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Agricultural Data Collection Experiences and Challenges in Chinese Taipei

Submitted by: Chinese Taipei



**Workshop to Assess and Improve
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Economies
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Agricultural Data Collection Experiences and Challenges in Chinese Taipei

Council of Agriculture
Chinese Taipei

October 27, 2011



Outline

- **Overview of Agriculture in Chinese Taipei**
- **Agricultural Data Collection System in Chinese Taipei**
- **The Challenge and Improvement in Agricultural Data Collection**
- **The Importance of Agricultural Statistics on Policy Decision Making**
- **Conclusions**

Overview of Agriculture in Chinese Taipei

- Size of Chinese Taipei: 36,000 km²
- 59% of the island is consisted of mountains and forests.
- About 813,126 ha, or 22.5% is used for agricultural production (2010).
- The average farm size is 1.1 ha (2010).
- Chinese Taipei has a population of 23 million (2010).
- Agricultural employment accounts for 5.24% of total employment (2010).



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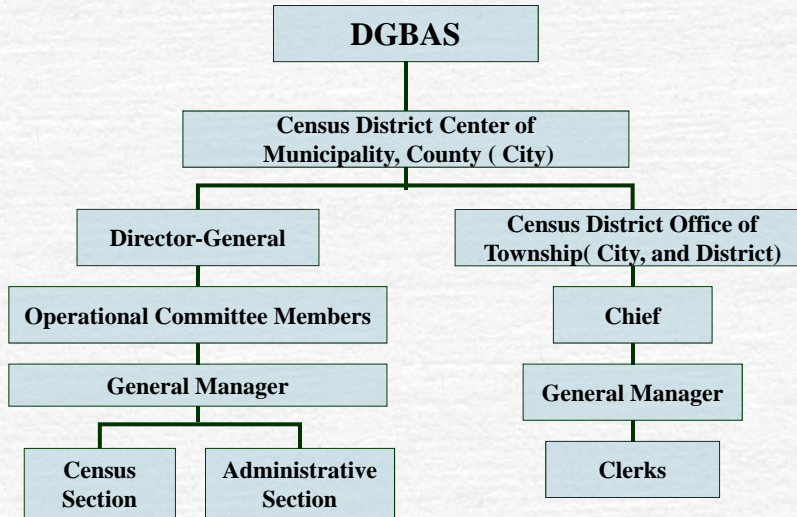
The agricultural Data Collection System in Chinese Taipei

- The agricultural data is collected by two separate agencies :
 - Bureau of Statistics in Directorate- General of Budget, Accounting and Statistics (DGBAS).
 - Council of Agriculture (COA).
- Bureau of Statistics is in charge of conducting the census of agricultural, forestry, fishery, and husbandry.
- The census was carried out regularly for every five years since 1956. The census collected information related to structures of production, characteristics of labor, utilization of farm, and status quo of management of agriculture, forestry, fishery, and husbandry industries.
- The outcome of the census provides a comprehensive picture of the agricultural sector, and is a major reference for the formulation of national policies and implementation of agricultural development plans.

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The agricultural Data Collection System in Chinese Taipei

● Agriculture Census System



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The agricultural Data Collection System in Chinese Taipei

● Agricultural Information Survey

- COA is responsible for the designing, planning, collection and monitoring of agricultural data. It also aggregates the data of agricultural production and provides statistics of food consumption and natural resources.
- Monthly Agricultural Statistics and Agricultural Statistics Yearbook which provide statistics of agricultural production, prices of agricultural products, farm households, costs of production, trade of agricultural product, market prices, damages of natural disaster, are published regularly.
- The operation of agricultural information survey
 - ◆ 2,000 field surveyors who carry out surveys, of 250 kind of crops by the sub-area (about 200~300 ha).
 - ◆ The information is reported from local to central agency by the “agricultural information survey network system”

