

**ESSENTIALS OF MILK HYGIENE, A
PRACTICAL TREATISE ON DAIRY AND
MILK INSPECTION AND ON
THE HYGIENIC PRODUCTION AND
HANDLING OF MILK, FOR STUDENTS OF
DAIRYING AND SANITARIANS**

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Essentials of milk hygiene, a practical treatise on dairy and milk inspection and on the hygienic production and handling of milk, for students of dairying and sanitarians by C. O. Jensen

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AND HANDLING OF MILK, FOR STUDENTS
OF DAIRYING AND SANITARIANS

BY

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BY

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AUTHOR'S PREFACE.

(TO THE ENGLISH EDITION.)

IN the hygienic movement of the times the control of the production and handling of milk has not been given a prominent place. But the significance of this subject is now plain and everywhere efforts are being made to institute such a control or to improve it. The efforts of cities to secure a wholesome supply of milk must of course differ and be adapted to local conditions, but they must all be governed by the same principles and rest on exact knowledge of the composition of milk and of the dangers that are to be avoided.

In the preparation of this book it has been my hope that it would not only be of use to my Danish colleagues, but that my colleagues in other countries would find it to be of service to them. For this reason I published a Danish and a German edition simultaneously and for the same reason I have been very glad to grant Prof. Pearson's request for permission to prepare an English edition.

C. O. JENSEN.

TRANSLATOR'S PREFACE.

THE production of market milk is a rapidly growing industry. The demand for milk in cities is continually increasing and there is reason to believe that the rate of increase will advance.

The milch cow transmutes the pasturage and forage of the farm into edible protein, lactose and fat—into units of nutriment for man—at less than one-half the cost of similar units in beef produced by the steer. Milk is not only the most economical but, when pure and undefiled, it is among the most wholesome and it is the most easily digestible of all foods of animal origin. These are the strongest possible reasons for its extended use.

On the other hand, there is no other food that, under ordinary conditions, is so exposed to contamination, that is so easily contaminated or that so fosters contamination as milk. Hence the necessity for the study of milk hygiene.

The subject is a broad one. Milk hygiene involves some knowledge of the physiology of cows, especially with relation to breeding, lactation and nutrition; of comparative pathology, particularly the various diseases of the udder of the cow, the abnormal conditions that affect milk secretion, and the infectious diseases of cattle and of man that may be transmitted by milk; of bacteriology, in regard to the pathogenic organisms and the saprophytes that occur in milk, their effects, their behavior under various conditions and especially at different temperatures; of the chemistry of milk and its adulterations and, besides these, there must be added

TRANSLATOR'S PREFACE

certain, important chapters from animal husbandry, dairy husbandry and dairy industry.

Until quite recently, milk inspection in the United States has been carried on by untrained men who have had little, if any, knowledge of the sources or nature of the contaminations of milk or of the means by which they must be avoided; their whole technical equipment has consisted in a few rule-of-thumb tests to detect gross adulterations. A large number of milk inspection services are still organized on this basis. In several cities, however, attention has been paid to microscopic and bacteriologic examinations of milk, and it has been shown that a very large proportion of the supply fails to meet even a moderate standard for cleanliness, thus revealing the need for measures at the seat of production and during transit to prevent injurious contaminations.

It is becoming increasingly manifest to sanitarians that more must be done to protect consumers from the unwholesome conditions and the diseases propagated and transmitted by milk and the broader men in dairy industry realize that milk must be made safe and be protected if it is to find and retain its proper place in the dietary of the people.

This makes a demand for a discussion of milk hygiene from the standpoint of the sanitary supervision of market milk—from the side of the man who is to do the practical work of protecting the milk supply—and it is this demand that Professor Jensen's book is planned to meet.

LEONARD PEARSON.

PART I.

INTRODUCTION.

Cow's milk has a peculiar place among our food stuffs in that it is not only an important and indispensable part of the daily dietary of most people, but it is being used more and more for the feeding of infants and, indeed, is often almost the exclusive food for children during the first years of life. It is, therefore, quite natural that at present when the science of hygiene is receiving so much attention—especially in relation to the large cities—that there should be a demand for a reliable supervision of market milk. It is true that the milk trade in cities has been subject to a certain inspection, but attention has been directed to only one side of the question, to the possibility of adulteration, and to provide that fat is not removed and that there is no alteration in the composition of the milk. From the standpoint of hygiene this is merely of secondary importance because it is in other ways that milk acquires dangerous properties and may, indeed, become the means of spreading virulent diseases.

A properly organized milk control of the present day can not, therefore, be restricted to determining that milk offered for sale is unadulterated. On the contrary, it must be its chief purpose to prevent milk possessing injurious properties from coming into the market and to prevent market milk from acquiring such properties during the time that it is being handled and stored. Since it is possible only by means of a thorough, tedious examination to determine whether a given

sample of milk is unwholesome, milk control can not be restricted to a simple inspection of the milk or to taking a sample for further examination. *To insure real safety, the inspection must be broadened to cover the health and feeding of the cattle, the cleanliness of the producing plant, the method of handling and caring for the milk and the condition of health of the people who come in contact with it.* Milk control is, for the reason stated, more difficult and more expensive than, for example, meat inspection, and this is undoubtedly one of the principal reasons why the control of milk production and the milk trade is so defective in most countries.

During recent years, a somewhat comprehensive control of the milk trade in its various relations has been carried out in a number of large cities, but a thoroughly satisfactory system does not exist and will be difficult to establish on account of its cost. In Denmark, a long step has been taken in the matter of milk control through the voluntary initiative of a single large company which, at a time when milk hygiene was receiving little attention, inaugurated a very comprehensive system of control, and thereby set an example that has been followed by other large companies, not only in Copenhagen but also in foreign countries. These companies have, in some respects, carried their control to a point far beyond that contemplated at the time by the public authorities.

Copenhagen is on the point of supplementing its health laws in relation to the milk trade within its limits.

As it is chiefly through the work of Veterinarians that meat inspection has gradually increased and is now conducted in a scientific manner, so, to a large extent, we have to thank the Veterinarians for the fact that the control of the production and sale of milk is grow-