Situation of Greenhouse Horticulture

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Ministry of Agriculture, Forestry and Fisheries

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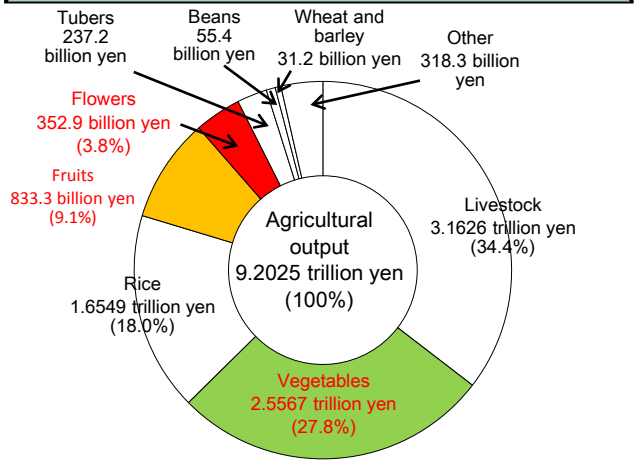
1. Status of greenhouse horticulture (1)

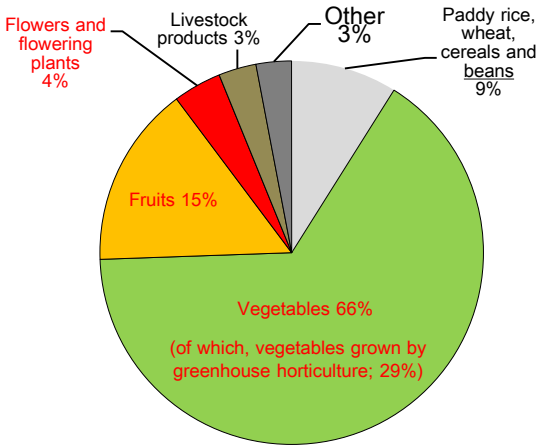
- Horticultural crops, such as vegetables, fruits and flowers, account for some 40% of Japan's agricultural production in value. As they have a strong potential to become high value-added products through growers' ingenuity, they form an important and attractive field chosen by 85% of new farmers.
- In terms of consumption, they constitute an important item of national consumptive life as they account for the largest portion of spending of foodstuffs in value. Stable, year-round supply of products by greenhouse horticulture is indispensable to meet consumer needs.
- As prices of vegetables are greatly affected by the supply, the stabilization of supply by means of greenhouse horticulture is important for, among other things, the protection of national food consumption.

○Japan's agricultural output



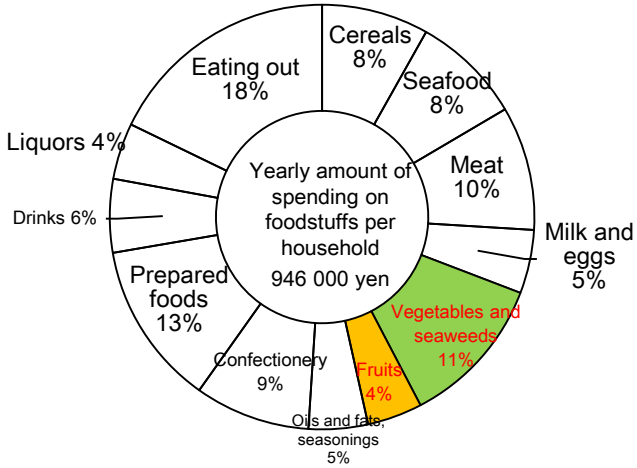
Source: Statistics of Agricultural Income Produced 2016, MAFF

