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The
Copenhagen Milk Supply Company.

(„Københavns Mælkeforsyning“).

By

G. Borch, Esq., M. D.

Reprint from the Medical Weekly Review (Denmark).
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New edition, with the Regulations & Forms employed.

Translated, with notes, by

A. STEWART MACGREGOR,

British Vice-Consul, etc., etc.

COPENHAGEN.

Printed by Axel E. Aamodt.

1889.



In my article published in the Medical Weekly Review for March, 1878, on the projected Copenhagen Milk Supply Company, I endeavoured to place before the readers of that journal the programme of the Company and the object which it had in view. This Company, which commenced working in the month of April 1878, has now existed for ten years, and I think my readers will follow with interest the success which has attended it, and an account of the means by which this success has been attained. The object it set before it was to supply pure and unadulterated milk to the inhabitants of the city of Copenhagen, and especially to the infant population.

It will, perhaps, be remembered that, on the establishment of the Company, it was resolved that the undertaking was not to be of a purely mercantile character.

It was therefore decided that any profits exceeding the 5 per cent payable to the shareholders, should go towards reducing the price of milk, and improving the business generally. It was also agreed, that the members of the Committee of Control should have no monetary interest in the concern.

The nature of the prospectus and the promises contained therein appealed to the public, and soon secured its confidence and support, which was fully justified by the efficient manner in which the Committee of Control carried on the daily analyses of the milk.

This Committee consisted of the late Professor Panum, Mr. Bille, formerly Danish Minister at Washington, and the writer of this article.

The daily analyses of the milk were made in the laboratory of the University, where they are still carried on, according to the method prescribed by the late Professor Panum. On the death of Professor Panum, Dr. Engelsted was appointed his successor in the Committee.

To give a slight idea of the amount of work entailed by these analyses, I may mention that in one month, that of November 1887, the chemist examined the milk and cream of forty farms, with a stock of 3,007 cows.

This entailed 274 analyses of the weight and density of sweet milk, 233 analyses of the density of skim milk, and 1,173 analyses of the density of two qualities of cream.

Every evening samples are taken of the milk and cream sent in by each farmer who has contracted for the supply, and these samples are examined next morning in the Company's own dairy, which is situated close to the railway station of Frederiksberg (a suburb of Copenhagen).

By these means, should any fault be found with the milk, it may at once be rejected. Then, again, before the milk is sent out for delivery in the morning, an average sample is taken of each quality of milk and cream, and these are sent to the University to Mr. Bohr, lecturer on chemistry, who publishes monthly the results of his daily analyses, giving the highest, lowest, and average figures.

When taking the samples of milk on its arrival from the country, its temperature is also noted. The contractors are bound by the rules of the Company to cool the milk, immediately after milking, to *) 5° Reaumur, so that even in the hottest season it can be transported to the city without its temperature rising more than a few degrees.

If, however, on its arrival it is found that its temperature has risen above **) 8° Reaumur, the milk is rejected by the Company, and disposed of at the expense of the contractor.

One of the most important and at the same time most difficult tasks, is to secure wholesome milk; for the above mentioned analysis can only guarantee the chemical properties of the milk, but not its physical qualities, which, considered from a hygienic point of view, are of the greatest importance.

In order, however, to ensure the greatest security possible in this respect, the following measures have been adopted.

The only milk accepted is that which is supplied from farms which have a really superior and healthy stock of cattle, and besides this, the Company demand from farmers and mana-

*) 5° Reaumur about 43° Fahrenheit.

**) 50° Fahrenheit.

gers a moral guarantee that its rules respecting the feeding and treatment of the cows shall be strictly attended to.

The price paid for the milk is the very highest obtainable, higher than the parties contracting can get for it anywhere else: thus the contractor would suffer a pecuniary loss were his contract to be cancelled, and he has the highest inducement to comply with the regulations of the Company.

