ASPECTS OF DAILY NUTRIENT SUPPLY IN DORMITORIES, HOKKAIDO UNIVERSITY, IN 1982

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Introduction

Japan has become one of the countries of highest longevity[1]. According to the structure of the population, it is assumed to lead to a widespread elderly society. To each citizen, the essential problem of managing daily health habits has become of vital importance.

At the present time in Japan, there is an abundance of food, such as was unheard of in prewar and postwar days of extreme food shortage, and it has become one of the advanced countries in economics and technology, in particular. On the other hand, mortality statistics reveal that malignant cancers, cerebral apoplexy, and cardiovascular diseases are ranked as the highest. Besides, increase in obesity, beri-beri, diabetes, and extreme loss of weight have been prevailing. These symptoms are considered to be one of the outcomes of malnutrition. It is a well-known fact that these symptoms can be prevented in most cases by a sensible choice of daily food consumption by each individual. Therefore, the essential key to leading a happy livelihood as adults is the establishment of dietary habits from childhood through adolescence and youth.

The objective of this survey was to investigate the present conditions involving the students' daily dietary pattern in Hokkaido University and to offer references to convince them of the advantages of nutrition education for themselves and also for health control in the society which they will be responsible for eventually.

Hokkaido University students consisted of those living in dormitories, approximately 5% of the whole, and in other facilities. Information relating to routine diet of the dormitories was more readily available than that of

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the other students' diets which were extremely hard to check. So the author decided to study of the students in dormitories. It was too complicated to search for details of their intake. Therefore, the author turned to study their food supply.

This was the second survey of the dietary status in dormitories of Hokkaido University in 1982. The first survey was conducted in 1971, which revealed low quality of protein and low adequacies of calcium, thiamine, and riboflavin. One of the reasons was thought to be that their food expenses paid to the dormitories was approximately 50% of the food expenditure of the national average in 1971[2]. This data aroused the concern to cope with the problem as to how to convince the students unaware of the demerits of being ignorant about the dormitory food expenses which they should have paid for then, in spite of the earnest advice of nutritionists.

At the Hokkaido University in 1982, a new men's dormitory was being built to replace the former one with a long history and thus to end dormitory meal service. This study involves the dietary patterns of the former dormitories, which are of interest as reference, as well as to preserve past records.

In order to improve the habits of daily food consumption hereafter, it is certainly worthwhile to aim at studying in detail, how to request well-balanced and appetizing meals at reasonable prices to food service associations on the campus, and how to choose adequate menus for the sake of each individual student.

Methods

Subjects:

Table 1 shows the list of former 9 dormitories which consisted of 558 students in November, 1982. They included Keiteki, Soen, Tsukisamu, Yuei, Shinshu, Kita, Joshi (women), Arishima, — all in Sapporo; and Hokushin in Hakodate. The first, Keiteki, included students of the Department of General Education only, (freshmen and sophomores). Junior and senior students in #2-7 dormitories (dorm) belonged to the eleven faculties on the Sapporo Campus. #8 dorm accommodated graduate students in Sapporo. #9 was for the students in Faculty of Fisheries in Hakodate. The estimated average age per dorm was 19 years old for #1 and the 20's for the rest.

Survey term:

The duration of survey lasted for 6 consecutive days on routine diets in November, 1982.

TABLE 1. Number of the subjects in each dormitory, Hokkaido University in November, 1982

Number	Name of Dormitory	Number of students	Registry in:
1	Keiteki Ryo	265 men	Department of General Education
2	Soen Gakuryo	32 men	Faculties on Sapporo Campus
3	Tsukisamu Gakuryo	11 men	the same of No. 2
4	Yuei Ryo	20 men	the same of No. 2
5	Shinshu Gakuryo	20 men	the same of No. 2
6	Kita Gakuryo	42 men	the same of No. 2
7	Joshi Ryo	20 women	the same of No. 1 and No. 2
8	Arishima Ryo	11 men	Graduate school
9	Hokushin Ryo	137 men	Faculty of Fisheries on Hakodate Camus
	Total	558	

Procedures:

1. Collection of data: a) Fulfillment of questionnaires for 6 days through weighing food before and after preparation in the kitchen by cooking staffs with a nutritionist in Sapporo and in Hakodate. The contents of the questionnaires led to obtaining calculated values utilizing the recipe method (food preparation and consumption method) by ICNND[3] as follows: this procedure consists of determining the amount of each food item consumed in each dorm during the survey period by weighing each edible food used in the preparation of each meal and correcting this amount for any food which is not consumed. From the number of individuals served (head count), the average amount of each edible food item used in the preparation of each meal is determined for the survey period. From these data, nutrient intake calculations are made using food composition tables[4,5,6]. Where unusual foods are encountered, they should be identified, described and substituted as similar items; b) To obtain analytical values, analysis of food samples was accumulated for rations served for breakfast, lunch, and supper separately, just for one day during the survey period in the 6 dorms in Sapporo by the author.

