The per capita daily intake of dietary fiber (DF) in Japan between 1917 and 1991 was assessed using statistical reports regarding nutrition, food consumption, production, and trade balance. The reported contents of DF for each food category were used; these values were based on the modified Southgate method and modified Prosky AOAC method. Average per capita daily consumptions of total DF calculated by the modified Southgate method were 30.3 g in 1917-1924 and 15.6 g in 1991. Those calculated by modified Prosky AOAC method were 28.6 g in 1917-1924 and 14.5 g in 1991. Both calculation methods yielded values indicating that the DF intake had been almost constant in the last 20 years. Differences in the calculated values of DF obtained by the two methods are attributed mainly to the difference in the measured values for rice. J Epidemiol, 1995; 5: 205-210.

Dietary fiber (DF) has attracted attention as regards lipid-lowering effects1-2), improvement of large-bowel function, and protective effects against colorectal cancer and colon diverticulosis3-4). In Japan, hyperlipemia and large-bowel diseases used to be rare in the past but have become more frequent in recent years. This may be associated with decrease in DF intake after World War II5-6). To augment our knowledge on DF and health, we investigated in detail the time trend and present status of DF intake in Japanese. There have been some studies on DF intake in Japanese, but none of them has evaluated DF intake with respect to either subtypes of DF (cellulose, hemicellulose, and lignin) or food groups.

On the other hand, the definition of DF has not been established. There is no established method of measuring DF. Though the Southgate method7) and the Prosky method8) are frequently used, these two methods have been reported to yield markedly different estimates depending on foods. Therefore, DF intake estimated only by one method may cause a misleading interpretation.

Based on data obtained by 2 prewar surveys and those by a postwar nutritional survey, we calculated DF intake using DF contents of foods determined by the modified Southgate method9) and the modified Prosky AOAC (Association of Official Analytical Chemist10,11) method.

MATERIALS AND METHODS

The following three sets of data were used to calculate the per capita daily intake of DF.

1) The results of the National Nutrition Survey: The survey has been carried out every year throughout Japan since 194612). In this survey, the consumption of each food item by each family enrolled in the study is assessed by weighing the food items consumed on 3 consecutive weekdays. The mean daily intake of each food item per person is then calculated.

2) The “Individual Daily Consumption” published by the Japan Society for the Promotion of Science in 193813): The data were based on the government food production statistics. The national consumption of food items was estimated quantitatively, and divided by the total population to obtain the per capita consumption.

3) The individual daily consumption of foodstuffs calculated by Toda and Ienaga13): The mean annual food consumption in Japan was obtained using domestic pro-
Table 1. Dietary fiber contents of food items.

| Food group          | Modified Southgate method | Modified Prosky method |
|---------------------|---------------------------|------------------------|
|                     | Total | Cellulose | Hemi-cellulose | Lignin | Total | Lignin |
| Rice                | 1.6a  | 0.17      | 0.78           | 0.67   | 0.8   |
| Barley              | 6.5   | 0.92      | 4.62           | 0.96   | 8.1   |
| Wheat               | 3.2   | 0.61      | 2.55           | 0.04   | 1.9   |
| Other grains        | 5.0   | 0.71      | 3.55           | 0.74   | 2.7   |
| Seeds               | 8.5   | 1.54      | 5.85           | 1.11   | 7.2   |
| Sweat popato        | 2.5   | 0.73      | 1.76           | 0.01   | 1.7   |
| Potato              | 2.1   | 0.61      | 1.48           | 0.01   | 1.1   |
| Other potatoes      | 2.5   | 0.73      | 1.76           | 0.01   | 1.9   |
| Processed potatoes  | 1.3   | 0.38      | 0.91           | 0.01   | 2.2   |
| Preserves           | 1.1   | 0.11      | 0.84           | 0.15   | 1.4   |
| Confectionaries     | 2.0   | 0.30      | 1.46           | 0.24   | 1.8   |
| Miso                | 3.7   | 2.20      | 1.29           | 0.25   | 5.6   |
| Tofu                | 0.5   | 0.06      | 0.14           | 0.34   | 0.3   |
| Tofu processes      | 1.6   | 0.18      | 0.42           | 1.03   | 0.6   |
| Soy and other beans | 10.0  | 1.94      | 7.80           | 0.26   | 10.0  |
| Other pulses        | 10.0  | 1.94      | 7.80           | 0.26   | 10.0  |
| Fruits              | 0.9   | 0.45      | 0.45           | 0.02   | 1.6   |
| Fruit juice         | 0.3   | 0.15      | 0.15           | 0.00   | 0.2   |
| Green-yellow vegetables | 1.3 | 0.78      | 0.44           | 0.10   | 2.5   |
| Other vegetables    | 1.0   | 0.59      | 0.38           | 0.05   | 1.8   |
| Pickles             | 3.0   | 1.91      | 0.93           | 0.16   | 3.0   |
| Mushrooms           | 4.2   | 3.09      | 0.93           | 0.22   | 3.0   |
| Seaweeds            | 19.1  | 3.29      | 3.26           | 12.53  | 6.0   |
| Processed foods     | 1.2   | 0.50      | 0.50           | 0.20   | 1.2   |
| Other foods         | 1.2   | 0.50      | 0.50           | 0.20   | 1.2   |

