Preparation of dairy products

Agrodok-series No. 36

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41. Small-scale mushroom cultivation – 2
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Agrodok 36

Preparation of dairy products

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Foreword

This Agrodok is meant to serve as a manual for those who want to start small-scale production of dairy products in developing countries. The booklet introduces the reader to small-scale dairy production using simple techniques. It also gives an idea of the opportunities available to earn some income through cheese making. Locally there is often much knowledge available on production of dairy products. We would advise you to get acquainted with such methods in your area before starting on your own. We would also suggest that you not introduce Western dairy products if there is no need to do so, especially if local dairy products are already being made.

The authors have used information provided by the late J.C.T. van den Berg of the Wageningen Agricultural University in the Netherlands, who had much experience with factory production of dairy products in the tropics. The recipes described in this Agrodok have been drawn from various sources. We would greatly appreciate it if you would write to us about your experiences with the recipes in this book and with information on other local recipes. Where possible, they will be included in a future revised edition.

The sixth, revised edition has been updated with some technological knowledge about dairy science and dairying techniques and experience in extension service. However it is utterly impossible to cover the whole field of dairy technology. To do this, one needs basic knowledge of dairy chemistry, physics and microbiology, in addition to hygiene and handling of the milk on farm level. Therefore this booklet has to be considered as an introduction. Interested readers have to extend their knowledge by means of further reading and professional training in some important dairy techniques. The list of literature references and useful addresses may be of help.

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Wageningen, August 2006
# Contents

1 Introduction 6
1.1 What is this booklet about? 6
1.2 Why process milk? 6
1.3 What problems can arise? 8

2 Significance of milk and dairy products for humans 10
2.1 Milk as food 10
2.2 Composition and characteristics of various types of milk 12
2.3 Infant nutrition 13
2.4 Lactose intolerance 15
2.5 Milk and dairy products in the diet 16

3 Hygiene 18
3.1 Deterioration due to micro-organisms 18
3.2 Contamination of milk with extraneous matter 22
3.3 Hygienic production, storage and processing of milk 22

4 Processing techniques 28
4.1 Pasteurisation 29
4.2 Cooling 31
4.3 Souring by fermentation or acidification 33
4.4 Creaming 33

5 Starter cultures 35
5.1 The development of lactic acid bacteria 35
5.2 Cultivation of starter cultures of lactic acid bacteria 36
5.3 Growth of starter cultures 37
5.4 Maintenance of starter cultures 40
5.5 Preparing your own culture 41

6 Recipes 44
6.1 Cream 45
6.2 Sour cream 46
6.3 Butter 46
6.4 Buttermilk and sour milk 50
6.5 Ghee 51
6.6 Koa 52
6.7 Rabi 52
6.8 Yoghurt 53
6.9 Kefir 55

7 Cheese 59
7.1 Utensils for making cheese 62
7.2 The quality of milk used to make cheese 64
7.3 Coagulation of the milk 64
7.4 Separating curd and whey 67
7.5 The use of cheese whey 68
7.6 Collection and preservation of the curd 69
7.7 Maturation of the cheese 71
7.8 Cheese recipes 73

Further reading 82

Useful addresses 83

Appendix 1: Measures 86
1 Introduction

1.1 What is this booklet about?
Livestock is usually kept for various reasons in the tropics such as traction, the provision of meat, wool, hair, skins and manure which, when dried, can be used as fuel. Milk is often no more than a by-product of animal husbandry, although it is a valuable foodstuff. Furthermore, keeping livestock can be a way of saving. In the event of an emergency, animals can be sold to provide money. As such, animal husbandry is also a kind of insurance against, for example, disease and crop failure.

It is not by accident that a certain kind of milk-producing animal is kept in a specific area. This is due to climatic conditions, locally prevalent diseases, available fodder, the possibilities for the owner to take risks, additional tasks that the animal is expected to do, religion and tradition and the preference for products that the animal produces.

Keeping dairy animals often leads to a surplus of milk. If milk production is higher than consumption in a certain area, the surplus can either be sold on the market, or it can be processed so that it does not go off. If the quantity of milk to be processed is small (up to 100 litres at a time), this activity is considered to be small scale. This Agrodok deals with the small-scale processing of milk using simple equipment.

1.2 Why process milk?
There are many reasons to process milk into dairy products, such as the following:

➢ Many dairy products can be kept longer than fresh milk, therefore the milk does not have to be consumed immediately.
➢ The demand for fresh milk may be limited, and there may be more interest in dairy products.
If the daily amount of fresh milk for sale is limited, it may be more economical to process the milk into less perishable products, store them, and sell them later in greater quantities.

There may be no market for fresh milk close by, and only preserved products can be sold at markets at a greater distance.

Greater financial gain may be obtained.

Apart from these reasons, it should also be realised that many population groups in Asia and Africa cannot or can hardly consume milk because of so-called lactose intolerance. Lactose intolerance implies that the body is almost or entirely unable to digest the milk sugar, lactose, which is found in milk. Only small amounts of milk (up to 200 ml) consumed several times a day can be digested. Dairy products in which a proportion of the milk sugar is converted during production, such as cheese, curd, yoghurt and sour milk or buttermilk, do not cause many problems in this respect.

Figure 1: Milk products
Before processing surplus milk, one must consider whether it is profitable to do so. The processing is not always easy and there may be losses. For example, a waste product of cheese making is whey, which contains many valuable nutrients. If the whey is not used, a valuable part of the milk is lost. Furthermore, while milk is being processed quality deterioration may occur and it can go off. Only when milk is drunk immediately can you be sure that nothing is lost.

1.3 What problems can arise?

Small-scale processing of milk means the processing of small quantities of milk, up to 100 litres at a time, using simple implements and as little extra equipment as possible. Processing milk in the tropics can be difficult because of the high temperatures and high relative humidity often found there. These conditions present special problems in choosing the right kind of dairy products. Their storage life must always be taken into account.

High temperatures are bad for cheese making, especially for maturing cheeses. High temperatures also cause the bacteria already present in milk to multiply quickly. Milk sugar then turns sour, leading to the curdling of milk. However, these lactic acid bacteria are not harmful to humans.

Thorough cleaning of dairy utensils and equipment is essential. Anyone handling milk must also pay great attention to hygiene. Lack of hygiene can contaminate milk with other types of bacteria, which turn it sour and reduce its storage life. The prevention of contamination is especially difficult when milk is collected from various places and processed centrally. Addition of even a small quantity of infected milk contaminates the total quantity of the milk.

A further problem is the lack of equipment. One has to try to manage with simple dairy equipment, but even this can be difficult to find for small-scale milk processing. Electricity is usually not available so electric equipment (e.g. for cooling) cannot be used unless a generator
is installed. Additives such as rennet for cheese making are often difficult to obtain in the tropics.

The following chapters discuss the importance of milk in the diet, hygiene and milk processing techniques.

The second part of the booklet gives guidelines for heating, cooling and fermentation and for the processing of cream, butter, ghee, sour dairy products and cheese.

Figure 2: Sheep provide milk, meat, wool, skin, pelts and manure