

THE RATE OF SECRETION OF BREAST MILK *

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The problems involved in breast feeding have been studied long and exhaustively and there remains little to be said on the subject. There is one point, however, on which medical writers are indefinite, that is, the length of time which a baby should be allowed to stay at the breast at each feeding.

Twenty minutes at each nursing is usually taught as an absolute rule to nurses and physicians, and by them transmitted to the mother. This tradition has been handed down from generation to generation and is seldom questioned.

Few textbooks mention definitely the nursing time, merely stating that it should not be prolonged beyond 20 minutes, and that often from ten to fifteen minutes will suffice. Many authors state that the baby may nurse until satisfied or sleepy. A few hint at what we have found to be the real facts, but are not sufficiently definite.

Still says, "The time taken at the breast should be about 15 minutes. Some infants suck so rapidly that they will empty breasts in less than ten minutes, with resulting colic and vomiting. To prevent this mothers should regulate the flow by compressing the nipple with the hand."

It seems to us that the colic and vomiting described may more properly be attributed to overfeeding than to rapid feeding.

Kerley says, "Weighing the baby at intervals of from three to five minutes and noting gain has shown that from three to four ounces, which may represent the child's stomach capacity, may be obtained in two, three or five minutes. From a free, full breast a good nurser will take one ounce in one minute. The idea that a nursing infant will take no more than is good for him is the fruit of inexperience."

Grulee says, "As an arbitrary rule it is not well to leave the baby at the breast longer than from fifteen to twenty minutes. In restricting the time at the breast we must take in consideration that in the first five minutes the child gets as much as in the next ten minutes."

This study was undertaken to try to ascertain the facts in this matter. The objects in mind were: (1) to determine the rate at which the baby gets the milk from the breast; (2) to determine the average time which is taken to obtain the entire feeding.

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In order to ascertain these points we have used the method of "fractional weighing," that is, weighing a number of babies at frequent intervals during nursing. The increase in weight during each interval represents the milk secreted. By using a scale which weighs accurately to $\frac{1}{4}$ ounces quite correct figures are obtained.

It may fairly be said, it seems to us, that it is not desirable to let a baby nurse after he really stops getting milk from the breast. The child who sucks will swallow, and if there is no milk he will swallow air. This increases his gastric distension and predisposes to vomiting and colic, as was pointed out by Smith and LeWald¹ several years ago.

Prolonged nursing is bad for the baby also because it means fostering the habit of chewing the nipple when no milk is being secreted.

In the second place, the saving of the mother's time is important. The following examples show what this may mean:

A mother had two babies eleven years apart. During the early months the first was nursed twenty minutes every two hours, or 200 minutes a day. The second was nursed five minutes every four hours, or twenty-five minutes a day. The mother saved 175 minutes or nearly three hours of her time a day, and the second baby did perfectly well.

Another mother nursed her first child twenty minutes every two hours, nine feedings, or 180 minutes a day. At ten weeks the child developed eczema, was cut down to forty seconds every four hours, five feedings, or 200 seconds a day, about one-sixtieth of the first plan. This mother had such an abundant and rapid milk secretion that the baby still gained on the very short nursing periods.

In addition, the sparing of the mother's nervous system has to be considered. A great many women complain that the prolongation of the nursing to fifteen or twenty minutes makes them exceedingly nervous, while they do not mind short nursings at all.

It is also bad for the nipple to have the baby chew on it longer than is necessary.²

The point may be raised that the supply of breast milk is more likely to fail if the nursings are shortened too much. This point has been carefully noted by one of us for several years, and breast milk does not seem to fail more quickly on relatively short nursings than it did on the older principle of prolonged ones.

Another possible objection may be that it has been found by analysis that the breast milk taken at the latter part of the nursing (strippings)

1. Smith, C. H., and LeWald, L. T.: The Influence of Posture on Digestion in Infancy, *Am. J. Dis. Child.* **9**:261 (April) 1915.

