UNIVERSITATEA TEHNICĂ A MOLDOVEI

EVALUAREA STATUTULUI NUTRIȚIONAL ÎN FIER A ELEVILOR DIN R. MOLDOVA

Masterand gr. MRSC

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РЕЗЮМЕ

Республика Молдова на пути к европейской политике пытается развивать традицию организованной системы школьного питания. В настоящее время все больше школ переходят на типовое меню, разработанное для питания детей в школах. Целью данной работы является оценка нутритивного статуса железа у учеников, питающихся в таких школах, а рабочим материалом послужило меню и ученики теоретического лицея «Академик Константин Сибирский» - Кишинев.

Меню анализировали на соответствие поступления микро- и макронутриентов данным, рекомендованным действующими нормативными документами. Установлено, что предлагаемые школой завтраки для детей 7-10 лет имеют незначительный дефицит углеводов (52 % против 57 %), избыток 3 % белков и 2 % липидов. С другой стороны, в случае обеда был выявлен профицит: +12% углеводов и +1% белков и дефицит -13% липидов. Результаты нашего расчета показывают, что энергетическая ценность школьных обедов в Молдове ниже рекомендуемой, так как подростки покрывают за счет школьных обедов только 27,81% суточной потребности в энергии, а в случае младших классов – 32,98%. Также было оценено потребление микронутриентов модельного меню и установлено, что при двухразовом питании в школе учащиеся могут покрыть 162 % своих потребностей в Fe, более 58 % суточной дозы Ca, 78 % Zn, 137 % Mg, 83 % Na, 72 % K. Однако данные представлены с теоретической точки зрения, поэтому допустима погрешность. По этим причинам для школьного меню, разработанного на 2 недели, было экспериментально определено количество Fe. Полученные данные показали, что погрешность между теоретическими и экспериментальными данными может варьировать от 0,44 до примерно 52%. Однако завтрак, принимаемый в школе, может покрыть от 27,12 до 56,43% суточной потребности в железе, а обед – еще от 25,81 до 65,62%.

На основе анкетирования, в котором приняли участие 290 учащихся, был исследован характер их питания. Исследовали частоту приемов пищи в школе, источники питания в период обучения ребенка в школе и частоту употребления некоторых продуктов, богатых железом.

ABSTRACT

The Republic of Moldova, on the way to European politics, is trying to develop the tradition of an organized school feeding system. Currently, more and more schools are moving to a standard menu designed for feeding children in schools. The purpose of this work is to assess the nutritional status of iron in students who eat at such schools and the menu and pupils of the theoretical lyceum „Academician Constantin Sibirschi" - Chisinau served as the working material.

The menu was analyzed for compliance with the intake of micro- and macronutrients to the data recommended by the current regulatory documents. It has been established that the breakfasts offered by the school for children aged 7-10 years have a slight deficiency of carbohydrates (52% versus 57%), an excess of 3% of proteins and 2% of lipids. On the other hand, in the case of lunch, a surplus was revealed: +12% carbohydrates, +1% proteins and a deficit of -13% lipids. The results of our calculation show that the energy value of school lunches in Moldova is lower than recommended, as adolescents cover only 27.81% of their daily energy needs through school lunches, and in the case of lower grades - 32.98%. The consumption of micronutrients of the model menu was also assessed and it was found that with two meals a day at school, students can cover 162% of their needs for Fe, more than 58% of the daily dose of Ca, 78% Zn, 137% Mg, 83% Na, 72% K.

However, the data are presented from a theoretical point of view, therefore, an error is allowed. For these reasons, the amount of Fe was experimentally determined for the school menu developed for 2 weeks. The obtained data showed that the error between theoretical and experimental data can vary from 0.44 to about 52%. However, breakfast taken in school can cover 27.12 to 56.43% of the daily iron requirement, and lunch can cover another 25.81 to 65.62%.

Based on a survey in which 290 students took part, the nature of their nutrition was studied. We examined the frequency of meals at school, food sources during the child's schooling, and the frequency of consumption of certain iron-rich foods.

