

such resources and the environmental deterioration as the result of their increased food exports.

(5) In order to explore the effects of production substitution between oilseeds and grains, as well as the consumption substitution between direct grain intake and feed use, the FAO's World Food Model is modified by the introduction of arable area as the resource constraint factor.

The simulation finds that a 10% decrease of arable land in the United States and China, the two major food producing countries, can be largely mitigated by more intensified land use, crop diversification, expansion of food trade, and the like. (This part (5) was mainly carried

out by Koji Yanagishima, Economist of FAO, Visiting Research Fellow of PRIMAFF)

## 4. Publication

Sotaro Inoue, Atsuyuki Uebayashi, Koichiro Akashi and Shunji Oniki "Long-Term Grain Market Projection with Considerations on the Availability of Arable and Irrigation Land: Development and Use of Resource Constraint Pilot Model", *Journal of Agricultural Policy Research*, vol. 4, 2003, p1-25.

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## Demand Analysis of Vegetables by Intended Purpose

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While demand for vegetables is increasingly diversified, it is inevitable that the future promotion of domestic vegetable production relies on accurately tracking and responding to trends in vegetable demand determined by the intended purposes of the vegetables, which can be classified in three categories: household consumption, food processing, and food services (catering and ready-to-eat meals industry). The objective of this research is to understand changes in demand for vegetables according to certain types of items and their intended purposes, plus whether they are domestically produced or imported.

The methods used for the research are described below. With reference to the food balance sheet (conversion of perishable items), estimations of vegetable demand for intended purposes for the year 2000 were made according to major items, and whether they are domestically produced or imported. Also, regarding vegetables in general, demand was classified in three categories by intended purpose: household consumption, food processing, and food services.

The estimation of the vegetable demand for household consumption was made mainly with reference to the amounts of fresh vegetables purchased, which were acquired from the "Annual Report on the Family Income and Expenditure Survey." For the estimation of the vegetable demand for food processing and food services, a questionnaire regarding types of items, and domestic products and imported products, was given to those who are involved in vegetable processing and the food services industries, and the findings were applied with

the necessary factors, which were added to the existing statistics in order to enable the estimation.

(1) The proportion of the vegetable demand of major items for household consumption in 1990 and 2000 was calculated in comparison with the overall demand for other purposes (Fig. 1). For many items, the proportion of the vegetable demand for household consumption decreased from 1990 to 2000. Especially, the proportions of carrots and spinach decreased sharply, because the demand for carrots as ingredients in vegetable juices, and for frozen spinaches by the food service industry increased respectively.

Frozen vegetables are indispensable materials for the food service industries, in that the inedible parts are removed beforehand and the prices and product quality are more stable than fresh vegetables.

(2) Fig. 2 shows the proportions of vegetable demand for major items by intended purpose in 2000. In the case of tomatoes, radishes and Chinese cabbage, the proportions for the food processing are relatively high, because tomatoes are used as ingredients in juice and ketchup, and Chinese cabbage and radishes are used as ingredients for pickles. The proportion of onions and welsh onions for food services are relatively high, because of their role as basic foods.

(3) The usage of vegetables in processing and food services is increasing in accordance with the tendency to eat out. Additionally, pre-processed and processed foodstuffs are wide

used by the food service industry, in order to simplify the cooking process for part-time employees, reduce the time required to serve, and reduce garbage. In these circumstances, it is necessary to convert the domestic vegetable

production from household consumption purposes to various purposes, including processing and food-services uses, to improve response capabilities to future vegetable demand.

