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New York

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PRACTICAL INFANT FEEDING.

A Study of Four Hundred Cases,

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New York City.

In June, 1908, the first Babies' Dairy, a feeding station for the preparation of modified milk for sick infants, was opened in New York City. Since that time three other stations have been opened and are now in operation.

The conclusions reached in this paper are the practical results of observations upon 400 cases treated in these dairies. All of these cases have been cared for in tenement homes in crowded sections of New York. Their care differs only from the care which the ordinary tenement house baby receives in that they have been supplied with food prepared by the nurse in the dairy kitchen under a physician's direction.

Very careful records and statistics of these cases are on file. They have all been kept under obervation weekly during the first year of life, and our nurses are still in touch with a large proportion of the cases.

The total death rate has been less than 10 per cent. (9.47). The significance of this will be seen when it is compared with the 14 or 15 per cent., which is the normal death rate of all infants, both breast-fed and bottle-fed, under one year of age in Manhattan.

Death from diarrheal diseases has practically been eliminated. Only two such deaths have occurred, and these were in the first few months that the station was open. During a period of two and one-half years, no death from diarrhea has occurred.

Deaths from marasmus have occurred in cases which were practically moribund upon admission, and where some secondary disease, like pneumonia or whooping-cough, has supervened, but we have had no deaths from marasmus in cases which have been fed at the dairy for a month, that is, cases which have been kept alive for thirty days have recovered. Of the total number of deaths, twelve were due to pneumonia and the remainder to various causes, none of them being related to the gastro-intestinal system.

Method of Feeding.—It is, however, the practical rather than the statistical part of our work that we wish you to consider. Our efforts have been to simplify the work of infant feeding and to reduce to the simplest terms, the treatment of the common disorders. With that thought in mind the following formulas have "evolved themselves:"

MILK FORMULAS IN USE AT THE BABIES' DAIRY.

The basis of the formulas is 7 per cent. top milk (the top 16 ounces of a quart bottle, removed with a Chapin dipper, after standing about four hours).

Constituents	Feedings in 24 hours	Frequency of feedings	Amount of feedings	Total ounces of mixture	Percentage composition
*Formula No. 1 Top milk, 4 oz. Water, 28 oz.	9	Every 2 hours during day and twice at night	1½ oz.	32 oz.	Proteids, .40% Fats, .88% *Sugar, 6.%
Formula No. 2 Top milk, 6 oz. Water, 26 oz.	9	Every 2 hours during day and twice at night	2 oz.	32 oz.	Proteids, .60% Fats, 1.3% Sugar, 6.%
Formula No. 3 Top milk, 8 oz. Water, 24 oz.	9	Every 2 hours during day and twice at night	2 oz.	32 oz.	Proteids, .80% Fats, 1.7% Sugar, 6.%
Formula No. 4 Top milk, 10 oz. Water, 22 oz.	9	Every 2 hours during day and twice at night	2½ oz.	32 oz.	Proteids, 1. % Fats, 2.2% Sugar, 6.%
Formula No. 5 Top milk, 12 oz. Barley water, 20 oz.	7	Every 2½ hours during day and once at night	3 oz.	32 oz.	Proteids, 1.2% Fats, 2.6% Sugar, 6.%
Formula No. 6 Top milk, 14 oz. Barley water, 18 oz.	6	Every 3 hours during day and once at night	3½ oz.	32 oz.	Proteids, 1.4% Fats, 3.% Sugar, 6.%
Formula No. 7 Top milk, 16 oz. Barley water, 16 oz.	6	Every 3 hours during day and once at night	4 oz.	32 oz.	Proteids, 1.6% Fats, 3.5% Sugar, 6.%

Attention is called to the fact that each formula is made up into a total of 32 ounces, and that 16 ounce top milk (7 per cent.) is used as a basis. As soon as the baby is able to digest formula

* To each of the above formulas 4 level tablespoonfuls of milk-sugar should be added.

No. 7, it is possible to change rapidly to full milk by means of the following intermediate formulas:

No. 1.	Full milk	14 oz.	4 to 5 ounces every $3\frac{1}{2}$ to 4 hours
	Barley water	28 oz.	
No. 2.	Full milk	21 oz.	
	Barley water	21 oz.	
No. 3.	Full milk	28 oz.	
	Barley water	14 oz.	

