

Milk and dairy products in hotel daily menue

Greta Krešić, Irena Colić Barić, Borislav Šimundić

Original scientific paper – Izvorni znanstveni rad

UDC: 637.141

Summary

The aim of this work was to determine the portion of milk and dairy products as a source of macronutrients, energy, vitamins and minerals in average hotel menus for some category of hotel guests. For this purpose the evaluation of 66 whole day meals (breakfast, lunch and supper) on daily menus was made. Meals were therefore mathematically and statistically analysed and compared with recommendations (RDA and DRI) for middle aged and elderly guests, both genders.

The obtained results indicated that the meals should be balanced according to nutritional principles, because of too high energy share derived from fats (average 47.95%) while just about 37.57% of daily energy was from carbohydrates origin. The energy values were much higher than recommendations for both genders, respectively.

The energy share from milk and dairy products origin was 11% of total energy what should be considered as a suitable. The most served dairy product was milk while the ice-cream took the second place. It is necessary to increase the yogurt and similar fermented products consumption, especially for the elderly guests. With milk and dairy products consumption males and females fulfill 92% RDA for calcium, and 61.80 % DRI for elderly, respectively.

Key words: milk, dairy products, hotel meals

Introduction

Milk and dairy product food groups are notable for their contributions of calcium, riboflavin, protein and vitamin B₁₂ (Whitney et al., 1998, Tratnik, 1998). Although milk and dairy products are recommended as a source of

calcium in diet, all dairy foods are not equivalent sources of calcium, because of their different protein, sodium, potassium and vitamin A contents. All above listed have potential for modifying the effects of dairy foods on calcium excretion or skeletal mass maintenance (Weinsier and Krumdieck, 2000). Milk fat contains a number of potential anticarcinogenic components including conjugated linoleic acid, sphingomyelin, butyric acid and other lipids. Conjugated linoleic acid inhibits proliferation of human malignant melanoma, colorectal, breast and lung cancer cell lines (Parodi, 1997). Anticarcinogenic properties have also been attributed to lactic acid bacteria that fermented milk in dairy food products (Pool-Zobel et al., 1993).

The health benefits of milk and dairy consumption have been showed by body of evidences. Some component of dairy products, probably calcium, exerts a protective effect against hypertension (Ackley et al., 1983). Consumption of dairy products may also be associated with reduced risk of stroke because of appropriate metabolic balance and strong correlation between calcium, magnesium and potassium intakes when dairy products are consumed (Massey, 2001). Several fermented dairy products including bifidus- and acidophilus- containing yogurt and milk beverages and kefir have been classified as useful cholesterol-lowering agents. Therefore, dairy products fermented with the proper strain of bacteria can be anticipated to result in a lowering of the circulating cholesterol concentrations, thus diminishing the risk of coronary heart disease in the population (St. Onge et al., 2000).

The aim of this work was to determine the portion of milk and dairy products in hotel meals served, classified according to category of hotel guests. Unfortunately menu planings in hotels is still unique for all guests with no exceptions regarding the age and the gender. In view of the above mentioned in this work the evaluation of hotel meals on menus for middle aged and elderly guests, of both gender has been made.

Materials and methods

In order to determine milk and dairy product share in daily menus the data were collected from the B category hotel in Opatija, Croatia. This hotel is a part of the hotel chain so the menus are usually standardised among the hotels of the same category. For assessment of energy and nutritive value in diet the daily menu reports were used. For this purpose 66 whole-day meals (breakfast,

lunch and supper) on daily menus were analysed. The portion sizes as well as different food share were expressed as weight (g). Nutritive value of selected menus were established using the tables with chemical composition of foodstuffs and drinks (Kaić-Rak, Antonić, 1990; Šimundić et al., 1994). Nutrient intakes were observed with regard to RDA - Recommended Dietary Allowances and DRI- Dietary Reference Intakes (The National Academy of Science 1989; Food and Nutrition Board, 1997). RDAs are also accepted in Croatia as official dietary intakes recommendations (Regulation of the health accuracy of food, 1994). Dairy products were present as weight and portion of daily energy value. The shares of micronutrients from dairy origin were also expressed. Daily energy and micronutrients intakes were compared with dietary recommendations in order to estimate the range in which the standards for middle aged (25-50y) and elderly (>51y) persons are fulfill.

All collected data were statistically analysed using a statistical software programme SPSS (Version 7.0, 1995).

