Publications Committee

BULLETIN

OF THE

UNIVERSITY OF TEXAS

No. 373

EXTENSION SERIES NO. 66 NOVEMBER 25, 1914

Suggestions For Infant Feeding

BY

ANNA E. RICHARDSON

Published by the University six times a month and entered as second class matter at the postoffice at Austin, Texas

VON BOECKMANN-JONES CO., PRINTERS, AUSTIN, TEXAS

1914

640-1114-2m-6910

BULLETIN

OF THE

UNIVERSITY OF TEXAS

No. 373

EXTENSION SERIES NO. 66 NOVEMBER 25, 1914

Suggestions For Infant Feeding

BY

ANNA E. RICHARDSON

Published by the University six times a month and entered as second class matter at the postoffice at Austin, Texas

VON BOECKMANN-JONES CO., PRINTERS, AUSTIN, TEXAS

1914

Cultivated mind is the guardian genius of democracy. . . . It is the only dictator that freemen acknowledge and the only security that freemen desire.

President Mirabeau B. Lamar.

The benefits of education and of useful knowledge, generally diffused through a community, are essential to the preservation of a free government.

President Sam Houston.

Suggestions for Infant Feeding.

Nature's food, mother's milk, is, of course, the best food for the child, but owing to illness or inability to nurse their children, thousands of mothers must each year feed their infants artificially.

To successfully feed an infant is no simple task. It is estimated that about 50 per cent of all artificially fed children die. Each child is a law unto itself, and there can be no hard and fast rules laid down. The suggestions offered are for the average normal child, and will not fit every case. In the case of abnormal or sick children, the advice of a competent physician should be sought and followed, and a special diet will doubtless be prescribed to fit the individual need.

Nature has pointed the way to the best food for the child, accepting her guidance, when human nourishment is impossible, we use the milk of some animal, and modify it to approximate the composition of mother's milk. The milk of various animals has been used, the goat, mare, and cow. Because of its convenience and its general use, cow's milk is most commonly used for infant feeding.

COMPOSITION OF MILK.

Mother's milk contains all the elements necessary to the normal development of the child, and in just the proportion in which the child can best utilize them. It contains protein, the food principally needed to build the body tissue so that the little one will steadily grow and gain in size. Carbohydrates and fats are the energy foods which supply the infant with the needed energy to kick and to scream and to normally develop. The minerals present in the milk serve to develop the bony structure and to supply the needed minerals to every part of the body. Water is needed for all body fluids. An artificial food then, to be a good substitute for mother's milk, must contain these five food principals; and they must not only be present, but if the child is to develop normally they must be present in approximately the same proportion that they are found in mother's milk.

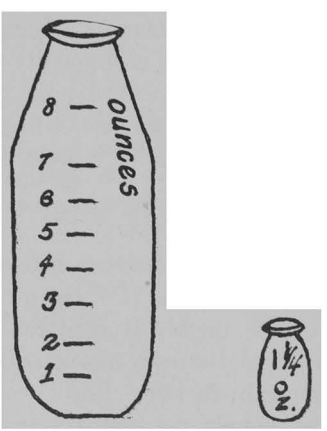
	Protein.	Fat.	Carbohydrate.	Ash.	Water.
Cow's milk	3.5	4.0	4.5	0.75	87.25
Mother's milk	1.5	3.5	7.0	0.2	87.80

By comparing the compositions of these two we find that mother's milk contains less protein and ash but more fat and carbohydrate than the cow's milk, so that for an infant straight cow's milk is not a suitable food.

MODIFIED MILK.

The problem, then, is to so modify this cow's milk that it will take the place of mother's milk and will furnish a food on which the baby will thrive, and grow in strength and in weight.

Amount to Feed.—The quantity of food a child should take is also a most important element of successful feeding, for there are many cases of children who suffer either from under or excess feeding. The child's stomach at birth is a small bag, and cannot hold large amounts at a time.



Relative sizes of an eight-ounce bottle and an infant's stomach at birth.