○Item for new entry farmers



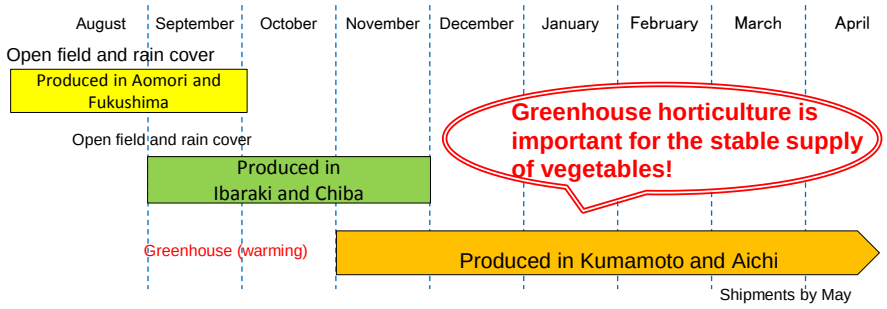
Source: Investigation of the Actual Farm Working of New Farmer 2016, National New Farmer Center for Becoming New Farmer

○ Yearly amount of spending on foodstuffs per household

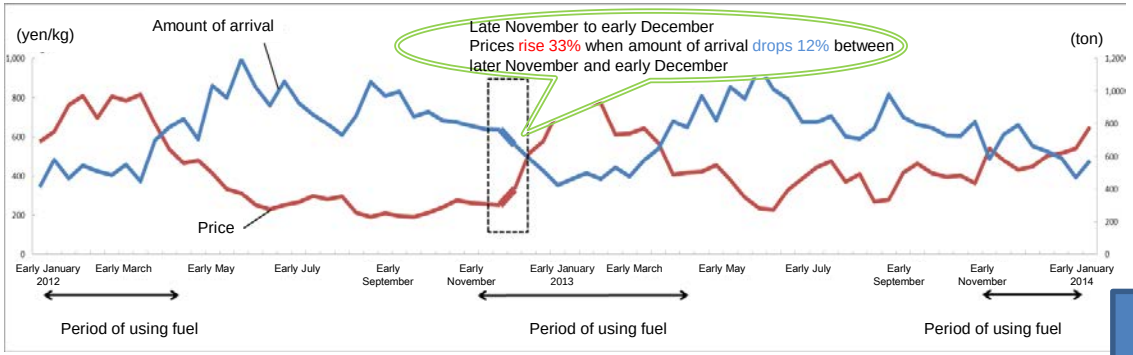


Source: Family Income and Expenditure Survey (2017) by the Ministry of Internal Affairs and Communications

○ Situation of relay-like shipments of tomatoes in season from production regions



○ Changes in wholesale prices of green bell peppers and amount of arrival at Metropolitan Central Wholesale Market



1. Status of greenhouse horticulture (2)

- Greenhouse horticulture is being undertaken for a variety of products and has captured extremely high production shares for certain products.
- Greenhouse horticulture of vegetables is highly labor-productive and can generate earnings even on small areas of land as its income per 10a is roughly three times that of open-field culture.

Total area of greenhouse and share of production

Product	Protected cultivation Gross area (ha)	Share of production (%)
Tomatoes	6,971	74
Spinach	4,325	24
Strawberries	3,970	88
Cucumbers	3,525	61

Source:

Greenhouse Establishment, 2014, Vegetable Production Shipment Statistics , 2014 MAFF

Income per 10a of greenhouse horticulture

	Gross profit (in 1,000 yen)	management cost (in 1,000 yen)	Income (in 1,000 yen)	Working time (hours)
Greenhouse cultivation of vegetables	1,082	620	462	338
Open-field cultivation of vegetables	396	238	158	191
Cultivation of fruits	475	291	183	211
Cultivation of rice	119	103	16	33

