PASTEURIZATION OF MILK IN UNITED STATES

Next to water, milk has been in the past the most prolific source of food-borne diseases; and the hygienic value of milk as a food makes it doubly necessary that all possible steps should be taken to avoid danger from this source.

There are three distinct ways in which milk causes disease, (1) by the transmission of pathogenic germs from the cow to man; (2) by the dissemination of the germs of the specific communicable diseases of man, and (3) by the production in infants of the summer diarrheas caused by non-specific microbes of putrefaction.

The principal disease of the cow which may be transmitted to man is tuberculosis. Streptococci sore throat in man is often conveyed by milk from a cow with streptococcic mastitis. Of specific human infections transmitted by milk, tyhpoid fever, scarlet fever, septic sore throat and diphtheria are of chief importance. Hundreds of outbreaks of these diseases directly traceable to milk are on record and in communities supplied with raw cow's milk the number of such epidemics recognized, increases with the care given to a study of epidemiology. Finally, heavy toll is paid to infant diarrhea in the summer season as the result of the combination of debilitating warm weather with the use of decayed cow's milk, such as dirty cows, dirty stables, dirty milkers, dirty dairies and dirty middlemen too often supply.

What are the means that have been and are being used to combat this menace to public health? Notable progress has been

made during recent years in improving the conditions of milk pro duction, keeping the milk as clean as possible and protected so far as may be from infected animals and men. Health departments inspect farms and dairies and at the other end of the line control the quality of the milk as delivered, by bacteriological examination. This latter has proven to be a decided incentive to cleanliness on the part of the dairmen. The control of possible infection from human or bovine sources is however, a matter of more considerable difficulty. The danger of infection by human carriers is hard to control, as evidenced by the epidemic of septic sore throat caused in Boston, in 1911, by a model dairy. The opportunities of human contact in milk production are numerous, and if an unsuspected carrier is present along the line, a single cough over the pail or the touch of the finger to the rim of a container may result in an epidemic, so fine a culture media is milk for the reproduction and multiplication of bacteria.

Fortunately we have here, as in the case of water supplies, a simple and effective means of restoring initial sanitary purity. In the case of milk the process consists according to present standards, ~~in~~ heating to 140-145 degress F. for 20 to 30 minutes. This, it has been conclusively proven is sufficient heat to kill all the pathogenic, non-sporebearing bacteria. Simple and effective as this means is, it has encountered numerous obstacles and widespread opposition in its application. While every argument against this measure has been proven invalid nevertheless there are still opponents who ~~still~~ believe in these antiquated objections and stand in the way of the enactment and enforcement of this important public health measure. ~~For this reasons the~~

For this reason the commonest objections will be reviewed.

In the first place there is evidence that pasteurization has not prevented epidemics. This can be accounted for by the lack of standardizations and proper inspection and control. The recent perfection of a recording thermostat will do much to standardize and control the process. Objections raised by the dairymen is the effect on the taste, the cost and the raising of the cream line. The first is disputed which is good evidence that taste is not but very little effected, if any, the cost is not excessive and is to be little considered if it saves human life. While the cream line is raised, the milk contains the same amount of fat, if pasteurization was compulsory, there could be no objection to this on the part of the individual dairymen. It was suggested that milk after pasteurization would be deprived of its lactic acid bacteria and would, therefore, be subject to dangerous putrefaction instead of normal souring. This however has been shown not to occur, since sufficient lactic acid bacteria survive or get in from other sources to insure changes, that while slow are the same as those which occur in raw milk. The last objection, but one that still lives, even in the minds of perhaps 50 % of the Medical profession, is thatpasteurization would unfavorably affect the digestibility of milk and might cause scurvy and rickets by destruction of necessary vitamines. The ~~strength of~~ widespread belief in this argument is well illustrated by a letter from the public health officer of Rochester ~~Minn.~~ N.Y. dated Nov. 1922 (1) which I quote, " I do not believe in the pasteurization of milk ---- By and by we are going to have everything pasteurized. Of course, our brains are now pretty well pasteurized, at least the thin grey suface with which