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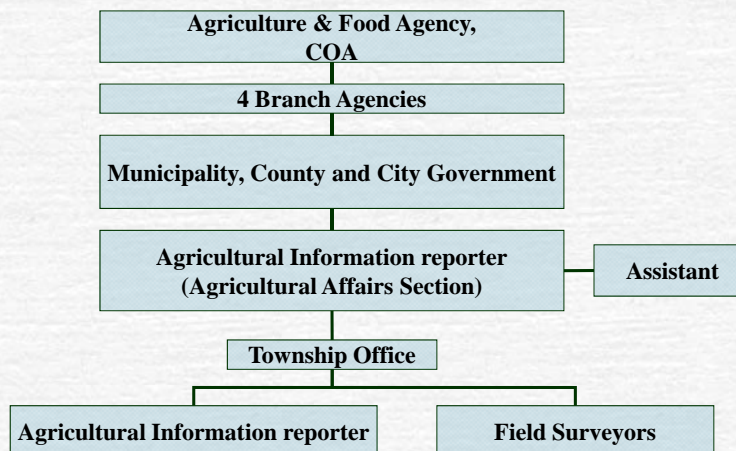
Table 1: The Major Items of Published Agricultural Statistics in Chinese Taipei

Title of Publication	Statistics Contents	Responsible Agency
Agricultural statistics yearbook	Agricultural economic indicators, agricultural production (crop, livestock, forestry and fishery production), land (cultivated, forest, livestock land area and aquacultural area), farm families and agricultural labor, farm family income, prices of agricultural products operations and revenues (production costs and income), agricultural disasters.	Statistical Office under the COA (Agriculture and Food Agency, Fisheries Agency)
Food Supply and Utilization Yearbook	Food balance sheets, domestic production and supply, food production indices, food self-sufficiency ratios, statistics by groups and commodities.	Statistical Office under the COA
Agricultural Trade Statistics	Quantity and value of agricultural exports and imports, Quantity and value of agricultural exports and imports by commodity group and commodity, quantity and value of import and export by major trading partners.	Statistical Office under the COA

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The agricultural Data Collection System in Chinese Taipei

● The System of Agricultural Information survey



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The agricultural Data Collection System in Chinese Taipei

● Survey of Production Areas

- The surveyor surveys the production areas and amounts for about 250 different crops every year over the period of the first crop, the second crop, and the inter crop.
- Personal Digital Assistant (PDA) with GPS is used to double check production areas of the important and selected crops and enhance the accuracy of field survey.

● Survey of Yield

- For main crops, a sample area is harvested first and then its yield is converted to yield-per-hectare. For other crops, the yield-per-hectare is obtained by interviewing with producers.
- The yield-per-hectare is adjusted with the average value of high and low productivity data. Then the yield-per-hectare is multiplied by production area to obtain yields of product.

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The agricultural Data Collection System in Chinese Taipei

● Production Forecasting and Prices survey

- Production forecasting of 60 major crops is conducted monthly to provide production and demand regulation reference data.
- About 90 crops and 3,600 farm households are selected each year to survey production cost for understanding the structure of production.
- Daily prices of important agricultural products from the production sites and markets are collected for the references of both the government and the public.