Results and discussion

This research was designed to give results on milk and dairy products consumption in hotel diet. Most of commercial hotels in Croatia do not have specially designed menus for different custom groups. Because of that reason in this work we intended to estimate the ratio of nutrition standards fulfillment in hotel meals offer with special regard on nutritive needs of middle aged and older customers. In selected hotel a limited choice menu was offered. A limited choice menu may provide selections for some menu items but it offered no choice for others (Spears and Vaden, 1985). In investigated hotel, for dinner and supper meals a choice of three (for dinner) or four (for supper) menus which consisted of meat or meat alternative or fish, vegetable, salad and dessert, were offered, while there were no choices in entrees.

The results of our survey showed that the meals were no balanced according to nutritional principles (Table 1). In well-balanced diet, energy share of macronutrients should be in the range of 50-60% from carbohydrates, 25-30% from fats and 10-25 % from proteins (Živković, 1994). In selected menus the highest energy share was derived from fats (approximately 48%), while the carbohydrates represented just about 38 % of daily energy portion. Only the protein amounts were close to recommendation. It could also be seen that total energy intakes were in very wide range (from 13163.41 kJ to

22508.40 kJ). It is notable that the maximum daily energy value of meals is almost twice as minimum value.

Table 1: The average ($\bar{x} \pm sd$) energy value and energy shares of proteins, carbohydrates and fats in whole day hotel meals (n=66)

Tablica 1: Prosječna ($\bar{x} \pm sd$) energetska vrijednost i raspodjela proteina, ugljikohidrata i masti u cjelodnevnoj pansionskoj ponudi (n=66)

Parameters Parametri	$\bar{x} \pm sd$	Min	Max
Energy intake (kJ) Unos energije (kJ)	16588.96 \pm 1942.77	13163.41	22508.40
Proteins (g) Proteini (g)	139.55 \pm 18.93	89.81	197.16
Proteins (%kJ) Proteini (%kJ)	14.48 \pm 1.51	10.89	17.91
Carbohydrates (g) Ugljikohidrati (g)	362.66 \pm 52.63	258.01	536.23
Carbohydrates (%kJ) Ugljikohidrati (%kJ)	37.57 \pm 3.62	30.87	44.39
Fats (g) Masti (g)	204.59 \pm 31.64	147.75	282.45
Fats (%kJ) Masti (%kJ)	47.95 \pm 3.99	40.28	57.82

Table 2: The average ($\bar{x} \pm sd$) intakes of energy and proteins (%RDA) from daily hotel meals for middle aged (25-50y) and elderly (>51y) males and females

Tablica 2: Prosječan ($\bar{x} \pm sd$) unos energije i proteina (%RDA) kroz dnevnu hotelsku ponudu za muškarce i žene srednjih godina (25-50 g) i starije dobi (>51g)

Parameters Parametri	Energy (%RDA) Energija (%RDA)			Proteins (%RDA) Proteini (%RDA)		
	$\bar{x} \pm sd$	Min	Max	$\bar{x} \pm sd$	Min	Max
Males (25-50 y) Muškarci (25-50 g)	136.62 \pm 16.00	108.41	185.37	221.51 \pm 30.04	142.55	312.95
Males (> 51 y) Muškarci (> 51 g)	172.26 \pm 20.17	136.69	233.73	221.51 \pm 30.04	142.55	312.95
Females (25-50 y) Žene (25-50 g)	180.09 \pm 21.09	142.90	244.35	279.108 \pm 37.85	179.61	394.31
Females (>51 y) Žene (>51 g)	208.52 \pm 24.42	165.47	282.94	279.108 \pm 37.85	179.61	394.31

From data shown in Table 2 it is obviously that energy intakes calculated as a portion of Recommended Dietary Allowances (RDA) are much higher (from 136.62 to 208.52 %) for both males and females, respectively. In keeping with 1989 RDA tables, in this study the elderly was defined as > 51 y. Proteins intakes were also much higher than recommended (max. for female was 394.31 % RDAs). Protein intakes which significantly exceeded recommendations may result in negative calcium balance leading to calcium excretion, representing a special danger for bone mass in elderly (Heaney, 1993). Energy and proteins intakes are known to diminish with age as aged persons are less active and consumed less food. Several researches however have shown that gastrointestinal function appears to be well preserved with aging, at least regarding macronutrients (Russell, 2000).

