

Assessment of the Nutritional Value of Mare's Milk and Fermented Mare's Milk Products and the Possibility of Their Use in Baby Food

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Background. Mare's milk is a promising source for making baby food products. **Objective.** Our aim was to assess the nutritional value, fatty acid and ascorbic acid content in mare's milk and its products as well as the possibility of their use in baby food. **Methods.** Mare's milk and its products — drinking milk, yogurt, fermented milk product and curds — are taken as targets of research. The content of proteins, fats, carbohydrates and caloric content is determined in the products. The fatty acid composition is studied by gas chromatography, the content of vitamin C — by high-performance liquid chromatography. When calculating the daily intake of dairy and fermented milk products for children aged 1–11 years, the recommendations of the Union of Pediatricians of Russia as well as the norms of physiological needs were used. **Results.** It has been found that mare's milk products are energy-restricted. Inclusion of mare's milk products in the diet of children aged 12–23 months will meet the need for omega-6 by 15–34%, for omega-3 by 15–23%, for vitamin C by 39.6–57.3% of the recommended daily dose. For children aged 2–11 years, daily consumption of 200 ml of yogurt based on mare's milk provides a daily dose of omega-6 by 4.3–14.5%, of omega-3 by 6.4–12.0%, of vitamin C by 23.8–31.7% of the recommended daily dose. **Conclusion.** The study results indicate that it is advisable to include fermented mare's milk products in the diet of children aged 1–11 years.

Key words: mare's milk, fermented milk products, baby food, polyunsaturated fatty acids, vitamin C.

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RESULTS

Table 1. Indicators of the nutritional value of mare's milk products

Indicator	Drinking milk	Fermented milk product	Yogurt	Curds	Mare's milk
Proteins, %	2.0 ± 0.2	2.2 ± 0.15	2.3 ± 0.21	5.25 ± 0.53	2.1 ± 0.2
Fats, %	1.6 ± 0.1	1.8 ± 0.1	1.9 ± 0.1	5.3 ± 0.52	1.6 ± 0.1
Carbohydrates, %	6.3 ± 0.4	6.9 ± 0.5	7.0 ± 0.17	14.4 ± 1.44	6.2 ± 0.3
Moisture, %	89.8 ± 0.7	88.6 ± 0.6	88.3 ± 0.6	74.1 ± 0.4	89.7 ± 0.8
Energy value, 100 g					
• kcal	47.6 ± 3.3	52.6 ± 3.5	54.3 ± 2.4	126.4 ± 12.6	47.6 ± 2.9
• kJ	202 ± 14	225 ± 15	230 ± 10	536 ± 54	202 ± 12

Table 2. Fatty acid composition of mare's milk and its products

Fatty acids	Drinking milk	Fermented milk product	Yogurt	Curds	Mare's milk
UFA, %	30.0 ± 3.0	39.0 ± 3.6	26.0 ± 2.4	39.0 ± 3.8	31.0 ± 3.0
MUFA, %	38.0 ± 4.1	26.0 ± 3.0	44.0 ± 3.6	28.0 ± 2.8	29.0 ± 2.7
PUFA, %	32.0 ± 3.0	35.0 ± 3.2	30.0 ± 2.3	33.0 ± 3.6	39.0 ± 3.9
Linoleic acid, mg/100 ml*	405 ± 62	506 ± 47	463 ± 39	1,283 ± 142	363 ± 34
α-Linoleic acid, mg/100 ml*	60 ± 9	74 ± 11	74 ± 20	188 ± 19	85 ± 17

Note. * — with fat content of the products indicated in Table 1 (for curds we have a value of 100 g).

UFA/MUFA/PUFA — unsaturated/monounsaturated/polyunsaturated fatty acids.