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Приложение 1

Meniu pentru copii din Liceul Teoretic „Academician Constantin Sibirschi" - Chișinău

Nr.	Наименование блюд	Выход, г.	Масса брутто, г.	Масса нетто, г.	Вода, мл	Белки, г	Жиры, г.	Углеводы, г			Пищевые волокна, г	Органические кислоты, г	Зола, г	Минеральные вещества, мг							Витамины, мг						Энергетическая ценность, ккал.
								Моно- и дисахариды	Крахмал	Всего				Na	K	Ca	Mg	P	Fe	Zn	A,	β-каротин,	B_1	B_2	PP	C	
Понедельник - 1 неделя, осень																											
Dejun 1																											
1	**Макаронные изделия с маслом и сыром 45%**	150/5/15			**100.07**	**12.76**	**9.61**	**0.88**	**39.01**	**39.89**	**2.70**	**0.31**	**0.84**	**365.81**	**82.11**	**164.70**	**35.45**	**180.11**	**0.87**	**1.54**	**0.07**	**0.02**	**0.03**	**0.09**	**1.65**	**0.11**	**326.66**
	Макароны отварные		150.00	150.00	93.00	8.70	1.40	0.84	39.01	39.85	2.70	0.00	0.83	196.50	66.00	10.50	27.00	87.00	0.75	0.77	0.00	0.00	0.03	0.03	0.60	0.00	235.50
	Масло Răzeni 82,5% жирности		5.00	5.00	0.80	0.03	4.13	0.04	0.00	0.04	0.00	0.00	0.01	0.35	0.75	0.60	0.00	0.95	0.01	0.01	0.03	0.02	0.00	0.01	0.01	0.00	37.40
	Сыр 45%		16.00	15.36	6.27	4.04	4.09	0.00	0.00	0.00	0.00	0.31	0.00	168.96	15.36	153.60	8.45	92.16	0.11	0.77	0.04	0.00	0.00	0.06	1.04	0.11	53.76
2	**Филе куриное отварное**	50			**35.00**	**15.00**	**0.90**	**0.30**	**0.00**	**0.30**	**0.00**	**0.00**	**0.00**	**5.57**	**123.07**	**5.72**	**44.23**	**81.90**	**0.71**	**1.47**	**0.05**	**0.00**	**0.02**	**0.03**	**7.66**	**0.65**	**69.20**
3	**Напиток лимонный**	200			**187.00**	**0.20**	**0.00**	**10.60**	**0.00**	**10.60**	**0.40**	**1.20**	**0.29**	**7.52**	**36.86**	**13.92**	**4.26**	**4.80**	**0.16**	**0.03**	**0.00**	**0.00**	**0.01**	**0.00**	**0.04**	**7.28**	**47.40**
4	**Фрукты свежие по сезону (Слива)**	200			**174.00**	**1.40**	**0.60**	**20.00**	**0.00**	**20.00**	**2.80**	**0.00**	**0.74**	**0.00**	**314.00**	**12.00**	**14.00**	**32.00**	**0.34**	**0.20**	**0.03**	**0.38**	**0.06**	**0.05**	**0.83**	**19.00**	**92.00**
Всего завтрак					**496.07**	**29.36**	**11.11**	**31.78**	**39.01**	**70.79**	**5.90**	**1.51**	**1.87**	**378.90**	**556.04**	**196.34**	**97.94**	**298.81**	**2.08**	**3.24**	**0.15**	**0.40**	**0.12**	**0.18**	**10.19**	**27.04**	**535.26**
Prânz																											
1	**Салат из свежей капусты, моркови и зеленого горошка**	100			**89.00**	**3.70**	**8.00**	**5.56**	**1.11**	**6.68**	**2.90**	**0.24**	**1.27**	**19.48**	**289.84**	**185.92**	**71.76**	**110.80**	**2.28**	**1.50**	**0.21**	**1.37**	**0.17**	**0.10**	**1.96**	**40.48**	**116.60**
	Капуста свежая		81.50	62.50	57.00	1.10	0.10	2.88	0.06	2.94	1.30	0.19	0.44	8.13	187.50	30.00	10.00	19.40	0.38	0.25	0.00	0.04	0.02	0.04	0.56	37.50	17.50
	Масло подсолнечное нераф.		3.00	3.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.00
	Лук		12.00	10.08	9.00	0.10	0.00	0.82	0.01	0.83	0.30	0.02	0.10	0.40	17.64	3.12	1.41	5.80	0.08	0.09	0.00	0.00	0.01	0.00	0.05	1.01	4.10