Table 3: The average ($\bar{x} \pm sd$) intakes of milk and dairy products (g/day) and portion of this group in daily energy intakes (% kJ/day)

Tablica 3: Prosječan ($\bar{x} \pm sd$) unos mlijeka i mliječnih proizvoda (g/dan) i udio ove skupine u cjelodnevnom energetsom unosu (%kJ/dan)

Parameters Parametri	g/day g/dan			% kJ/ day % kJ/dan		
	$\bar{x} \pm sd$	Min	Max	$\bar{x} \pm sd$	Min	Max
Milk and dairy products /Mlijeko i mliječni proizvodi	377.84± 134.00	152.94	730.59	10.99 ± 4.83	3.54	24.57
Milk/Mlijeko	205.25± 69.10	129.13	329.14	3.03 ± 0.91	1.78	4.94
Fresh cheese/Svježi sir	18.33± 14.65	5.46	41.89	0.47 ± 0.35	0.13	1.19
Three-quarter fatty cheese/Tričetvrt masni sir	33.86± 18.67	13.04	92.16	2.07 ± 1.77	0.59	7.41
Yogurt/Jogurt	34.80± 66.67	0	200	0.56 ± 1.10	0	3.81
Cream/ Vrhnje	33.03± 30.09	0	180	2.02 ± 1.65	0	7.35
Ice-cream/Sladoled	52.58± 64.15	0	230	2.83 ± 3.38	0	12.41

In order to determine milk and dairy products portion in daily menus, these products were grouped as follows: milk, fresh cheese, three-quarter fatty cheese, yogurt, cream (sour and whipped) and ice-cream. It is obviously that about 11 % of total energy intakes are from milk and dairy products origin

(Table 3). This is in good agreement with dietary recommendations which proposed consumption of 10 % of total energy from milk and dairy products in the case of total daily energy intake of more than 11760 kJ (Colić Barić et al., 2000). Milk was served at the highest amount (205.25 g/day) and represented the highest individual energy portion (3.03 % kJ/day), respectively. Milk was served mostly in a breakfast or as a part of sauces. Daily milk serving is notable for all customer categories because of good calcium bioavailability from milk (Gueguen and Pointillart, 2000). Although the energy portion of ice-cream was also high (2.83 % kJ/day) because of its high energy value and quite a big serving (1 serving counted 200g). The yogurt serving took the third place with 34.8 g per day. Yogurt is valuable in nutrition because has less lactose and more lactic acid, galactose, peptides, free amino acids, and free fatty acids than does milk (Shahani and Chandan, 1979). Increased yogurt consumption, particularly in immunocompromised populations such as the elderly, may enhance the immune response, which would in turn increase resistance to immune-related diseases (Meydani and Ha, 2000). Due to this fact it is essential to increase the amount of yogurt and similar fermented products serving in a hotel meals offer.

Table 4: The average daily intakes of micronutrients from milk and dairy products in hotel meals (n=66)

Tablica 4: Prosječan dnevni unos mikronutrijenata mlijekom i mliječnim proizvodima u hotelskoj ponudi (n=66)

	Ca (mg)	P (mg)	Fe (mg)	A (ij)	B ₁ (mg)	B ₂ (mg)	Niacin (mg)	C (mg)
Milk/Mlijeko	244.24	186.77	0.21	232.38	0.08	0.33	0.21	2.05
Fresh chees/ Svježi sir	17.41	27.49	0.05	12.21	0.004	0.004	0.02	0
Three-quarter fatty cheese/ Tričetvrt masni sir	326.76	223.49	0.17	225.52	0.01	0.06	0.03	0.34
Yogurt/Jogurt	42.11	33.06	0.07	34.76	0.01	0.05	0.04	0
Cream/ Vrhnje	28.74	19.49	-	280.51	0.01	0.05	0.03	-
Ice cream/ Sladoled	78.86	52.58	0.05	35.02	0.01	0.05	0.05	-

The average amounts of micronutrients from dairy products are summarized in Table 4. In this survey, a three-quarter fatty cheese was the most important source of calcium (326 mg) followed by the milk (244 mg).

The same tendency was observed for phosphorus amount (223 mg from three-quarter fatty cheese and 186.77 mg from milk, respectively). Established calcium and phosphorus ratio was 1.36:1. Although the three-quarter fatty cheese is rich in fats (cca 30 g per 100g) and energy, do not contribute in arterio-sclerosis formation (Tratnik, 1998). Hard cheese is also an important calcium source accounted in this survey as well.