The size of the infant's stomach is a guide as to the amount of food to be given at each feeding. The total quantity which the child should have in a day has been estimated from the amount consumed by a great many normal, breast fed infants.

The following table gives the number of feedings per day and the amount of each feeding:

Age.	Intervals Between Meals by Day.	Night Feedings.	Quantity for One Feeding. (oz.)	Quantity for 24 Hours. (oz.)
2-7 days	2 hours	1	1-1½	10-15
2-3 weeks	2 hours	1	1½-3	15-30
4-5 weeks	2½ hours	1	2½-4	20-32
6-9 weeks	2½ hours	1	3-5	24-40
9 wks.-5 mon..	3 hours	1	4-6	28-42
5-9 months	3 hours	0	5-7½	30-45
9-12 months ...	4 hours	0	7-9	35-45

To modify cow's milk so that it will approximate nature's food we must dilute it with water and add sugar. The water added should be pure boiled water, and the sugar to add is lactose, the sugar found in both cow's and mother's milk. Maltose may be used, it is easily digested, and is also more laxative than the other sugars. Fat is very much needed in the child's diet, and as cow's milk diluted with water will make a mixture too weak in fat, we use top milk. The top part of a bottle which has stood several hours has more cream and so more fat than the other part of the milk. The upper half of a bottle of milk that has stood at least four hours is called 7 per cent milk. There are thirty-two ounces to a quart. Seven per cent milk is the upper sixteen ounces of a quart bottle. The milk may be dipped out with a small dipper, or syphon, several varieties of each are on the market.

From birth to six months. Dr. Holt formulas 7 per cent milk.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
7 per cent milk[1]	2 (oz.)	3	4	6	9	10	16	18[4]	20
Milk sugar[2]	1	1	1	1 1–5	1 1–2	1 1–2	1 1–2	1 1–2	1 1–2
Lime water[3]	1	1	1	1 1–5	1 1–3	1 1–2	2	2	2
Boiled water.....	17	16	15	17	19	18	22	20	18
Amount fed.....	10–15	15–30	20–30	25–35	25–35	28–40	30–40	30–45	30–45

[1]The whole upper half of the bottle must be thoroughly mixed, then the required number of ounces taken out.

[2]Three level tablespoons may be calculated as 1 oz. sugar.

[3]*Lime Water.* Pour two quarts of boiled water over one tablespoon of fresh unslacked lime. Stir until slacked, and let stand until clear. Drain carefully from sediment.

[4]When more than 16 ounces of milk are needed, two quart bottles must be used.

These formulas vary. Some infants with strong digestions can increase the strength of the formula much more rapidly than a child with weak digestion.

From six to twelve months. Dr. Holt formulas 7 per cent milk.

	I.	II.	III.
Top milk	(upper 20) 22 oz.	(upper 24) 24 oz.	Whole milk 26 oz.
Milk sugar	1–2	1	1
Lime water	2	2	2
Boiled water	16	6	...
Barley gruel	....	8	12
Amount fed	35–45	35–45	35–45

It must always be remembered that a baby who has had only breast milk and who is given cow's milk for the first time must be given a weaker formula than a child of the same age who has always been artificially fed.

Signs of Proper Nourishment.—The best signs that the food is satisfactory and that the baby is thriving is a gradual and steady increase in weight. During the first year a record of the weight is most valuable. The child should be weighed every week during the first six months and at least once in two weeks during the next six months. There is seldom a gain during the first week or two of artificial feeding, but after this a healthy child will gain from four to six ounces a week up to about the sixth month. The average weight at birth is seven to seven and a half pounds. This weight is doubled at six months, at nine months it weighs seventeen to eighteen pounds, and at the end of a year it should have trebled its weight. During the first few weeks of artificial feeding, if the infant does not lose in weight, or there is a slight increase; if it sleeps well and does not suffer from colic or other signs of indigestion, you may be satisfied that the formula is adapted to its needs.

