

Dietary habits of partly breast-fed and completely weaned infants at 9 months of age

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Abstract

Objective: To test whether there are differences in diet diversity between children still being partly breast-fed at 9 months and those completely weaned at the same age.

Design: Cross-sectional study.

Setting: Cross-sectional study (SKOT cohort) in the area of Copenhagen, Denmark.

Subjects: Healthy term infants (n 312) at 9 months of age (mean 9.1 (SD 0.3) months).

Results: The infants partly breast-fed (n 168) at 9 months had significantly lower body weight ($P < 0.0001$), were significantly shorter ($P = 0.0022$) and were introduced to complementary foods significantly later ($P < 0.0001$) than completely weaned infants (n 141) of similar age. Furthermore, they had lower intake of energy, both in absolute amount ($P < 0.0001$) and per kilogram of body weight ($P = 0.049$). Significantly lower intakes of most energy-yielding nutrients, in absolute amounts and as energy percentages, were seen for the partly breast-fed compared with the completely weaned infants. These differences appear to be caused primarily by differences in the type and amount of milk consumed, as the energy derived from sources other than milk was similar except for fatty spread and vegetables as a side dish. Only small differences were found for absolute intakes of foods between feeding groups, although fatty spread had significantly higher intake rates and consumption ($P = 0.031$) among partly breast-fed compared with completely weaned infants.

Conclusions: At 9 months the infants partly breast-fed did not eat a less diversified diet compared with those completely weaned at the same age. Despite later introduction to complementary foods compared with the completely weaned, their intake of foods was similar and no delay in their progression towards the family foods was noted.

Keywords
Infants
Diet
Breast-feeding
Weaning

The importance of an adequate diet in infancy and early childhood has long been recognised and it has become evident that nutrition during childhood and early infancy has importance for the development of disease later in life^(1–3).

The timing of the first introduction of complementary foods has shown to be an important factor for subsequent health. Studies have shown a protective effect of later introduction of complementary foods in relation to infancy weight gain⁽⁴⁾, adult overweight⁽⁵⁾ and respiratory illness during childhood⁽⁶⁾. A longer duration of breast-feeding is associated with a delayed introduction of complementary foods^(4,7,8) and results from a large cohort study showed an interaction between breast-feeding and introduction of complementary foods, suggesting that the combination of short periods of breast-feeding and early

introduction of complementary foods may contribute to increased infancy weight gain⁽⁴⁾. The effect of early introduction of complementary foods on overweight later in life is not known, but it has been suggested that individuals introduced early to complementary foods are more susceptible to an obesogenic environment, involving both physiological and psychological factors⁽⁵⁾.

Several studies have reported differences in food intake between infants being partly breast-fed and those completely weaned in the second half of infancy, where foods and drinks become an increasing part of the diet^(9–13). Whether this difference is caused by delay in the progression towards spoon feeding due to later introduction to complementary foods is uncertain, but of interest for future investigations on breast-feeding and later health outcomes. Moreover, this could be beneficial for counselling

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of mothers and fathers in healthy infant feeding practices. For this reason the aim of the present study was to test whether there are differences in diet diversity between children still being partly breast-fed at 9 months and those completely weaned at the same age.

Materials and methods

Data for the present study were obtained from infants seen at the first examination of the SKOT cohort, an ongoing prospective cohort which has the overall aim to describe how complementary feeding influences growth, development and risk factors for later disease. The infants were examined at age 9 months \pm 2 weeks.

A random sample of 9-month-old infants living in Copenhagen and Frederiksberg was established through the National Danish Civil Registry. The sample included infants born from April 2007 to May 2008. An invitation was posted to 2211 families, 4 to 7 weeks before the infants turned 9 months of age. The inclusion criteria were singleton infants born at ≥ 37 weeks of gestation and without diseases expected to affect growth or food intake. Written consent to participate was obtained from parents. An interview on diet, growth and health of the infant was performed, and instruction on food recording was given. The age of the infant at which full and partial breast-feeding stopped was recorded, and for infants still being breast-fed information on the daily frequency the infant was breast-fed a meal or part of a meal, according to the parent, was obtained. The parent was told that a breast-feed for comfort should not be counted. Less than once per day was coded as zero. Full breast-feeding was defined as only receiving breast milk, water, vitamins and minerals. The study protocol was approved by The Committees on Biomedical Research Ethics for the Capital Region of Denmark (H-KF-2007-0003).