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5. 農產品生產量值

5. Quantity and Value of Farm Products

項目	民國 96 年 (2007)				民國 97 年 (2008)				單位	項目	民國 96 年 (2007)				民國 97 年 (2008)				單位
	產量	價值	單位	指數	產量	價值	單位	指數			產量	價值	單位	指數	產量	價值	單位	指數	
1. 農產品	389,120,223	188,000	kg	100	467,988,989	198,000	kg	100	1	Value of Farm Production	389,120,223	188,000	kg	100	467,988,989	198,000	kg	100	
1. 稻米 (稻類)	1,363,458	19,136	26,093,341	6.71	1,477,375	21,523	35,362,747	7.51	1	Crop Production	1,363,458	19,136	26,093,341	6.71	1,477,375	21,523	35,362,747	7.51	
2. 雜糧	5,274,954	1.61			7,907,273	1.75			2	Cereal Other	5,274,954	1.61			7,907,273	1.75			
3. 油料	19,100	13,040	246,294	0.19	97,294	13,944	200,743	0.19	3	Food Crop	19,100	13,040	246,294	0.19	97,294	13,944	200,743	0.19	
4. 蔬菜	34,983	13,070	1,107,750	0.29	30,807	14,300	1,171,028	0.26	4	Food Crop	34,983	13,070	1,107,750	0.29	30,807	14,300	1,171,028	0.26	
5. 水果	200,087	10,000	2,000,871	0.51	212,816	12,000	2,181		5	Food Crop	200,087	10,000	2,000,871	0.51	212,816	12,000	2,181		
6. 花生	31,800	40,300	2,100,316	0.54	55,075	44,740	2,464		6	Food Crop	31,800	40,300	2,100,316	0.54	55,075	44,740	2,464		
7. 茶	4,800	10,000	48,000	0.02	2,100	14,000	90		7	Food Crop	4,800	10,000	48,000	0.02	2,100	14,000	90		
8. 其他	6,098	30,300	426,542	0.11	7,913	40,630	466		8	Food Crop	6,098	30,300	426,542	0.11	7,913	40,630	466		
9. 其他	310	170,740	51,449	0.01	468	200,300	38		9	Food Crop	310	170,740	51,449	0.01	468	200,300	38		
10. 其他	47,008	41,176	1,939,806	0.50	49,823	40,706	1,987		10	Food Crop	47,008	41,176	1,939,806	0.50	49,823	40,706	1,987		
11. 其他	46,971,761	12,007			46,914				11	Food Crop	46,971,761	12,007			46,914				
12. 其他	110,806	8,900	942,273	0.24	119,720	8,900	946		12	Food Crop	110,806	8,900	942,273	0.24	119,720	8,900	946		
13. 其他	83,700	9,800	772,127	0.20	92,319	8,900	796		13	Food Crop	83,700	9,800	772,127	0.20	92,319	8,900	796		
14. 其他	17,470	10,000	121,460	0.03	12,766	14,000	146		14	Food Crop	17,470	10,000	121,460	0.03	12,766	14,000	146		
15. 其他	12,378	24,100	793,461	0.20	31,810	25,700	811		15	Food Crop	12,378	24,100	793,461	0.20	31,810	25,700	811		
16. 其他	42,475	18,000	164,495	0.20	38,000	28,000	1,000		16	Food Crop	42,475	18,000	164,495	0.20	38,000	28,000	1,000		
17. 其他	97,920	38,000	3,720,917	0.96	93,124	42,100	4,044		17	Food Crop	97,920	38,000	3,720,917	0.96	93,124	42,100	4,044		
18. 其他	47,989	18,000	683,491	0.17	39,000	11,000	694		18	Food Crop	47,989	18,000	683,491	0.17	39,000	11,000	694		

12. 農業生產指數

Agricultural Production Index


民國 96 = 100.00
2006 = 100.00

年別 Year	總指數 General Index	農作物 Crops	林業 Forestry	漁業 Fishery	畜業 Livestock
民國 55 年 1966	47.25	99.79	1,098.45	29.82	17.09
60 1971	59.13	109.24	1,210.63	48.69	25.09
65 1976	73.29	121.46	951.56	66.46	35.77
70 1981	83.43	116.99	667.07	81.48	51.51
75 1986	93.57	110.10	622.20	100.27	71.63
80 1991	106.18	113.36	211.67	110.66	95.77
81 1993	103.68	108.67	127.75	106.75	89.11
82 1993	109.94	116.07	133.36	113.44	103.43
83 1994	106.57	111.99	100.67	100.04	109.29
84 1995	110.55	117.54	117.50	104.23	114.78
85 1996	110.72	113.93	96.80	99.35	119.42
86 1997	108.28	115.75	108.88	101.29	110.54
87 1998	103.28	106.18	137.91	101.40	102.37
88 1999	104.46	113.38	115.91	99.29	98.66
89 2000	106.76	108.08	114.35	108.56	104.28
90 2001	105.45	103.40	94.68	110.39	104.60
91 2002	106.78	109.09	105.62	119.37	102.65
92 2003	109.94	106.21	115.01	127.82	100.60
93 2004	105.29	100.95	114.81	118.71	100.47
94 2005	99.28	91.38	89.79	116.28	97.64
95 2006	100.00	100.00	100.00	100.00	100.00
96 2007	97.60	93.52	68.52	105.74	97.57
97 2008	92.65	93.98	63.39	91.35	93.21
98 2009	91.01	93.87	64.44	83.16	92.85
99 2010	92.70	96.20	59.18	84.64	93.52

資料來源：行政院農業委員會統計室
Source: Statistics Office, COA, Executive Yuan.



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The Challenge and Improvement in Agricultural Data Collection

- **The challenges of agricultural data collection in Chinese Taipei**
 - The manpower and budget of the agricultural survey system are insufficient.
 - The cropping system is complicated and thus the data collected in the survey period is not easy to reflect the full picture completely.
 - Policy targets may be different for various policies, which causes difficulty on accurately evaluating the effectiveness to each policy.
 - The collected quantity of agricultural products are still unable to precisely reflect real status of production and marketing condition and thus can not effectively undertake measures to stabilize the price.