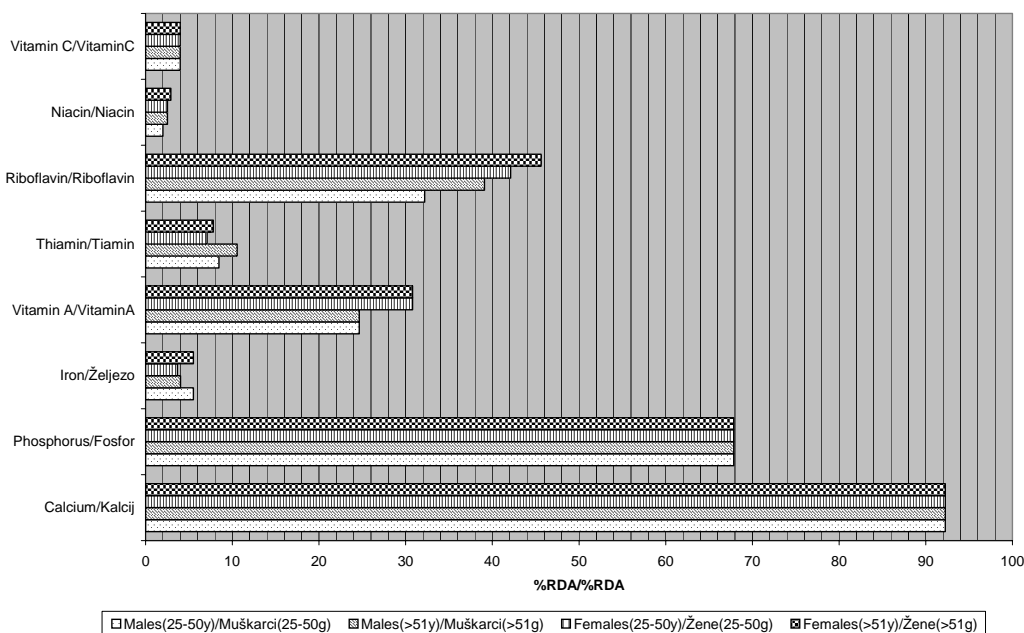


Figure 1: Estimate average daily intakes of some vitamins and minerals from milk and dairy products for different custom groups (% RDA)

Slika 1: Prosječna zastupljenost nekih vitamina i minerala porijeklom iz mlijeka i mliječnih proizvoda namijenjenih različitim skupinama gostiju (% RDA)

From Figure 1 it can be seen clearly that with milk and dairy products consumption as a part of hotel menus males and females fulfill more than 90 % RDA for calcium what is praiseworthy. The phosphorus intake was lower (cca 68 % RDA). Calcium and phosphorus intakes were equal for both gender because of still valid equal recommendation (The National Academy of Science, 1989). Notable is also the riboflavin intake from dairy origin (from

32 to 46 % RDA) because of known evidences on correlation between frequency of milk intake and riboflavin status among elderly people (Alexander et al., 1984; Boiswert et al., 1993; Whitney, 1998).

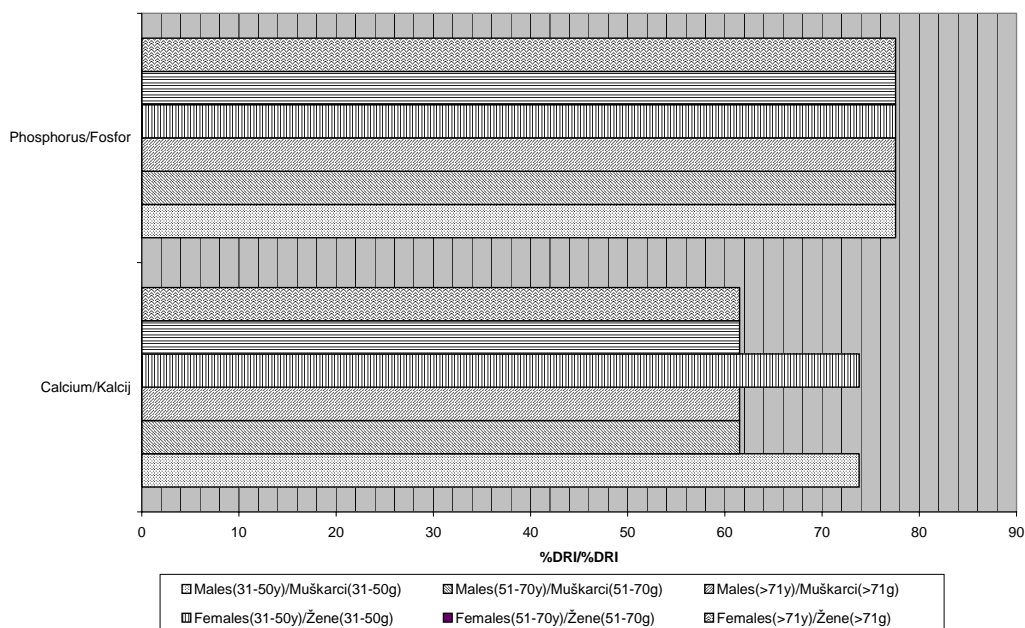


Figure 2: Estimate average daily intakes of calcium and phosphorus from milk and dairy products as a portion of Dietary Reference Intake (%DRI)

