

What drives parents to buy toddler milk?

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Summary

For some years, in Germany toddler milk has been commercially available for children from one or two years of age. As it is recommended that toddlers should consume 1/3 litres of cow's milk and the supply of nutrients in conventional foods is generally adequate, it was the aim of this study to determine the motives for or against purchasing toddler milk in households with children aged 12 to 36 months, together with other differences in the nutrition of children who drink toddler milk or cow's milk.

The main motives for the purchase were linked to health and taste. For both groups, the data indicated that children eating with their families had normal nutritional behaviour. If children drink large volumes of toddler milk, they will take up significant additional quantities of macro- and micronutrients, so that parents should be informed that toddler milk is from a nutritional point of view not necessary for their children.

Keywords: Nutritional habits, purchasing habits, toddler milk, child nutrition, consumer habits, milk

higher than recommended. Moreover, although protein intake is higher than recommended, it lies within the range regarded as acceptable by the FKE [1, 4, 5].

Some years ago, manufacturers of baby food in Germany launched products which are promoted as being specifically for the nutrition of toddlers. One of these products is the so-called "toddler milk", a milk substitute product produced on the basis of cow milk protein (semi-skimmed milk and whey), with additives such as maltodextrin as filler, lecithin as emulsifier, plant oil, vitamin and mineral mixtures and, often, with flavours.

The manufacturers claim that toddler milk is better adapted to the nutritional needs of toddlers than cow's milk and even that it is healthier than cow's milk.

In comparison to semi-skimmed cow's milk, toddler milk usually contains less protein (3 g versus 1.5 g per 100 ml), more fat (1.6 g versus 2.6 g per 100 ml, partially as unsaturated fatty acids) and more carbohydrates (aside from lactose, also other disaccharides and polysaccharides) [6]. As shown in ♦ Figures 1 and 2, there are also some marked differences between toddler milk and cow's milk with respect to vitamins and minerals. Toddler milk is particularly rich in micronutrients, which are not present in conventional milk in significant quantities (less than 15 % per 100 ml of the recommended daily intake for toddlers), namely, iron, zinc, copper, selenium, manganese, vitamins A, D, B₁, B₆, C, K,

Introduction

Nutritional scientists and paediatricians recommend that toddlers – children aged 12 to 36 months – should eat at the family table. As part of a balanced and varied diet, they should consume about 300 (to 330) ml cow's milk, including milk products per day; the milk should preferably be semi-skimmed (fat content 1.5 %) [1, 2].

In contrast to young babies, whose special nutritional needs can only be

met by breast milk (or industrially produced infant formula), toddlers do not require special foods. If the recommendations from the Forschungsinstitut für Kinderernährung Dortmund (FKE) [Institute for Research in Child Nutrition] for a balanced and varied diet (optimised mixed nutrition – optimix®) are considered, toddlers can reach the D-A-CH reference values by consuming conventional foods, such as bread, fruit, vegetables and milk or milk products [1, 3].

Studies performed in Germany on the nutrition of toddlers confirm that the median intake of vitamins and minerals is in accordance with the reference values (exception: vitamin D, iodine, folate and iron), or even exceed these [4, 5]. In addition, the fat and carbohydrate intakes are within the range of the D-A-CH reference values, but the intakes of saturated fatty acids and of sugar are

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and E, niacin, pantothenic acid and folic acid [6, 7]. Just by drinking 200 ml of toddler milk (and neglecting other food), children can consume already about 20 to 50 % of the reference values for some vitamins and minerals (◆ Figures 1 and 2).

In this context, the present study aimed to find out why toddler milk is purchased and whether the children who are given toddler milk also differ from children who drink

cow's milk with respect to their other nutritional habits.

Methods

To answer the study questions, the Bundesinstitut für Risikobewertung (BfR) [Federal Institute for Risk Assessment] initiated a survey of households with children aged 12 to 36 months, in which children receive either toddler milk or cow's milk.