a g/100 g wet matter base  
bThis Table was quoted from the Nakaji N et al. Dietary fiber intake and intake patterns among the general population in Aomori, calculated using modified Southgate and Prosky method. Jpn J Hyg 1993; 48: 628-63715)  

RESULTS

DF intake by foodstuff

Table 2 shows the DF intake by foodstuff during the period between 1917 and 1991. Except for the year 1946, rice generally made the largest contribution to the total DF intake estimated by the modified Southgate method. However, the percent contribution of rice gradually decreased in the recent years. On the other hand, the largest contribution to the total DF intake determined by the modified Prosky method was generally from vegetable consumption. Rice made the third greatest contribution to DF in 1966 and the second greatest in 1970, but the percent contribution of rice was below the third rank and lower than those for barley and wheat and vegetables in all other years. The differences in the percent contributions of rice to the total DF between the two methods were due to the different contents of DF in rice (Table 1).

Total DF intake

The mean total daily intake of DF calculated by the
### Table 2. Chronological change of dietary fiber intake in Japan.

| Food Group Year         | 1917-1924<sup>a</sup> | 1937 | 1946 | 1950 | 1955 | 1960 | 1966 | 1970 | 1975 | 1980 | 1985 | 1991 |
|-------------------------|------------------------|------|------|------|------|------|------|------|------|------|------|------|
| DF source:              |                        |      |      |      |      |      |      |      |      |      |      |      |
| Rice                    | 6.0<sup>b</sup>(19.7) | 7.5  | 3.1  | 11.6 | 5.5  | 23.9 | 5.6  | 24.8 | 5.8  | 28.4 | 5.4  | 29.8 | 4.9  | 29.7 | 4.0  | 23.0 | 3.6  | 22.0 | 3.5  | 21.3 | 3.2  | 20.5 |
| Barley & Wheat          | 5.5<sup>b</sup>(18.3) | 6.0  | 9.0  | 34.1 | 6.6  | 29.1 | 6.3  | 28.1 | 4.0  | 19.5 | 2.7  | 15.0 | 2.3  | 13.7 | 3.0  | 17.1 | 3.0  | 18.3 | 3.0  | 18.4 | 2.9  | 18.6 |
| Seeds                   | 0.0 (0.0)              | 0.1  | 0.0  | 0.1  | 0.1  | 0.3  | 0.0  | 0.2  | 0.0  | 0.2  | 0.1  | 0.7  | 0.2  | 1.0  | 0.1  | 0.7  | 0.1  | 0.7  | 0.1  | 0.7  | 0.1  | 0.8  |
| Potatoes                | 0.0 (0.0)              | 4.1  | 6.0  | 22.5 | 3.0  | 13.4 | 1.9  | 8.4  | 1.4  | 6.7  | 1.5  | 8.1  | 0.7  | 4.4  | 1.3  | 7.3  | 1.3  | 8.1  | 1.4  | 9.1  |
| Confectionaries         | 0.0 (0.0)              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.4  | 2.0  | 0.5  | 2.7  | 0.7  | 4.4  | 0.6  | 3.3  | 0.5  | 3.0  | 0.5  | 2.8  | 0.4  | 2.8  |
| Pulses                  | 8.5 (28.1)             | 7.1  | 2.1  | 7.8  | 2.8  | 12.3 | 3.5  | 15.6 | 3.7  | 18.0 | 2.3  | 12.5 | 2.0  | 12.1 | 1.9  | 11.1 | 1.8  | 10.7 | 1.8  | 10.9 | 1.8  | 11.7 |
| Fruits                  | 0.4 (1.4)              | 0.3  | 0.1  | 0.8  | 0.4  | 1.6  | 0.3  | 1.5  | 0.6  | 3.2  | 1.1  | 6.2  | 0.8  | 4.5  | 1.8  | 10.1 | 1.4  | 8.5  | 1.3  | 7.7  | 1.0  | 6.3  |
| Vegetables              | 8.5 (28.2)             | 4.5  | 0.3  | 13.2 | 4.8  | 18.2 | 3.8  | 16.7 | 3.9  | 17.4 | 3.5  | 17.1 | 3.7  | 20.2 | 3.6  | 21.6 | 3.3  | 19.0 | 3.2  | 19.7 | 3.3  | 20.0 |
| Mushrooms               | 0.0 (0.0)              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.4  | 2.1  | 0.3  | 2.1  | 0.4  | 2.5  | 0.4  | 2.8  | 0.4  | 2.8  |
| Seaweeds                | 1.3 (4.4)              | 4.8  | 1.2  | 13.9 | 0.6  | 2.5  | 0.8  | 3.7  | 0.9  | 4.4  | 0.7  | 4.1  | 1.3  | 7.9  | 0.9  | 5.4  | 1.0  | 5.9  | 1.1  | 6.5  | 1.2  | 7.5  |
| Others                  | 0.0 (0.0)              | 0.0  | 0.1  | 0.2  | 0.1  | 0.3  | 0.1  | 0.4  | 0.1  | 0.5  | 0.1  | 0.6  | 0.1  | 0.7  | 0.1  | 0.8  | 0.2  | 1.0  | 0.2  | 1.0  | 0.1  | 0.5  |
| Total                   | 30.3 (100)             | 34.3 | 26.5 | 100  | 22.8 | 100  | 22.5 | 100  | 20.3 | 100  | 18.1 | 100  | 16.6 | 100  | 17.4 | 100  | 16.5 | 100  | 16.3 | 100  | 15.6 | 100  |

