



# **How to Evaluate the Losses of Vegetables and Fruits in Mainland China?**

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## **Productions of Vegetables & Fruits**

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## Consumptions of Vegetables & Fruits

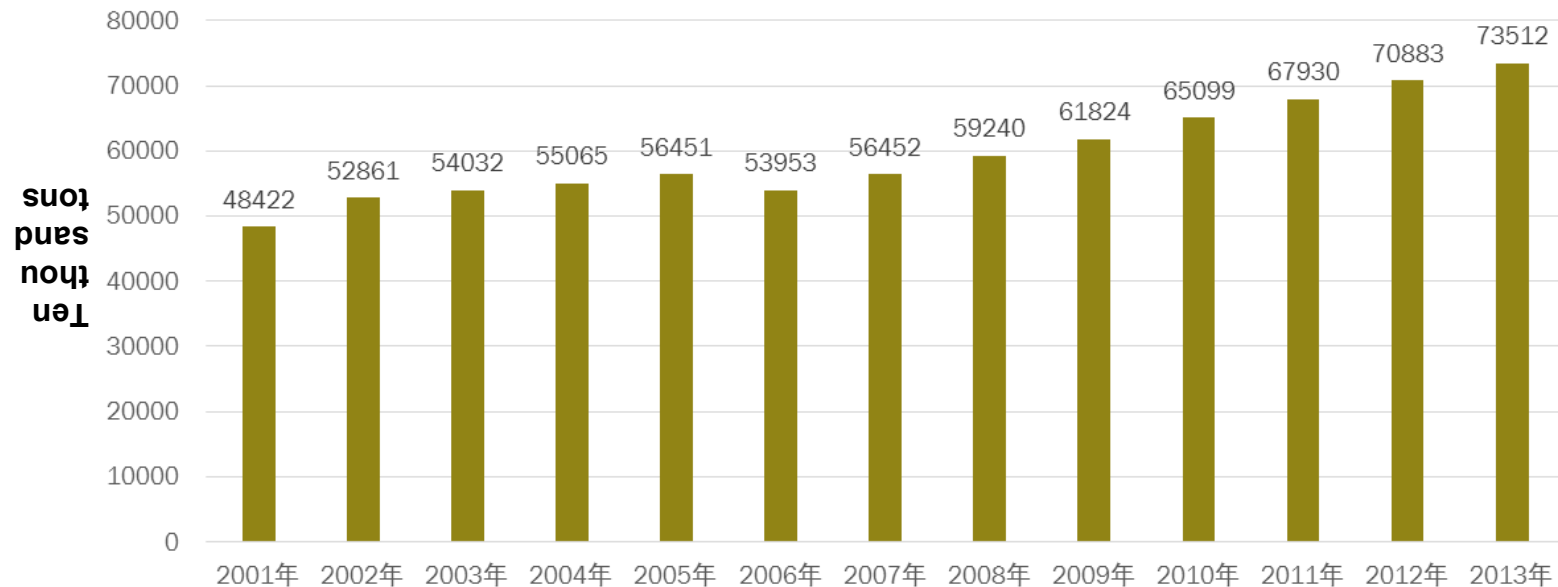
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## Losses of Vegetables & Fruits