At the examination nude weight to the nearest 1 g was measured for all infants using a digital paediatric scale (Saratorius IP 65; Bie & Berntsen AS, Herlev, Denmark). Recumbent length was measured using a digital measuring board (Force Technology, Brøndby, Denmark) and recorded to the nearest 0.5 cm. All measurements were performed by four well-trained observers.

The diet was recorded for seven consecutive days using a validated method consisting of pre-coded booklets accompanied by a booklet with twelve food photograph series⁽¹⁴⁾. The pre-coded food record was developed specifically for children between 6 months and 4 years of age and the booklets were divided into different parts corresponding to breakfast, lunch, dinner and in-between meals. The quantities were estimated from standard portion sizes, household measures or from the twelve food photograph series, depending on the specific food or drink. At the end of each meal and each group of food or drink, blank fields were present for the parents to use if

appropriate. If the child attended day care the food and drinks were recorded in household measures by the day care staff on a sheet, and then transferred to the pre-coded food record by the parents. In the study, the pre-coded food booklets were checked for completeness after the registration period, so any inappropriate responses could be clarified immediately.

All intakes of energy, nutrients and food items recorded in the pre-coded food record were calculated for each individual using the software system GIES version 1.000d, developed at the National Food Institute, Technical University of Denmark (Søborg, Denmark), and the Danish Food Composition Databank version 7 (National Food Institute, Technical University of Denmark; <http://www.Foodcomp.dk>). The intake model in GIES operates with three separate data layers: the recorded food intake, recipes and food composition data. The Danish Food Composition Databank and the recipes were amended to include products and recipes common for infants and young children.

To estimate the quantity of breast milk consumed, information on the frequency of feeding was used combined with data on the volume of breast milk per feed from Dewey *et al.*⁽¹⁵⁾. If the child received breast milk ≥ 6 times/d, the assigned volume was 130 ml/feed; with 3–5 feeds/d, the assigned volume was 89 ml/feed; and with < 3 feeds/d, the volume assigned was 53 ml/feed. The nutritional content of breast milk was calculated according to published values^(16,17).

Estimation of the degree of possible over- and under-reporting was done by comparing each infant's daily energy intake with his/her likely energy requirement, as described by Conn *et al.*⁽¹⁸⁾. In brief, each infant's energy requirement was calculated according to values obtained by the doubly labelled water method for 9-month-old infants⁽¹⁹⁾. Subsequently, 95% confidence limits around the total energy expenditure value were added⁽²⁰⁾ and the range was used as plausible intake.

Anthropometric measurements were entered into the software program WHO Anthro 2005 (WHO, Geneva, Switzerland; <http://www.who.int/childgrowth/software/en/>).

Intakes of energy-yielding nutrients were presented as means and standard deviations, and the *t* test was used to test if the intake differed between feeding groups. Because of the skewed distribution, added sugars were presented as median values and the Mann–Whitney *U* test was used to test if the intake differed between the feeding groups. Estimated intakes of foods and food groups are presented as medians, 25th and 75th percentile (P_{25} and P_{75}), and comparison of the groups partly breast-fed and completely weaned was done with the Mann–Whitney *U* test. The two feeding groups were also compared adjusting for weight of the infant, mother's age, mother's education and number of persons in the household using the general linear model. Comparisons between categorical values were made using the χ^2 test. All *P* values are two-sided with a level of significance of $P < 0.05$.

Data were analysed with the SAS for Windows statistical software package version 9.1 (SAS Institute Inc., Cary, NC, USA).

Results

Three hundred and twelve infants participated and were examined. Of these, two were excluded because of too many missing recordings days (>2 d) and one due to unrealistically high intakes of energy and fat. Thus the final study sample included 309 infants with a mean age at examination of 9.1 (SD 0.3) months. Almost all infants (99%) had received breast milk at some time and 141 were still partly breast-fed (46%) at 9 months. The median (P_{25} , P_{75}) duration of exclusive breast-feeding was 4.2 (2.5, 5.1) months. The majority of the infants were Caucasian and eleven (4%) had mixed Caucasian/non-Caucasian parents. Selected characteristics of all infants and their mothers, and according to partly breast-fed and completely weaned feeding groups, are presented in Table 1. Mothers of partly breast-fed infants were more

likely to be less than 35 years of age and to be higher educated than mothers of completely weaned infants. No differences between the two groups were seen for number of persons in the household, household income or birth weight of the infant. The partly breast-fed infants were significantly lighter, shorter, had lower BMI Z-score and were introduced to complementary foods later than completely weaned infants (Fig. 1).