<sup>a</sup>The values in 1917-1924 and 1937 were based on "Individual Daily Consumption" by Toda & Lenaga<sup>120</sup> and the Japan Society for the Promotion of Since in 1938<sup>121</sup>, and the values in 1945-1991 were calculated from the National Nutrition Survey<sup>122</sup>

<sup>b</sup>g/day, *percentage of total fiber intake
Table 3. Chronological change of total dietary fiber intake (g/day) per 1,000 g (total food consumption) and 1,000 kcal.

| Per 1,000 g | 1917-1924 | 1937 | 1946 | 1950 | 1955 | 1960 | 1966 | 1970 | 1975 | 1980 | 1985 | 1991 |
|------------|-----------|------|------|------|------|------|------|------|------|------|------|------|
| Southgate  | 18.9      | 22.6 | 24.0 | 21.3 | 20.4 | 18.0 | 14.5 | 13.1 | 12.3 | 12.2 | 12.1 | 11.7 |
| Prosky     | 17.8      | 19.7 | 22.6 | 18.7 | 17.8 | 15.5 | 12.8 | 11.6 | 11.4 | 11.3 | 11.3 | 10.8 |
| Per 1,000 kcal |         |      |      |      |      |      |      |      |      |      |      |      |
| Southgate  | 11.5      | 10.8 | 12.7 | 10.9 | 10.7 | 9.7  | 8.2  | 7.5  | 7.8  | 7.8  | 7.8  | 7.6  |
| Prosky     | 10.8      | 9.4  | 12.0 | 9.5  | 9.3  | 8.4  | 7.3  | 6.6  | 7.2  | 7.2  | 7.3  | 7.1  |

The modified Southgate method was 30.3 g in 1917-1924 and 34.3 g in 1937, and decreased to 26.5 g in 1946 (immediately after the end of World War II) and to 15.6 g in 1991. The current DF intake was as low as 45.5% of the intake in 1937. The mean DF intake calculated by the modified Prosky method was 28.6 g in 1917-1924 and 29.9 g in 1937, and decreased to 25.0 g in 1946 and to 14.5 g in 1991. The total fiber intake was almost unchanged over the past 20 years regardless of the method used for the estimation although the estimates on the modified Southgate methods were always higher. The total DF intakes per 1,000 g of food intake and per 1,000 kcal are shown in Table 3. The highest level was noted in 1946; the DF intake by the modified Southgate method per 1,000g was 24.0g, and that by the Prosky method was 22.6 g; and the corresponding values per 1,000 kcal were 12.7 g and 12.0 g, respectively. A gradual decline in the fiber intake was observed thereafter; the intake in the most recent decades was about half of the 1946 level.

