

HACCP

case study no. 4

Dried milk production

WHO / ICD

HACCP STUDY

DRIED MILK PRODUCTION

1 INTRODUCTION

In order to provide the consumer with safe milk powder, the conditions under which it is produced should be well chosen and critical steps kept adequately under control.

The factory manager of a certain dairy plant has asked its quality assurance manager to carry out a HACCP study of a newly installed milk powder production line in order to revise the HACCP plan.

The local food inspector has never been involved in the production of milk powder and has asked the plant manager to participate in the study in order to assure that certain aspects of food safety and legislative compliance are adequately addressed.

The quality assurance manager has selected several well-motivated people to carry out the HACCP study with him. The food inspector participates in the discussions but the final responsibility for making the decisions is in the hands of the other members of the team.

2 THE PRODUCT

The product is a simple full-cream milk powder. It is intended for use by people of all ages who live in a country where refrigeration facilities for fresh milk are sparse. Its preparation requires only the reconstitution of the powder in warm water. Once reconstituted, the milk should be consumed immediately or, at most, within two hours after preparation.

3 RAW MATERIALS

Milk is obtained from a farmers cooperative that operates a milk collection and chilling operation. The chilled milk is transported by tankers to the factory. The plant is located in a country with a moderate climate, the farms are of moderate size, and cows are normally quite healthy, although mastitis problems do sometimes occur. Pests may bother the cows and certain feed ingredients may come from tropical countries. The powder is packed in tins which are obtained from a nearby factory.

4 THE FACTORY

The plant recently switched from the production of sweetened condensed milk to the production of milk powder. The employees have been trained by the production manager and have sufficient technical skills to produce a product of the required quality. Unfortunately, the factory is located quite close to a waste treatment plant; however, odour problems occur very infrequently.

5 THE LINE

The actual processing line is newly installed but everything except the drying tower had to be installed in an existing building which was formerly used for the production of sweetened condensed milk (for the lay-out see the enclosed plan). The line consists of milk reception, skimming, standardising, clarifying, pasteurising, condensing, homogenising, spray-drying, cooling, filling and packaging. Some details concerning some of the processing steps are given in the Annex .

N.B .

The study team is under time pressure and decides to deal only with hazards of the highest priority.

ANNEX

A SHORT DESCRIPTION OF THE PRODUCTION OF SPRAY - DRIED MILK POWDER

Raw milk is received, either in tanks or churns, in the milk reception area (Fig. 1).

Part of the milk is skimmed i.e. the fat is removed (Fig. 2) . This skimmed milk is added to unskimmed milk in a standardization tank in order to obtain the required fat content.

The standardized milk is then clarified, normally at a temperature of around 40°C, in a kind of centrifuge to remove undesirable matter before pasteurization (Fig. 3).

Pasteurization is usually carried out in tubular or plate heat exchangers of various types (Fig. 4).

Prior to drying, the milk is concentrated in evaporators where it is indirectly heated, and where the vapour is separated from the condensed milk (Fig. 5).

In order to obtain the correct size and distribution of fat globules the concentrated milk is homogenised by compressing and decompressing the milk in so-called homogenizers (Fig. 6).

In the spray-drying process, the concentrated milk is dispersed by a nozzle or other means in the spray tower (Fig. 7). The fine droplets are exposed to a stream of air, the water evaporates and is extracted with the air from the drying tower. The powder falls down and is removed at the base of the tower. Cyclones are attached to the tower to separate milk powder fines from the outgoing air. The hot powder is cooled with air before it is filled in tins or other packaging material.

Notes for the teacher

The participants should be divided over working groups of ca. 6-8 persons. The course leader has to explain that each group has to simulate a real situation, i.e. they have to act as a HACCP team.

The task is to fill in the HACCP data sheet, and to present to all participants the outcome of their efforts.

As background information they get:

A description of the factory, the milk supply and the product

A simple flow (block) diagram

A lay-out of the factory

A short description of the process

Some figures illustrating some of the equipment

A HACCP data sheet

The working groups have to use their imagination to fill in all the missing elements, and consequently each working group may come up with other hazards, CCPs, critical limits etc. **There is not one good HACCP data sheet !**

The study will normally take at least half a day. The groups are only helped by the "experts" (the course leader and some technical helpers) when critical information is lacking, or when a group gets lost in details.

During the presentation of the results of the HACCP study, the leader should only indicate where mistakes in the procedure were made. For instance when it is clear that a group did not use the decision trees, when CPs (non-critical control points, covered by GHP) are listed as CCPs, when hazards are mentioned which are not causing safety concerns etc..

The purpose of the exercise is that the participants get a better understanding of the system, and how HACCP forces people to make decisions. The exercise is what counts, not the results.