

THE USE OF DRIED MILK IN INFANT FEEDING.

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THE use of dried milk in infant feeding is of comparatively recent date. Some form of dried milk is said to have been used as far back as 1868, but it was about the end of last century that milk powders became of practical value. Since 1902 considerable improvements have been made in the preparation of dried milk powders and at present there is a large production of these in a form which renders the addition of sugar or other foreign substances unnecessary.

There are several methods for preparing dried milk, but there are only two principles involved. In the one, the milk is allowed to flow in a thin stream into revolving drums heated by steam, and, in the other, after condensation, the milk is sprayed into drums, through which heated air is passing. The various methods employed aim at obtaining a pure product which will keep for as long a period as possible without loss of flavour. As a general rule the drying of the milk on steam-heated cylinders is the method employed, as this gives a more soluble and more lasting product.

Owing to the fact that dried milk is being extensively used for infant feeding and that its use is likely to be greatly extended in the future, it is necessary to consider what effects drying has on the physical and chemical properties of milk. The degree of change apparently depends on the temperature employed in drying and the period over which the temperature acts.

The soluble calcium salts are rendered insoluble and, as a result, the action of rennet is affected. The curd produced by rennet with dried milk is much finer than with ordinary milk and this would tend to lead to easier digestion.

Milk sugar is unaffected by drying and the fats are but little altered. The albumin and globulin of milk is coagulated but caseinogen is not, though this protein is said to be affected in some way and rendered more easy of digestion. The various ferments of milk-catalase, peroxidase, formaldehydase and amylase are, of course, destroyed but the importance of these seems to have been exaggerated and their absence apparently in no way affects the digestibility of dried milk.

An important constituent of milk is the vitamins, the substances which are absolutely essential for the normal growth of the body. Experiments with dried milk have shown that these substances are reduced during the drying process and not completely removed and that young rats fed on dried milk continue to develop normally. This is an important experimental result though there is a possibility that vitamins diminish in dried milk as a result of keeping over long periods. The temperature at which the milk is dried is of great importance and also the duration of drying, as both these factors affect considerably the nutritive efficiency.

There are certain advantages which dried milk possesses and which should be considered. The first is with regard to its keeping properties. Micro-organisms do not multiply in dried milk and the number of micro-organisms found in any sample depends very largely on the care, or want of care, in the packing process. As a result of this property, dried milk is not liable to decomposition. Certain physical changes may occur in dried milk from keeping. The colour tends to get darker. The proteins may become less soluble and some change in the fat causes alterations in flavour and odour of the milk.

The easy portability of dried milk is another great advantage. Considerable saving is effected in labour and transport, and there are some who say that dried milk can be made as economical a proposition as ordinary cow's milk.

Dried milk is convenient to use and there is no waste. Ordinary milk is very apt to go bad at times and varies very much in composition. Dried milk ensures the supply of a food of constant composition.

Turning now to the question of the application of dried milk to infant feeding, it is obvious that where possible, a young mammal should be fed on the milk of its mother because the mother's milk differs in many ways from the milk of other species. It is held by Chapin that milks of different species differ, because the milk has a developmental function, being intended to prepare young animals for the food of adult life. If breast-feeding is not practicable, the best substitute is cow's milk provided a good clean, pure milk can be guaranteed. If not, dried milk is the best substitute. I do not propose to enter into a discussion of the mode of feeding. It is sufficient to state that the infant has considerable powers of adaptability and if healthy the digestion of a foreign milk should present no difficulty.

In what follows, it must be assumed that a suitable cow's milk is not available and by "suitable" is meant a pure, clean cow's milk. Many favourable opinions have been given regarding dried milk, though some say that these results are due to more medical supervision. Dried milk is very extensively used in England and Wales and in various infant welfare centres and it seems to have one great advantage, *viz.*, it is easily digested. Dr. Millard of Leicester did not find that the continued use of dried milk for twelve months was followed by rickets or scurvy. Dr. Naish of Sheffield confirms this by saying that babies fed on dried milk show the occurrence of rickets in very few cases, while Dr. Lapage of Manchester states that he has seen rickets, but that, in these cases the disease would have occurred on other diets. I do not wish to enter into a discussion on the aetiology of rickets but I am convinced that the diet is a secondary cause with the production of this disease and certainly the rarity of rickets amongst European children in this country where dried and other milks are extensively used would tend to negative the view that dried or condensed milks produce rickets.

Experience in England has shown that dried milk is more easily digested than cow's milk and better tolerated and that it is of great value in the prevention of summer diarrhoea, a disease which is responsible for an enormous mortality amongst infants both in India and in England.

With dried milk, it has been shown that there is no risk of scurvy. It is well to remember that scurvy is an extremely rare disease but in any case it might be safer to give orange juice daily especially if the feeding is prolonged.

The most frequent abnormality with dried milk is constipation but it is doubtful if this is more so than with milk and water. This effect of dried milk is said to be due to the complete absorption and digestion of the milk but I doubt this explanation as I think a more likely one is the occurrence of excessive soap formation in the intestine. The best way to remedy this is to add a teaspoonful of sugar to each feed.

Sometimes the infant appears intolerant of dried milk, but in such cases an intolerance to cow's milk is usually found as well. Such intolerance is usually due to failure to persevere and giving excess of food. Digestive troubles may result where dried milk is kept up for prolonged periods, but this usually occurs with the full cream varieties and can be easily stopped by reducing the fat in the milk.

An attempt has been made to use vegetable oils in dried milks but opinion regarding the value of these has not been in any way unanimous. It is well to remember such oils do not contain vitamins and this alone should be sufficient to condemn absolutely the use of such substances.

It may therefore be concluded that, where breast-feeding is impracticable, artificial feeding with a good cow's milk should be employed and if this cannot be obtained recourse should be had to a good quality dried milk. Dried milk owes its success to its being more digestible, more easily assimilated and more palatable. Any diminished solubility caused by the drying process does not affect digestibility. Dried milk is much freer from bacteria than ordinary cow's milk and it does not decompose, so that waste is avoided. Dried milk is well borne by marasmics and it is useful when summer diarrhoea is prevalent as it is easier kept and can always be prepared fresh. There is not the disadvantage of having to boil the milk and it has a great advantage in being of constant composition.

There is no evidence that dried milk produces scurvy or rickets, though the great disadvantage of this kind of food is its present cost. This practically places it outside the poorer classes especially in a city like Bombay, but it is here that the municipality and welfare associations can help by offering such dried milks at the lowest possible rate. The present milk supply in Bombay leaves a great deal still to be desired and if the babies cannot be assured of a good milk supply, the use of dried milk should be extended for the reasons already given.

THE DELHI MATERNITY AND CHILD WELFARE EXHIBITION.

HER EXCELLENCY Lady Chelmsford performed the opening ceremony of this Exhibition on the 21st February last at 3-30 p.m. The Exhibition was held in the grounds of the Lady Hardinge Pardah Gardens. On arrival H. E. the Viceroy and Lady Chelmsford were received by the Hon'ble Mr. H. Sharp, C.S.I., C.I.F., Chairman of the Organizing Commi