Questionnaire and data collection

The survey employed a questionnaire that predominantly contained closed questions (specified possible answers) on the motives for or against the purchase of toddler milk, as well as the children's habitual consumption of toddler milk in comparison to cow's milk (frequency of consumption, volumes and drinking

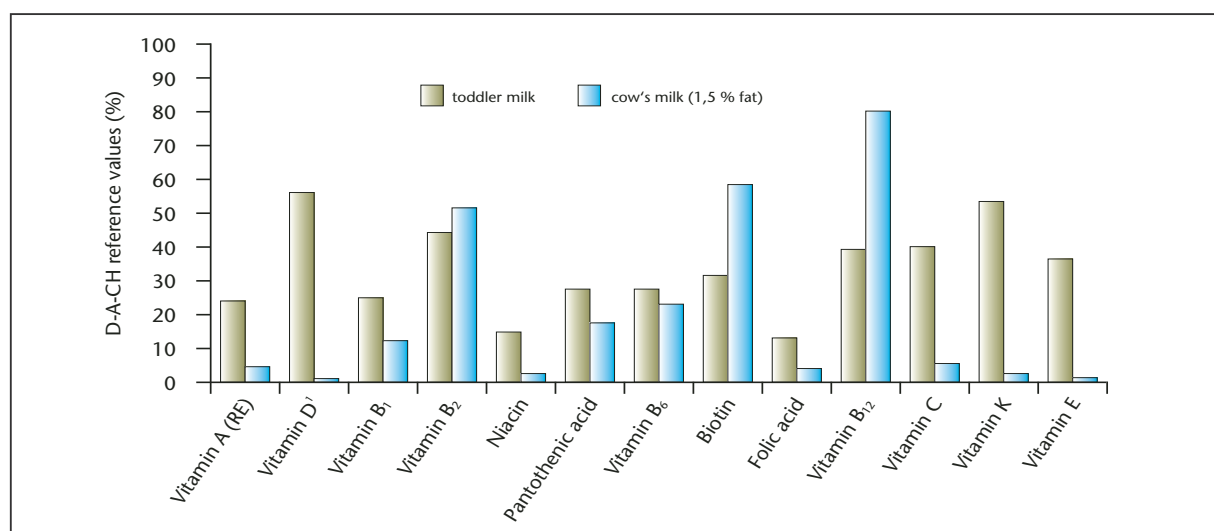


Fig. 1: Average contribution of 200 ml toddler milk and cow's milk (1.5 % fat) to the D-A-CH reference values for vitamins in children aged 12 to 36 months

¹The 2008 D-A-CH reference value for vitamin D was used, as this considers endogenous synthesis.

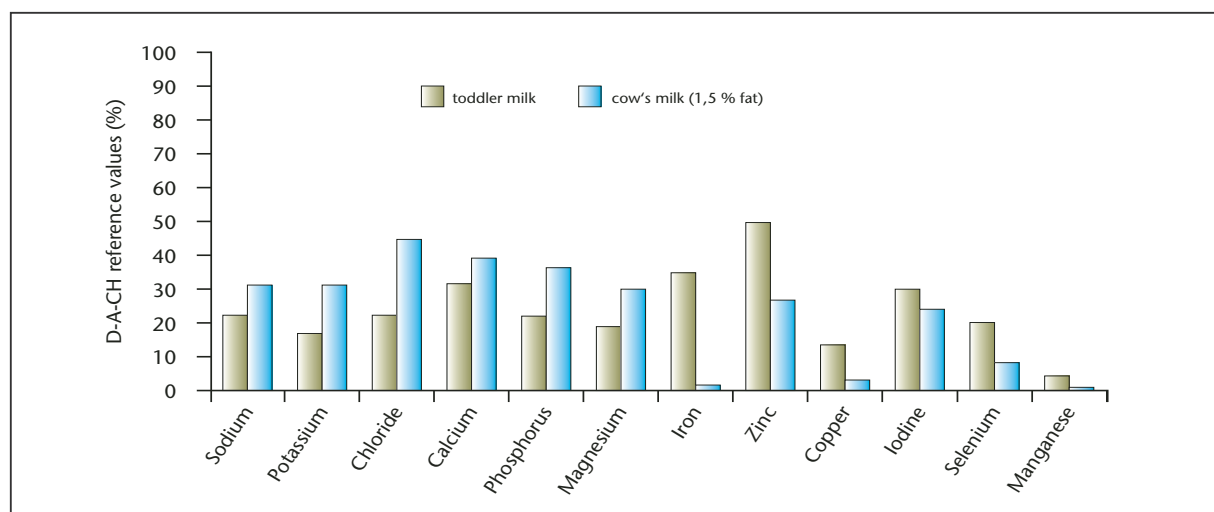


Fig. 2: Contribution of 200 ml toddler milk and cow's milk (1.5 % fat) to the D-A-CH reference values for minerals in children aged 12 to 36 months