2. In discussing this paper, Dr. R. S. Haynes said that the incidence of cracked nipples had been much reduced at The Sloane Maternity Hospital since the nursing time had been cut down from twenty minutes to eight or ten minutes.

is richest in fat, and that, therefore, he child's nursing time should not be reduced lest he lose this necessary part of the milk. This is doubtless true, but does not excuse leaving the baby at a breast which has been emptied, and from which he is getting no milk whatever.

The method of "fractional weighing" used in this study is not a new one, since it has long been used as a routine by many clinicians for determining the length of time a baby should be allowed to nurse, and for deciding whether he needs one breast or both for each feeding.

We have used the two minute interval in the majority of the cases studied. Some observations have been made at one minute intervals, but this gives too short a time between the weighings for the baby to get a good start. The time has been taken from the instant nursing began, and the baby has been removed from the breast promptly at the end of two minutes whether he has nursed vigorously or fitfully. Few of the babies object to being interrupted for the few seconds which it takes to weigh them. The nursings have been continued on one breast until the baby obtained nothing during one or two periods of two minutes, or until he refused to nurse any more; a few were stopped when vomiting occurred. In most cases the baby was offered the second breast, and allowed to nurse until the weight remained stationary or until the baby refused to continue.

It is obvious that there are many factors which must be considered in studying the results obtained, such as the age of the baby, his weight, whether he is of average size, overweight or underweight; his vigor and his temperament. Furthermore, the time of day is of no small importance. The morning nursings give a larger amount than those taken in the afternoon, as a rule. A great many of our observations were made in the out-patient department between 2 and 5 o'clock, when the milk supply is not at its best.

The condition of the breast, its size and fullness, the variation between the two sides, and whether one breast or both are necessary, all bear directly upon the figures obtained. If the infant is thriving and the supply of milk bids fair to continue, we must interpret a single poor nursing in a different light from a similar one obtained from a definitely failing breast. The matter of added bottles also make some difference in the manner in which baby does his share of the nursing. If the breast milk is growing scanty the baby will often refuse to nurse well, preferring to wait for the bottle which he has learned to expect.

We find that our observations fall naturally into four groups according to the amount obtained in relation to the weight of the child. It is not possible to compare the nursing curve of a large child who gets 6 or 7 ounces from one breast with that of a 6 pound baby who gets only $\frac{1}{2}$ ounce from two breasts.

We have assumed that a good feeding is one in which a baby gets about 0.4 ounce (or more) per pound of body weight.³ But since we are dealing with breast milk a somewhat smaller amount, 0.33 ounces per pound, has been assumed to be adequate.

The observations have been grouped as follows:

1. Adequate feeding from one breast (more than 0.33 ounce milk per pound). Twenty per cent. of our observations fall into this class.

2. Adequate feedings from both breasts. Twenty-five per cent. are in this class.

3. Fair feedings from the two breasts (from 0.25 to 0.33 ounce of milk per pound). These babies were mostly fed on the breast alone and were doing well; the comparatively poor nursing was probably only due to the time of day or other factors. Twenty per cent. are in this class.

4. Poor feedings. These babies obtained less than 0.25 ounce of milk per pound from two breasts. They make up 35 per cent. of the observations. This group contained the largest number of babies who were given bottle or cereal in addition to the breast (fifteen of the thirty-five). The milk supply was failing in a good many cases.

A mass of figures like these can be best studied by the graph method. We have plotted all our observations separately—but have shown only a few typical feedings (Fig. 4) and the curves of averages (Figs. 1, 2 and 3) of the various groups. Each average curve has been continued as long as any individual baby obtained milk. This does not mean that all the group got milk to the point represented by the end of the curve. The average time after which no more milk was obtained ("average emptying time" of the breast) is plotted on each line as a circle surrounding a dot.

In studying the curves in each group, it is necessary again to subdivide according to the size of the baby. We have taken weight as the criterion rather than age. As a matter of fact, this is a fair thing to do because more of the babies have been over weight for their age rather than under. We have divided them into: (1) those under 9 pounds; (2) those from 9 to 12 pounds; (3) those from 12 to 15 pounds, and (4) those over 15 pounds.