2. Sample preparation: Food samples were homogenized for each ration separately, then dried in a forced-draft oven at 80°C and ground.

3. Analytical methods: a) For energy determination, Model CA-3 Shimazu bomb calorimeter was used; b) Nitrogen was determined by semi-micro Kjeldahl method with a Kjeltec system of Tecator Co. Ltd. which was constituted of a decomposing and distillating instrument; c) Phosphorus

was determined by Vanado Molybdate method at 410 mμ using a spectrophotometer Model 100-20 of Hitachi Co. Ltd.; d) Calcium, magnesium and iron were determined by a atomic absorption spectrophotometer Model 1100 of Varian Techtron Co. Ltd.; and e) Potassium and sodium were determined by flame photometrically with the same instrument. For minerals, methods c), d) and e), described previously, followed after digestion of sample materials with H_2SO_4-$HClO_4$-HNO_3 mixture; f) Amino acid analysis was performed by Model 835 Hitachi highspeed amino acid analyzer, Hitachi custom ion-exchange resin #2619 (2.6 mm i. d. × 250 mm), MCI® Buffer 835-PF-Kit under the conditions for physiological fluids analysis.

4. Calculation: In the food composition tables, the column of fiber was replaced by the value available by PAUL *et al.*[7], and for the column of vitamin D, the value in the Food Composition Tables 3rd ed.[19] was used, whereas the rest remained in the original form[4,5,6]. Nutrient adequancy was obtained as the ratio of nutrient supply divided by Recommended Dietary Allowances for Japanese (RDA)[8]. For computing, the multi-processing system, HITAC M-280H, M-280H, M-200H, at the Computer Center of Hokkaido University was used.

Results and Discussion

Table 2 shows the average value of calculated nutrient supply in 8 dorms, Hokkaido University for 6 days in November, 1982. Protein energy ratio is 13.0% and fat energy ratio is 27.2%, therefore, protein, fat, and carbohydrate (PFC) ratio is estimated as 13 : 27 : 60, besides 15 : 24 : 61 of the national average in 1982[9], this diet showed a tendency of low protein and high fat; 5950 mg of sodium consumption was calculated as 15 g of salt per day as coefficient 2.54;—this amount represents 50% excess, whereas, 10 g of optimum salt intake per day is recommended for adults in Japan. Both 39% of animal protein ratio and 43% of animal fat ratio were found to be approximately 10% lower than the national average which were 50% and 52% respectively. Both vitamins, riboflavin and niacin derived from animal food were 48% and 45% respectively. It was clarified that 100% of vitamine D was derived from animal food. In relation to nutrient adequacies of the columns (C) and (D), 3 meals a day were served in 3 dorms, and 2 meals were served a day in the rest, nutrient adequacy was 1 for 3 meals-a-day; for 2 meals-a-day it was 2/3, so $0.79=(1\times3+2/3\times5)/6$ is the standard adequacy for the 8 dorms. The nutrients shown below 0.79 of the adequacy were calcium and vitamin D in 1982, and calcium, thiamine and riboflavin in 1971 for the data of dorms. On the other hand, the national average

TABLE 2. Average value of calculated nutrient supply in 8 dormitories, Hokkaido University, for 6 days in November, 1982, including the adequacies