The cows on the different farms are examined at regular periods by competent veterinary surgeons, and those animals which supply the milk for children are examined once a fortnight.

The veterinary surgeon must fill up a form, in which he gives a report on the condition of the fodder and on the state of cleanliness in which both cows and cow-houses are kept.

Any cases of lung complaints, or of other diseases, real or suspected, he must report, specifying more particularly which of the animals supply milk for general, and which for special uses. He is also obliged to state how much milk is yielded by the cows which are ill and separated from the others, and the use made of it.

As a further precaution an inspector is regularly sent out to examine the management of the dairy farms. He must fill up a form, reporting on the condition of the cows & the quality of the fodder; he must also see that the rules laid down by the Company are observed with regard to feeding the animals; also that cleanliness is exercised while milking.

He must examine the cooling apparatus; report if it is in order; if there is a sufficient stock of ice; & how it is stored. Besides all this, an experienced dairy-maid is sent out to superintend the milking of the cows. Her attention is specially directed towards securing cleanliness during the milking; also to the cooling of the new milk. In order to keep the milk as cool as possible after its arrival at the Company's dairy, the milk-cans are placed in large vessels filled with ice; but before this is done the milk undergoes a thorough process of purification.

The filtration is carried out in the following manner: The milk forces itself by its own weight from a higher placed vessel through the bottom of another vessel placed below; this latter vessel is half filled with a layer of sponges, closely pressed together by means of a perforated sheet of metal placed above them. After having been filtered through these sponges, the

milk runs through a pipe terminating in the upper part of a third vessel. One is astonished to see the quantity of impure and uninviting-looking matter which is drawn from the milk by this process. It is superfluous to add, that the sponges after having been used in this process of filtration are scrupulously cleansed; and this is done by passing them repeatedly through hot steam, and pressing them between rubber-rollers. To show the importance and extent of this process, it may be here observed, that the Company uses sponges to the value of £ 100 Sterling per annum.

At first only the milk intended for children was subjected to this system of filtration, but since it has been proved to be so advantageous, all the milk and cream sold by the Company are now filtered. While the milk is in the dairy, every care is taken to preserve its purity. The dairy-hall, 200 feet in length, is divided lengthwise into two equal parts; in one of these the large staff of workers exclusively carry on their work, while in the other the milk itself is preserved and cooled from the moment it is brought into the dairy till the time it is sent out for delivery.

Through the partition-wall thus dividing this apartment, the milk is conveyed by means of pipes into another hall, where it is bottled; the workmen employed in the process of bottling being obliged to wear clean white blouses.

We thus see that the Company not only takes the greatest possible pains to procure good & wholesome milk from the country, but also uses every means in its power, and spares no expense, to keep it good in all stages on its long way from producer to consumer.

Nor do these efforts to attain the object in view end here.

Experience, both at home and abroad, has taught us that milk has proved a dangerous and ready medium in conveying infectious diseases, especially diphtheria and typhoid fever, and considering the great number of farms from which the milk comes, and the consequently increased number of possible sources of infection, the following precautions are taken to avert danger.

Every contractor is pledged to report immediately on any case of infectious disease appearing either upon his farm or among his work-people. His attention is especially directed to

the women who milk; no one in whose home an infectious disease has broken out being allowed to assist in dairy work.

To ensure the contractor against loss in cases of this kind, the Company is bound to purchase the suspected milk at the usual price, but only if intimation as regards the outbreak of the disease has been made at once.

This milk is not re-sold; nor does it ever come into contact with the milk which the Company supplies to its customers.

The same strict supervision is exercised over the workpeople connected with the Company's own dairy and establishment at Frederiksberg. Dr. Schou and Dr. Bilsted, who are engaged by the Company to watch over the health of its employés, are authorized to suspend from work any person in whose family an infectious disease has appeared. These people, though suspended from their work, are paid their full wages; and have thus no temptation to conceal any case of illness from the doctor.