3. This amount was derived from the following: In the early months the child needs 3 ounces of fluid per pound of body weight (one-fifth of his weight) and seven feedings: $\frac{\text{Wt.} \times 3}{7} = 0.4$ In the middle months the child needs $2\frac{1}{2}$ ounces per pound (from one-sixteenth to one-seventeenth of his weight) and from five to six feedings. $\frac{\text{Wt.} \times 2\frac{1}{2}}{6} = 0.4 +$. In the latter months he will take 2 ounces per pound (one-eighth of his weight) and five feedings $\frac{\text{Wt.} \times 2}{5} = 0.4$. Therefore, 0.4 ounce of fluid per pound is about the amount needed for all babies.

This gives three or four curves on each chart, one for each group of babies by weight. Some of them contain only a few observations, but the individual variations from the average are not great.

The twenty observations in which the baby obtained an adequate feeding from one breast (Table 1 and Fig. 1) were made on sixteen different babies. All but three were being fed on breast alone.

The curves (Fig. 1) show a distinct similarity—a rapid rise in the

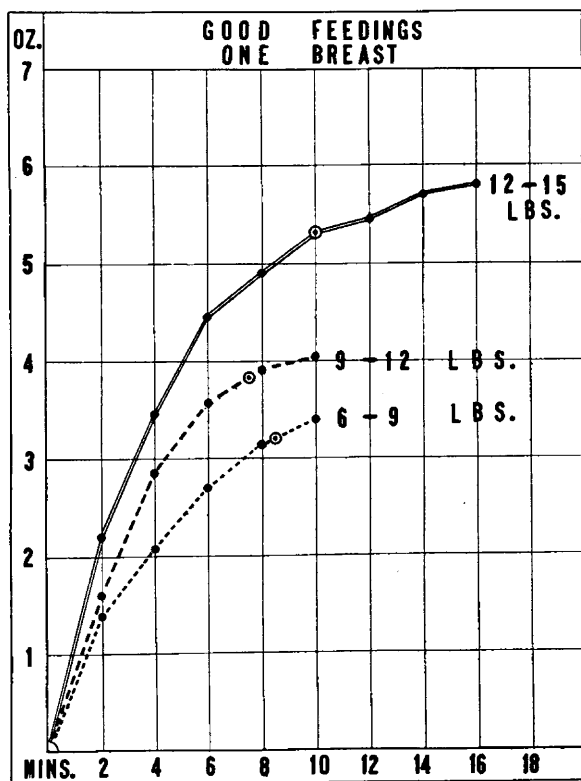


Fig. 1.—Curves obtained by averaging observations in Table 1, grouped according to the weight of the babies. Each curve is continued as long as any baby obtained milk. Average time after which no more milk was obtained is shown by circle surrounding dot.

first three periods, followed by a very small gain in each succeeding one. In all three the baby obtained about 40 per cent of the total amount in the first two minutes; from 60 to 70 per cent. in the first four minutes; from 75 to 85 per cent. in the first six minutes.

The average emptying time is shown as 8.5 and 7.6 minutes, respectively, in the two lower curves. None of the babies obtained any milk after ten minutes. Of the larger infants (from 12 to 15 pounds) one obtained some milk up to fourteen minutes and one up