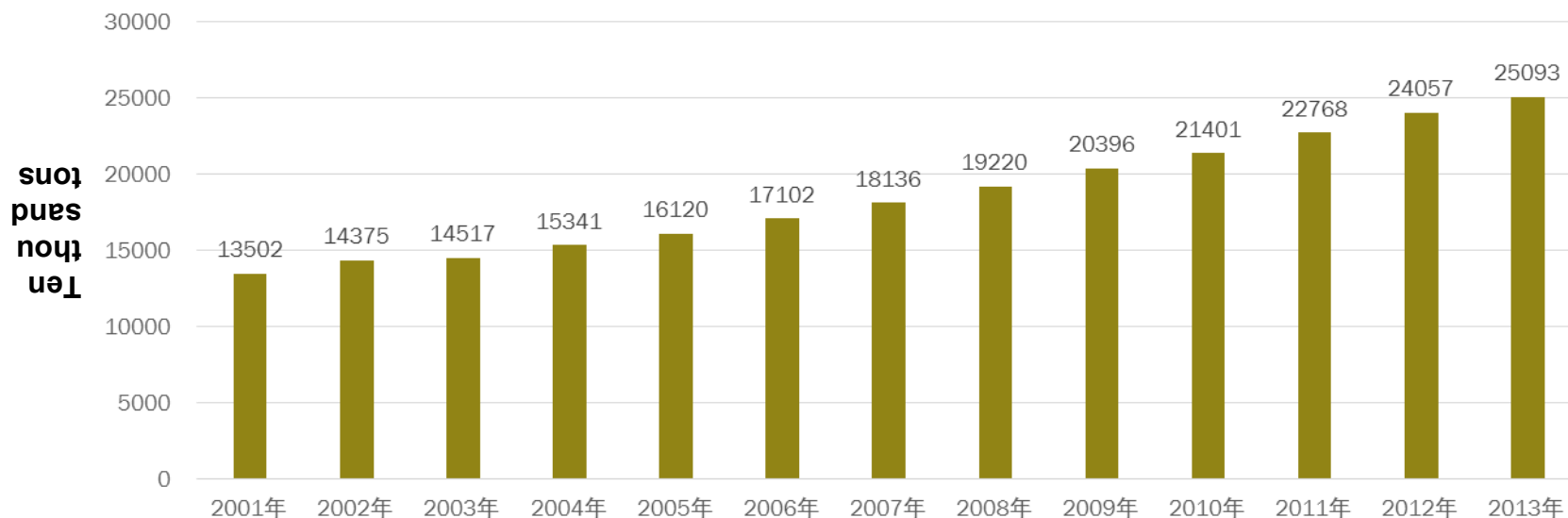
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# Production of vegetables



**Vegetables** : Mainland China produced 735 million tons of vegetables, accounting for 66 percent of global vegetable production in 2013 , with an increase of 250 million tons from 2001 and an average growth rate of 3.5 percent per year in the period 2001–2013. Deducting net exports of 9.4 million tons that year, per capita share of vegetables in 2013 was 534 kg.

# Production of fruits



**Fruits:** Mainland China produced 251 million tons of fruits, accounting for 38 percent of global vegetable production in 2013, with an increase of 116 million tons from 2001 and an average growth rate of 5.3 percent per year in the period 2001–2013. Deducting net exports of 1.55 million tons, per capita share of fruits in 2013 was 183 kg.

