widely among food companies throughout the world (Aburto, 1998). Generally, HACCP implementation requires a complex interrelation among governments, industry and consumers (Salay & Caswell, 1998). The government has the responsibility, through its food agencies, to promote laws and regulations that address food safety concerns. Unfortunately, this responsibility is not always accomplished. On the other hand, consumers in some countries argue that international standards offer a lower level of protection than domestic standards (Bureau & Jones, 2000).

Consequently, the dairy farm level has to be managed according to prerequisite programs, for instance in the form of Codes of Practices.

The quality of such programs and the actual safety status of the raw milk delivered are decisive factors for the design and operation of HACCP programs at the processing level.

For instance, the safe production of raw milk cheeses depends to a great extent on control of

hazards are at farm level. If the hazards introduced or present at the dairy farm are kept fully controlled there, then the measure needed at the plant level can be less efficient.

On the other hand, where the hazards introduced at farm level are not kept fully controlled, the HACCP program at plant level needs adaptation. So it is recommended higher pasteurization temperatures and longer holding periods than are practiced in other dairy plants. An appropriate general qualitative FSO for raw milk would be:

Raw milk used for processing shall be of a quality that enables it to become a food which is safe according to its intended end use; that is, it does not contain microbiological, physical or chemical hazards in amounts that, after being subjected to processing, handling and treatment, has an adverse effect on human health.

Quantitative FSOs would include targets for end products (consumer products) with respect to power, more complex food-handling practices, and lack of technical expertise and available personnel have all been cited as possible barriers to its development in these sectors (Jouve, 1994, Mortlock et al., 1999 and Stevenson, 1990).

-Management of GHP in the dairy pilot plant and the farm of agriculture faculty

Safe and suitable milk products are obtainable by applying the fundamental GHP

Constituting adequate preventive measures (prerequisite programs) combined with hurdle technology with or without microbiocidal processing.

The key point is to evaluate whether the accumulated and combined effects of all measures including general hygiene measures, both at farm and plant level, actually result in products that meet the FSOs.

-Programs at the dairy farm of agriculture faculty

Dairy production is characterized by the processing of raw milk, which most probably is contaminated with chemical, physical and microbiological hazards (ICMSF, 1986).

HACCP program application is not feasible at farm level, mainly due to the fact that most

hazards are usually controlled at a larger stage in the food chain, and secondly because the farmer neither has the resources nor the expertise to design and operate a HACCP program.

This combination is a widely used for all types of dairy products, e.g., drinking milk (heat treatment and cold chain), cheese (heat treatment, fermentation, salting, ageing), butter (heat treatment, fermentation, salting, water dispersion).

. Use of Hurdle Technology without combination with microbiocidal processing steps with or without additional preventive measures at primary production level. Some examples exist, e.g., cheese made from microfiltrated and/or thermised milk and raw milk products.

- Hurdle Technology

Microbial growth is dependent upon many conditions in the organism's environment such as: ingredients, nutrients, water activity, pH, presence of preservatives, competitive microorganisms, gas atmosphere, redox potential, storage temperature and time.

Control of these conditions can therefore be used to limit, retard or prevent microbial growth. Other factors or techniques can be used to reduce or eliminate the initial microbiological load as well as the concentrations of target pathogen(s). An environmental condition in food, a factor, or a processing step that limits, retards or prevents microbial growth (microbiostatic effect) and/or reduces the microbial load (microbiocidal effect), but which by itself cannot keep hazards under complete control, is called a *hurdle*.

microbiological pathogens, general hygiene and animal health indicators, residues of veterinary drugs, disinfectants and pesticides, mycotoxins, heavy metals, etc.

To meet such FSOs, prerequisite hygiene measures need to be taken at pre-farm level, e.g., feed quality, soil management, etc., at farm level (e.g. animal health management, hygienic practices), and by applying acceptance criteria at plant reception.

-Programs at the dairy pilot plant of agriculture faculty

Hurdle Technology has been used in the manufacturing of dairy products in all civilizations through history, and is a concept aimed at obtaining safe and suitable food through the use of basis food preservation technology In the manufacturing of milk products. Hurdle Technology is the most commonly used control measure that in combination with other control measures applied at dairy farm level and during distribution is used to achieve safe and suitable milk products. The three basic hygiene management approaches that are applied in the manufacturing of dairy products, all supported by preventive control measures at dairy farm level and at plant level, are:

Use of microbiocidal processing steps without the use of other hurdles. Very few examples exist, one being in container sterilized milk.

Use of Hurdle Technology as a combination of microbiocidal processing steps and other hurdles.

at such efficiency that it, by means of killing, elimination or removal, reduces the number of microorganisms including pathogens in the treated (final or intermediate) product to a level that does not compromise food safety or suitability.

Milk pasteurization applied by an appropriate time/temperature combination is traditionally used as a key microbiocidal processing step in the manufacturing of milk and milk products to reduce microbiological hazards in liquid milk to residual levels considered being safe.

A microbiocidal processing step reduces the number of microorganisms only at the point in the manufacturing process where it is applied and its effectiveness in terms of safety of the end product depends on the initial microbiological load, the effect of the process, and any post-treatment contamination and/or growth. Therefore, microbiocidal processing can normally not be applied as the sole control measure but must be applied in appropriate combinations with preventive measures and hurdles. A proper hazard analysis will enable identifying and assist in validating efficient combinations.

Among microbiocidal processes specific for

the manufacture of milk products, the most common are "warm" technologies such as pasteurization

Current research and development activities aim at providing To ensure the safety and suitability, generally more than one hurdle is needed in the efficient hygiene management. Suitable combinations of hurdles can be devised so that the organisms of concern can be reduced in numbers and/or no longer grow/survive in the product. Such suitable combinations are called *Hurdle Technology*.

Hurdle Technology is the use of a combination of selected hurdles, which can keep microbiological hazards and other microorganisms under control, with or without combination with microbiocidal processing steps, so as to obtain and retain the end product safety and suitability.

Hurdles applied in the manufacture of milk products include the following example:

Microbiostatic hurdles used include pH control (fermentation), use of antagonistic microflora, water activity control, time/temperature control;

Microbiocidal hurdle used include thermisation (heat treatment of a lower intensity than pasteurization), centrifugation or filtration techniques such as microfiltration and "bactofugation" and complex processes such as ripening of cheese.

- Microbiocidal processing

Hurdle Technology should integrate microbiocidal processing whenever needed to meet the FSOs.

A *microbiocidal processing step* is a single microbiocidal hurdle applied

- Conclusions

GHP is the part of GMP that consists of prerequisite hygienic suitability programs, hygienic processing and product design measures, managed by the HACCP system.

When foodborne diseases occur, they are most often caused by deviations from prerequisite practices, even though HACCP programs are in place. Therefore, reliance in the HACCP approach should not result in neglecting important prerequisite practices. When

efficient prerequisite programs are in place, HACCP works well. There is an urgent need to implement the FSO concept to enable up-to-date and flexible hygiene management in the dairy pilot plant.

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alternative "cold" technologies, and in some years, heat treatment may not be the most commonly used process.

- The HACCP system

HACCP is an excellent tool to manage hurdle technology and microbiocidal processing. However, when applied in dairy manufacturing, the following should be taken into account:

The enforcement of additional and specifically targeted preventive measures at farm level and in the manufacturing may be necessary where the other control measures applied at plant level are not sufficient.

. When a microbiocidal processing step is not applied, the end product safety depends on the effective selection and application of hurdles and/or additional preventive measures enforced at farm and/or plant level. If these additional measures are not sufficient, the application of adequate microbiological processing step(s) is necessary.

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