TABLE 1.—GOOD FEEDINGS SINGLE BREAST

Observation Number	Bottle	Cereal	Weight, Pounds	Age	Ounces of Milk Obtained in Each 2 Minute Period								Total, Oz.	Ounces Milk per Pound
					2	4	6	8	10	12	14	16		
1	6¼	7 weeks	0.5	0.5	0.75	0.75	0	...	...	...	2.5	0.4
2	+	..	6½	7 weeks	1.75	0.75	0.5	0.25	0.25	0	...	...	3.5	0.55
3	7	1 month	2	0.75	0.25	Ref.	...	...	...	...	3	0.3
4	+	..	8	3 weeks	1.25	1	1	0.75	0.25	Ref.	...	...	4	0.5
5	9¼	1 month	1.75	1	0.75	0.25	0	0	...	...	3.75	0.375
6	9¾	2 weeks	2.5	1	0.25	Ref.	...	...	...	...	3.75	0.375
7	10¼	6 weeks	2	1	0.5	Ref.	...	...	...	...	3.5	0.35
8	10¼	6 weeks	2	1	0.5	Ref.	...	...	...	...	4	0.4
9	10¼	3 weeks	1	1.5	0.5	1	...	...	...	...	4	0.4
10	10½	6 weeks	1	1	1.5	0.5	1.25	Ref.	...	...	5.25	0.48
11	11	8 weeks	0.5	1	1	1	0.5	0	...	...	4	0.41
12	10¾	6 weeks	2	1.5	0.5	Ref.	St.	...	...	...	4.5	0.37
13	10¾	6 weeks	2	1.5	0.5	1	...	...	...	...	4	0.37
14	11¾	2½ months	1.25	1.25	1	Ref.	Ref.	...	...	...	5	0.42
15	12¾	2 months	2	1.25	1	Ref.	...	...	...	0.5 R.	4.25	0.34
16	13	2½ months	0.5	1.75	1	0.25	0.25	0.5	0.75	...	5.5	0.42
17	13¾	4 weeks	2	1.75	2.5	1	Ref.	...	...	...	7.25	0.53
18	+	..	14½	7 months	3.5	1	0	0.5	1.25	0	...	...	6.25	0.43
19	15	5 months	3	1	1	0	...	...	...	...	5	0.34
20	15¼	3 months	2.25	0.75	0.5	1	1	0.25	0.75	0	7	0.46

to sixteen minutes, which prolongs this particular curve and makes the average emptying time ten minutes. Two of these children, however, emptied the breast in six minutes. Most of these babies are under two months old, and all but two weighed less than 15 pounds.

Figure 2 shows the nursings which were adequate from two breasts. In three of the groups from 58 to 68 per cent. was obtained from the first breast. In one group (from 9 to 12 pounds) about 50 per

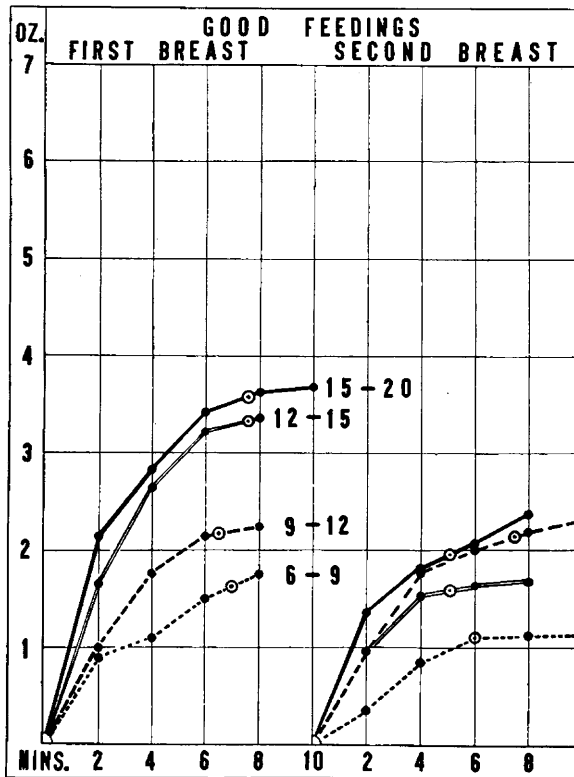


Fig. 2.—Curves showing average of observations from Table 2. Curves representing average amounts from second breast are plotted in broken, double, or solid lines to correspond to those of first breast. Average emptying time shown by circle and dot.

cent. came from each side. The smaller nursing from the second breast, is probably due to the fact that the baby loses the first edge of his appetite after he has obtained some food.