	Морковь		12.50	10.00	9.00	0.10	0.00	0.67	0.02	0.69	0.20	0.03	0.10	2.10	20.00	2.70	3.80	5.50	0.07	0.04	0.20	1.20	0.01	0.01	0.11	0.50	3.50
	Горошек зеленый консервированный		15.00	15.00	13.00	0.50	0.00	1.00	0.00	1.00	0.50	0.00	0.13	1.35	15.00	2.70	2.55	8.00	0.15	0.11	0.01	0.13	0.02	0.01	0.13	1.47	8.00
	Семена кунжута		10.00	10.00	1.00	1.90	4.90	0.20	1.02	1.22	0.60	0.00	0.51	7.50	49.70	147.40	54.00	72.00	1.60	1.02	0.00	0.00	0.13	0.04	1.11	0.00	56.50
2	**Суп картофельный с рисом**	250			**210.00**	**4.00**	**2.80**	**0.00**	**26.00**	**26.00**	**6.00**	**14.25**	**0.00**	**506.35**	**271.98**	**96.82**	**64.18**	**146.00**	**3.26**	**0.98**	**2.91**	**0.01**	**0.11**	**0.08**	**2.11**	**6.70**	**144.80**
3	**Котлеты из куриного филе в томатном соусе**	50/50			**61.00**	**22.70**	**5.10**	**0.99**	**0.27**	**1.26**	**0.00**	**0.18**	**1.38**	**40.29**	**299.93**	**31.13**	**85.06**	**186.70**	**1.15**	**1.44**	**0.85**	**0.04**	**0.05**	**0.07**	**11.96**	**1.22**	**144.80**
4	**Каша гречневая**	100			**75.00**	**3.70**	**3.90**	**0.40**	**16.22**	**16.62**	**3.30**	**0.00**	**0.94**	**171.79**	**111.84**	**11.06**	**59.36**	**88.30**	**1.98**	**0.61**	**0.02**	**0.02**	**0.13**	**0.06**	**2.12**	**0.00**	**116.40**
	Каша гречневая		100.00	100.00	74.00	3.70	1.00	0.40	16.22	16.62	3.30	0.00	0.94	171.54	111.31	10.64	59.36	87.60	1.98	0.60	0.00	0.00	0.13	0.06	2.11	0.00	90.20
	Масло Răzeni 82,5% жирности		3.50	3.50	1.00	0.00	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.53	0.42	0.00	0.70	0.01	0.00	0.02	0.01	0.00	0.00	0.01	0.00	26.20
5	**Сок 100% натуральный, содержание сахара<5г/100мл**	200			**176.00**	**1.00**	**0.20**	**19.80**	**0.40**	**20.20**	**0.40**	**1.00**	**0.60**	**12.00**	**240.00**	**14.00**	**8.00**	**14.00**	**2.80**	**0.08**	**0.00**	**0.00**	**0.02**	**0.02**	**0.40**	**4.00**	**92.00**
6	**Фрукты свежие (яблоки)**	200			**173.00**	**0.80**	**0.80**	**18.00**	**1.60**	**19.60**	**3.60**	**1.60**	**1.00**	**52.00**	**556.00**	**32.00**	**18.00**	**22.00**	**4.40**	**0.30**	**0.01**	**0.06**	**0.06**	**0.04**	**0.80**	**20.00**	**94.00**
7	**Хлеб***	30			**13.00**	**1.70**	**0.20**	**0.42**	**10.89**	**11.31**	**0.40**	**0.27**	**0.63**	**120.00**	**73.20**	**9.90**	**17.10**	**58.20**	**1.35**	**0.32**	**0.00**	**0.00**	**0.06**	**0.03**	**0.60**	**0.00**	**69.00**
	Хлеб пшеничный	30			**11.00**	**2.70**	**1.00**	**1.70**	**11.15**	**12.85**	**0.80**	**0.00**	**0.59**	**147.00**	**37.80**	**43.20**	**6.90**	**29.40**	**1.08**	**0.22**	**0.00**	**0.00**	**0.16**	**0.07**	**1.43**	**0.00**	**79.80**
Всего обед					**808.00**	**40.30**	**22.00**	**46.87**	**67.65**	**114.52**	**17.40**	**17.54**	**6.41**	**1068.91**	**1880.59**	**424.03**	**330.36**	**655.40**	**18.30**	**5.45**	**4.00**	**1.49**	**0.76**	**0.48**	**21.38**	**72.40**	**857.40**
Всего первый день - Понедельник (Завтрак + Обед)					**1304.07**	**69.66**	**33.11**	**78.65**	**106.66**	**185.31**	**23.30**	**19.04**	**8.27**	**1447.81**	**2436.63**	**620.37**	**428.30**	**954.21**	**20.38**	**8.69**	**4.15**	**1.89**	**0.88**	**0.66**	**31.57**	**99.44**	**1392.66**