vessels). In addition, the survey also covered the children's current nutritional habits – how often they consumed conventional foods and drinks, as well as special children's foods. The children's anthropometric parameters (height and weight) and socio-demographic characteristics were also obtained by questionnaire from the participants. The survey was performed in collaboration with a market research institute, using computerised web interviews (CAWI), with an existing consumer panel. The survey was restricted to households in which at least one child was aged 12 to 36 months and in which the person surveyed was personally responsible for purchasing food. The participants were selected on the basis of whether they had in the previous six months at least twice purchased either cow's milk (cow's milk purchaser) or toddler milk (toddler milk purchaser) for the toddler living in the household. It was aimed to have 500 persons each in the cow's milk

and the toddler milk groups, without representative character. The data collection was performed in October 2011.

Sample and Statistics

A total of 853 persons were surveyed, of whom 444 (52 %) were assigned to the toddler milk group and 409 (48 %) to the cow's milk group.

As the mean age of the children in the cow's milk group was higher than that in the toddler milk group (26 months versus 22 months), a sample was taken from two sub-groups: 55 % of the cases aged 1 to < 1.5 years were eliminated from the toddler milk group and 55 % of the cases aged 2.5 to 3 years were eliminated from the cow's milk group. As a consequence, the cow's milk group was comparable to the toddler milk group with respect to age (distribution, mean and standard deviation). Thus, a total of 700 questionnaires were available for data

analysis – 365 in the toddler milk group and 335 in the cow's milk group.

The descriptive analysis included frequencies, either absolute (n = case number; N = number of answers in multiple response questions) or relative (%). Group differences between the toddler milk and cow's milk groups were analysed with the Chi²-test. The statistical analysis was performed with PASW 18.0.

Results

About three quarters of the respondents in each group were women (toddler milk group: 77 % vs. cow's milk group: 72 %). Most of them were between 18 and 39 years old and had finished school with either Realschulabschluss [secondary modern school leaving exam] or Abitur [A-levels]. The great majority were married or living in partnerships (88 vs. 89 %) (♦ Table 1).

The group of toddler milk purchasers contained significantly more younger persons aged between 18 and 29 years, while in the cow's milk group, there were significantly more persons aged between 30 and 39 years (p < 0.05); there was no difference between the two purchasing groups with respect to any other socio-demographic characteristics.

As defined, the children were between 12 and 36 months old. The median age of both groups was 24 months and the age distribution was the same (p > 0.05). About 55 % of the children in each group attended a Kindergarten (♦ Table 1).

Motives for or against purchasing toddler milk

Regarding the main reasons for buying toddler milk, the main specified answers selected were health reasons, including allergy prevention (N = 178; 49 %; ♦ Figure 3), the better tolerance in comparison to cow's

Variable		Toddler milk		Significance
		Cow's milk		
		n (%)		
Purchaser				
Gender	male	85 (23.4)	95 (28.4)	n.s.
	female	279 (76.6)	240 (71.6)	n.s.
Age of the participants	18 to 29 years	152 (41.6)	104 (31.0)	< 0.05
	30 to 39 years	164 (44.9)	192 (57.3)	< 0.05
	≥ 40 years	49 (13.4)	39 (11.6)	n.s.
Educational status	none/Hauptschule leaving exam [lowest level in Germany]	26 (7.3)	17 (5.1)	n.s.
	Secondary modern school [Realschule]	126 (35.2)	108 (32.3)	n.s.
	Abitur [A-Level]	206 (57.5)	209 (62.6)	n.s.
Family status	married/in partnership	321 (88.4)	296 (88.6)	n.s.
	single parent	42 (11.6)	38 (11.4)	n.s.
Children				
Age of children	1 to < 1.5 years	69 (18.9)	63 (18.8)	n.s.
	1.5 to < 2 years	99 (27.1)	91 (27.2)	n.s.
	2 to < 2.5 years	118 (32.3)	116 (34.6)	n.s.
	2.5 to 3 years	79 (21.6)	65 (19.4)	n.s.
Kindergarten-attendance	yes	194 (53.7)	185 (55.6)	n.s.
	no	167 (46.3)	148 (44.4)	n.s.