The nursing infant that is properly nourished will sleep quietly several hours after nursing, will be good natured when awake, will show no signs of indigestion, and will gain steadily. When the milk is scanty or no longer satisfies the child, he will cease to gain, will be cross and restless, and will nurse for a long time in his efforts to satisfy its hunger.

Additions of Other Foods.—The time at which addition of other foods should be made to the diet varies. If the breast-fed infant shows all signs of thriving they need not be added until the tenth or eleventh month, but by the end of a year the infant should not depend solely upon mother's milk, for it no longer is suitable to the needs of this growing organism. To the child who is artificially fed additions are made much earlier, often the fifth or sixth month.

Such foods should be used as cereal gruels made of barley, wheat or oat flour, four tablespoons to a quart (if the whole grain is used the cereal should be thoroughly cooked four to six hours and carefully strained), and orange juice. Beef juice may be given to infants when they are anaemic, at ten months, but it is a stimulant and is unnecessary for the normal child. It is far better not to use it.

CARE OF THE MOTHER.

The care of the child should not be deferred until the time of its birth, for the right care of the mother during the period preceding the birth of her child is essential if the infant is to enter the world fully equipped for life.

Modern science has dispelled most of our fears about prenatal influences, but it has left us more firmly convinced than ever that the proper nutrition of the mother is essential, for the developing organism of the child is dependent upon the blood stream of the mother for its elements of growth.

As far as possible the mother should lead a normal life, taking plenty of exercise and living out in the fresh air. She should be as free from care as possible, and should have plenty of sleep and plenty of nourishing food. All food whims and fancies should be discouraged. The diet should be simple and easily digested, yet should amply supply her needs. By thus keeping the mother's system in a healthy condition she can furnish the needed elements of growth to her developing child.

The Nursing Mother.—The proper care of the nursing mother is also essential in the proper care and feeding of the infant. The nursing mother should have a simple diet. In addition to her regular meals, cocoa, milk, or gruels may be taken. She should

avoid rich foods and very acid fruits. She should have plenty of sleep and good fresh air, with suitable outdoor exercise, and should be free as far as possible from care or anxiety; for the condition of the mother materially affects the condition of the milk.

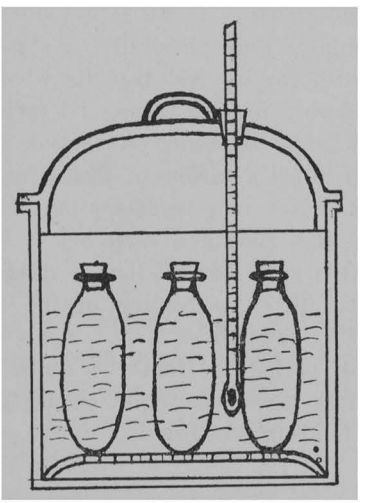
The Care of the Milk.—Cow's milk at best is a very different thing from mother's milk, so great care should be taken in its choice and handling. Summer diarrhea is caused by bacteria present in milk. As these bacteria develop more rapidly in warm milk, we have far more digestive trouble among infants in summer. Clean milk is the only safeguard. Dirty milk means disease, so during the hot summer months the death rate for infants soars way up. The milk from a herd is better than from one cow, for the composition of the milk will be more constant. The supply should come from a clean dairy whose herd has been inspected, and which is careful in the handling and cooling of the milk. The milk should also be well taken care of in the home, and always cool.

Pasteurization.—Authorities differ as to the advisability of pasteurizing milk, but if for any reason a satisfactory supply is not available, pasteurization is a safeguard, and should always be done in case of an epidemic of any kind, or when you have any suspicion of the cleanliness of your milk.

Directions for Pasteurization.—A Freeman pasteurizer is excellent, but a home-made pasteurizer can be made out of a bucket with a fitted cover and a rack on which to set the bottles. It is best to have a hole in the cover fitted with a cork through which you can pass a thermometer by which to regulate the temperature of heating. The bottles are placed in water up to the level of the milk, and the water heated to a temperature of 165 degrees F. The pail is removed from the heat, covered, and allowed to stand for one-half hour. The milk is then quickly cooled and kept cool, for warm milk is a splendid medium for the growth of bacteria.