Nutrient	Supply	Ratio of animal food	Adequacy		
			1982	1971	1982 National
	(A)	(B, %)	(C)	(D)	(E)
Energy (En) (kcal)	2378	18	0.9	0.9	1.1
Energy (kj)	9768	18			
Protein (Pr) (g)	77.7	39	1.1	1.0	1.2
Fat (g)	72.0	43			
Carbohydrate (C.H.)					
Non fiber (NF) (g)	337.3	0			
Dietary fiber (DF) (g)	18.5	0			
Ash (g)	24.8	13			
Calcium (Ca) (mg)	452	27	0.7	0.6	0.9
Phosphorus (P) (mg)	1233	28			
Iron (Fe) (mg)	12.0	22	1.2		1.3
Sodium (Na) (mg)	5950	8			
Potassium (K) (mg)	2676	17			
Vitamin A (VA) (IU)	2468	14	1.2	1.0	1.0
Thiamine (VB_1) (mg)	1.54	29	1.5	0.5	1.5
Riboflavin (VB_2) (mg)	1.10	48	0.8	0.7	1.0
Niacin (Nia) (mg)	16.4	45	1.0		
Ascorbic acid (VC) (mg)	108	4	2.1	1.0	2.6
Vitamin D (VD) (IU)	66	100	0.6		
Protein energy ratio (%)	13.0				
Fat energy ratio (%)	27.2				

(A): Average value of calculated nutrient supply. (B): Ratio of nutrient from animal food to total food supply. (C): Nutrient adequacies of dorm's food supply in 1982. (D) Nutrient adequacies of dorm's food supply in 1971. (E): National average of nutrient adequacies in 1982.

in 1982 showed the same or more adequacies than those of the dorms. Therefore, the average nutrient supply in the dorms showed a tendency to be lower in protein, lower in animal protein ratio, higher in fat, higher in salt, and lower adequacies in calcium than those of the national average in 1982.

Table 3 shows the percentage of average nutrient supply by food groups consumed for 6 days in 8 dorms. Bold face represents more than 10% of the value. Grains supplied were 54% of total energy whereas the national

TABLE 3. Percentage of average nutrient supply of food groups in eight dormitories, Hokkaido University, for six days in November, 1982

Food group	En	Pr	Fat	C.H. NF	C.H. DF	Ca	P	Fe	Na	K	VA	VB_1	VB_2	Nia	VC	VD
Grains	**54**	**32**	7	**81**	**49**	5	**41**	**16**	1	**15**	0	**45**	**10**	**31**	0	0
Starchy roots	2	2	0	4	**10**	3	3	3	0	**10**	0	4	2	6	**12**	0
Sugar	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Fats & oils	8	0	**30**	0	0	0	0	0	1	0	**11**	0	0	0	0	0
Legumes	7	**15**	**11**	3	7	**24**	**12**	**24**	**29**	**11**	0	5	**11**	5	0	0
Fish & shellfish	4	**15**	7	0	0	**17**	**12**	9	5	7	2	5	**13**	**21**	0	**95**
Meat & poultry	**11**	**17**	**29**	0	0	1	8	8	2	7	2	**22**	**16**	**24**	4	0
Eggs	2	6	6	0	0	4	6	5	1	2	9	2	**16**	0	0	5
Milk	1	1	1	0	0	5	2	0	0	1	1	0	3	0	0	0
Vegetables	5	7	1	6	**31**	**32**	**12**	**22**	**15**	**37**	**71**	**13**	**18**	9	**74**	0
Fruits	1	0	0	1	2	1	0	1	2	1	0	1	1	0	8	0
Fungi	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0
Seaweed	0	0	0	0	0	2	0	1	2	2	2	0	1	0	1	0
Beverages	0	0	0	0	0	1	0	0	0	1	0	0	3	1	0	0
Seasonings & spice	2	3	4	1	1	3	3	7	**38**	5	1	2	4	2	0	0
Prepared foods	2	0	3	0	0	0	0	1	2	0	0	0	1	0	0	0

Boldface represents the value more than ten percent.

average was 48%. The characteristics of these diets consisted mainly of nutrient supplies of grains, legumes, fish and vegetables, but meat was partially supplied; vegetables were an important source of dietary fiber, minerals and vitamins; 95% of vitamin D was derived from fish and shellfish; in sodium supply, 31% from seasoning and spices; 15% from vegetables (mainly pickles) and 29% for legumes including miso, were found. It is considered that Table 3 is convenient for nutritional education as means to realize clearly the role of food groups comprising the daily meals: — the aim should be to reduce the amount of seasoning with use of much salt in meals, besides to increase consumption of fish and shellfish that are necessary for shortage of Vitamin D.