Tab. 1: Socio-demographic characteristics of the study population
n. s. = not significant

milk (N = 162; 44 %), as well as the composition or specific ingredients in the product (N = 137; 38 %).

In addition, some participants stated that they purchased the products for reasons of taste (N = 83; 23 %), or on recommendation (N = 104; 29 %), or that they had been influenced by advertising offers (N = 76; 21 %) or special quality seals (N = 73; 20 %) (◆ Figure 3).

Some of the participants (N = 63; 17 %) stated that their purchase had been motivated by claims made by the manufacturers of toddler milk. Participants who could remember specific claims (n = 48; 76 %) mostly recalled claims related to the vitamin and mineral content (N = 26; 54 %), the good tolerance of the products (N = 17; 35 %) and that toddler milk was healthier than cow's milk (N = 17; 35 %) (no figure).

About two thirds of the purchasers of toddler milk (n = 251; 69 %) preferred the products in powder form and regarded the longer shelf-life of the powder as an important advantage relative to cow's milk (N = 153; 42 %).

Some of the purchasers (n = 58; 16 %) also saw disadvantages for toddler milk relative to cow's milk, the most important being the higher price (N = 28; 48 %) (no figure).

Most of the purchasers of cow's milk had already heard of special toddler milk (n = 286; 85 %), but did not buy the products, as they thought they were unnecessary (N = 122; 44 %) and too expensive (N = 78; 28 %) and/or they thought that cow's milk was adequate and well tolerated (N = 77; 28 %) (no figure).

Children's drinking habits

Most of the children examined here drank toddler milk and conventional cow's milk 4- to 7-times per week (toddler milk: n = 236; 66 %; cow's milk: n = 249; 75 %) or 1- to 3-times per week (toddler milk: n = 63; 18 %; cow's milk: n = 57; 17 %). Sixty-one (61) children in the toddler milk group (17 %) and 27 children in the cow's milk group (8 %) only rarely drank milk (1- to 3-times per month) (p < 0.0001) (◆ Table 2).

Half the children in the toddler milk group (n = 177; 50 %) drank between 180 and 300 ml toddler milk per day. The majority of the cow's milk group (n = 192; 57.8 %) drank between 60 and 120 ml per day (p < 0.0001) (◆ Table 2); the figures are for the days on which the milk was consumed. For frequent drinkers (4- to 7-times per week), the following median volumes were determined: toddler milk: 240 ml/day versus cow's milk: 180 ml/day (◆ Figure 4).

In comparison to cow's milk, toddler milk was more frequently drunk from a cup with a drinking lid (p < 0.0001) or from a baby bottle (p < 0.0001) (◆ Table 2). When the analysis was stratified by age group (12-23 months vs. 24-36 months), it was found that even older children (24 to 36 months) in the toddler milk group more frequently used a baby bottle than in the cow's milk group. This was statistically significant at high drinking volumes ≥ 240 ml/day) (p < 0.001).