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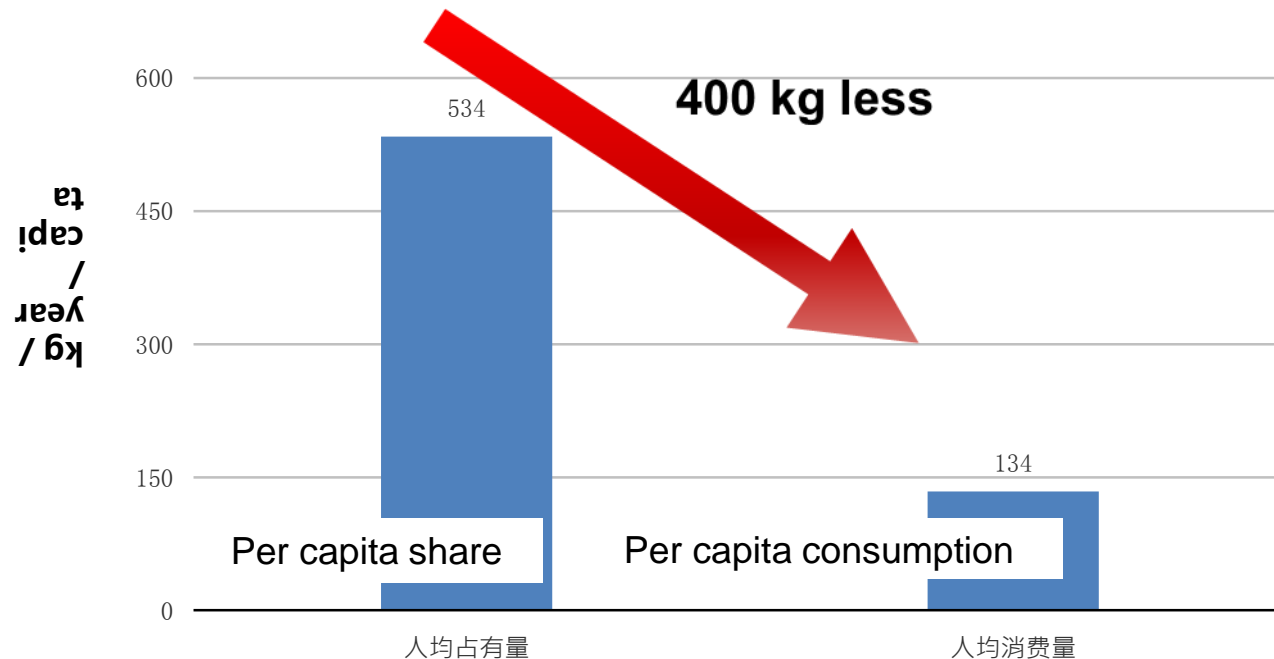
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Losses of Vegetables & Fruits

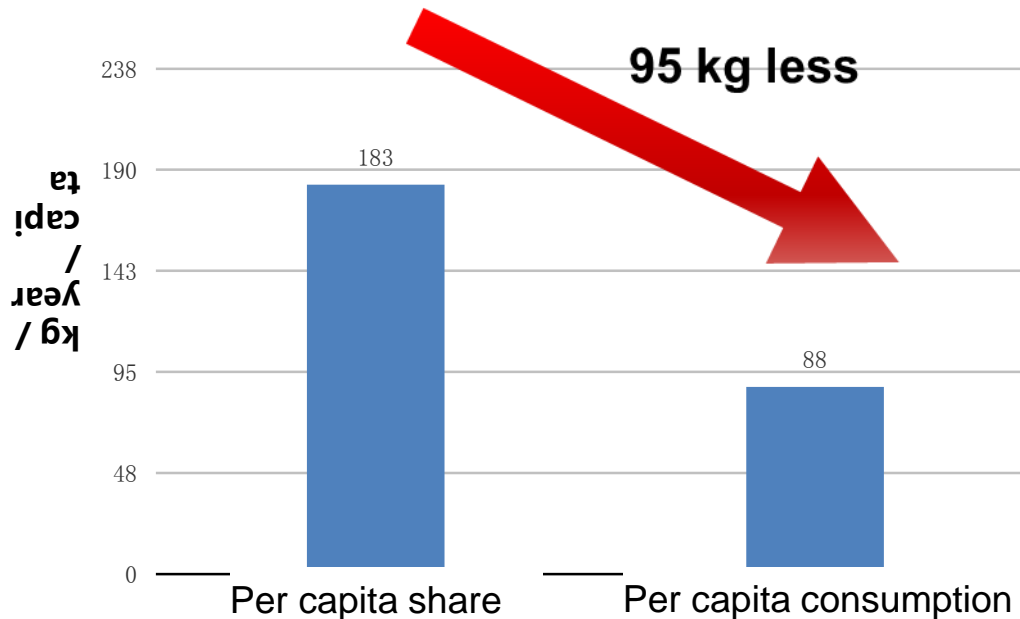
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# Per capita share and consumption of Veggies. in 2013



**Vegetables:** Based on the results of Survey of Residents' Food Consumption in 2013 by IFND, per capita vegetables (table, similarly hereinafter) consumption of urban residents was **144 kg/year** and that was **105 kg/year** for rural residents . The urban residents consumed 37% more vegetables than the rural residents. The national per capita consumption is **134 kg/year**, which is 400 kg less than the per capita share of 534 kg.