Slika 2: Prosječan dnevni unos kalcija i fosfora iz mlijeka i mliječnih proizvoda kao udio preporuka (%DRI)

In order to ensure enough calcium, phosphorus, magnesium, vitamin D and fluoride during life cycles a DRI standards were set (Food and Nutrition Board, 1997). Corrected recommendations are necessary to ensure strong and dense skeleton during early life and also to minimize the bone loss that tends to occur later in life. Compared with DRI recommendations (1000 mg of calcium for person aged 31-50y and 1200 mg for elderly) from Figure 2 it can be seen that for middle aged males and females recommendation are fulfill in 74% while for elderly (61.80% DRI) it is necessary to increase calcium consumption to satisfied these needs. According to recommendations the

phosphorus needs do not depend on age. Because of decreased daily recommendation (700 mg) the standard fulfillment increased (average 77.80%).

Conclusions

The results of this survey showed that in hotel meals energy values of proteins, fats and carbohydrates should be better balanced. The portion of fats was too high (47.95%) while the average carbohydrates amount was lower (37.57%) than recommended. It is obviously that the correction in energy and proteins values is necessarily without regard to guests' age or sex.

Milk and dairy products share in daily diets were suitable as well as calcium share from milk and dairy products origin. Milk was primary served as a calcium source what have to be corrected in meals for elderly guests, because of reported lactase-deficiency in elderly persons. Because of that reason offer of yogurt and similar fermented products should be increased as well as the servings of three-quarter fatty cheese with exceptions of persons who have higher body mass than optimum.

ZASTUPLJENOST MLIJEKA I MLIJEČNIH PROIZVODA U DNEVNOJ HOTELSKOJ PONUDI

Sažetak

Cilj rada je utvrditi udio mlijeka i mliječnih proizvoda kao značajnih izvora energije, makronutrijenata, vitamina i minerala u prosječnoj hotelskoj menu ponudi. U tu svrhu izvršena je nutritivna analiza 66 cjelodnevni menu ponuda (doručak, ručak, večera). Rezultati su statistički obrađeni i uspoređeni sa preporukama, uz osvrt na potrebe gostiju srednje i starije životne dobi, oba spola.

Dobiveni rezultati su pokazali da obroci nisu uravnoteženi, te da prevelik udio ukupne energijske vrijednosti potječe od masti (prosječno 47.95%) dok svega 37.57 % ukupne energije potječe iz ugljikohidratnih izvora. Ukupna energijska vrijednost obroka bila je viša od preporuka za sve analizirane skupine gostiju.

Udio energijske vrijednosti porijeklom iz mlijeka i mliječnih proizvoda je 11% što se može smatrati zadovoljavajućim. Najčešće ponuđena namirnica iz ove skupine bilo je mlijeko, dok je sladoled na drugom mjestu. Neophodno je povećati ponudu jogurta i ostalih mliječno fermentiranih proizvoda, posebice u ponudi za goste starije životne dobi. Unosom mlijeka i mliječnih proizvoda muškarci i žene su zadovoljili 92% potreba za kalcijem obzirom na RDA preporuke, odnosno 61.80% potreba prema DRI preporukama za osobe starije životne dobi.

