

the population, approximately 2,500 per annum are similarly dealt with. I have alluded to the difference in the percentage of tubercular cows in New Zealand as compared with Great Britain. There no accurate figures are obtainable, but I have had given me estimates which give varying figures—one being as high as 70 per cent., others lower—but all far above what we know to be the outside possible figure here. The best guide we have in New Zealand is furnished by the meat-inspection returns, which for the year 1911-12 gave the following percentages:—

	Examined.	Affected with Tuberculosis in Any Degree.	Per Cent.
Bullocks and heifers	105,356	5,180	4.91
Cows	43,395	5,295	12.20

It should be noted that a small proportion of the cows included in this return were condemned animals sent for slaughter to places where Inspectors were stationed, in order that the proper destruction of the carcasses might be ensured, and also that they might be profitably utilized by conversion into manure. A further considerable proportion were old cows, past their usefulness for milking purposes.

That cow's milk can be a potent factor in the dissemination of tuberculosis is shown by the results of the inspection on slaughter of pigs fed upon the by-products of dairy factories—skim-milk and whey. The inspection of factory-supplying cows is not so consistent or so thorough as is that of cows whose milk is consumed direct, and this must be clearly borne in mind in connection with what I am going to say now. At the same time a great deal of good work is done. This is shown by the fact that during the past year 2,672 head of cattle were condemned and slaughtered for tubercular disease. By far the greater majority of these were dairy cows, and one would be quite safe in putting the number at about 2,500. In spite of this we find that a large percentage of the pigs fed upon skim-milk and whey are tubercular. The percentage in different districts varies, but it is always in ratio to the percentage of tubercular cows in the district. Where the cows are clean, as in Marlborough, the pigs are clean; and *vice versa*. Over the whole of New Zealand, out of 175,699 pigs examined, 14.36 per cent. were found affected in any degree. But I have known batches come down for slaughter from certain North Island districts where the percentage of affected animals has been 34.32 per cent., 35.22 per cent., 41.66 per cent., and in one lot of fifty pigs 100 per cent.

Pasteurization of skim-milk and whey has been recommended by the Department as a preventive measure, and where properly done, as in the official demonstration carried out at the Glen Oroua Factory in 1910, has proved to be most effective. Full particulars of the results of this were published in the *Journal of the Department of Agriculture* for June, 1911. One has to be careful in publishing abroad facts of this kind, as it might be inferred that dairy-factory butter is equally dangerous, but this is not so. Nearly every butter-factory now pasteurizes its cream before converting it into butter, this being done because pasteurized cream produces a butter of better quality. Further, the quantity of butter consumed at one time by the ordinary individual is so comparatively small that even if a few of the specific organisms of tuberculosis were present in it the consumer's phagocytes would probably be quite capable of effectively dealing with them. The evidence afforded by the number of dairy-factory by-product-fed pigs indicates clearly one important channel by which the disease is disseminated among cattle in dairying districts, seeing that calves are principally reared upon similar food and are naturally liable to infection also. Hence it is clearly necessary that all dairy-factory by-products should be properly pasteurized before being distributed to farmers. I do not believe that all this contamination of factory milk by the specific organism of tuberculosis arises from the existence of mammary tuberculosis in cows. It is a fact that most tubercular cattle discharge large numbers of these organisms with their faeces, and accidental contamination of milk by the faeces of such cows is probably responsible for some of the trouble.

As regards the question of the pasteurization of whole milk before distribution to consumers, you are better qualified to judge than I, seeing that, as I understand, there are points in connection with digestibility and assimilability which have to be considered. Apart from these, however, it is questionable whether there is anything tangible to be said against it.

You will perhaps have noticed that in alluding to the specific organism of tuberculosis I have not used the term "bacillus." I have done this advisedly, for I am very strongly inclined to the opinion this organism is not a bacillus. This is, of course, by no means a new idea. As long ago as 1881 Metchnikoff formed the opinion that the organism really should be classed among the fungi, and the arguments in favour of this are given in detail in a recently published work on Parasitology by J. Guiart, Professor of the Faculty of Medicine, Lyons. These are as follow:—

"Nevertheless, the question of the tubercular bacillus has entered on a new phase during these last years. It seems almost proved that it is not at all a question of a bacterium, but of a veritable fungus, filamentous and ramified, akin to that of actinomycosis. As this question is not treated in the works of bacteriology, and as it seems to us that the physician should ignore nothing concerning tuberculosis, we will state shortly the arguments in favour of the new ideas we have just mentioned.

"1. In the cultures, as in sputum, long and slender filaments with secondary ramifications may be found. This fact was discovered in 1887 by Metchnikoff, who henceforth considers the tubercular bacillus as a fungus, and calls it *Scleurothrix Kochi*. These filaments and ramified forms can, moreover, be obtained artificially (Arloing).

"2. In the cultures the ramified filamentous forms become more and more numerous in proportion as the microbe abandons parasitic life and becomes a saprophyte. Therefore it is undoubtedly a phenomenon of growth. At a certain stage these cultures resemble absolutely those of actinomycosis.