While we are writing, three persons, acting under the doctor's orders, are in this way absent from their work. To show the care that is taken to prevent the spread of infection, it may be mentioned that last summer, when a case of typhoid fever broke out in the family of one of the functionaries living on the Company's premises, to avoid the possibility of any germs of infection mixing with the milk in any way, a two story cottage was hired: to one story of which the infected family was at once removed, while the other story was kept in readiness to receive any fresh case which might appear. Fortunately, however, it was not required.

A speciality of the Copenhagen Milk Supply Company is the milk for children; its value is generally admitted by the inhabitants of the city, as shown by its still increasing sale: — last year it went up to 1,275,000 Danish pounds.*) As I have already stated, the cows yielding this supply are subjected to a more frequent and searching examination than the others, and special attention is paid to their winter fodder. In summer the conditions required for each kind of milk are the same — the fodder of the cows must consist of grass and clover only; other kinds of food, such as vetches, are not allowed; nor, on any account, are cows

*) Milk is sold by the pound in Denmark; a gallon is about 9 Danish pounds and a pound a little more than a pint English.

to be kept in the house during summer. As soon as a contractor, from want of pasture, is obliged to feed his stock in-doors, his contract with the Company is cancelled, until he again can put his cows on grass. During winter the cows producing the children's milk must be fed only with hay, straw, oats, barley, and a small quantity of carrots. It has therefore been necessary to pay a higher price to the contractors for this quality of milk, but this extra expenditure, together with the cost of the careful bottling, is not covered by the slightly increased price paid for it by the public. The profit made by the Company on this milk is thus less than that made on the ordinary sweet milk. But, in the interest of the community, this important kind of milk is sold as cheap as possible. Abroad it costs even twice as much as it does here.

It stands to reason, that such a system as the one described above should have arrived at its present stage of perfection only by degrees and through experience, and it is only fitting that we should here mention the name of the man who has the chief merit that the results are so admirable. It is to the great ability, indefatigable energy, and unflagging interest of Mr. G. Busck, that the Copenhagen Milk Supply has reached what may justly be termed its present ideal state.

But, notwithstanding the great importance of the enterprise, and the great support it has met with from the public, it has not as yet proved a great success from a commercial point of view, for it is only within the last year or two that a satisfactory dividend has been realized.

In 1879 the sale of 3,900,000 pounds of milk and cream was effected, and in 1887 this quantity had increased to 10,800,000 pounds, but of this amount a considerable portion — in 1887 more than 1,000,000 pounds — has been sold at a reduced rate, viz. 200,000 pounds delivered to infant-schools and similar charitable institutions at a very low figure, besides what has been distributed gratis among the very poor.

In this paper I hope I have succeeded in showing to my readers that the Company has fully carried out the programme published by it ten years ago, and at the same time I hope I have made plain, that the Copenhagen Milk Supply Company has become a powerful agency in promoting the health of the city.

Besides the direct advantage thereby obtained, there is an indirect advantage which is even greater. By teaching the inhabitants of the city what is really good and wholesome milk, the whole milk trade has been roused to the necessity of supplying it, and the standard has been raised. In the lively competition which has thus arisen, the Copenhagen Milk Supply Company occasionally suffers commercially.

For example, the uninitiated have some difficulty in distinguishing between the red hand-carts of the Company and those of its rivals — so closely do the counterfeit carts resemble the original. In this way milk of a quality inferior to that supplied by the Company is at times palmed off upon the public; but this, sometimes most troublesome difficulty, it is confidently anticipated will soon be obviated.

Postscript.

On the 28th of February last, Mr. Bang, Lecturer on Veterinary Science, in a very interesting and learned lecture delivered before the members of the Medical Society, on the subject of Tuberculosis in domestic animals and its relation to the same disease in man, emphasized more fully the remarks he had made on a former occasion, concerning the contagious and dangerous nature of »Tuberculosis of the Udder«.