Seventy-five Percent (75 %) of the toddler milk group stated that the

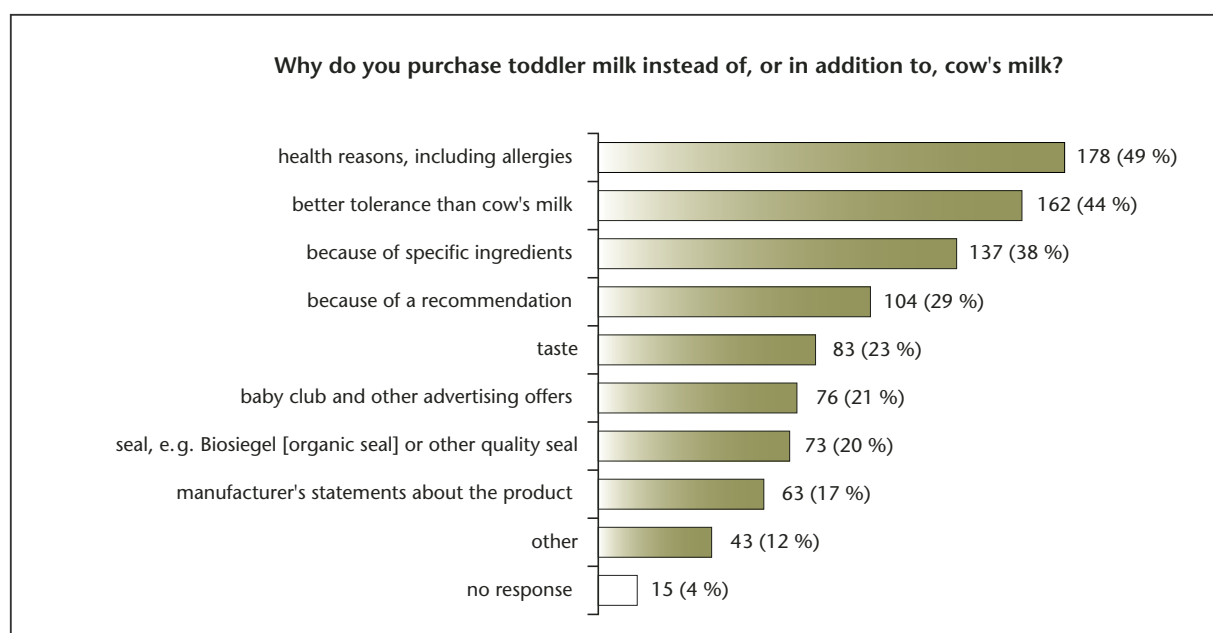


Fig. 3: Motives for purchasing toddler milk

child also sometimes drank cow's milk (n = 273; no figure). However, no record was made of the volumes of this additional cow's milk or of the frequency with which it was drunk.

Children's eating habits

At the time of the survey, the great majority of the children in both groups took part in family meals (toddler milk group: n = 304 [83 %]; cow's milk group: n = 285 [85 %]; p > 0.05).

◆ Figure 5 gives an overview of the frequent consumption of normal foods, separate by user group. The frequency categories "daily" and "4- to 6-times weekly" were aggregated to give the category "frequent consumption". As the figure shows, more than two thirds of the children in both groups frequently consumed bread or rolls (toddler milk group [= TM-group]: 81 %; cow's milk group [= CM-group]: 85 %), fruit (TM-group: 90 %; CM-group: 84 %), vegetables (TM-group: 64 %; CM-group: 77 %) and milk products (TM-group: 72 %; CM-group: 63 %). However, significantly more children

in the toddler milk group than in the cow's milk group frequently consumed foods of the following food groups:

- potatoes, noodles or rice (p < 0.0001; odds ratio [OR] and 95 % confidence interval [95 % CI]: 3.38 [2.47-4.61])
- fruit (p = 0.01; OR [95 % CI]: 1.79 [1.15-2.81])
- milk products (p < 0.05; OR [95 % CI]: 1.50 [1.09-2.06])
- eggs or egg dishes (p < 0.05; OR [95 % CI]: 1.66 [1.05-2.62])
- fish (p < 0.0001; OR [95 % CI]: 4.02 [2.15-7.54])

On the other hand, significantly more children in the cow's milk group frequently consumed vegetables (p < 0.0001; OR [95 % CI]: 1.92 [1.37-2.63]) and sweets (p < 0.05; OR [95 % CI]: 1.47 [1.04-2.08]) (◆ Figure 5).

Moreover, about two thirds of the participants of each group (64.5 % of the toddler milk group and 60.4 % of the cow's milk group) stated that they also purchased special children's foods (aside from toddler milk (p > 0.05) (no figure).

Discussion and Conclusions

The results show that most of the respondents purchased toddler milk for health reasons (allergies, specific ingredients, product tolerance). Other motives for purchase were taste, special advertising offers and special quality seals. Thus, the results were in accordance with those from other studies, which showed that purchasing habits are influenced by many factors; the principle factors are health-related, although these are influenced to various extents by other factors, such as brands, price, trust and other characteristics of the food and its manufacturing process [8-12].

