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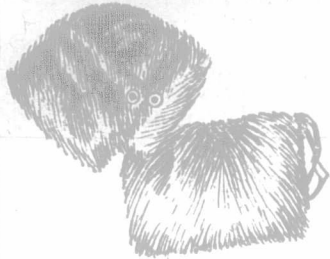
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be carried to the milk by flies, as illustrated by a slide showing fly-tracks on a bit of jelly which, like milk, is an admirable medium for the growth of germs; a slide prepared on the day after the fly's peregrinations showed the tracks enormously enlarged—because of the colonies of disease germs developed from the germs left by the fly's filthy feet.

How it is Done.

POSSIBLY there is no one who has heard that milk may contain anywhere from 10,000 to 75,000,000 germs in a cubic centimeter who has not wondered just how the tests are made, and if they can possibly be made with any degree of accuracy. The Western Dairymen who heard Mr. Best's talk, and saw the pictures which he used, understand all that now. He showed exactly how it is done.

The types of germs in ordinary milk, he said are: (1), those that are harmless, and (2), those that produce a diseased condition. Some of the germs go through the teat into the udder. They are usually washed out in the fore-milk, therefore that should always be rejected.

Some of the harmless germs produce souring. The most common of these is the lactic acid germ, which usually comes from the manure. It has the peculiar property of being able to kill out many dangerous germs that cannot grow in sour milk. There are other kinds, however, that produce souring and may produce disease. One is called the "colon bacillus", and it gets in also from the manure. Another is known as the "Streptococcus". A fourth kind is the "putrefactive" germ; which gives a bad odor to milk, and may cause diarrhoea in children.

Another germ is the one that makes butter rancid by forming an acid in it. Also there are rather rare germs that produce color in milk—red, green, brown, or yellow. Milk sometimes has what is called a "turnip" taste, but this may be due to some kind of germ. A bitter taste may be caused by something the cow has eaten, but also sometimes to a certain germ. Red milk may be due to blood, or to the cow having eaten quantities of certain herbs, or it may be caused by a certain germ in the milk while slimy milk may be due to pus, or to an organism that gets into the milk from water or from the air.

Types that Produce Disease.

Among the types of germs that produce disease in man, the first dealt with by Mr. Best was the tubercle bacillus.

This bacillus from the cow will get into the milk when the cow has tuberculosis of the udder. Or the disease may be present in the lungs or bowel, and the excretions may fall into the milk. But the germs of human tuberculosis may also get into the milk from a consumptive person milking the cow.

Other germs cause diphtheria, scarlet fever, etc. They get in from the outside—from the hands of the milker or his mouth or nose secretions, if he is infected. Also germs that cause anthrax, foot and mouth and other diseases, may be in the milk.

Number of Germs Permitted.

Before milk is sold as "pure", there should be no more than a certain number of germs in it—10,000 to the cubic centimeter (15 drops) is the limit of our certified milk.

"Certified milk" comes from certified farms that comply with certain regulations. All of the conditions are the best possible, and the germs in the milk may fall as low as 5,000 or even less per cubic centimeter. The men about such farms must wear clean clothes and wash their hands before milking. The stables must be kept clean; inspection for tuberculosis and tuberculin tests must be made periodically and all cows that react must be discarded.

There are certain dealers who deliver milk containing from 25,000,000 to 75,000,000 germs (slides of these were here shown, and they were—dreadful!) These get notice that they must "clean up."

Very soon after milking, the milk should be cooled, so the germs will not grow as rapidly, but first all germs and dust should be kept out if possible. Milk should be kept cold until delivered.

How Tested.

Testing for Bacteria:—Mr. Best next gave a demonstration of how milk is

tested in the laboratories by a process by which one can tell, fairly accurately, how many germs are in 1 cubic centimeter.

The milk is collected in tagged, sterilized bottles. Next it is shaken thoroughly and the stopper and top are sterilized in flame. Fifteen drops (1 cc.) are then drawn up into a sterile pipette and transferred to a sterile glass plate. The next step is to melt jelly and run it in from a sterile tube; then the plate is placed in an incubator, where the germs grow. After 2 days it is possible to tell the number. When necessary, the milk is diluted by measurement first.

Testing for Fat.—Testing for fat is usually done by the "Babcock" method. You shake a bottle of milk, then take a pipette with a measured quantity of it and put it in a Babcock testing bottle with a long neck (about 18 grammes of milk). Next add a certain amount of sulphuric acid. The acid carbonizes everything in the milk except the fat—turns the rest of the milk quite black. The bottle is then placed on a centrifuge machine in which the fatty particles are thrown on top. The next step is to add hot water and place the bottles back in the machine for 2 minutes. This brings in the fat up in the graduated neck, where it can be measured. The Provincial law permits milk to be sold if it shows 3 per cent. of butter fat, but some cities place the percentage higher.

Sometimes the "Adams" and "ether" methods are used, but they are slower than the "Babcock."

Milk Inspection.

Dr. Tamblin gave a short talk on the work of the milk inspectors. He began by speaking of the prevalence of tuberculosis in cattle. He was convinced that bovine tuberculosis is transferrable, and told of a case in which milk from a cow in an advanced stage of the disease (sometimes they will not react in the advanced stages) was fed to 9 little pigs. At 3 months of age 3 had died and another was sick.

Through the efforts of Dr. Torrance the law has been made to govern the testing of cattle for tuberculosis in a way that will appeal to cattle owners. Now the owners of pure-bred herds may have their cattle tested free by applying to Ottawa. If they are found free an "accredited herd" certificate is given. The tests are made twice a year, and some compensation is to be made for those destroyed.

Dr. Tamblin thought it too bad that all milk is not certified. The trouble is that in some localities the buyers will not pay the price. For certified milk the count of bacteria must be not more than 5,000 in winter and 10,000 in summer, per c c. He thought this was not a farmer's proposition, but advocated the greatest cleanliness and care. Milk brought in by some farmers near London had tested as low as 10,000; that brought in by others as high as 57,000,000 and more—a quite inexcusable count.

Not only should the milkers and stables be clean, but also the approaches to the stable should be clean and dry. It is impossible for cows to wade through mire without getting so covered with it that the milk is contaminated.

In his inspections, however, he had found at least 50 per cent. of the dirt on the men. On several occasions he had found men milking in the dark; very few have a damp cloth to wipe the udders, or a place near to wash the hands.

"According as the men who sell milk love mercy and to do good," concluded Dr. Tamblin, "shall we have a low bacterial count and milk fit to feed babies."

Mr. Nichol then brought up the plan for a co-operative dairy in London, but that is being explained in a different part of this paper.

What Can the Western Do?

COL. Brown, the last speaker, wished to know just how the "Western University" can help in this problem, and asked for suggestions.

"The Western," he said, hopes not only to help the students in College, but also the boys and girls on the farms, and the teachers in all the schools of Western Ontario. Also it wants to carry on adult education. All this can be one through extension lectures and an extension library service.

In Western Ontario there are 154,600