Приложение 2

LABORATORUL DE ÎNCERCĂRI „ILAS" AL I.P. „INSTITUTULUI DE CHIMIE"
AL MEC AL RM
MD –2028, m. Chişinău, str. Academiei, 3, tel. 022 739 977

RAPORT DE ÎNCERCĂRI

Nr. 256 25 octombrie 2022

DENUMIREA PROBEI - mîncare pentru copii

NUMĂRUL DE MOSTRE - 10

PREZENTATOR - UTM

TIPUL ŞI SCOPUL ÎNCERCĂRILOR - determinarea metalelor

Nr	Denumirea probelor	Valorile depistate
		Fier (Fe), mg/kg
1	03.10 завтрак	4,34
2	03.10 обед	10,5
3	04.10 завтрак	4,44
4	04.10 обед	8,92
5	05.10 завтрак	6,08
6	05.10 обед	5,53
7	06.10 завтрак	4,46
8	06.10 обед	9,32
9	07.10 завтрак	9,03
10	07.10 обед	4,13
Metoda de încercări		absorbție atomică

Notă: Rezultatele încercărilor se referă numai la mostra încercată.
Multiplicarea raportului de încercări este admisă cu acordul laboratorului

I.P. «INSTITUTUL DE CHIMIE» al MEC al RM LABORATORUL DE ÎNCERCĂRI «ILAS»