The secretion in the individual breasts follows the general rule. Most of the milk is obtained in the first four minutes (from 65 to 80 per cent.) and the largest amount in a single period is in the first two minutes (from 45 to 58 per cent.). The average emptying time is from $6\frac{1}{2}$ to $7\frac{1}{2}$ minutes.

TABLE 2.—GOOD FEEDINGS BOTH BREASTS

Observation Number	Bot- tles	Ce- Weight, real Pounds	Age	Ounces of Milk Obtained in Each 2 Minute Period						Total First Breast	Ounces of Milk Obtained in Each 2 Minute Period						Total Second Breast	Total Milk Both Breasts Pound	Ounces Milk per Breast Pound
				Ounces of Milk Obtained in Each 2 Minute Period							Ounces of Milk Obtained in Each 2 Minute Period								
				2	4	6	8	10	12		2	4	6	8	10	12			
21	+	6%	3 wk.	0.5	0.25	0.25	0.5	0	...	1.5	0.5	0.25	0	0.25	0.25	0	1.25	2.75	0.4
22	..	7½	1 mo.	1.75	0	0	...	...	...	1.75	0.25	0.5	0	...	...	...	1.75	3.5	0.46
23	..	7½	5 mo.	0.5	0.25	0.25	0.25	0	...	1.25	0.5	0.5	0.25	V.	...	...	1.25	2.5	0.34
24	..	8	3 wk.	0.75	0.25	0.5	0.25	Ref.	...	1.75	0.75	0.5	0	...	...	...	1.25	3	0.375
25	..	8	1 mo.	1	0.25	0.5	0.25	0	...	2	0	0.75	0	...	...	...	0.75	2.75	0.34
26	..	9%	2 mo.	1.25	1	0	0.5	0	0	2.75	0.75	1	0	0.5	0	...	2.25	5	0.5
27	..	9%	1½ mo.	0.5	0	0.25	0.25	0	...	1	0.5	1	0.25	0	0.5	0	2.25	3.25	0.38
28	+	9%	6 wk.	1	0.25	0.5	0	...	...	1.75	0.25	0.5	0.5	0.5	0	...	1.75	3.5	0.4
29	..	10	2½ mo.	1.25	0.5	0.25	0	...	...	2	1	0.75	0.5	Ref.	...	...	1.75	3.75	0.38
30	..	10	11 wk.	1	1.5	0	...	...	...	2.5	1.5	1.5	0.5	Ref.	...	...	3.5	6	0.6
31	..	10%	3½ mo.	0.75	0.75	0.5	0	...	...	2	0.75	0.5	0.5	0.25	0.25	Ref.	2.25	4.25	0.4
32	+	11	5 mo.	1	1.5	0.5	0	...	...	3	1.5	0.5	0	0	0	...	2	5	0.45
33	..	11½	2½ mo.	1.25	0.5	0.25	0	...	...	2	1.25	1.25	1	0.25	0.5	0	4.25	6.25	0.54
34	..	12	3 mo.	1.25	0.75	0.5	0.25	0.5	...	3.25	0.75	0.25	0.25	0.25	V.	...	1.5	4.75	0.4
35	..	13%	3½ mo.	1	1.5	0	...	...	...	2.5	1	1.25	0	...	...	...	2.25	4.75	0.36
36	..	13%	4 mo.	1.75	1.25	0.75	0	...	...	3.75	0.5	0.5	0.25	0	...	...	1.25	5	0.385
37	..	13%	3 mo.	1	0.75	0.5	0.25	0	...	2.5	1.25	1.25	0	...	...	...	2.5	5	0.37
38	..	13%	3 mo.	1	1.75	0	...	...	...	3.75	1	0	0	...	...	...	1	4.75	0.37
39	..	14%	5 mo.	3.5	0	1	...	...	...	4.5	2	1	0.5	St.	...	...	3.5	8	0.55
40	..	14%	3 mo.	2	1.25	0.5	0.5	0	...	4.25	0.25	0.25	0	...	...	...	0.5	4.75	0.53
41	+	15½	4½ mo.	2	1	0.5	0	...	...	3.5	1	0.75	0	...	...	...	1.75	5.25	0.34
42	..	15½	3 mo.	1.75	0.25	0.5	0.25	0	1.25	4	0.5	0.75	0.25	0.5	0	0	2	6	0.4
43	..	16%	5 mo.	1.5	0.5	1.25	0.75	0.25	0	4.25	2	0	0	...	...	...	2	6.25	0.37
44	..	18%	7 mo.	3.5	1.75	0.75	0	...	...	6	0.75	0	0	...	...	...	1.5	7.5	0.4
45	+	19%	6 mo.	2	1	0	...	...	...	3	2.5	0	0.75	1	0	...	4.25	7.25	0.37