In absolute terms, partly breast-fed infants had lower energy intake than completely weaned infants (Table 2). When analysed per kilogram of body weight these differences were reduced considerably, only just reaching the significance level. For absolute intakes of protein and carbohydrate, partly breast-fed infants had lower intakes than the completely weaned infants; however, no difference was found for fat and added sugars. Comparing nutrient densities, the percentage of energy provided by protein and carbohydrate was lower for partly breast-fed infants than for completely weaned infants, but higher for fat. Despite differences between the two groups all overall mean intakes for the energy-yielding nutrients were within the recommendations for this age group⁽²¹⁾.

Table 1 Characteristics* of all mothers and infants surveyed and according to feeding group: healthy term infants at 9 months of age, SKOT cohort, Copenhagen, Denmark

	All (<i>n</i> 309)		Partly breast-fed at 9 months (<i>n</i> 168)		Completely weaned at 9 months (<i>n</i> 141)		<i>P</i> value	
	<i>n</i>	%	%	%	%	%		
Mothers								
Age (years)								
<25	11	3.6	1.2	6.4	6.4			
25–29	88	28.5	30.4	26.2	26.2			
30–35	147	47.6	44.6	51.1	51.1			
>35	63	20.4	23.8	16.3	16.3		0.029	
Education								
Basic school	8	2.6	5.3	7.1	7.1			
Vocational education, upper secondary school	46	14.9	7.7	15.7	15.7			
Short higher education	31	10.0	8.3	12.1	12.1			
Long higher education	224	72.5	78.7	64.4	64.4		0.019	
No. of persons in the household								
2–3	182	58.9	62.5	54.6	54.6			
4–5	119	38.5	35.7	41.8	41.8			
>6	8	2.6	1.8	3.5	3.5		0.29	
Household income (DKK per annum)								
<200 000	12	3.9	4.8	2.8	2.8			
200 000–399 999	42	13.6	12.5	14.9	14.9			
400 000–599 999	47	15.2	12.5	18.4	18.4			
600 000–799 000	95	30.7	29.8	31.9	31.9			
>800 000	107	34.6	39.3	29.1	29.1			
Do not know	6	1.9	1.2	2.8	2.8		0.348	
		Mean	SD	Mean	SD	Mean	SD	
Infants								
Age (months)		9.1	0.3	9.1	0.3	9.1	0.3	0.273
Weight (kg)		9.1	1.0	8.8	0.9	9.3	1.0	<0.0001
Birth weight (kg)		3.5	0.4	3.6	0.4	3.5	0.4	0.447
BMI Z-score		0.4	1.1	0.2	1.1	0.5	1.0	0.003
Length (cm)		71.9	2.5	71.5	2.4	72.3	2.5	0.0022
Solids introduced (month)		4.5	0.8	4.7	0.8	4.3	0.7	<0.0001

DKK, Danish krone.

*Percentages for categorical variables and means and standard deviations for continuous variables.

Comparison of the proportions of partly breast-fed and completely weaned infants consuming selected foods and food groups showed that partly breast-fed infants were, as expected, less likely to drink formula ($P < 0.0001$) and if they did so the median daily intake was much lower (Table 3). Also gruel was consumed less frequently ($P < 0.0001$) and in much smaller amounts by partly breast-fed infants compared with completely weaned ($P < 0.0001$; data not shown). Although similar proportions of partly breast-fed and completely weaned infants drank cow's milk ($P = 0.676$), smaller amounts by the former were recorded. Considering foods, similar proportions of the partly breast-fed and completely weaned infants consumed porridge ($P = 0.279$), fruit purée and vegetable purée ($P = 0.146$ and $P = 0.337$, respectively), milk products ($P = 0.215$), bread ($P = 0.942$), vegetables/vegetable products ($P = 0.667$), vegetables as a