For example, in the current survey, 10 % of purchasers criticised the fact that toddler milk was more expensive than cow's milk, but still purchased the products. On the other hand, those who bought no toddler milk regarded the higher price as the second most important argument against purchase.

The fact that taste was also stated as a reason for purchase may be explained by the addition of flavours to some of the products, so that they are sweeter than cow's milk (e.g. vanilla or banana taste). This may also be one of the reasons that greater volumes of toddler milk are consumed than of cow's milk.

Early taste experiences – amniotic fluid, breast milk, food in early childhood – may influence the acceptance of specific types of taste and this may modify nutritional habits in later life [13, 14]. Therefore subsequent studies might investigate the consequences of the consumption of (flavoured) toddler milk on nutritional habits in later life.

Although the taste of toddler milk was one of the reasons given for the purchase of these products, the data do not demonstrate that toddler milk was only drunk by children who did not like cow's milk. At any rate,

Variable	Toddler milk n (%)	Cow's milk n (%)	OR (95%-KI)	p-Value
drinking frequency				
regularly [4- to 7-times/weekly]	236 (65.6)	249 (74.8)	1	
often [1- to 3-times weekly]	63 (17.5)	57 (17.1)	0.85 (0.58; 1.28)	> 0.05
rarely [1- to 3-times/monthly]	61 (16.9)	27 (8.1)	2.38 (1.46; 3.88)	< 0.0001
total	360 (100)	333 (100)		
volume drunk				
60-120 ml	136 (38.7)	192 (57.8)	1	
180-300 ml	177 (50.4)	104 (31.3)	2.40 (1.73; 3.33)	< 0.0001
≥ 360 ml	38 (10.8)	36 (10.8)	1.49 (0.90; 2.47)	> 0.05
total	351 (100)	332 (100)		
drinking vessels				
normal drinking cup	99 (27.7)	176 (54.5)	1	
baby cup with sipping lid	120 (33.6)	85 (26.3)	2.5 (1.72; 3.70)	< 0.0001
baby bottle	138 (38.7)	62 (19.2)	4 (2.70; 5.88)	< 0.0001
total	357 (100)	327 (100)		

Tab. 2: Drinking frequencies and volumes, as well as drinking vessels used
95 % CI = 95 % confidence interval, OR = odds ratio

75 % of the toddler milk group stated that their children also sometimes drank cow's milk, although the frequency and quantities are not known. Moreover, 17 % of the children drank toddler milk only once or 3 times per month and 13 % of the participants stated that they only used toddler milk when there was no cow's milk in the house; this indicates that some children did not drink toddler milk instead of cow's milk, but in addition to this, or as an alternative.

Moreover, it was revealed that, relative to cow's milk, toddler milk was more frequently drunk from a baby cup with a sipping lid or from a baby bottle, and that the volumes drunk were greater (median volumes drunk by children with frequent consumption in both groups: 240 versus 180 ml per day). The higher volumes in the toddler milk group may be due to the manufacturer's recommendations (ca. 160 to 480 ml per day) [6], or perhaps due to drinking from the bottle. Other studies have found that greater volumes are consumed if milk is drunk from a baby bottle [15, 16].

In addition, another study has observed that children who still drink from the bottle at the age of 24 months have a 30 % greater risk of being overweight at 5.5 years [17]. In our group of children who consumed toddler milk, children who frequently drank from the bottle at the age of 24 to 36 months also consumed greater volumes (≥ 240 ml/day).

Aside from the fact that the large volumes of toddler milk consumed generally lead to increased intakes of energy and nutrients, this also contradicts the fact that toddler milk has lower protein content than cow's milk, which is advertised by the manufacturers. In any case, the benefit of the lower protein content in toddler milk is questionable; although some studies have observed

a correlation between increased protein intake in early childhood and subsequent increased BMI and/or body fat percentage [18, 19], this has not been adequately demonstrated and protein intake in children aged 1 to 3 years in Germany is within the recommended limits [4].