we are supposed to think things. ----- Man and his children cannot live on pasteurized foods without gravely interfering with his nutrition. " No chemical changes occur in milk kept below 150 degrees F. except for the inactivation of the antiscorbutic vitamins.(2) The recent work of Hess has shown, in regard to this latter point, that heating in itself is less destructive of the vitamins, than is the aging of the milk, and such reduction in vitamin content as does occur will be counteracted by orange juice, tomato pulp or other anti-scorbuti, which should in any case form a part of the diet of the bottle-fed baby. The fat soluble vitamin, which is one of the most important food elements derived from milk, is not affected by pasteurization.

What of the evidence of the benefits of pasteurization. The literature is full of evidence of the efficacy of this measure in markedly reducing the incidence of milk-borne infections. No attempt will be made in this paper to give any extensive review of the statistics. The following are a few illustrations gathered at random (3) In New York City where 98 % of the milk is pasteurized, one outbreak of typhoid has occured since 1917, there have been 37 outbreaks in the rest of the state.(3) On Randall's Island in the harbor of New York, from 1895 to 1897 infants were fed raw milk from a herd pastured on the island, the infant mortality was 41.8%; pasteurization was instituted in 1898 with a result that the infant mortality dropped to 21.7 % without any other preventative measures being instituted.(3) In Greenable France, pasteurized milk was fed half the children during the summer months with a death rate of 27.9 %, the half fed with raw milk showed

a death-rate of 69.3 %(4) Statistics by Park and Holt have shown strikingly the advantages of pasteurized over raw milk in infant feeding. Of fifty-one children fed with raw milk during the summer months, thirty-three had diarrhea, two died, and only seventeen remained well. Of forty-one receiving pasteurized milk but ten had diarrhea, one died, and thirty-one remained entirely well through out the summer. The actual diminution of the living bacterial contents of milk by pasteurization is enormous, the milks so treated often containing not more than one thousand, usually less then fiteen thousand living bacteria to each cubic entimeter.

Something of the progress of this most important health measure can be obtained by a brief review of the history of pasteurization.(3) The process was first defined and insituted in Chicago in 1908. By 1915 approximatedly 75 % of cities over 500,000 had 50 % of their milk supply pasteruized, 50 % of cities with population ranging between 100,000 and 500,000 had 30 % pasteurized milk. In 1921 of the former group of cities, 90 % of the milk was pasteurized, of the latter group 50 %. Of thirteen cities with populations ranging between 250,000 and 500,000 seven had 90 % pasteurized milk, six, including Portland had 50 % pasteurized. This remarkable progress in the institution of this preventative measure makes it seem probable that before many more years has past, pasteurization will be quite universally accepted and enforced in all cities larged enough to support a dairy and be a problem in the spread of milk-borne diseases. For this reason be have a right to expect to see a somewhat marked decline in the incidence of these milk-borne diseases in the next few years.

SUMMARY

Milk has in the past been a prolific source of food-borne diseases. Much has been done in way of improving the conditions of milk production but this has not proven to be an adequate protection. Pasteurization has offered a simple and effective means of restoring initial purity to milk. It has met with countless objections, all of which have been invalidated by experimental proof. Statistics show pasteruization to be effective in reducing the incidence of milk-borne diseases. There has been remarkable widespread acceptance of this preventative measure by the larger cities of U.S. since its institution in Chicago in 1908. It gives promise of being universally accepted as a public health measure in the very near future.

BIBLIOGRAPHY

(2) Neslon Loose-Leaf Medicine, Vol. VI pp. 72-75
(3) Paper written by Dr, G.E. Burgett, 1922.
(4) Bacteriology, Zinsser pp. 1037-1038.
(1) Letter from Geo. W. Goler M.D. to Miss Bertha Hallam Nov. 1922
Health Bureau Report, Rochester N.Y. Sept. 1922
Preventative Medicine & Hygiene, Rosenau, PP. 788-792