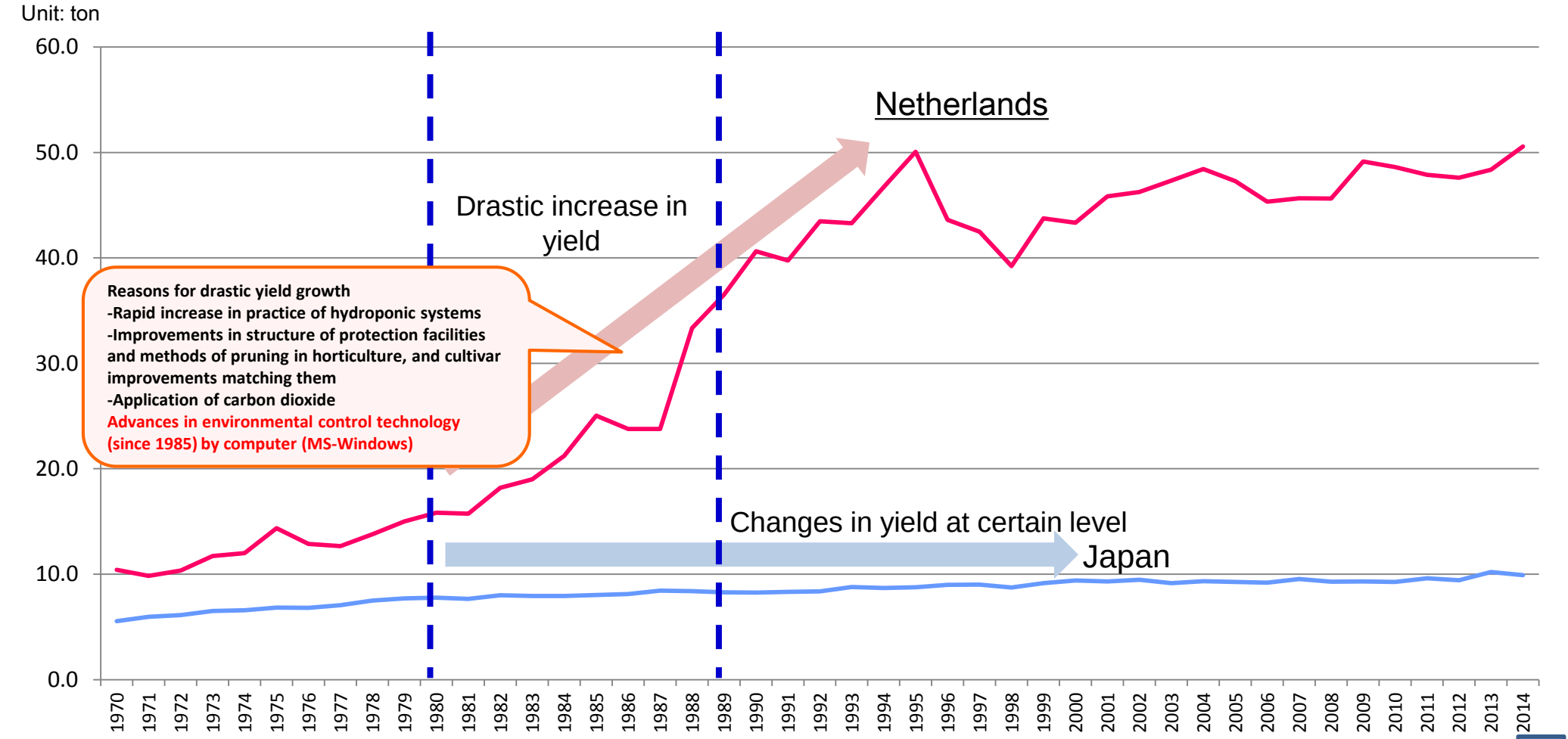
Source:

Statistics on Management by Farming Type, 2014 MAFF

2. Challenges to greenhouse horticulture (1) (environmental control (1))

○While greenhouse horticulture accounts for the majority of tomato production, output per 10a in the Netherlands has increased since the 1980s due to the widespread practice of hydroponic systems and CO_2 generators . In particular, it has increased drastically since 1985, when computer-based environmental control technology advanced.
○The yield per 10a in Japan, meanwhile, has stalled at a low level.