side dish ($P = 0.067$), fruit/fruit products ($P = 0.867$), fruit in pieces ($P = 0.222$), meat/meat products ($P = 0.092$), fish/fish products ($P = 0.200$) and potatoes/rice/pasta ($P = 0.427$). However, partly breast-fed infants were more likely to consume fatty spread ($P = 0.039$) and less likely to consume cakes/ice cream/sweets ($P = 0.024$). In absolute terms, partly breast-fed infants consumed less industrially produced fruit purée ($P = 0.033$) and cakes/ice cream/sweets ($P = 0.005$) and more fatty spread ($P = 0.023$) and vegetables as a side dish ($P = 0.013$) than the completely weaned infants. Adjusting for the weight of the infant, mother's age, mother's education and number of persons in the household, the only differences were that vegetables and cakes/ice cream/sweets lost significance, but industrial porridge ($P = 0.026$) and milk products ($P = 0.044$) became significant with the partly breast-fed eating less than the completely weaned (Table 3).

Unadjusted values for the contribution of energy from selected foods and food groups to total energy (covering 95% of the energy intake) showed that formula contributed less to the daily energy intake for the partly breast-fed infants compared with the completely weaned ($P < 0.001$). The same was seen for gruel ($P < 0.001$). Considering the contribution of energy from food sources, the partly breast-fed infants received more energy from vegetables as a side dish ($P = 0.004$) and fatty spread ($P = 0.0005$) and less from cakes/ice cream/sweets ($P = 0.009$) compared with the completely weaned infants. Adjusting for the same covariates as above, the only difference was that cakes/ice cream/sweets lost significance (Table 4).

Regarding over- and under-reporters we found that about 11% of the infants in both groups were possible over-reporters and 3% and 0% were possible under-reporters in the partly breast-fed group and the completely weaned group, respectively.

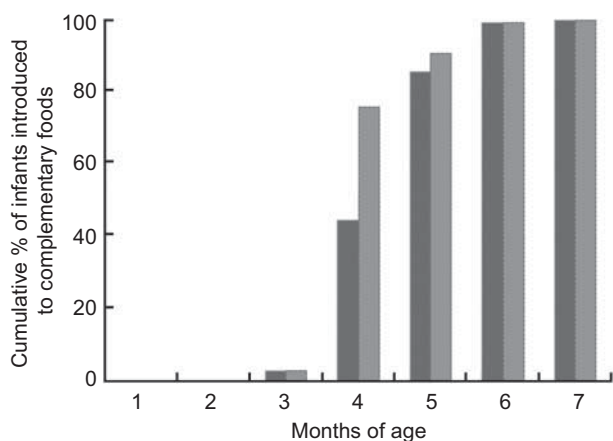


Fig. 1 Cumulative percentage of infants introduced to complementary foods per month (■, among those who were partly breast-fed at 9 months; □, among those who were completely weaned infants at 9 months): healthy term infants ($n = 309$) at 9 months of age, SKOT cohort, Copenhagen, Denmark

Table 2 Daily macronutrient intakes (inclusive of estimated breast milk intake) of all infants surveyed and according to feeding group: healthy term infants at 9 months of age, SKOT cohort, Copenhagen, Denmark

	All ($n = 309$)		Partly breast-fed at 9 months ($n = 168$)		Completely weaned at 9 months ($n = 141$)		Recommended intake*	P value†
	Mean	SD	Mean	SD	Mean	SD		
Energy (kJ)	3476	908	3284	937	3708	816		<0.0001
Energy (kJ/kg)	387	107	377	116	400	93	355	0.049
Protein (g/d)	24.9	8.4	22.1	7.8	28.3	7.9		<0.0001
Protein (%E)	12.1	2.2	11.4	2.4	12.9	1.6	7–15	<0.0001
Total CHO (g/d)	105.5	28.2	97.5	28.9	115.2	24.1		<0.0001
Total CHO (%E)	51.9	6.2	50.8	6.4	53.2	5.8	45–60	0.0006
Added sugars (g/d)‡	2.5	0.9, 5.1	2.0	0.6, 4.4	2.9	1.4, 6.5		0.002
Added sugars (%E)	2.2	2.4	2.2	2.7	2.1	2.0	Max 10	0.764
Total fat (g/d)	35.8	11.6	35.3	12.1	36.4	11		0.387
Total fat (%E)	37.9	6.0	39.5	6.0	36.0	5.4	30–45	<0.0001

%E, percentage of energy intake; CHO, carbohydrate.