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The Challenge and Improvement in Agricultural Data Collection

● The improvement strategies in agricultural data collection

➤ Strengthening agricultural survey statistics system

- ◆ to improve the manpower and increase budget of agricultural statistical system.
- ◆ to expand survey items and strengthen agricultural statistics and data collection to effectively reflect the outcomes of agricultural policy implementations.
- ◆ to strengthen the communication among different departments of the system as well as between local and central agencies.

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The Challenge and Improvement in Agricultural Data Collection

➤ Strengthening agricultural production information collection and statistics

- ◆ to utilize the ICT tool in the planting area survey
 - to manipulate PDA with GPS to check production areas base on cadastres.
 - to provide instant information for production forecasting, monitoring and early warning.
- ◆ to estimate yield-per-hectare of important crops
 - some important crops, such as oranges, pears, guavas, and bananas, are chosen to establish yield-per-hectare estimation models since 2009.

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The Importance of Agricultural Statistics on Policy Decision Making

- Fresh agricultural products are usually difficult to preserve. Their yields are also easily affected by climate conditions. That results in imbalance between supply and demand. Thus, prices often fluctuate widely during the harvest season. We may offer relevant information to reduce fluctuation of price.
- **Early warning mechanism of production and marketing of agricultural product**
 - to set up target level of the production and monitor price
 - to monitor and collect the daily price of important crops and the international grain price.
 - to establish early warning mechanism to monitor the yields and prices.

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The Importance of Agricultural Statistics on Policy Decision Making

- **Mechanism for production and marketing adjustment**
 - Adjustment in early time
 - ◆ The reducing of production is encouraged to avoid excess supply and declining of prices.
 - Export enhancing
 - ◆ to assist farmers to export their products.
 - Product processing
 - ◆ encourage factories to process inferior product.
 - Direct sale
 - ◆ Enhance bulk purchase from great consumption groups and group purchasing from internet.
 - Sales promotion
 - ◆ initiate the ordering platform for discount domestic product, promote products through sales fair and cooperation with outlets and supermarkets.
 - Purchase for storage
 - ◆ Store excess products in refrigeration storing facilities.
 - ◆ the storage is released to stabilize the fluctuation of market prices when the supply of market is short.

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The Importance of Agricultural Statistics on Policy Decision Making

- Case Analysis 1 - monitoring and early warning for banana
 - The rationale of analysis
 - ◆ There are many kinds of fruits harvested in summer in Chinese Taipei. In the meantime, the quality of banana is low, and its demand decreases. It usually causes the price of banana drop dramatically in summer.
 - Adjustment measures
 - ◆ For example, while we knew from the data of prior survey in June 2011, we advised farmers to export, process, and enhance bulk purchase by great consumption groups and group purchasing from the internet. As a result, we had dealt with 1,000 tons by August. The price of banana at the production sites was raised and higher than the monitoring price.
 - Improvement in production and marketing of banana
 - ◆ Adjust the production period and reduce the supply of banana in summer.
 - ◆ Establish banana export production area and advice exporters to contract with farmers to form a stable supply and marketing chain.

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The Importance of Agricultural Statistics on Policy Decision Making

- Case Analysis 2 - monitoring and early warning for garlic
 - Survey areas of production
 - ◆ We used the digitizing tool (PDA) to survey production area of garlic .
 - Production forecast
 - ◆ From the planting of garlic in November, the level of production was forecasted monthly.
 - ◆ The level of production increased by almost 40% because of continuing low temperatures at the beginning of this year .
 - Adjusting measures:
 - ◆ Process extra garlic and arrange direct purchase by great consumption groups and sale promotion.

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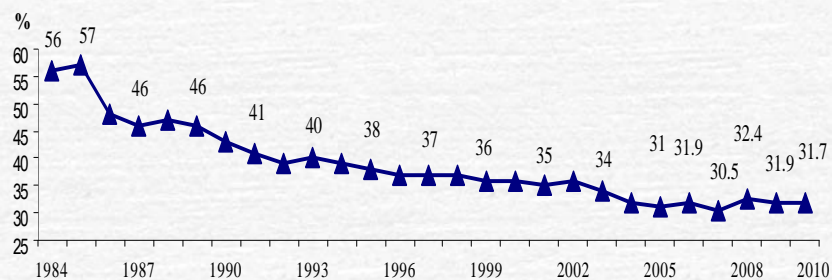
The Importance of Agricultural Statistics on Policy Decision Making

- In recent years, global environment changes dramatically. Due to climate change and extreme weather conditions, ever increasing global population, rapid increases in food demand from the emerging economies, and high petroleum price and promotion of bio-energy, the price of food is soaring. Food security has become the most important issue in the world.
- **Food self-sufficiency Ratio (SSR)**
 - Chinese Taipei is a net food import of economy. Food self-sufficiency ratio declined from 107.9 % in 1961 to 31.7% in 2010 (weighted by calorie). It is almost the lowest among East-Asia economies.
 - Grain, such as wheat, corn, and soybean almost fully imported, from other economies.
 - Domestic supply is composed of domestic production, import and stock.