Changes in yield of tomatoes per 10a

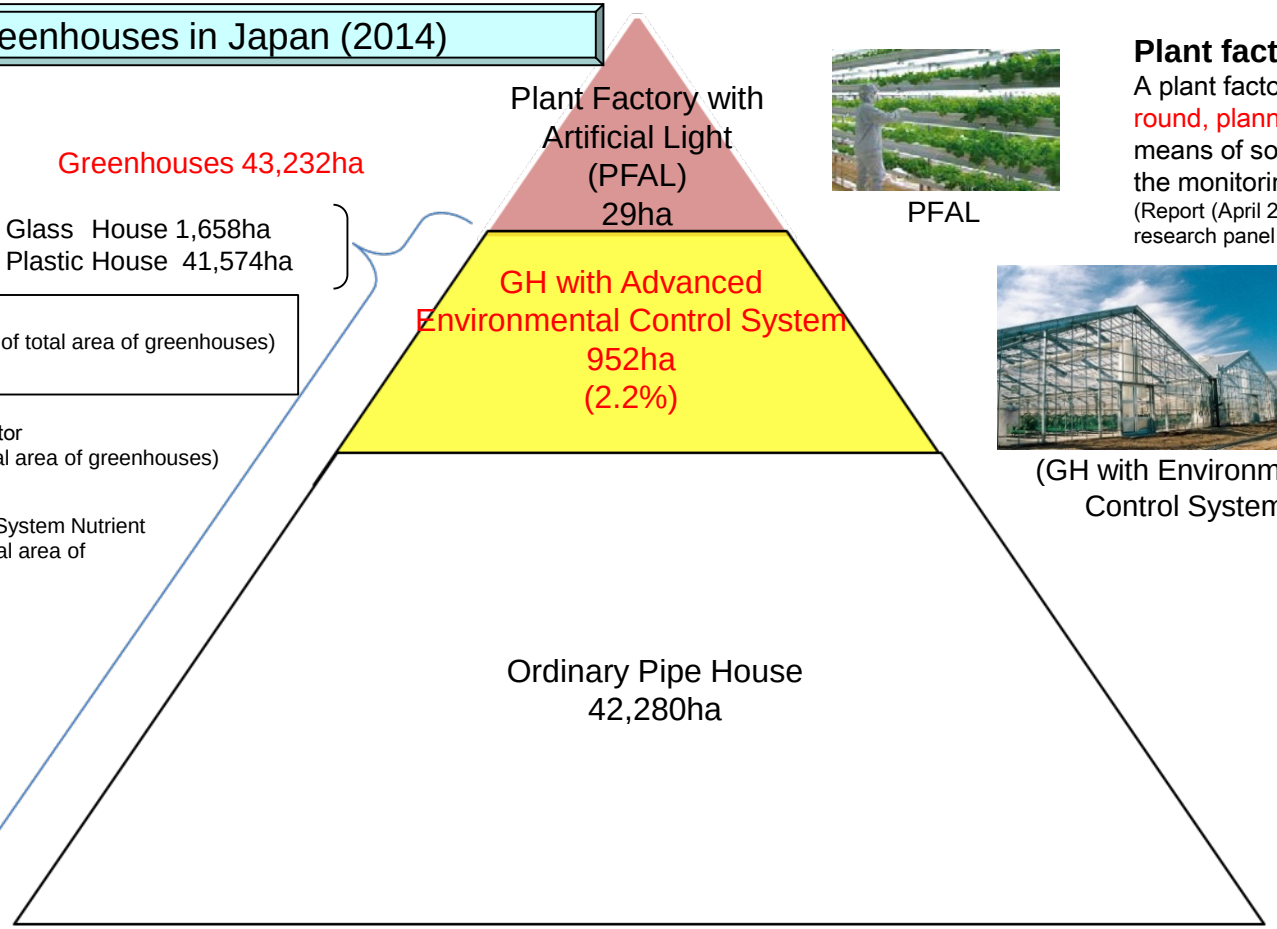


Sources: The Netherlands: FAOSTAT, Japan: Vegetable production shipment statistics (winter-spring tomatoes)

2. Challenges of greenhouse horticulture (1) (environmental control (2))

- To extend periods for which agricultural products including vegetables can be shipped, horticulture in Japan has advanced from vinyl tunnels and rain covers to greenhouses and devices to control temperatures in greenhouses.
- While greenhouses occupy a total area of 43,232ha, greenhouses equipped with devices to warm them and those capable of controlling light and other environmental factors account for 17,406ha (40.3%) and 952ha (2.2%), respectively.
- To ensure a stable supply of vegetables and other food regardless of weather conditions, it is important to raise the ratio of greenhouses equipped with environmental control devices and improve productivity.