Table 4 represents the nutrient adequacies and energy ratios of protein and fat supplied during 6 days by dorm. Bold face represents the value less than 0.66 for the dorms that supplied 2 meals a day, and 0.99 for the ones that served 3 meals a day. There were only two dorms #4 and #5 where

TABLE 4. Energy and nutrient adequacies and energy ratios of protein and fat in the diet supplied during six days at eight dormitories, Hokkaido University in 1982

Dorm	Meals a day	En	Pr	Ca	Fe	VA	VB_1	VB_2	Nia	VC	VD	Energy ratio Pr	Energy ratio Fat
1	3	1.2	1.3	**0.9**	1.4	1.7	3.4	1.0	1.1	2.4	**0.5**	12.0	28.6
2	2	0.8	1.0	0.8	1.2	1.1	1.2	0.8	0.8	2.3	**0.3**	14.0	27.2
3	2	0.8	0.8	**0.5**	0.9	0.7	0.9	**0.5**	**0.6**	1.1	**0.5**	11.2	24.6
4	2	0.9	1.1	0.8	1.3	2.0	1.3	0.9	1.1	2.8	0.7	13.5	30.7
5	3	1.2	1.7	1.4	1.9	2.2	1.8	1.2	1.7	3.8	1.6	15.8	27.2
6	3	1.1	1.2	**0.7**	1.1	**0.9**	1.3	**0.7**	1.1	2.0	1.0	12.1	22.8
9	2	0.7	0.8	**0.5**	0.9	**0.4**	1.0	**0.5**	0.7	1.2	**0.2**	12.6	28.1
7	2	0.7	0.7	**0.4**	**0.6**	**0.5**	1.1	0.7	**0.6**	0.9	**0.3**	12.4	32.9

Boldface represents the value less than 0.66 for the dormitory supplied two meals a day, and 0.99 for the one served three meals a day.

adequate nutrient was evident in the meals supplied. A shortage of calcium and vitamine D was found in more than half of them. Lower value of vitamine A and riboflavin were observed in one-third of them. Nutrient shortage has been found at dorms #3, #7, and #9, — the worst one was #7 (women's dorm). Additional food might be consumed, it is assumed, but it is doubtful that their daily intake as a whole is well-balanced or not. It should be taken into consideration that females have to receive sufficient nourishment at each meal in order to acquire a well-built healthy physique essential to bearing sturdy children of the following generation. Although most of the dorms revealed the evidence of shortage in nutrients, the astonishing fact was that dorm #5 supplied substantial meals, resulting in risk of obesity because some lacked exercise, etc.. This led the author to state that adequate nutrition should be taken and is vitally important for students supplied meals of shortage as well as excess. Vitamine B_1 (thiamine) in #1 showed the highest adequacy because of enriched rice.

Table 5 indicates the analytical value of nutrient supply for one-day diet in 6 men's dorms where food samples could be accumulated on the Sapporo campus. In spite of 2 meals a day served #3 dorm showed a remarkably low value in nitrogen (N), calcium (Ca), iron (Fe), and magnesium (Mg). The salt supplied was 12 g as average.

Table 6 offers nutrient adequacies of the analytical nutrient supply divided by RDA or other references. RDA was cited as reference for energy, protein, Ca, and Fe; 1300 mg by KOSHINO[10] in P; optimum intake for

TABLE 5. Analytical value of enegy and nutrient supply for one-day diet in six men's dormitories on Sapporo campus, Hokkaido University, in November 1982

Number	Meals per day	Energy (kcal)	N (g)	Ca (mg)	P (mg)	Fe (mg)	Na (mg)	K (mg)	Mg (mg)
1	3	2335	14.02	605	1074	34.6	4481	2425	282
2	2	1935	13.19	468	1078	19.1	5530	2999	517
3	2	1723	7.61	267	566	13.7	4285	1028	82
4	2	1636	9.32	882	916	15.1	1644	2097	242
5	3	2887	22.30	852	1764	37.8	8630	3857	405
6	3	2481	15.61	586	1132	22.9	4178	2116	240
Average		2166	13.68	610	1088	23.9	4791	2420	295

Data were analyzed by T. TADANO except for energy by J. SEKINE.

TABLE 6. Energy and nutrient adequacies obtained by the analytical value of nutrient supply in six men's dormitories on Sapporo campus, Hokkaido University, in November 1982 (%)

Number	Meals per day	Energy$^{\alpha}$	Protein$^{\alpha}$	Ca$^{\alpha}$	P$^{\beta}$	Fe$^{\alpha}$	Na$^{\gamma}$	K$^{\delta}$	Mg$^{\varepsilon}$ (Mg)$^{\theta}$
1	3	**90**	117	**86**	**83**	288	114	243	148 (**97**)
2	2	77	118	78	83	191	140	300	272 (178)
3	2	**69**	68	**45**	**44**	137	109	103	**43** (**28**)
4	2	69	83	147	70	151	**42**	210	127 (83)
5	3	116	199	142	136	378	219	386	213 (140)
6	3	**99**	139	**89**	**87**	229	106	212	126 (**83**)
Average		86	121	99	84	229	122	242	155 (102)

α: Recommended Dietary Allowanches (RDA) for Japanese (1979)[8] was cited as the reference value.

