ON FORMALIN AS A MILK-PRESERVATIVE.

BY SAMUEL RIDEAL, D.Sc.

(Read at the Meeting, May 1, 1895.)

IN my own experiments with formalin as a milk-preservative, I have found that when used in the proportion of 1 part formaldehyde in 10,000, milk remained fresh without curdling for seven days. Mixtures of water and milk containing formaldehyde in the proportion 1 : 10,000 and 1 : 100,000 were also tested. The control sample became sour on the third day, that with formaldehyde 1 : 100,000 remained sweet for one day longer, and that with 1 : 10,000 was fresh on the twelfth day. I found that the formalin used for preserving milk in the trade has 5 oz. of pure formalin to 1 gallon, corresponding to 2 oz. formaldehyde in 160 oz., or 1 : 320. This is used in the proportion of $\frac{1}{2}$ pint to the churn of 17 to 18 gallons, and does not impart any taste or smell to the milk even after boiling. In this strength the milk keeps fresh for at least three days, and corresponds to :

1 part formaldehyde in 46,080 parts milk,
or, 1 c.c. formalin in 18,432 c.c. milk.

* See abstract on page 167.

One gallon of the diluted formalin as used by the milk-vendors does the same work as 10 lb. of the powder preservative containing 75 per cent. of boric acid and 25 per cent. of borax.

I understand that 15,000 gallons of this dilute formalin have been sold to milk-vendors since it was placed on the market last year. At present I have not been able to devise a simple method for estimating the amount in milk. In strong solutions it can be estimated by means of a standard ammonia solution, since, as was shown by Trillat, formaldehyde combines with ammonia to form hexamethylene amine, thus :

so that 180 parts by weight of formaldehyde combine with 68 of ammonia.

In determining the strength of a formalin solution, first ascertain its acidity (this I have never found to be higher than 6 c.c. of $\frac{\text{N}}{100}$ NaHO per 100 c.c. of pure formalin), agitate a known volume with excess of a standard ammonia solution in a stoppered bottle, and then distil off the excess of ammonia into standard acid and titrate back.

For detecting formaldehyde in milk, I find Schiff's reagent (magenta bleached by sulphurous acid) of use. All milk samples which I have examined give, however, a pink colour with this reagent, pointing to the presence of some aldehydic compound in milk, but it differs from formaldehyde in not being volatile. If, therefore, a portion of the suspected milk sample be distilled into water, the distillate gives a pink colour with Schiff's reagent if formalin is the preservative employed.

I consider that formalin is much to be preferred to borax or boric acid as a milk-preservative, seeing that the quantity required is so much smaller, viz., 1 oz. of formaldehyde, as against 5 lb. of borax and boric acid. Its volatility is distinctly in its favour, as the small quantity present is evaporated on warming the milk. As to its toxic action, I have not heard of any ill effects, and have myself repeatedly drunk the 1 per cent. solution, whilst that used for milk preservation is almost tasteless. For cream a slightly stronger solution is used, and in this connection it may be interesting to note that the use of salicylic acid in conjunction with the borax-powder has increased in the last year or two, being present to the extent of 5 to 10 per cent. in some preservatives, mixed with saccharin to mask the taste.

DISCUSSION.

Mr. WYNTER BLYTH raised the question as to whether formalin should not be considered an adulterant, and suggested that steps might with advantage be taken by the Council of the Society to get the matter put upon a statutory basis. It was very desirable that a clear definition should exist as to the nature of a preservative, and the proportions in which such might be used.

Mr. CASSAL agreed with Mr. Wynter Blyth. Public Analysts were in a very difficult position owing to the want of a clear understanding as to what should be done about preservatives. The Local Government Board had been approached on the matter in regard more especially to the addition of boric acid preparations to butter, and had expressed a very guarded opinion. The Board did not appear to consider it advisable that boric acid in butter should be regarded as an adulterant,

at any rate at present. Public authorities and the public generally appeared to take a different view. His own opinion was, that to permit the addition of preservatives to food was objectionable and, in fact, dangerous. If preservatives were to be allowed, purchasers should be fully informed at the time of purchase of the nature and quantity of the preservative used.

The CHAIRMAN (Mr. Allen) said it was open to question whether the Council would be able to take any effective action ; the practical difficulties in the way were considerable. He was afraid it would not be in order to submit Mr. Blyth's suggestion to the meeting as a formal resolution, since no previous notice had been given.

Mr. BODMER remarked that the Sale of Food and Drugs Act appeared to sanction the use of preservatives, provided they were not injurious to health.

Dr. RIDEAL said it was pretty certain that formalin was a preservative which was not injurious to health. The fact of so small a quantity of it being required was very much in its favour. He did not know what was the amount of a toxic dose of formaldehyde, but he had himself repeatedly drunk 1 per cent. solutions of it without ill effects.