From the second breast again from 70 to 80 per cent. was obtained in the first four minutes. The variation of individual nursings is from two minutes to ten minutes. Most of the babies had emptied the breast in from six to eight minutes. The average time is from five to seven and one half minutes. These babies who needed two breasts are, in general, somewhat older than the first group.

The fair nursings (Table 3 and Fig. 3) include twenty observations on babies, 60 per cent. of whom were being fed on breast alone and

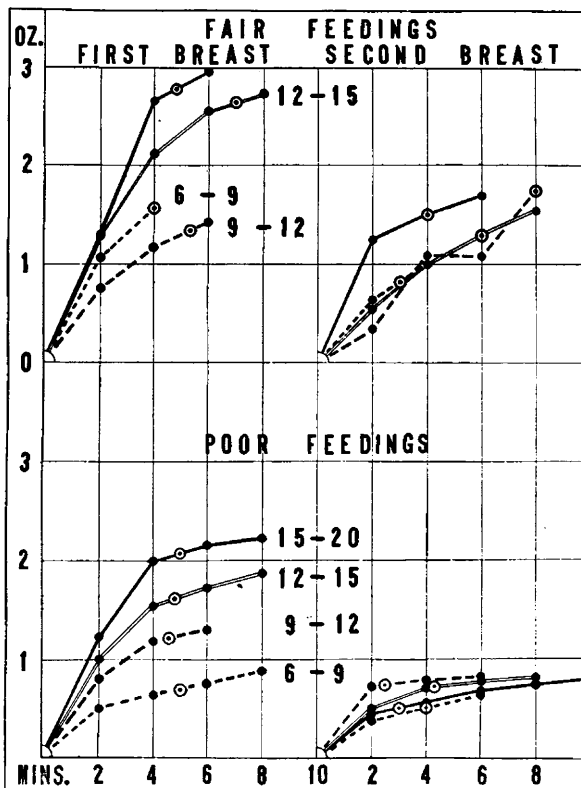


Fig. 3.—Curves showing averages of observations from Tables 3 and 4. Same conventions as Figures 1 and 2.

were doing well. The curves of the first breast show a similar form to the good nursings except that they are shorter, nearly all having finished at six minutes. The average emptying time (four, four and eight-tenths and five and three-tenths minutes) is short except in one group, (seven minutes).

The second breast curves are somewhat more irregular but are based on only a few nursings, since several of these babies refused the second breast. The emptying time is short in most cases.

TABLE 3.—FAIR FEEDINGS BOTH BREASTS

Observation Number	Bot- tle	Ce- Weight, real Pounds	Age	Ounces of Milk Obtained in Each 2 Minute Period										Ounces of Milk Obtained in Each 2 Minute Period										Total First Breast	Total Second Breast	Total Both Breasts	Pound per Milk Ounces																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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TABLE 4.—POOR FEEDINGS BOTH BREASTS