On the other hand, additional high volumes of toddler milk could make a significant contribution to micronutrient intakes. Thus, only drinking 360 ml toddler milk per day (prevalence: 10 % of the study group) would correspond to the reference values for the daily intake of vitamins D and K, as well as iron and zinc. As toddlers in Germany receive adequate amounts of nutrients [4, 5], additional intakes through toddler milk might mean that the intakes of some micronutrients are considerably higher than the reference values. Similar findings have been recorded in the consumption of toddler milk in France [20] and in the FITS Study (Feeding Infants and Toddlers Study) through the consumption of food supplements by toddlers [21].

With respect to the children's other eating habits, it can be concluded that both groups consumed conventional foods at the time of the survey. It is striking that the toddler milk group more often ate potatoes, noodles or rice, ($p < 0.0001$) as well as fruit ($p < 0.01$), egg and egg dishes ($p < 0.05$), fish ($p < 0.0001$), and other milk products ($p < 0.05$), while children of the cow's milk group more often consumed vegetables ($p < 0.0001$), and sweets ($p < 0.05$).

As only frequencies but no amounts of consumption were enquired, only limited statements are possible about nutrient intake or comparisons with other consumption studies [4, 5]. Nevertheless, the data collected here indicate that the nutritional habits of the children in the toddler milk group are similar to those in the cow's milk group. Even parents who give their children toddler milk comply with the recommendation that children should be given family food from the first year of life. As toddler milk was used together with varied

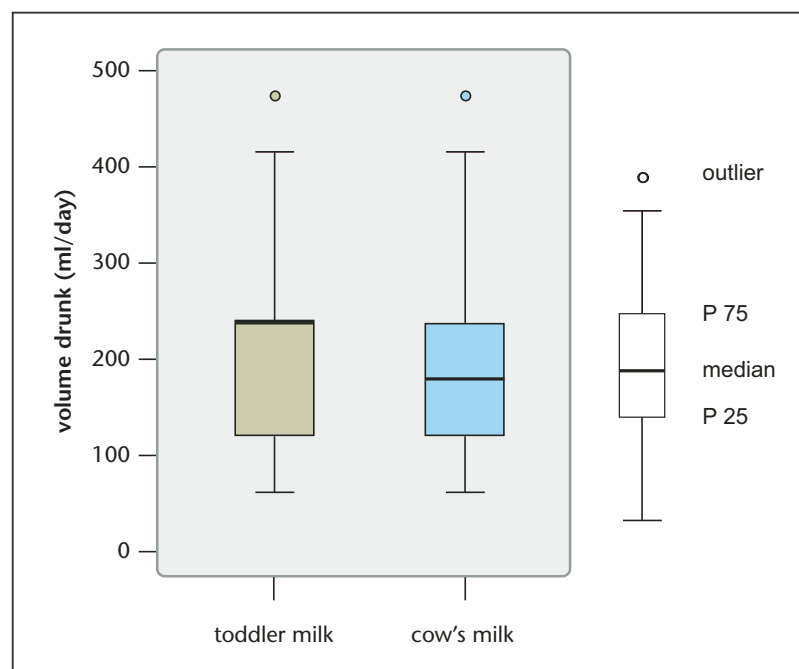


Fig. 4: Volumes drunk by children who frequently consumed toddler milk (n = 234) and cow's milk (n = 249) (4- to 7-times per week)

diet and some foods, such as fish, fruit and eggs, were even consumed significantly more often by children in the toddler milk group, there may be evidence that children in the toddler milk group received a more diverse and more nutritious diet than children in the cow's milk group.

Most of the children in the study drank toddler milk or cow's milk regularly. Information on their use can therefore be regarded as reliable. As, however, the sample was specifically recruited from an existing panel of persons who had purchased toddler milk – and cow's milk in the control group – for a toddler in their household, the study group is not representative of families with toddlers in Germany. This is confirmed by the finding that the educational

status of the study group was higher than that of comparable age groups in Germany [22]. In addition, the proportion of men (> 20 %) is comparably high in both groups, although it is roughly the same as in the National Food Consumption Study (NVS II), according to which 65 % of women and 29 % of men in Germany are exclusively responsible for purchasing food [23].