β: KOSHINO, T.: Juzen Igakukai Zasshi, 57, 1395 (1955)[10] was cited as the reference value (1300 mg/day).

γ: Dietary goals for Japanese, RDA for Japanese, p. 108 (1979) was cited as the value(10 g/day).

δ: FRANK, H. A. *et al.*: West J. Surg., 60, 25 (1952)[11] was cited as the value (1000 mg/day).

ε: GOTO, S. *et al.*: Eiyo to Shokuryo, 25, 359 (1972)[12] was cited as the value (190 mg/day).

θ: JONES, J. E. *et al.*: Am. J. Clin. Nutr., 20, 632 (1967)[13] was cited the value (290 mg/day).

Boldface reprecents the value less than 0.66 for the dormitory supplied two meals a day, and 0.99 for the one served three meals a day.

adults in Na of 3937 mg (10 g as salt)[8] ; 1,000 mg by FRANK[11] in K ; 190 mg by GOTO[12], and 290 mg by JONES[13] in Mg were used as references. The ratios of nutrient supply divided by JONES are shown in parentheses ; Dorms #2-#4 served two meals a day, so it was judged that those less than 66% in adequacy was regarded as the shortage, and the remaining three dorms serving three meals a day could be considered as being less than 99% in shortage which was represented as boldface. There was shortage of energy, Ca, P, Mg (by JONES), found in each of three dorms, and shortage of Na was found in one dorm, and that of Mg (by GOTO) was found in another one. Dorm #3 showed the poorest adequacy, though, substantial diets were served in the dorms #2, #4 and #5. In the row of figures denoting the "Average" 84% is the checkpoint, because, according to the 3 meals-a-day in three dorms and 2 meals-a-day in three dorms, nutrient adequacy was 1 for 3 meals-a-day ; for 2 meals-a-day it was 2/3, so $0.84=(1\times3+2/3\times3)/6$ is the standard adequacy for the six dorms. It was interesting to note that the average of energy and all nutrients were equal to or above the standard figures, even Mg (by JONES).

Table 7 indicates the ratio of daily analytical value to a calculated one. Because of lack of calculated value of Mg, only seven ratios have been indicated. The average Fe ratio is strikingly high of 190%. The reason is thought to be the result of using an iron pot for direct and indirect cooking. 249% of Ca found in dorm #4 was the cause of the rise in the average rate of Ca ; — this analytical value in Ca was derived from the fried sandfish (Hata-hata in Japanese) bones and all which also applies to P showing a higher rate. The similarity of calculated and analytical values was found in energy and protein. In minerals, there is a trend of figuring out a higher calculated value than the analytical one except Fe.

TABLE 7. Ratio of daily analytical value to a calculated one for nutrient supply in six men's dormitories on Sapporo cumpus, Hokkaido University in November 1982 (%)

Number	Energy	Protein	Ca	P	Fe	Na	K
1	83	88	109	73	222	69	77
2	111	104	110	97	168	101	93
3	102	96	99	69	211	102	84
4	102	101	249	121	161	61	76
5	101	114	91	94	203	88	87
6	88	94	113	73	165	97	75
Average	96	100	119	86	190	87	83

TABLE 8. Comparison of essential amino acid pattern for one-day diet in six men's dormitories, Hokkaido University, in 1982*, with the national average in 1973, the provisional patterns of FAO in 1973, and FAO in 1957, and the compositions of milk and egg proteins (*mg per g nitrogen*)

	Isoleucine	Leucine	Lysine	Methionine+ Cystine	Phenylalanine+ Tyrosine	Threonine	Tryptophan	Valine
1*	258	454	253	56	369	178	—	308
2*	249	452	233	103	328	168	—	309
3*	244	440	220	49	357	138	—	322
4*	269	461	265	110	387	183	—	346
5*	301	477	259	139	368	187	—	319
6*	288	470	268	129	385	179	—	325
National average[14]	251	474	379	224	512	244	78	328
FAO (1973)[15]	250	440	340	220	380	250	60	310
FAO (1957)[16]	270	306	270	270	360	180	90	270
Cow's milk[17]	407	630	496	211	634	292	90	440
Egg[17]	415	553	403	346	672	317	100	454

*): Data analysed by T. KASAI. [14]: Data calculated by N. MATSUNO. [15]: Values reported by a Joint FAO/WHO Expert Committee for "Energy and Protein Requirements" in 1973. [17]: Values reported by a Joint FAO/WHO Expert Group on "Protein Requirements" in 1965. [16]: Values reported by the FAO Committee on "Protein Requirements" in 1957.