*Nordic Council of Ministers, 2004⁽²¹⁾.

†Comparing breast-feeding groups by the Student *t* test or the Mann–Whitney *U* test (added sugars).

‡Median value and 25th, 75th percentiles because of the skewed distribution.

Table 3 Daily intakes (g/d) of selected foods and drinks and percentages of consumers among all infants surveyed and according to feeding group: healthy term infants at 9 months of age, SKOT cohort, Copenhagen, Denmark

Food group	All (n 309)		Partly breast-fed at 9 months (n 168)			Completely weaned at 9 months (n 141)			Unadjusted P value	Adjusted P value*
	Median	P ₂₅ , P ₇₅	% consuming	Median	P ₂₅ , P ₇₅	% consuming	Median	P ₂₅ , P ₇₅		
Drinks										
Breast milk	0	0, 80	100	80	80, 355	0	–	–	<0.0001	<0.0001
Formula	126	0, 387	48	0	0, 114	92	377	231, 477	<0.0001	<0.0001
Follow-on formula	0	0, 0	8	0	0, 0	28	0	0, 36	<0.0001	<0.0001
Cow's milk (drinking)	43	1, 118	71	36	0, 109	79	46	5, 118	<0.0001	<0.0001
Juice/squash/soft drinks	0	0, 0	13	0	0, 0	20	0	0, 0	0.060	0.748
Foods										
Porridge			99			99				
Home-made	107	43, 171	93	105	47, 170	89	107	43, 171	0.793	0.936
Industrial	4	0, 50	48	0	0, 43	53	11	0, 64	0.217	0.026
Fruit purée			74			82				
Home-made	7	0, 32	55	4.5	0, 29	58	7.1	0, 36	0.497	0.729
Industrial	4	0, 29	47	0	0, 21	55	7	0, 36	0.033	0.0013
Vegetable purée			82			81				
Home-made	34	0, 100	71	33	0, 98	74	36	0, 100	0.918	0.983
Industrial	0	0, 21	35	0	0, 17	40	0	0, 25	0.246	0.267
Milk productst	3	0, 39	54	4	0, 31	51	0	0, 50	0.952	0.044
Bread	24	13, 39	96	23	11, 39	98	26	13, 39	0.560	0.074
Fatty spread	2	1, 4	85	3	1, 4	81	2	0, 4	0.023	0.031
Vegetables/vegetable products	34	18, 56	99	35	18, 55	99	33	19, 57	0.743	0.918
Vegetables as a side dish	10	1, 22	82	12	3, 27	79	8	1, 18	0.013	0.125
Fruit/fruit products	84	49, 121	100	83	49, 121	100	87	49, 122	0.865	0.816
Fruit in pieces	58	29, 90	98	57	28, 89	94	58	30, 91	0.786	0.820
Meat/meat products	13	6, 24	96	12	5, 22	99	16	7, 26	0.066	0.163
Fish/fish products	5	1, 10	88	5	2, 10	88	5	2, 11	0.476	0.443
Potatoes/rice/pasta	6	0, 22	70	6	0, 19	75	7	0, 23	0.399	0.888
Cakes/ice cream/sweets	0	0, 2	36	0	0, 1	50	0	0, 3	0.005	0.162

P₂₅, 25th percentile; P₇₅, 75th percentile.

*Comparing intakes from breast-feeding groups by general linear models adjusted for weight of the infant, mother's age, mother's education and number of persons in the household.

†Not potable milk products, including yoghurt and milk on cereals.

Table 4 Contribution (%) of selected foods and food groups to total energy intake among all infants surveyed and according to feeding group: healthy term infants at 9 months of age, SKOT cohort, Copenhagen, Denmark