**DF intake by subtype**

The change of DF content by DF subtypes is shown in Table 4. The mean daily intake of hemicellulose was 17.2 g in 1917-1924, and 19.1 g in 1937, and continuously declined thereafter to a level of 8.1 g in 1991. The mean intake of cellulose was 8.5 g in 1917-1924, 7.9 g in 1937, and 4.8 g in 1991, while the mean intake of lignin was 4.6 g in 1917-1924, 7.3 g in 1937, and 2.7 g in 1991. The highest rate of reduction during the entire period was noted for hemicellulose (53%).

**DISCUSSION**

Several recent reports described the consumption of DF in Japan. Mori et al.17) measured the DF contents of meals served at a college student restaurant using the modified Southgate method, and reported that the individual daily intake of DF was estimated to be 15-19 g. Nakashima et al.19) also measured the DF in the standard menu at a university student restaurant according to the van Soest method for about one month, and reported that the mean individual daily DF content of the meals was 15.8 g. Minowa et al.20), applying various reported values for the DF content of foods measured according to the Southgate method or the Van Soest method to the consumption of each food reported by the National Nutrition Survey in 1979, found that the mean individual daily DF consumption was 19.4 g to 17.4 g in the 10 largest cities and 20.2 g in other municipalities. Similar findings have also been reported by Ohi et al.21), Bright-See & MaCkeown-Eysenno22), and the Japan Association of Prefectural and Municipal Public Health Institutes.23)

The sample population in the National Nutrition Survey is large (about 39,000 persons), and the measured daily intake probably represents the average per capita daily consumption in Japan. Furthermore, since the survey has been performed annually for a long period and with a consistent methodology, it presents an advantage of revealing long-term trends. On the other hand, the individual daily consumption based on the food production or consumption statistics may be subject to substantial inaccuracy. For this reason, both the DF intake per 1,000 g and that per 1,000 kcal of the total food intake were used to examine the time trend in DF intake.

The yearly change in DF intake in Japan has been reported by Ohi, Munakata et al.5), Ohta et al.13), and the Japan Association of Prefectural and Municipal Public Health Institutes4), all of whom found a reduction of 20-30% during about the last 30 years. We found that the total DF intake in 1937 was greater than that in the year 1946 by 7.8 g (modified Southgate method) or 4.9 g (modified Prosky method). The total DF intake in 1917-1924 was lower than that in 1937, but was still greater than that in 1946 (difference, 3.8 g, modified Southgate method ; 3.6 g, modified Prosky method). These findings strongly suggest that the reduction in total DF intake was already in progress even before World War II. Furthermore, the DF intake per kg of total food intake also decreased after the peak in 1946.

The subtype of DF has recently been studied4,23,24), because each subtype plays a specific role physiologically. Digestion in the small intestine is affected mainly by water soluble DF, represented by pectin, while the regulation of large intestine functions and fecal excretion are associated mainly with water insoluble DF, represented by cellulose, hemicellulose and lignin. In this study, the reduc-
Table 4. Chronological change of dietary fiber intake by subtype.

| Subtype          | 1917-24 | '37 | '45 | '50 | '55 | '60 | '66 | '70 | '75 | '80 | '85 | '91 |
|------------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Hemicellulose    |         |     |     |     |     |     |     |     |     |     |     |     |
| Rice             | 2.9     | 3.6 | 1.5 | 2.6 | 2.7 | 2.8 | 2.6 | 2.4 | 1.9 | 1.7 | 1.7 | 1.5 |
| Barley & Wheat   | 4.1     | 4.4 | 6.4 | 4.9 | 4.7 | 3.0 | 2.1 | 1.8 | 2.4 | 2.4 | 2.4 | 2.3 |
| Seeds            | 0.0     | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Potatoes         | 0.0     | 2.9 | 4.2 | 2.1 | 1.3 | 1.0 | 1.0 | 0.5 | 0.9 | 0.9 | 0.9 | 1.0 |
| Confectionaries  | 0.0     | 0.0 | 0.0 | 0.0 | 0.3 | 0.4 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 |
| Pulses           | 6.6     | 5.5 | 1.3 | 1.7 | 2.3 | 2.4 | 1.2 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 |
| Fruits           | 0.2     | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 | 0.5 | 0.4 | 0.9 | 0.7 | 0.6 | 0.5 |
| Vegetables       | 3.2     | 1.7 | 1.7 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Mushrooms        | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Seaweeds         | 0.2     | 0.8 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Others           | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Total            | 17.2    | 19.1| 15.4| 13.0| 12.6| 11.2| 9.3 | 8.2 | 9.0 | 8.6 | 8.5 | 8.1 |