Şef ILAS: Tatiana Mitina

Приложение 3

Nr.	Наименование блюд	Выход, г.	Вода, мг	Белки, г	Жиры, г.	Углеводы, г			Пищевые волокна, г	Органические кислоты, г	Зола, г	Минеральные вещества, мг							Витамины, мг						Энергетическая ценность,
						Моно- и дис	Крахмал	Всего				Na	K	Ca	Mg	P	Fe	Zn	A.	β-caroten	B1	B2	PP	C	
Понедельник - 1 неделя, осень																									
Dejun I																									
1	Макаронные изделия с маслом и сыром 45%	100/5/15	69.07	9.86	9.14	0.60	26.01	26.61	1.80	0.31	0.56	300.31	60.11	161.20	26.45	151.11	0.72	1.28	0.07	0.02	0.02	0.08	1.45	0.11	231.78
	Филе куриное отварное	40.00	28.00	12.00	0.72	0.24	0.00	0.24	0.00	0.00	0.00	4.46	98.46	4.58	35.38	65.52	0.57	1.18	0.04	0.00	0.02	0.02	6.13	0.52	55.44
	Напиток лимонный	160.00	149.60	0.16	0.00	8.48	0.00	8.48	0.32	0.96	0.23	6.02	29.49	11.14	3.41	3.84	0.13	0.02	0.00	0.00	0.01	0.00	0.03	5.82	35.20
	Кренделъ	14.00	1.63	1.49	0.16	0.14	9.83	9.97	0.51	0.03	0.29	85.54	18.20	3.36	2.52	12.74	0.22	0.00	0.00	0.00	0.02	0.01	0.42	0.00	48.34
	Всего завтрак		248.30	23.52	10.03	9.46	35.83	45.29	2.63	1.30	1.09	396.32	206.25	180.27	67.76	233.21	1.64	2.48	0.11	0.02	0.07	0.12	8.04	6.45	370.76
Prânz																									
	Суп картофельный с рисом	250.00	210.00	4.00	2.80	0.00	26.00	26.00	6.00	14.25	0.00	506.35	271.98	96.82	64.18	146.00	3.26	0.98	2.91	0.01	0.11	0.08	2.11	6.70	157.20
	Перловая каша	100.00	67.33	2.93	3.53	0.30	22.60	22.90	2.53	0.00	1.20	375.00	54.00	19.00	14.00	101.00	0.60	0.82	0.00	0.01	0.03	0.02	1.00	0.00	140.20
	Котлета из куриного филе	50.00	31.00	16.10	3.30	0.30	0.00	0.30	0.00	0.00	0.81	33.67	168.18	4.01	49.53	97.30	0.90	0.96	0.05	0.00	0.04	0.04	7.92	0.00	95.30
	Компот яблочный	155.00	133.00	0.20	0.20			21.10	0.60								0.62								
	Хлеб*	30.00	13.00	1.70	0.20	0.42	10.89	11.31	0.40	0.27	0.63	120.00	73.20	9.90	17.10	58.20	1.35	0.32	0.00	0.00	0.06	0.03	0.60	0.00	54.64
	Хлеб пшеничный	30.00	11.00	2.70	1.00	1.70	11.15	12.85	0.80	0.00	0.59	147.00	37.80	43.20	6.90	29.40	1.08	0.22	0.00	0.00	0.16	0.07	1.43	0.00	72.80
	Всего обед	615.00	465.33	27.63	11.03	2.72	70.64	94.46	10.33	14.52	3.24	1182.02	605.16	172.93	151.71	431.90	7.81	3.30	2.96	0.01	0.39	0.25	13.06	6.70	520.14
вторник - 1 неделя, осень																									
Dejun I																									
	Натуральный йогурт 2,5%	125	100	3.5	3.1	16.3	0	16.3	0	1	0.875	56.25	153.8	136.25	16.25	106.3	0.125	0.5	0.0288	0.025	0.038	0.163	0.75	2	107.1
	бутерброд с маслом (обогащенный Fe хлеб)	5/30	13.8	1.725	4.325	0.46	10.89	11.35	0.4	0.27	0.64	120.35	73.95	10.5	17.1	59.15	1.76	0.326	0.03265	0.02	0.06	0.032	0.61	0	92.025
	Чай с сахаром, лимон	200	190	0.4	0.2	7.6	0	7.6	0.2	0.6	0.152	4.2	60.12	21.04	10.9	17	0.8	0.0118	0.001	0	0.004	0.02	0.224	3.82	34.2