Observation Number	Bot- tle	Ce-Weight, real Pounds	Age	Ounces of Milk Obtained in Each 2 Minute Period										Ounces of Milk Obtained in Each 2 Minute Period										Total Second Breast	Total Both Breasts Pounds	Ounces Milk per Pound
				2	4	6	8	10	12	Total First Breast	2	4	6	8	10	12	Total Second Breast	2	4	6	8	10	12			
				0.75	0	0	0.25	0	0	0.75	0.25	0.25	0	0	0	0	0.75	0.25	0.25	0	0	0	0	0.75	1.5	0.19
66	+	84	1 mo.	0.25	0.25	0	0.25	0	0	1	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	0.5	1.5	0.18
67	+	84	1 wk.	0.75	0.25	Ref.	0	0	0	1	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	0.5	1.5	0.17
68	+	94	2 mo.	0.75	0.25	0	0	0	0	0.5	1.25	0	0	0	0	0	1.25	0.5	0	0	0	0	0	1.25	1.75	0.18
69	+	94	1 mo.	0.75	0.25	0	0	0	0	0.5	1.25	0	0	0	0	0	0.5	0.5	0	0	0	0	0	0.5	2.25	0.23
70	+	94	6 wk.	0.75	0.25	0	0	0	0	1.25	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	0.5	1.75	0.17
71	+	104	2 mo.	0.75	0.25	0	0	0	0	1.25	0.5	0	0	0	0	0	1.5	1.5	0	0	0	0	0	1.5	2.5	0.23
72	+	104	2½ mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
73	+	104	2 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
74	+	114	2 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
75	+	114	2 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
76	+	114	2 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
77	+	114	2 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
78	+	124	3 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
79	+	124	3 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
80	+	124	4 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
81	+	134	3 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
82	+	134	3 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
83	+	144	3 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
84	+	154	4 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
85	+	154	4 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
86	+	154	4 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
87	+	154	7¼ mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
88	+	154	3 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
89	+	164	3½ mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
90	+	164	3½ mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
91	+	164	6 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
92	+	164	6 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
93	+	174	4 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
94	+	174	7 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
95	+	174	7 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
96	+	174	5 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
97	+	174	11 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
98	+	174	4 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
99	+	184	6 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23
100	+	184	8 mo.	0.75	0.25	0	0	0	0	1.5	0.5	0	0	0	0	0	0.5	0.5	0	0	0	0	0	1.5	2.5	0.23