| Cellulose        |         |     |     |     |     |     |     |     |     |     |     |     |
|------------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Rice             | 0.6     | 0.8 | 0.3 | 0.6 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 |
| Barley & Wheat   | 0.9     | 0.9 | 1.3 | 1.0 | 1.0 | 0.7 | 0.5 | 0.4 | 0.6 | 0.6 | 0.6 | 0.5 |
| Seeds            | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Potatoes         | 0.0     | 1.2 | 1.7 | 0.9 | 0.5 | 0.4 | 0.4 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 |
| Confectionaries  | 0.0     | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Pulses           | 1.7     | 1.4 | 0.7 | 1.0 | 1.1 | 1.1 | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 |
| Fruits           | 0.2     | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.5 | 0.4 | 0.9 | 0.7 | 0.6 | 0.5 |
| Vegetables       | 4.9     | 2.6 | 2.9 | 2.3 | 2.4 | 2.1 | 2.2 | 2.2 | 2.0 | 1.9 | 1.9 | 1.8 |
| Mushrooms        | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Seaweeds         | 0.2     | 0.8 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Others           | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Total            | 8.5     | 7.9 | 7.3 | 6.1 | 6.0 | 5.4 | 5.3 | 4.8 | 5.5 | 5.1 | 5.1 | 4.8 |

| Lignin           |         |     |     |     |     |     |     |     |     |     |     |     |
|------------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Rice             | 2.5     | 3.1 | 1.3 | 2.3 | 2.3 | 2.4 | 2.2 | 2.0 | 1.7 | 1.5 | 1.4 | 1.3 |
| Barley & Wheat   | 0.6     | 0.7 | 1.3 | 0.7 | 0.6 | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| Seeds            | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Potatoes         | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Confectionaries  | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Pulses           | 0.2     | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Fruits           | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Vegetables       | 0.4     | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Mushrooms        | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Seaweeds         | 0.9     | 3.1 | 0.8 | 0.4 | 0.5 | 0.6 | 0.5 | 0.9 | 0.6 | 0.6 | 0.7 | 0.8 |
| Others           | 0.0     | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total            | 4.6     | 7.3 | 3.8 | 3.7 | 3.9 | 3.7 | 3.4 | 3.6 | 3.0 | 2.8 | 2.8 | 2.7 |

*a g/day

The Southgate method7) and the Prosky method8) are the conventional methods of measuring DF. The modified Southgate method has an advantage that DF can be assayed by subtype, but starch must be completely eliminated, which time-consuming. The starch elimination requires a lot of water, which might also eliminate some water-soluble fibers. On the other hand, the Prosky method, an enzyme gravimetric method, is simple and easy to perform, and has therefore been recommended by AOAC as a DF assay method.

Our results revealed some differences between the DF values calculated by the two methods, and the most important is the marked difference in DF content in rice. The value used per 100 g wet weight of highly milled rice was
1.6 g for the modified Southgate and 0.7 g for modified Prosky method. Rice accounted for 31.0% (weight %) of the entire food intake in Japan in 1937. Although the consumption of rice has recently declined, it still accounted for 14.1% of consumption in 1991. Thus, the large differences between the values for rice were further magnified by the role of rice as a major food source in Japan, resulting in marked differences between the values calculated by the two methods. Difficulties in determining DF in starch-rich diets have been pointed out in previous studies. In one study, the DF content per 100 g (dry weight) of rice measured according to the Englyst method was 0.62 g, about one-six of that measured by the Prosky method (3.67 g); the difference was ascribed in part to starch resistant to degradation by the enzymes. However, the higher values obtained by the modified Southgate compared to the Prosky method suggest the existence of factors disturbing the measurement of DF other than resistant starch.

In the present study, the degree of processing of the rice consumed in Japan was not taken into consideration. During World War II, highly milled rice was probably almost unavailable, and the Japanese had no choice but to eat undermilled, half milled, or brown rice. If it is assumed that undermilled rice represented 50% of the rice eaten by the Japanese in 1937, the total DF intake would increase by 4.5 g (from 34.3 g to 38.8 g, modified Southgate method) or by 2.3 g (from 29.9 g to 32.2 g, modified Prosky method). Thus, the estimation of DF from rice is one of the most important issues in the estimation of intake of DF in Japan.

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