	Рисовая каша (на молоке), изюм	150	94.32	4.28	3.92	6.95	16.67	23.62	4.47	0.15	1.74	276.88	338.72	89.57	53.89	160.07	1.07	0.79	0.08	0.36	0.14	0.12	2.42	1.01	155.78
	Всего завтрак		398.12	9.90	11.54	31.31	27.56	58.87	5.07	2.02	3.40	457.68	626.54	257.36	98.14	342.52	3.75	1.63	0.14	0.41	0.24	0.33	4.01	6.83	389.11
Prânz																									
	Сладкая кукуруза	15															0.07								
	Картофельный суп с макаронами	250	287	3.3	2.5	3	14.25	17.25	2.3	0.25	1.5	15.5	638.5	24	30.25	78	1.25	0.5085	1.25	0	0.125	0.075	1.79	10	109.3
	Тушеная свинина с овощами	30/30	64.00	10.50	10.70	3.00	0.60	3.60	0.50	0.09	0.00	158.39	258.68	44.31	20.70	135.40	0.54	2.05	0.06	0.37	0.04	0.16	4.61	2.23	153.70
	Пшеничная каша	100	72	4.55	5	4.65	15	19.65	0.7	0	0	504.54	142.7	96.26	13.91	86.1	0.288	0.4452	0.048	0.016	0.054	0.121	1.584	0.9	143.2
	Чай с сахаром, лимон	160	190	0.4	0.2	7.6	0	7.6	0.2	0.6	0.152	4.2	60.12	21.04	10.9	17	0.6	0.0118	0.001	0	0.004	0.02			
	Хлеб*	30	13	1.7	0.2	0.42	10.89	11.31	0.4	0.27	0.63	120	73.2	9.9	17.1	58.2	1.35	0.321	0	0.001	0.06	0.027	0.6	0	54.64
	Хлеб пшеничный	30	11	2.7	1	1.701	11.151	12.85	0.8	0	0.594	147	37.8	43.2	6.9	29.4	1.083	0.222	0	0	0.16	0.073	1.434	0	72.8
	Всего обед		637.00	23.15	19.60	20.37	51.89	72.26	4.90	1.21	2.88	949.63	######	238.71	99.76	404.10	5.18	3.56	1.36	0.39	0.45	0.48	10.01	13.13	533.64
среда - 1 неделя, осень																									
Dejun I																									
	Запеканка из творога с вареньем	75/10	32.5	8.25	14.8	4.525	3.825	8.35	0.065	0.39	0.535	46.175	159.9	83.125	22.675	134.1	0.965	0.44925	0.15	0	0.06	0.1505	1.75	0.37	199.73
	Какао с молоком	200	165	7	4.7	19.5	0	19.5	2	0	1.3	88	394	228	46	210	0.84	1.26	0.102	0.008	0.078	0.364	0.266	0.4	152.3
	Свежие яблоки	155	134.08	0.62	0.62	13.95	1.24	15.19	2.79	1.24	0.775	40.3	430.9	24.8	13.95	17.05	3.41	0.2325	0.00775	0.0465	0.047	0.031	0.62	15.5	74.4
	Всего завтрак		331.58	15.87	20.12	37.98	5.07	43.04	4.86	1.63	2.61	174.48	984.78	335.93	82.63	361.15	5.22	1.94	0.26	0.05	0.18	0.55	2.64	16.27	426.43
Prânz																									
	Борщ с капустой и картошкой	250															2.50						2.04	12.61	330.48
	Тушеное куриное филе	30/30	43.8	14.1	1.02	0.24	0	0.24	0	0	0.66	36	175.2	4.8	51.6	102.6	0.84	0.78	0.04	0.00	0.04	0.04	6.43	0.00	66.54
	Чай с сахаром, лимон	130	190	0.4	0.2	5.6	0	5.6	0.2	0.6	0.152	4.2	60.12	21.04	10.9	17	0.6	0.0118	0.001	0	0.004	0.02			
	Хлеб*	30	13	1.7	0.2	0.42	10.89	11.31	0.4	0.27	0.63	120	73.2	9.9	17.1	58.2	1.35	0.321	0	0.001	0.06	0.027	0.6	0	54.64
	Хлеб пшеничный	30	11	2.7	1	1.701	11.151	12.85	0.8	0	0.594	147	37.8	43.2	6.9	29.4	1.083	0.222	0	0	0.16	0.073	1.434	0	72.8
	Арпакас из пшеницы																0.532								
	Всего обед		257.80	18.90	2.42	7.96	22.04	30.00	1.40	0.87	2.04	307.20	346.32	78.94	86.50	207.20	6.91	1.33	0.04	0.00	0.27	0.16	10.51	12.61	524.46
четверг - 1 неделя, осень																									