Care of Bottles.—It is very important that the bottles and nipples, as well as the milk, should be most carefully cared for. The bottles should be rinsed with cold water as soon as emptied. Before using them they should be carefully washed and placed in boiling water for twenty minutes. The best bottle to use is a

graduated eight-ounce bottle with no corners and a mouth wide enough so that it may be easily cleaned. The nipples should be chosen so that the hole is just large enough for the milk to flow drop by drop. New nipples should be boiled for five minutes, but this is unnecessary every day. They should be carefully rinsed in cold water after each using, and then soaked in water containing a little borax or boracic acid. Once a day they should be turned inside out and carefully washed. The milk for the



Home-made Pasteurizer.

whole day's feeding should be made up at once, carefully bottled, and stoppered with sterile cotton, and kept cold in the ice box. When time for the feedings the milk must be warmed by placing the bottle in warm water and carefully heating to about 98 degrees F.

PROPRIETARY FOODS.

There are a great many infant foods on the market. These foods are of various kinds. Some of them are predigested foods, some are milk foods, and some are cereal foods. None of them are a satisfactory substitute for mother's milk, nor are they as good as modified cow's milk. Their best use is as additions to

modified milk, but they should never be used in its place unless prescribed for a special case by a physician.

Food for Children Over a Year Old.—Too often, as soon as the baby has been weaned or has given up its bottle, it is brought to the table and fed the same food that the grown up members of the family eat. This is not right, for we must remember that the young child is a delicate organism, and that its digestive system can easily be upset. We hear much about the relation between mental and physical growth. If we expect our child to develop as he should, mentally and physically, we must see that he is properly nourished, for we feel that its whole future welfare depends upon the proper feeding during its early years. During this period its food habits are being established, and it is essential that the child learn to eat a variety of foods, for the development of a rational appetite is a very necessary part of the training of a child. Often it takes time and care, but it is worth our best efforts to see that the child has all that it needs to develop into a strong, healthy adult. The feeding of the child must be a gradual adjustment to new foods.

The first feeding period is from the ninth to the fifteenth months. During this period the child should gradually become accustomed to the following foods:

Milk.
Cereals (well cooked and strained).
Orange juice.
Egg yolk.
Zwieback or dry toasted bread.

The next period is from fifteen months to two years. The feeding continues as in the first period. We may introduce some variety in the cereal and the fruit juice, also we introduce a vegetable, cooked and strained. Spinach is a particularly valuable one to commence with. All additions should be given in small quantities until the child's digestive organs have accustomed themselves to the new food.

The next period is from two to four years. Here our menu will consist of:

Milk (1 quart). This may be taken as a beverage or used in combination with cereals or in simple desserts.

Cereals (unstrained).
Fruits (cooked and mashed).
Eggs.
Stale bread.

Vegetables cooked and strained, i. e.:

Spinach.
Onions.
Asparagus.
Potatoes.
Carrots.
Peas.

Simple desserts, as:

Custards.
Junkets.
Gelatine.
Whips.
Cereal puddings.

The next period, four to seven years, will include the first years of school, and will involve other problems, such as proper school lunches. It is essential that we remember that the entire school age is a period of growth, that the child is constantly facing new situations which demand nervous and muscular energy, and that careful feeding is essential to his healthful, normal development.

BIBLIOGRAPHY.

The Care and Feeding of Children, L. Emmet Holt.
Theory and Practice of Infant Feeding, Chapin.
How to Feed Children, Louise Hogan.
Short Talks to Young Mothers, C. G. Kerley.
Human Nutrition (Parts I and II), Flora Rose.
Care and Feeding of Children (Parts I and II), Flora Rose.
The Feeding of Young Children (Teachers' College Bulletin), M. S. Rose.
Food for Children (University of Texas Bulletin), Jessie P. Rich.
Diseases of Infancy and Childhood, L. Emmet Holt.
The Prospective Mother, Slemonds.