Food group	All (<i>n</i> 309)		Partly breast-fed at 9 months (<i>n</i> 168)		Completely weaned at 9 months (<i>n</i> 141)		Unadjusted <i>P</i> value	Adjusted <i>P</i> value*
	Median	P ₂₅ , P ₇₅	Median	P ₂₅ , P ₇₅	Median	P ₂₅ , P ₇₅		
Drinks								
Breast milk	0	0, 10.6	9.0	5.0, 29.3	–	–	<0.0001	<0.0001
Formula	10.2	0, 28.7	0	0, 8.8	28.6	15.5, 38.3	<0.0001	<0.0001
Gruel	0	0, 0	0	0, 0	0	0, 2.6	<0.0001	0.0001
Cow's milk	1.2	0, 3.1	1.1	0, 3.1	1.3	0.1, 3.2	0.476	0.907
Juice/squash/soft drinks	0	0, 0	0	0, 0	0	0, 0	0.076	0.077
Foods								
Porridge	14.0	8.4, 21.9	14.0	8.3, 24.1	13.9	9.3, 19.5	0.598	0.688
Fruit purée	2.7	0.2, 6.0	2.5	5.5, 8.5	3.3	0.6, 6.3	0.216	0.164
Vegetable purée	4.8	1.1, 11.2	4.9	1.0, 11.3	4.7	1.3, 11.1	0.817	0.881
Milk productst	0.4	0, 3.7	0.5	0, 3.3	0	0, 4.5	0.987	0.262
Bread	7.5	4.3, 11.1	7.7	4.1, 12.0	7.1	4.4, 10.1	0.223	0.104
Fatty spread	1.8	0.5, 3.5	2.4	0.9, 4.1	1.5	0.3, 3.0	0.0005	0.0004
Vegetables as a side dish	0.6	0.1, 2.2	1.1	0.2, 2.8	0.4	0.1, 1.5	0.0004	0.0003
Fruit in pieces	5.3	2.8, 7.7	5.5	3.0, 8.4	4.7	2.5, 7.2	0.225	0.0751
Meat/meat products	3.8	1.7, 6.2	3.5	1.5, 6.0	4.0	1.8, 6.3	0.298	0.517
Fish/fish products	0.8	0.2, 1.7	0.8	0.2, 1.6	0.7	0.2, 1.8	0.897	0.536
Potatoes/rice/ pasta	1.0	0, 3.0	1.0	0, 3.0	0.9	0, 3.1	0.782	0.193
Cakes/ice cream/sweets	0	0, 0.8	0	0, 0.5	0	0, 1.1	0.009	0.111

P₂₅, 25th percentile; P₇₅, 75th percentile.

*Comparing breast-feeding groups by general linear models adjusted for weight of the infant, mother's age, mother's education and number of persons in the household.

†Not potable milk products, including yoghurt and milk on cereals.

Discussion

The present results showed that infants partly breast-fed at 9 months do not eat less diversified diets compared with those completely weaned at the same age, despite later introduction to complementary foods. They had lower intake of energy, both in absolute amounts and per kilogram of body weight, even though the significance decreased when adjusting for body weight. Lower intakes of most energy-yielding nutrients were seen for the partly breast-fed compared with the completely weaned infants. These differences appear to be caused primarily by differences in the type and amount of milk consumed, as the energy derived from sources other than milk was similar, except for fatty spread and vegetables as a side dish (Table 4). This result is in agreement with findings from studies of 9-month-old infants from both the USA and Australia^(9,18). However, the present study found only small differences for intakes of foods between groups, although fatty spread showed significantly higher intake rates and consumption among partly breast-fed compared with completely weaned infants. A higher intake of fatty spread was also recorded for partly breast-fed infants at 12 months of age compared with non-breast-fed infants at the same age in a study by Lande *et al.*⁽¹⁰⁾. It is possible that mothers of the partly breast-fed infants in the present study were more focused on including fatty spread in generous amounts in their infants' diet, due to concern about their infants' energy intake, as these infants generally were leaner than the completely weaned infants. The absolute fat intake was similar in the present study for the two groups of infants, resulting in a significantly higher contribution of fat to total energy for the partly breast-fed infants. This difference may partly be due to a significantly higher contribution of fatty spread to total energy for the partly breast-fed infants. Fat contributed on average 40% of dietary energy for infants who were still breast-fed and 36% of dietary energy for infants who were not. These values are well within the Nordic Nutrient Recommendations 2004 for this age group (30–45% of energy), but are considerably higher than figures reported from the Copenhagen Cohort Study, in which the percentage of energy from fat for 9-month-old infants was 32% and 31% respectively for partially breast-fed *v.* not breast-fed infants^(11,21). The Copenhagen Cohort Study raised concerns about inadequate fat intake in infants, which was supported by several international studies^(22,23). Subsequently more focus in dietary guidelines in Denmark has been placed on the importance of infants receiving fat in adequate amounts and our results may reflect this effort.