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Figure1 : Average Food Self-sufficiency Rate

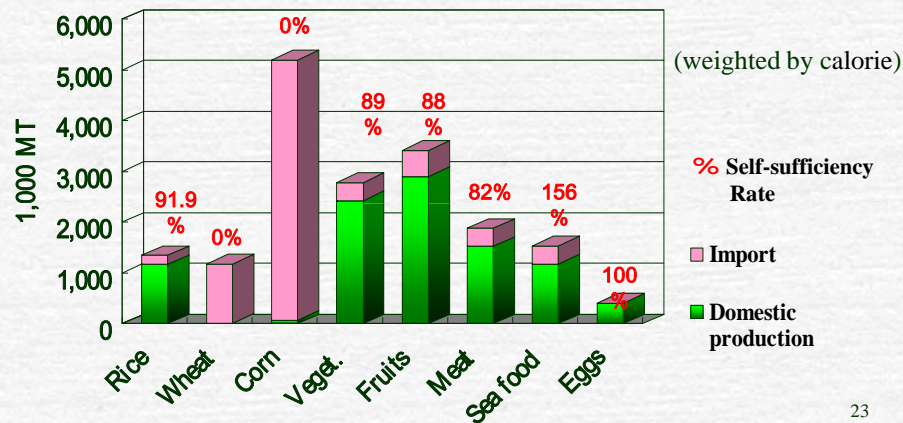
(Weighted by Calorie)



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Figure 2 : Food Self-sufficiency Ratios in Chinese Taipei

- Average Food Self-sufficiency Rate was 31.7% in 2010
- Almost the lowest among East-Asia economies



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The Importance of Agricultural Statistics on Policy Decision Making

- **Causes of low level of food self-sufficiency**
 - The trend of international trade liberalization and globalization.
 - Change in the food consumption behaviors
 - ◆ Rice consumption per capita per year reduced from 98kg in 1981 to 46kg in 2010.
 - Aging farmers and set-aside farmlands
 - ◆ The average age of farmers is 53 years old; 17% of the farmers are aged more than 65 (in 2009). The average age of the leading farmers is 63 years old; 50 % of the leading farmers are aged more than 65 years old.
 - ◆ To keep a balance between supply and demand, 16,000 hectares of farmland is currently lying fallow.
 - The small size of farm
 - ◆ The average farm size: 1.1 ha (2010).
- **PFC Ratio for food supply** (Protein, Fat, and Carbohydrate)
 - 13 : 38 : 48 per capita per day (2009); appropriate ratio 12 : 30 : 58.
 - 2,695 kcal per capita per day (2009); appropriate figure is 2,200 kcal.

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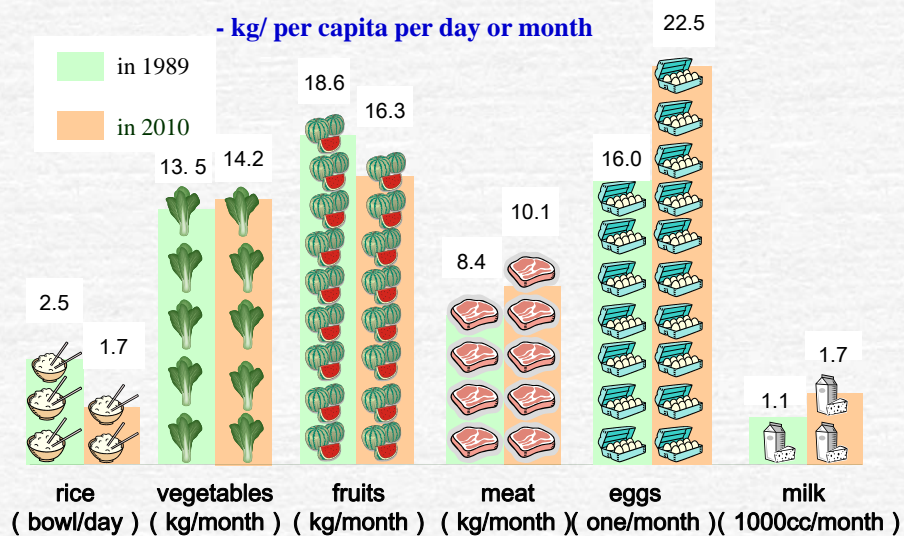
**Table 2: Food Availability for Consumption
in Chinese Taipei** Unit: Kg/ Per Capita Per Year