Table 3. Contribution of dairy products based on mare's milk to meet the physiological needs of children aged 12-23 months

Product	Energy value, kcal	Proteins, g	Fats, g	Carbohydrates, g	Vitamin C, mg	Omega-6 (linoleic acid), g	Omega-3 (α-linolenic), g
Norm of physiological needs	1,200	36	40	174	45	4–9*	0.8–1*
<i>When using infant formula</i>							
Drinking milk (100 g)	47.6	2.0	1.6	6.3	8.0	0.4	0.06
Fermented milk product (150 g)	78.9	3.3	2.7	10.3	7.8	0.5	0.07
Curds (40 g)	50.6	2.1	2.1	5.7	2.0	0.5	0.07
Total	176.2	7.4	6.4	22.3	17.8	1.4	0.2
Norm, %	14.7	20.5	16	12.8	39.6	15–26	15–18
<i>Without using infant formula</i>							
Drinking milk (100 g)	95.2	4.0	3.2	12.6	16.0	0.8	0.12
Fermented milk product (150 g)	78.9	3.3	2.7	10.3	7.8	0.5	0.07
Curds (40 g)	50.6	2.1	2.1	5.7	2.0	0.5	0.07
Total	224.7	9.4	8.0	28.6	25.8	1.8	0.26
Norm, %	18.7	26.1	20	16.4	57.3	20–34	19–23

Note. * — energy value of daily ration, %.

Table 4. Satisfaction of the daily physiological needs of preschool and primary school children when consuming yoghurt (200 g) based on mare's milk

Product	Energy value, kcal	Proteins, g	Fats, g	Carbohydrates, g	Vitamin C, mg	Omega-6 (linoleic acid), g	Omega-3 (α-linolenic), g
Yogurt	108.6	4.6	3.8	14.0	14.26	0.9	0.15
Daily requirement for children (%*) aged:							
2–3 years	7.6	11.0	8.1	6.8	31.7	6.4–14.5	9.6–12.0
3–7 years	6.0	8.5	6.3	5.4	28.5	5.0–11.2	7.5–9.4
7–11 years	5.2	7.3	5.4	4.6	23.8	4.3–9.6	6.4–8.0

Note. * — energy value of daily ration, %.

Table 5. Comparative composition of milk of various farm animals [1]

Indicators	Milk			
	Mare	Cow	Goat	Camel
Protein, g/100 ml	1.4–3.2	3.0–3.9	3.0–5.2	2.4–4.2
Casein/whey proteins	1.1	4.7	3.5	2.7–3.2
Lactoferrin, mg/100 ml	10–200	2–50	2–20	2–728
Lysozyme, mg/100 ml	50–133	-	-	-
Fat, g/100 ml	0.3–4.2	3.3–5.4	3.0–7.2	2.0–6.0
Lactose, g/100 ml	5.6–7.2	4.4–5.6	3.2–5.0	3.5–5.1
Energy value, kcal	46.0–48.8	64.5–67.7	66.7–68.9	57.4–78.2
<i>Amino acids, mg/100 ml</i>				
Essential amino acids	936	1,380	1,668	1,073
Amino acids	3,295	4,710	5,233	3,878
<i>Fatty acid composition, %</i>				
UFA	37.5–55.8	55.7–72.8	59.9–73.7	47.0–69.9
MUFA	18.9–36.2	22.7–30.3	21.8–35.9	28.1–29.4
PUFA	12.8–51.3	2.4–6.3	2.6–5.6	1.8–11.1
Linoleic acid	3.6–20.3	1.2–3.0	1.9–4.3	1.2–2.0
α -Linoleic acid	2.2–31.2	0.3–1.8	0.2–1.2	0.6–1.0
<i>Microelements, mg/100 ml</i>				
Ca	50–135	112–123	85–198	105–157
P	20–121	59–119	79–153	58–104
Mg	3–12	7–12	10–36	8–16
K	25–87	106–163	140–242	124–179
Fe	0.02–0.15	0.03–0.1	0.05–0.1	0.07–0.37
Zn	0.09–0.64	0.3–0.55	0.4–0.6	0.19–0.6
Cu	0.02–0.11	0.01–0.08	0.02–0.05	0.01–0.19
<i>Vitamins, in 100 ml</i>				
A, mcg, R.E.	9.3–34	17–50	50–68	5–97
D, mcg	0.32	0.3	0.25	0.3–1.6
E (α -tocopherol), mcg	26–113	20–184	28–110	21–150
B ₁ , mcg	20–40	28–90	40–68	10–60
B ₂ , mcg	10–37	116–202	110–210	42–168
C, mg	1.3–8.1	0.3–2.3	0.9–1.5	2.4–18.4

Note. UFA/MUFA/PUFA — unsaturated/monounsaturated/polyunsaturated fatty acids.

FINANCING SOURCE

Not specified.

CONFLICT OF INTERESTS

Not declared.

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