After these formulas, undiluted full milk may be given in gradually increasing quantity.

Barley water is prepared by adding one teaspoonful of barley flour and one-half teaspoonful of salt to a quart of water. Cook slowly until half is boiled away, then add water to make a quart.

Barley water may be dextrinized by adding to each quart two teaspoonfuls of glycerite of diastase (Cereo).

This change may be made regardless of the age of the infant. Many cases are able to digest full milk at three or four months of age and most cases at six months.

No lime water has been used in any formula for the past two years, and we feel that it is not only unnecessary but that it prevents proper developement of the digestive organs.

Plain water has been used as a diluent during the early weeks and dextrinized barley water after the first month. None of the formulas has been pasteurized or sterilized. Raw bottled milk with a fat content of 3.60 to 4 per cent. and a bacterial count ranging from twelve to forty thousand per cubic centimeter has been used for all formulas.

Milk-sugar in preference to cane-sugar has been used in all formulas. In hot weather, milk-sugar has been reduced to a minimum and in many cases has been omitted entirely from the formula during the summer months.

Marasmus.—Our experience leads us to the conclusion that marasmus is starvation of the body tissues due to partial or complete absence of the digestive functions of the gastrointestinal tract. We believe that this may be either a congenital defect or that it may be the result of prolonged improper feeding, and that many cases are complicated by gastric dilatation and pyloric spasm. Many different methods of treating these cases were tried during the early months with varying success. The one method which seems to solve the problem in the largest number of cases is the use of completely peptonized cow's milk modified to meet the needs of the infant. In other words, we select a formula the food value of which amply meets the needs

of the infant, but we do not put this preparation into the underdeveloped infantile stomach until the milk has been as nearly as possible predigested. As soon as the infant has regained its birth weight and is thriving normally, we return to low formulas of unpeptonized milk for the purpose of developing the digestive function, treating the case exactly like a normal infant of the same weight.

Eczema.—A large number of the cases brought to the dairy suffer from eczema, either localized or extending entirely over the surface of the body. We believe that all such cases are the result of an excess of fat or an excess of sugar in the food. Nothing in our experience has been more satisfactory than the rapidity with which these skin lesions disappear when sugar is withheld from the formula and the quantity of fat reduced. No medicine and no local treatment, other than the use of pure olive oil, has been found necessary in any of these cases.

Tuberculosis.—In contradistinction to our experience with eczema, we believe that tubercular infants require high fat percentages. No matter what the location of the tubercular lesion, the infant is invariably emaciated and seems to be able to digest and absorb more fat than any other class of cases.

We have used in these cases formulas given above, substituting for the sixteen ounce top milk, the top ten ounces (10 per cent.). In many cases, even of well developed tuberculosis, this treatment alone has resulted in their cure.

Diarrheal Diseases.—Too little attention has been given to the prophylaxis of the intestinal disorders which cause so many deaths during the summer months. Few infants succumb to these diseases, if they have been properly fed and cared for during the previous winter.

The cases which tax all our resources are not the ones which have been fed at the station, but are those which have become an easy prey for intestinal infection as a result of a long period of neglect and improper feeding. In such cases all nourishment has been withdrawn at the onset of vomiting and loose stools, and only water has been allowed for twelve to twenty-four hours. Barley water, either plain or dexterinized, is then allowed in small amounts until the stools become less frequent and are more normal in consistency. After this, the milk formulas may be resumed, beginning always with the lowest and increasing them with great caution.

In none of our cases has it been necessary to resort to castor

oil or other cathartics and in only a few cases have we used colonic irrigation.

The fatal cases are those which have been neglected by the mother until the infant is *in extremis*, and these deaths are largely preventable by means of the education of mothers. This we consider an important part of the milk station's work, and it should be aided by the family physician.

The limits of this paper allow us to refer only to a very few of the problems which have arisen, many of which are as yet unsolved. But we feel, at least, that we are working in the right direction, and that ultimately the reduction of infant mortality in large cities will be accomplished by means of the public feeding station.

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