Table 8 is an essential amino acid pattern in diets of these dorms, including the supply by the dorms, the national average in 1974 computed by MATSUNO[14], the values reported by a Joint FAO/WHO Expert Committee for "Energy and Protein Requirements" in 1973[15], the values reported by the FAO Committee on "Protein Requirements" in 1957[16], and values reported by a Joint FAO/WHO Expert Group on "Protein Requirements" in 1965[17]. The unit is mg per g nitrogen. The sum of methionine and cystine which are sulphur-containing amino acids, show a markedly lower value than that of other references. There are reports by NIIZEKI[18] that hydrolysis of food materials which involve several constituents besides protein, show more destruction in amino acid than that in the case of pure protein ; therefore, it is difficult to rely on the quantitative value of cystine, and also that of methionine depending on samples. Thus, there is need for reinvestigation, and there are no records pertaining to tryptophan so far. Although under these conditions, in order to obtain a general tendency on the quality of

TABLE 9. Amino acid score for one-day diet in the six men's dormitories, Hokkaido University in 1982

Dormitory	Isoleucine	Leucine	Lysine	Methio-nine+ Cystine	Phenyl-alanine+ Tyrosine	Threo-nine	Tryp-tophan	Valine
1	103	103	74	25	97	71	—	99
2	100	103	69	47	86	67	—	100
3	98	100	65	22	94	55	—	104
4	108	105	78	50	102	73	—	112
5	120	108	76	63	97	75	—	103
6	115	107	79	59	102	72	—	105
National average (1973)	112	108	111	102	135	98	—	106

protein in the dorm's diet, an attempt was made as follows:

Table 9 shows the amino acid score which was the quotient of the amino acid value in the dorm's diet divided by the value of FAO in 1973. Except for tryptophan and sulphur-containing amino acid, threonine was the limiting amino acid, its value ranging from 55 to 75, and showed contrast to the national average of nearly 100; therefore, there might be a low protein quality in the routine diet served in the dorms.

The expenditure per student of food supplied in the dorms in 1982 was found to be ¥ 400-640 as three meals a day, in contrast to the ¥ 800-900 per day for a child whose average age was 10 years in Hokkaido orphanages studied by SANTO in 1983-1984.

The students at the new dormitories have meals served at places out side the dormitories. Within the dorms, individual cooking for snacks is now allowed, so that it is imperative that the opportunity to convince students of the importance of daily diets including nutritional, economical and emotional factors and sensible choice of foods should be considered.

Summary

Concerning the dietary pattern for the dormitories of Hokkaido University, the second survey was conducted in November, 1982.

The calculated value was obtained by the recipe method of food materials for six consecutive days in eight dormitories, and the analytical value of food samples for a day in six dormitories were investigated with the following results.

1. The average content of the food supply in dormitories showed lower

protein, lower animal protein ratio, higher fat, and higher grain energy ratio than those of the national averages.

2. It was realized there was necessity of improvement of low nutrient adequacy in three of the dormitories (one dormitory of women) which were located in Sapporo and Hakodate. It is essential that young women realize the importance of forming habits of consuming a well-balanced diet to build sound bodies for the sake of the next generation.

3. Salt supply computed from the value of sodium was 15 grams per day in calculated value and 12 grams per day in analytical value, so, salt used freely at table tends to lead to excess consumption. Thus, improvement is essential and salt must be reduced in amount in the diet as well as to induce students to get used to less salty taste.

4. Analytical value of iron shows 190% of the value calculated. The reason is thought to be the result of using an iron pot for direct and indirect cooking.

5. The similarity of calculated and analytical values was found in energy and protein. In minerals, there is a trend of figuring out a higher calculated value than the analytical one except for iron.

6. Although, under the limited condition of amino acid analysis, there might be a low protein quality in the routine diet served in the dormitories.

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