○ Area of greenhouses in Japan (2014)



PFAL

Plant factory:
A plant factory is a cultivation facility capable of year-round, planned production of vegetables and others by means of sophisticated environmental control based on the monitoring of the environment and growth.
(Report (April 2009) by a working group on plant factories in a research panel on agriculture- and commerce-industry cooperation)

(GH with Environmental Control System)

(Ordinary Pipe House)

Source: Survey on Greenhouse Area, 2014, MAFF
The area includes rain protection facilities.
* Area of a greenhouse includes rain covers.

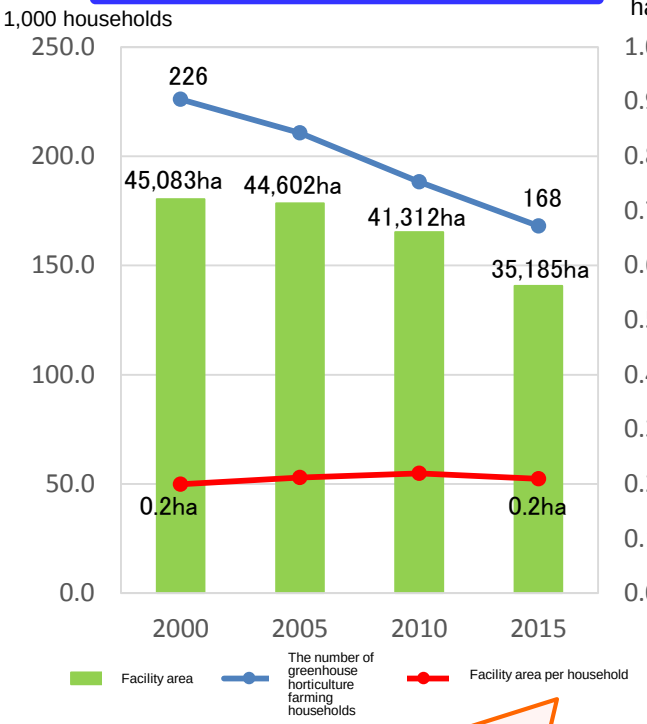
Area of PFAL (29 ha) was estimated based on National Survey on Plant Factory, March 2017.

2. Challenges of greenhouse horticulture (2) (management structure)

○The number of greenhouse horticultural farming households in Japan has been decreasing year after year due to the aging of farmers. But the area of greenhouses remains unchanged, at around 20a per household, and the scale of farming operations has failed to expand. The area of facilities erected therefore has decreased. In contrast, the area of greenhouses in the Netherlands has kept increasing year after year, so the scale of operation has been expanding.
○The area of greenhouses in Japan, seen on a scale-by-scale basis, is showing shrinking trends in operations smaller than 1ha but expanding trends in those larger than 1ha.

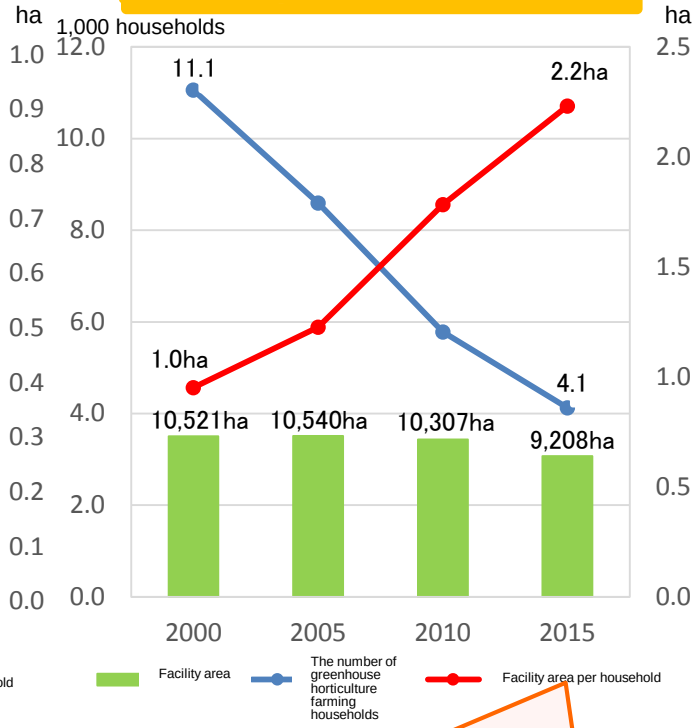
○ Number of farmers and operating land of greenhouse farm (Japan and the Netherlands)

Changes in Japan



The number of greenhouse horticultural farming households decreased while the scale of operations leveled off, resulting in a decrease in the area of greenhouses.