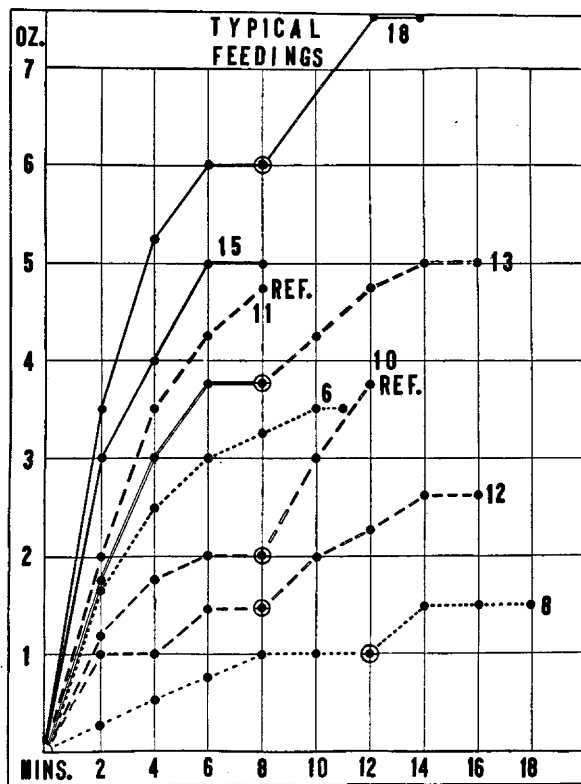


Fig. 4.—Some typical feedings. The numbers at end of each curve represent the weight of the baby. The point at which the second breast was begun is shown by the large circle. Various types of feedings are plotted. The curve marked 8 is a poor feeding, $1\frac{1}{2}$ ounces from two breasts—and is very unusual because the milk was obtained at a steady rate from the first breast. The curve marked 12 is a fair feeding, $2\frac{3}{4}$ ounces from two breasts—rather irregularly obtained. The curve marked 10 is a good feeding, $3\frac{3}{4}$ ounces from two breasts. After twelve minutes the baby refused to nurse. The curve marked 6 is a good feeding, $3\frac{1}{2}$ ounces from one breast, or 5.8 ounces per pound—this baby would have been as well off if he had been stopped at six minutes—with three ounces. Curve marked 13 is a good feeding from two breasts— $3\frac{3}{4}$ ounces from first, $1\frac{1}{4}$ ounces from second, 3.85 ounces per pound. Curve marked 11 is a very good feeding from an abundant breast, $4\frac{3}{4}$ ounces in eight minutes. The baby refused to continue after eight minutes. This mother regularly supplied from four to five ounces in six minutes, on many observations. Curve marked 15 is a fair feeding but a baby who was doing very well. He probably obtained more at other nursings, since he obtained 5 ounces in six minutes. Curve 18—six ounces in six minutes, $1\frac{1}{2}$ ounces from second breast. A very large thriving baby.

The poor feedings (Table 4, Fig. 3) again show the same general features. On the first breast the babies got from 80 to 90 per cent. of the milk in four minutes. The average emptying times were from four and five-tenths to five minutes.

The second breasts gave very poor feedings to all these babies, less than an ounce as a rule, most of which was obtained in two minutes. The average emptying time is very short (from two and four-tenths to four and two-tenths minutes). Only one baby obtained any milk after eight minutes and only three after six minutes. This group contains more older and larger babies when the milk would naturally be failing.

SUMMARY

From the above it is evident that nursing infants obtain the greater part of their feeding of breast milk in the first few minutes, from 40 to 60 per cent. in the first two minutes, and from 60 to 85 per cent. in the first four minutes. This holds true whether the supply is abundant, moderate or scanty. After eight minutes very few babies get any milk whatever. Only seventeen of our observations show any increase in weight after eight minutes; fourteen of these were from Tables 1 and 2—good feedings; only three babies obtained milk after ten minutes. A few larger, vigorous infants nursing from an abundant supply, may get small amounts of milk up to sixteen minutes.

The babies who need both breasts usually get less from the second than from the first side, except when one regularly yields a better supply. The rate at which a baby gets milk from the second breast is similar to that of the first breast: i.e., from 40 to 60 per cent. in the first two minutes and from 65 to 85 per cent. in the first four minutes. After that very little is obtained. The time after which a baby gets no more milk is usually shorter on the second breast than on the first.

The poor feedings have been completed in a shorter time than the good ones. When the breast supply is evidently failing, the baby gets all he can in from three to five minutes, as a rule. It does no good to leave a baby a longer time (from fifteen to twenty minutes) at a failing breast in the hope of eking out a meager supply.

If a baby empties the breast in from five to eight minutes and shows no signs of discomfort from an adequate feeding obtained in that time, there seems to be no good reason why he should not take his bottle in about the same time. If the nipple holes are of good size so that the milk flows freely, nearly all strong infants will finish the bottle in less than ten minutes. They evince less distress than the nurse does over the rapid feeding. On the other hand, a slow nipple either discourages the baby so that he will give up in disgust before he has

finished the bottle, or else makes him swallow so much air that he vomits or has colic. We believe that from eight to ten minutes should be ample time for any but the feeblest infants to take a bottle.

CONCLUSIONS

The method of fractional weighing may well be applied to every breast fed baby since it is the only way by which we can determine how long a given baby should nurse, and whether he needs one or both breasts.

It seems fair to conclude that a normal baby who gets enough milk from one breast needs to nurse, as a rule, only from six to eight minutes, rarely from ten to twelve minutes.

A baby who needs both breasts may nurse from six to eight minutes on the first and from five to seven on the second. Very few babies need as long as ten minutes on a breast. A good many will empty the breast in four or five minutes.

There is no evident reason why a baby should not take a bottle feeding as fast as he does one from a breast.