He stated, that the milk of cows suffering from this complaint contains a greater number of bacilli than milk from cows suffering from ordinary pulmonary tuberculosis, even though in a high degree, when the udder itself is not affected.

In the discussion which followed the lecture, Mr. Bang further stated, that Tuberculosis of the Udder is not difficult of detection, and that a diagnosis can be taken at a very early stage of the complaint, as it presents so many marked characteristics.

The development of the disease, however, is so rapid that an early diagnosis is imperative, in order to avoid the great danger that would arise from mixing with other milk the milk of cows so affected.

Owing to the rapidity with which cases of this kind develop, examination at long intervals is not sufficient. With regard to this disease, according to Mr. Bang, the only milk which can thoroughly be depended on, as being free from any taint of

infection, is the milk for children sold by the Copenhagen Milk Supply Company, as the cows from which that milk is obtained are examined by a veterinary surgeon every fortnight.

After hearing Mr. Bang's lecture, I felt it incumbent on me, as a member of the Control Committee, to bring under the consideration of the directors of the company the importance, and even necessity of subjecting every cow supplying the Company with milk and cream to this fortnightly veterinary examination. This motion was warmly supported by Dr. Engelsted, and after a consultation with Mr. Bang, the directors adopted my motion, and ordered all cows supplying milk to the Copenhagen Milk Supply Company to be examined fortnightly, particularly as regards Tuberculosis of the Udder. This order is now carried into effect on all the farms connected with the Company, though the additional expenditure thereby involved amounts to about £ 300 per annum.

Regulations

to be

observed by the Contractors.

I.

The milk, according to the agreement made, must be delivered either once or twice daily in time for the morning and evening trains.

It must not be sent from the farm earlier than is absolutely necessary for its arrival in proper time at the railway station.

In summer the vans for conveying the milk to the railway stations must be provided with a covering which can protect the pails from the rays of the sun.

II.

The greatest cleanliness must be exercised during milking, and all the milk must be strained through a wire sieve covered with a clean woollen cloth. **Immediately after milking, and during all seasons of the year, the milk must be cooled with iced water by aid of Laurence's cooler,** so that its temperature when it reaches Copenhagen is not above 8° Reaumur (50° Fahrenheit),

which can at all times be attained by cooling it to 4° Reaumur (41° Fahrenheit) before sending it from the farm. To provide for this, the average production of the cows at each farm (as shown by the usual fortnightly trial milkings) must be calculated, and 30 lbs. of ice (making due allowance for waste) must be kept in stock for every 100 lbs. *) of milk produced.

III.

The milk pails are cleaned by the receivers in Copenhagen, but must be rinsed out with cold water on their reaching the farm again in order to get rid of any dust or dirt which may have adhered to them during the return journey.

Until they are again required they must be placed in a cool airy spot, protected from all impurities, without lids, and on edge bottom upwards, so that the air can get into the inside of them.

On no account must they be used for any other purpose than holding milk.

IV.

The milk of cows newly calved must not be supplied until 12 days after calving.

The food of the cows must be such that the milk has no disagreeable taste from it. Swedish and other turnips must not be used at all, nor, in the autumn, turnip leaves. Carrots and mangolds may be used, but at most half a bushel per cow, to at least 7 lbs. of corn; 1½ lbs. of rape cake to at least 5 lbs. of oats and barley, exclusive of hay, may also be given.

Brewers' grain & similar refuse from distilleries are strictly forbidden, as also is every kind of fodder which is not fresh and in good condition.

The proportions in which the different kinds of food are to be given must be arranged with the Company before the Contractor commences to supply the milk.

*) About 11 gallons.

V.

In summer stall feeding will not under any circumstances be permitted. The cows must be fed in the open air, and upon clover and grass. Should green oats & vetches be given, while the animals are fed upon this description of food, the milk will not be received by the Company.

The Contractors must be willing — on word of honour — to reply to any enquiries made by the Company on these or other subjects, and to report at once any deviation from the rules imposed.