Category	1989	1990	1995	2000	2005	2006	2009	2010
Cereals	105.8	102.5	100.4	92.5	91.5	89.7	87.7	83.8
Rice	68.3	65.9	59.1	52.7	48.6	48.0	47.1	46.2
Vegetables	98.3	93.3	101.9	115.4	105.1	112.1	103.6	104.7
Fruits	135.7	131.5	137.5	136.3	123.3	137.4	118.9	127.3
Meat	61.3	62.9	72.8	79.0	77.1	79.0	73.7	75.6
Eggs	11.7	12.1	16.2	19.2	16.8	17.1	16.4	17.2
Fish & Sea food	45.5	47.5	38.3	40.2	29.9	28.5	29.9	33.4
Milk	13.8	14.9	23.0	23.6	20.2	21.0	42.9	42.3
Oils and Fats	21.9	22.5	26.0	25.1	26.3	24.2	22.2	22.7

Source: Food Supply and Utilization Year Book, 1989-2010, Council of Agriculture (Chinese Taipei)

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**Figure3: The change of Food Availability for
Consumption in Chinese Taipei**



Source: Food Supply and Utilization Year Book, 1989-2010, Council of Agriculture (Chinese Taipei)

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The Importance of Agricultural Statistics on Policy Decision Making

● APEC meeting on food security

- 2010 (Aug.): The APEC Food Security Forum held in Taipei to formulate regional food security action plans for discussion in October Ministerial Meeting .
- 2010 (Oct.): The 1st APEC Ministerial Meeting on Food Security, APEC Niigata Declaration on APEC Food Security- "...agreed to examine the feasibility of establishing cooperative approaches to address emergency food needs".
- 2011 (Aug.): APEC Food Security Forum- APEC Food Emergency Response Mechanism. Chinese Taipei proposes the establishment of a cost-effective and cooperative APEC Food Emergency Response Mechanism.

- **2011 (May):** The National Conference on Food Security was convened. Its conclusions included raising domestic food self-sufficiency rate, establishing food security risk management system and reserve mechanism, setting up an APEC mechanism for regional food security reserves, encouraging the consumption of locally produced food.

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The Importance of Agricultural Statistics on Policy Decision Making

● Major food security policy and actions in Chinese Taipei

- **Raising domestic food self-sufficiency rate**
 - ◆ Setting the goal of food self-sufficiency rate at 40% in 2020 under considerations of international situations and trade regulations.
 - ◆ Activating 140,000 hectares of fallowed rice paddies in line and promoting farmers to produce substitutions of the imported crops, such as feed corn and other grain crops.
- **To promote healthy life-styles**
 - ◆ to educate the citizens to change their consumption behaviors and promote healthy life-styles.
 - ◆ to promote the concept of food mileage and encourage the consumption of locally produced food.
- **Securing the food stocks**
 - ◆ Secure the food inventory for the emergency. Level of food stocks can not be less than the level of domestic consumption in 3 months.
 - ◆ Propose and promote to establish the APEC Food Emergency Response Mechanism to secure regional emergency food needs.

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Conclusions

- Agricultural statistics could reflect to the situation of agricultural operation and evaluate the performance of agricultural policy. They are used as a major reference for the formation of agricultural policies and implement of agricultural development plans.
- Through the agricultural data collection and survey, agricultural statistics provide accurate and timely agricultural information for agricultural decision making and policy planning such as:
 - Enhancing agricultural data collection system and policy decision supporting function.
 - enhancing accuracy of agricultural data collection to promote food security
 - enhancing supply forecasting mechanisms to properly adjust the agricultural production to balance the production and demand
 - stabilizing agricultural prices
 - protecting the rights and interests of farmers.
- Data collection is beneficial to assess agriculture problems and design address appropriate agricultural policy to improve the efficiency and quality of the policies and the perspectives of agriculture and to promote sustainable agricultural development.

**Thank you for
your attention**