Regarding drinks, the present study did not find any difference in intake of sugar-sweetened drinks (juice/squash/soft drinks) between the two feeding groups. In contrast, several studies found a significantly lower intake of sugar-sweetened drinks among completely

weaned infants compared with infants being partially breast-fed^(10,11,13).

The partly breast-fed infants had considerably lower intakes of formula and cow's milk compared with the completely weaned, which is reflected in their lower protein intake. In contrast to most countries, in Denmark it is recommended that cow's milk be introduced gradually: from the age of 9 months it can gradually become the main milk, while very small amounts can be given from the age of 6 months⁽²⁴⁾. Many countries, including the USA and the UK, do not recommend that cow's milk is used as the main milk before the age of 12 months^(25,26). The main reason for delaying the introduction of cow's milk in the diet is to prevent the development of Fe deficiency and to avoid high protein intake, as the Fe content of cow's milk is very low, while high in protein. However, the protein intake of the infants in both feeding groups in the present study and in the other Danish study (the Copenhagen Cohort Study) is comparable with that of infants at the same age in other countries^(11,12,18).

In the present study the infants were introduced to complementary foods at a mean age of 4.7 (SD 0.8) months and 4.3 (SD 0.7) months, respectively, for partially breast-fed infants and completely weaned infants. Of these only 3% from each group were introduced before 4 months (Fig. 1). This is in accordance with the Danish recommendations recommending exclusive breast-feeding up until 6 months; however, complementary foods may be introduced from 4 months of age to support optimal growth and development⁽²⁴⁾. The mean introduction times in the present study are in remarkable contrast to those found for infants from other industrialized countries. An analysis of five European countries found that 37% of formula-fed infants and 17% of breast-fed infants were introduced to complementary foods at 4 completed months⁽²⁷⁾, despite the fact that in 2001 WHO changed the recommendation for introducing complementary foods from 4–6 months to 6 months⁽²⁸⁾. The Committee on Nutrition of the European Society for Paediatric Gastroenterology, Hepatology and Nutrition concluded likewise in 2008 that exclusive or full breast-feeding for about 6 months is a desirable goal⁽²⁹⁾.

In the present study breast milk intake was estimated from frequency of feeding, which may be a rather crude estimate, not taking into account the duration of feeding and the variation in milk composition during a feed. Ideally, test weighing of milk intake, information on the duration of each feed and milk samples from each mother should have been collected. However, this requires extreme effort by the participants and was not a possibility in our study. The methods used for estimation of breast milk intake in the present study are comparable to those used in other studies^(12,18). Still, a potential small underestimation of the breast milk intake may be present. The mothers were asked about the frequency they breast-fed their infants a meal, and those who did

not breast-feed whole meals were coded as zero and no energy from breast milk was added to their total energy intake. The mean energy intake of the breast-fed infants in the present study was 3284 kJ/d, which is similar to earlier reported intakes from breast-fed infants at the same age^(12,18,22). However, slightly lower intakes have been reported in studies where test weighing of the breast milk intake was performed, but in these studies the fat energy percentage was correspondingly lower^(11,22).

One limitation of the present study is the presence of possible over- and under-reporters. However, by estimating the degree of possible over- and under-reporters we found that about 11% of the infants in both groups were possible over-reporters and only 3% and 0% were possible under-reporters in the partly breast-fed group and the completely weaned group, respectively. In comparison, Conn *et al.*⁽¹⁸⁾ found that 32% were likely to be over-reporting and <1% under-reporting, using the same method. We chose not to exclude these possible over- and under-reporters as intakes in this age group may vary a lot and most infants classified as possible over-reporters were just above the calculated limit.

The present study consists of infants from the Copenhagen area. The parents were well educated, motivated and may have been more health conscious than the majority, resulting in a sample that may not have been representative. This might increase compliance with advice on weaning, resulting in a more homogeneous sample than expected. It is conceivable that a larger deviation between the two feeding groups with regard to introduction time of complementary foods could have resulted in more significant dietary differences than noted in our study.

Conclusion

The present study showed in a Danish cohort of 9-month-old infants that partly breast-fed infants did not eat less diversified diets compared with those completely weaned at the same age. Despite later introduction to complementary foods than for those completely weaned, their intake of foods was similar and no delay in their progression towards the family foods was noted.

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