オランダの推移



While the number of greenhouse horticultural farming households decreased, the management scales expanded, resulting in the maintenance of the area of greenhouses.

○Change of total area by size operating land (Japan)

Operating land	Total greenhouse area (ha)			
	2000	2005	2010	2015
Less than 10a	3,488	2,707	2,249	2,207
10 ~ 30a	15,375	13,853	11,977	9,754
30 ~ 50a	11,578	11,822	10,692	8,564
50a ~ 1ha	9,762	10,807	10,479	8,743
10ha and more	4,880	5,413	**5,915 (14% of all farming households)**	**5,917 (17% of all farming households)**
Total	45,083	44,602	41,312	35,185

Source: Census of Agriculture and Forestry, MAFF , Centraal Bureau voor de Statistiek

2. Challenges of greenhouse horticulture (3) (energy costs)

○ Greenhouse horticulture is a business sector which, like the fishing sector, tends to be greatly affected by steep rises in fuel prices as heat, light and power expenses account for an extremely large portion of management cost.

○ Fuel has been repeating wild price fluctuations, affected by geopolitical risks, foreign exchange rates and international commodity prices. It is a production material for which the prediction of future prices is difficult.

○ Comparison of farm management expenses between greenhouse horticulture and paddy farming

(Unit: 1,000 yen/10a)

	Management cost	Gross profit	Income
Greenhouse green bell peppers	2,846	5,536	2,690
Greenhouse tomatoes	1,876	3,078	1,202
Greenhouse roses	2,077	2,664	586
Paddy farming	86	113	27

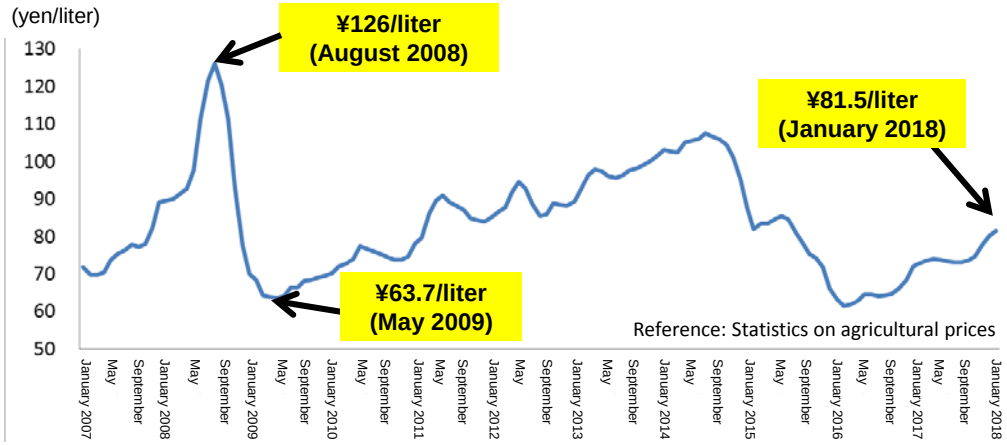
Source: Statistied Survey on Farm Management and Economy by farming type,2016,MAFF

○ Ratio of heat, light and power expenses to farm management cost

Greenhouse horticultural farming	Greenhouse green bell peppers	23%
	Greenhouse tomatoes	14%
	Greenhouse roses	37%
Open field farming	Green bell peppers grown in an open field	4%
Cultivation of fruits	Mandarin orange grown in an open field	5%
Paddy field farming	Cultivation of rice	5%
Fishery	Squid fishing (coastal)	26%

Source: Statistied Survey on Farm Management and Economy by farming type,2016 and fiscal 2015 survey report on fishery management,2015,MAFF

○Price changes of type-A fuel oil for agricultural use



○Average price of type-A fuel oil during warming period in greenhouse horticulture