As it was uncertain how widely spread the consumption of toddler milk is in Germany, the form of recruitment and data collection was used as a rapid and cheap approach to obtain initial information about the reasons that parents purchase toddler milk and how these children are fed in other respects. However, these data do not allow any conclu-

sion about how widely spread the consumption of toddler milk is in Germany and which factors influence the use of these products.

In accordance with the inclusion criteria, only households with at least one toddler aged 12 to 36 months were included, in which the surveyed person was personally responsible for purchasing food. Thus, the interviewees were not inevitably the parents of the child. Moreover, the recording method (CAWI) could not verify whether the expression "toddler milk" really only meant the industrial milk substitute products intended for children from one or two years of age. For example, an Australian study showed that toddler milk is often considered as infant formula there [24]. However, the reliability of these study data would not have been greatly impaired if some of the respondents had mistakenly equated toddler milk and infant formula, as infant formula too is no longer necessary for feeding toddlers and this would also contravene the recommendations for adequate nutrition for toddlers [1].

Conclusion

In the context of a varied diet for toddlers, with conventional foods, toddler milk provides a statistically significant contribution to the intake of macro- and micronutrients. But, in view of the nutritional status of toddlers in Germany, this is unnecessary and, in some cases, undesired. It was admittedly not the aim of this study to evaluate the benefit and possible risks of drinking toddler milk. As, however, many of the participants stated that health factors were decisive for their purchase, parents should be provided with information that it is unnecessary, for nutritional or physiological reasons, to provide toddler milk to toddlers who take part in family nutrition.

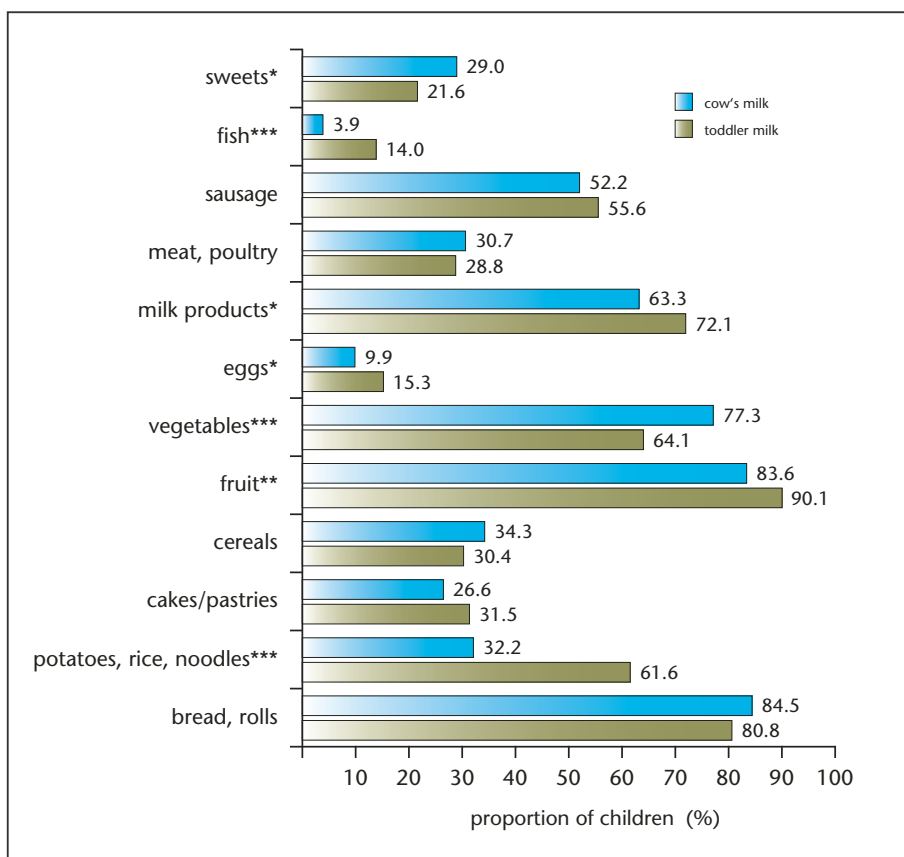


Fig. 5: Prevalence of frequent food consumption by children at the time of the survey
 * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.0001$

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Conflict of Interest

The authors declare no conflict of interest according to the guidelines of the International Committee of Medical Journal Editors.

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