# per capita share and consumption of fruits in 2013



**Fruits:** Based on the results of Survey of Residents' Food Consumption in 2013 by IFND, per capita fruits consumption of urban residents was **103 kg/year** and that was **70 kg/year** for rural residents . The urban residents consumed 47% more fruits than the rural residents. The national per capita consumption is **88 kg/year**, which is 95 kg less than per capita share of 183 kg.



# The situation of production and demand balance of fruits and vegetables in Mainland China

**The total supply of fruits and vegetables is consumed as fresh food, seed, feeds, processing, besides the loss should also be added if the changes in storage was not considered. The bureau of statistics and MOA are not yet carry out regular surveys on seeds, feeds, and loss of vegetables and fruits in Mainland China. Cause the lack of such survey data, coefficient of those proposed by FAO was just based on the estimation of experts. While, a number of studies have been carried out by some domestic researchers focusing on losses of fruits and vegetables.**

**Here we made some tentative analysis about the supply and demand balances of fruits and vegetables in 2013 based on those two kinds of results.**

# Supply and demand balance of fruit & Veggies. based on FAO food balance sheets

Commodity	Production	Import	Export	Domestic supply	Feed	Seed	loss	processing	Food	per capita consumption
unit	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	kg/capita/yr
Vegetables	73512	21	961	72572	4971	0	6336	0	61264	450
Fruits	25093	329	484	24938	0	0	2383	1236	21319	157

**According to the proportions of vegetables, fruits, feeds, seeds, loss, processing in 2011 FAO Food Balance Sheets, vegetables and fruits consumption in Mainland China were 613 million tons and 213 million tons respectively, while per capita consumption of those were 450 kg/year and 157 kg /year respectively in 2013 .**

Note: the data source of output is Chinese Bureau of Statistics; import and export data is cited from Customs Statistics Data Tables; feed, seed, loss, processing proportion of vegetables and fruits' data were calculated based on 2011 FAO Chinese food Balance Sheet data,

# Supply and demand balance of fruit & Veggies. based on existing research

Commodity	Production	Import Quantity	Export Quantity	Domestic supply quantity	Feed	Seed	loss	processing	Food	per capita consumption
	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	10000 tonnes	kg/capita/yr
Vegetables	73512	21	961	72572	4971		37229	13135	17236	127
Fruits	25093	329	484	24938	0		6235	6235	12469	92

**According to some existing researches, proportion of vegetable processing is 18.1 % and the loss in all the sectors from production to consumption is about 51.3% of the total supply, while the proportion of fruit processing and loss are both 25%. Thus, the vegetables and fruits consumption were 172 million tons and 125 million tons respectively, while per capita consumption were 127 kg/year, 92 kg /year respectively in 2013.**

Note: the data source of output is Chinese Bureau of Statistics; import and export data is cited from Customs Statistics Data Tables; proportion of loss and processing about vegetables and fruits is according to existing research in China; the amount of feed and seed were calculated based on the proportions of those in 2011 FAO food Balance Sheet.

# Comparison between two results of supply and demand balance in Veggies.

**Supply and Demand Balance of Veggies. in 2013**

	Processing proportion	Loss proportion	Per capita consumption calculated (kg/yr)	per capita consumption by IFND (kg/yr)
scenario 1	0	8.70%	450	134
Scenario 2	18.10%	51.30%	127	

**Note:** proportions of processing and loss in **scenario 1** was from FAO's Food balance sheet in 2011; proportions of processing and loss in **scenario 2** was from the existing research in Mainland China.