Ključne riječi: mlijeko, mliječni proizvodi, hotelska ponuda

References

- ACKLEY, S., BARRETT- CONNOR, E., SUAREZ, L. (1983): Dairy products, calcium, and blood pressure. *Am. J. Clin. Nutr.*, 38, 457-461.
- ALEXANDER, M., EMANUEL, G., GOLIN, T., PINTO, J.T., RIVLIN, R.S. (1984): Relation of riboflavin nutriture in healthy elderly to intake of calcium and vitamin supplements: evidence against riboflavin supplementation. *Am. J. Clin. Nutr.*, 39, 540-546.
- BOISVERT, W.A., CASTANEDA, C., MENDOZA, I., LANGELOH, G., SOLOMONS, N.W., GERSHOFF, S.N., RUSSELL, R.M. (1993): Prevalence of riboflavin deficiency among Guatemalan elderly people and its relationship to milk intake. *Am. J. Clin. Nutr.*, 58, 85-90.
- COLIĆ BARIĆ, I., KENĐEL, G., ŠPANJUR, L., ŠATALIĆ, Z. (2000): Milk and dairy products in daily diet of children and adolescents according to age and sex. *Mljekarstvo*, 50, 99-112.
- FOOD AND NUTRITION BOARD (1997): *Dietary reference intake for calcium, phosphorus, magnesium, vitamin D and fluoride*. Washington, DC: National Academy Press.
- GUEGUEN, L., POINTILLART, A. (2000): The bioavailability of dietary calcium. *J. Am. Coll. Nutr.*, 19, 119S-136S.
- HEANEY, R.P. (1993): Protein intake and calcium economy. *J. Am. Diet. Assoc.*, 93, 1259-1260.
- KAIĆ-RAK, A., ANTONIĆ, K. (1990): *Tablice o sastavu namirnica i pića*, Zavod za zaštitu zdravlja SR Hrvatske, Zagreb.
- MASSEY, L. K. (2001): Dairy food consumption, blood pressure and stroke. *J. Nutr.*, 131, 1875-1878.
- MEYDANI, S.N., HA, W.K. (2000): Immunologic effects of yogurt. *Am. J. Clin. Nutr.*, 71, 861-872.
- NATIONAL ACADEMY OF SCIENCE (1989): *Recommended Dietary Allowances*. Washington, DC: National Academy of Science.
- PARODI, P.W. (1997): Cows' milk fat components as potential anticarcinogenic agents. *J. Nutr.*, 127, 1055-1060.

POOL-ZOBEL, B.L., MUNZNER, R., HOLZAPFEL, W.H. (1993): Antigenotoxic properties of lactic acid bacteria in the *S.typhmuri* mutagenicity assay. *Nutr. & Canc.*, 20, 261-270.

REGULATION OF THE HEALTH ACCURACY OF FOOD (Pravilnik o zdravstvenoj ispravnosti dijetetskih namirnica) (1994): Narodne novine. 46, 1587-1597.

RUSSELL, R.M. (2000): The aging process as a modifier of metabolism. *Am. J. Clin. Nutr.*, 72, 529S-532S.

SHAHANI, K.M., CHANDAN, R.C. (1979): Nutritional and healthful aspects of cultured and culture-containing dairy foods. *J. Dairy Sci.*, 62, 1685-1694.

SPEARS, M.C., VADEN, A.G. (1985): *Food service organizations*. Macmillan Publishing Company, New York.

SPSS for Windows (1995): Statistical software programe, Version 7.0.

St-ONGE, M-P., FARNWORTH, E.R., JONES, P.J.H. (2000): Consumption of fermented and nonfermented dairy products: effects on cholesterol concentrations and metabolism. *Am. J. Clin. Nutr.*, 71, 674-681.

ŠIMUNDIĆ, B., JAKOVLIĆ, V., TADEJEVIĆ, V. (1994): Poznavanje robe-živežne namirnica sa osnovama tehnologije i prehrane. Tiskara Rijeka, Rijeka.

TRATNIK, LJ.(1998): *Mljekarstvo: tehnologija, biokemija i mikrobiologija*. Hrvatska mljekarska udruga, Zagreb.

WEINSIER, R.L., KRUMDIECK, C.L. (2000): Dairy foods and bone health:examination of the evidence. *Am. J. Clin. Nutr.*, 72, 681-689.

WHITNEY, E.N., CATALDO, C.B., ROLFES, S.R. (1998): *Understanding Normal and Clinical Nutrition*, 5 th ed., West/Wadsworth Publishing, Belmont CA.

ŽIVKOVIĆ, R. (1994): *Dijetoterapija*, Naprijed, Zagreb.

Author's addresses - Adrese autora:

Mr.sc. Greta Krešić

Dr.sc. Borislav Šimundić, izv. prof.

Faculty of Tourism and Hospitality Management, Department of Nutrition, Opatija, Croatia

Dr.sc. Irena Colić Barić, izv.prof.

Faculty of Food Technology and Biotechnology, Zagreb, Croatia

Received-Prispjelo:

May 15, 2002

Accepted-Prihvaćeno:

Juny 28, 2002