Should the Company, following the advice of their Chemical and Medical authorities, consider the milk of inferior quality — and therefore unfit for use — they shall be entitled, without any compensation to the Contractor, to refuse to take any milk supplied by him.

VI.

Should it not be possible to convey the milk at a reasonable rate per rail on the four chief holidays of the year, the Contractor must pledge himself to defray one half the expense of the carriage, or be willing, if the Company prefer it, to keep the milk himself.

I agree to the above.

.....
Signature of the Contractor.

Form filled up by the Veterinary

		Name of Farm.											
188 Month	day	Stock of Cattle.		Put in to supply children's milk.	Withdrawn from supplying children's milk.					Withdrawn from supplying milk.			
		Cows giving children's milk	Cows giving sweet milk		As milked dry	For tuberculosis of the udder	For tuberculosis in other organs	For other diseases	As suspected of tuberculosis	For tuberculosis of the udder	For tuberculosis in other organs		

Form filled up by the

188 Month day		Name of Farm.				
		Is the cooling apparatus in order?	How much ice is in stock?	How is the ice kept?	Condition & size of the milk coolers employed.	General remarks upon the dairy.

Surgeon every fortnight.

Number of cows.				Stock of young cattle.			
From sweet		Cows temporarily with-drawn.		How much milk did the cows temporarily withdrawn give at the last trial milking, and what became of the milk?	General condition of the cows.	Are the cow-houses kept perfectly clean?	Are the udders in particular kept perfectly clean?
For	As suspected of tuberculosis	Cows giving children's milk	Cows giving sweet milk				

(Signed)

Veterinary Surgeon.

Company's Inspector.

Contractor's name.					General remarks on the condition of the cows & cow-houses.
Number of cows in stock.	Condition of cows.	Quality of the hay & straw used.	Are the Company's instructions followed with regard to feeding?	Is sufficient cleanliness observed during milking?	

(Signed)

Inspector.

Form filled up by Inspecting Dairymaid.

Month.	Day.	Name of farm.	Impressions as to the cleanliness exercised during milking.	Faults requiring speedy correction.	Manner of employing ice in cooling	General remarks.

(Signed)
 Inspecting Dairymaid.

Circular: Infectious Diseases.

Copenhagen Milk Supply Company.

Solbjerg, Frederiksberg.

As the Contractors are aware, it has now been clearly demonstrated by science that various infectious diseases may be transmitted through milk. It is therefore of the **first importance** to the Company, that no milk should be supplied to them from farms where there is any infectious disease in the families of the persons employed in milking. The Company therefore earnestly request every Contractor to report immediately any case of this kind.

The highest price in the market will be paid for the milk from such farms, as usual, if the notice is given in time to prevent it from being sold.

Requesting your signature to the enclosed, we remain &c.

(Signed) **The Committee of Management.**

Contractor's Pledge.

I, the undersigned Contrator to the Copenhagen Milk Supply Company, pledge myself herewith, to the best of my ability, to enquire into every case of infectious disease occurring either upon my farm or among the people employed in working for me, and to report every case of the above kind **immediately** to the Company.

(Signed)

Contractor.

Cooperator Milk Supply Company
Solely Proprietary

The Cooperator Milk Supply Company is a new form of organization for the purpose of securing a steady supply of milk for the city of Chicago. It is organized on the basis of the first principles of co-operation, and its object is to secure for the city a supply of milk at the lowest possible price, and to distribute it in the most economical manner. The Company is organized on the basis of the first principles of co-operation, and its object is to secure for the city a supply of milk at the lowest possible price, and to distribute it in the most economical manner.

Witness the Committee of Management

Contractor's Pledge

The Contractor's Pledge is a promise made by the Contractor to the Employer. It is a promise to do the work in the best and most economical manner, and to deliver it in the most timely manner. It is a promise to stand by the Employer in all respects, and to do all that is required of the Contractor.