**There was a wide disparity between two results of per capita Veg. consumption. However, the result by Scenario two was much more closed to the survey results by IFND, with a difference of 7kg.**

# Comparison between two results of supply and demand balance in fruits.

**Supply and Demand Balance of fruits in 2013**

	Processing proportion	Loss proportion	Per capita consumption calculated (kg/yr)	per capita consumption by IFND (kg/yr)
scenario 1	5%	9.60%	157	88
Scenario 2	25%	25%	92	

**Note:** proportions of processing and loss in **scenario 1** was from FAO's Food balance sheet in 2011; proportions of processing and loss in **scenario 2** was from the existing research in Mainland China.

**There was also a wide disparity between two results of per capita fruits consumption. However, the result by Scenario two was much more closed to the survey results by IFND, with a difference of 4kg.**

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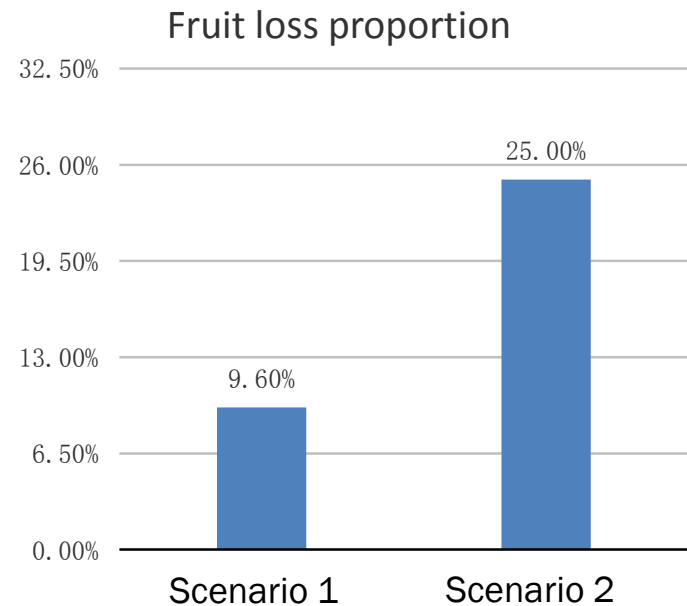
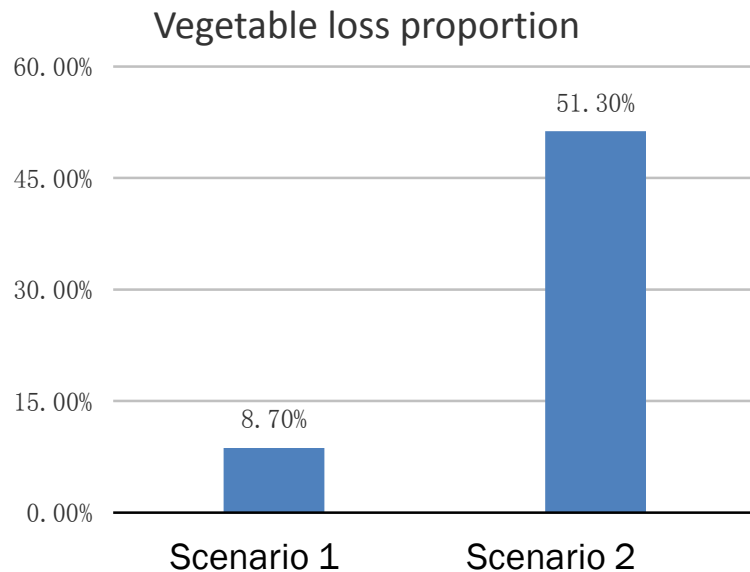


**Losses of Vegetables & Fruits**

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# The losses of fruits and vegetables in China mainland

Based on the comparison above, the current study believe that the loss rate of vegetables & fruits in FAO food balance sheets is significantly low, while the results from existing researches were much close to the reality. The losses of vegetables and fruits in circulation area were about 50%, 25% respectively in Mainland China.