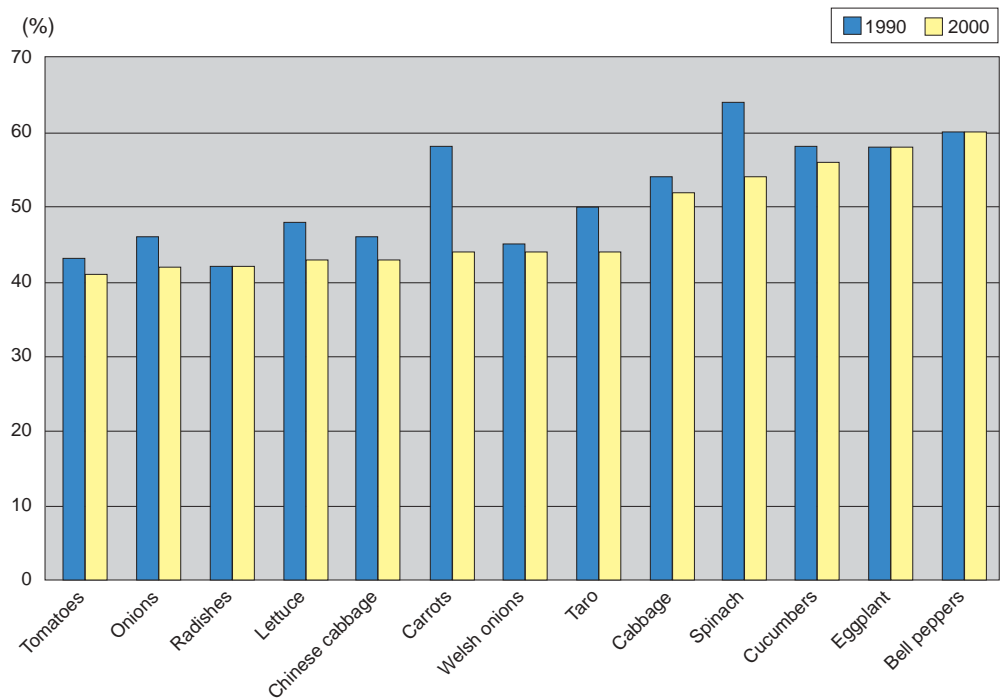


Fig. 1. Estimated Rate of Demand for Major Vegetables by Household Consumption in Japan

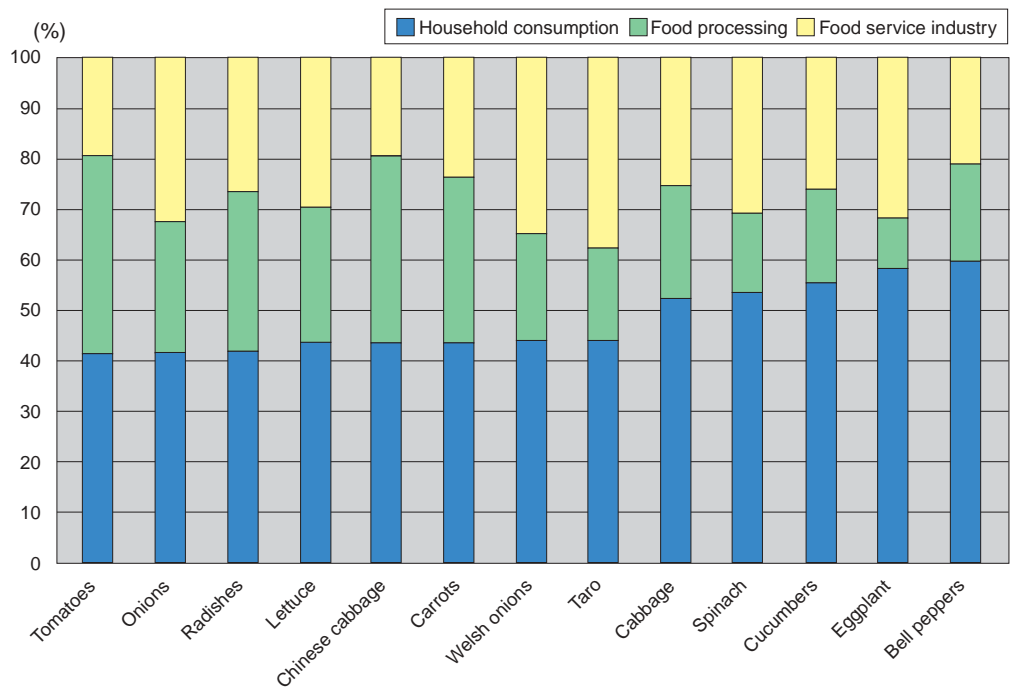


Fig. 2. Estimated Rate of Demand for Major Vegetables by Intended Purposes in Japan (2000)