# Reasons of the loss of fruits and vegs. in China

The losses of fruits and vegetables in the supply chain is mainly influenced by production, transportation and many other factors. And in Mainland China's case, the main reasons could be summarized as follows:

**First , nearly 70% production of fruits and vegetables distributes in several provinces, and self-sufficiency rate in cities is low.** In 2013, the top ten provinces' (cities') in fruits yield occupies 68% of domestic fruits, the top ten provinces' (cities') in vegetables yield occupies 65% of domestic vegetables yield . The self-sufficiency rate of vegetables especially in big cities , such like Beijing, is less than 30%. Even if Hainan province, which is thought as a main production province of fruits and Veggies, has a slack season every summer(May–Oct.), with 60% transferred vegetables from other provinces.

**Second, long distance between production and consumption.** Vegetables and fruits production concentrated mostly in the ten provinces, but the consumption distributes all over Mainland China which has 36 provinces. The average distance is about 500 km between production area and consumption area. The longest distance is more than 4000 km.



# Reasons of the losses of fruits and vegs. in China

**Third, cool food transportation and refrigeration is lagging.** The fresh-keeping storage capacity of fruits is only 20% of the total, in which cold storage and controlled atmosphere storage account for 6.5%. Most vegetables are transported by cars or trains without refrigeration equipment, or trucks with ice.

Only 10% vegetables is transported by refrigerated trucks.

**Fourth, too many intermediate stages in the Supply Chain.** fruits and vegetables in Mainland China are transported by a large tonnage, fast means of transport, and it could not directly carried to small traders and consumer. We need to add a set of transport links between farmer and consumer, and build a secondary wholesale distribution sectors in the local market. Normally, fruits and vegetables need to go through four to five intermediate links that can be carried to consumers.

# Reasons of the loss of fruits and vegs. in China

Fifth, standardization of the industrial chain of fruits and vegetables progressed slowly. There are 12 categories including 89 kinds of vegetables and 50 kinds of fruits which are often eaten in Mainland China. Although currently we have developed a lot of production technology standards about vegetables and fruits, but the standards of packaging, transportation, storage technology of fruits and vegetables are lacking. In the case of difficulty to control the quality of products in circulation, the development of e-commerce, order agriculture and other modern methods of distribution are being obstructed. The original spot trading is still the primary sales mode of fruits and vegetables.

# Thinking

One survey in China showed that the loss rate of vegetables in supply chain is inversely proportional to the net profit per unit product, and the reduce of loss is at the cost of the reduce of net profit of unit product. The most optimized Profit is the main goal for the business to choose circulation pattern, which is why the loss rate of vegetables and fruits in supply chain is high.

	Net profit per unit product	Circulation cost per unit product	Circulation loss rate
	yuan/kg	yuan/kg	%
Farmers - wholesale in producing area - wholesale in demand region- retail – consumers	0.53	0.62	29
Farmers – consumers	0.47	0.49	20
Farmers - vegetable cooperative organization - large-scale chain supermarket – consumers	0.11	0.8	16

Data source: " Comparison and Evaluation of Efficiency of Fresh Vegetable Circulation Channels of China  
"Logistics Technology,2014, 33 (2) .

# Suggestions

Mainland China is the first largest producer and consumer of vegetables and fruits. Because of lack of large scale investigation on the losses in supply chain of foods, the agricultural production goal is difficult to be made by MOA at some extent. Thus, We strongly suggest that APEC take Mainland China as an important subject in your project, and absorb domestic experts to take part in the research on evaluation system and Methodology about loss of vegs. and fruits, and carry out supply-chain survey on many varieties. If the same work could be extended to meat and cereal, it could definitely meaningful.

**IFND** is the only one institute focusing on Food and Nutrition issues which works for MOA. IFND has made much achievement in food consumption, nutrition evaluation, consumption behavior and agricultural supply and demand estimates. We kindly hope to take participate in the job of the research on the losses in supply chain of foods.

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# Thank you very much !

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