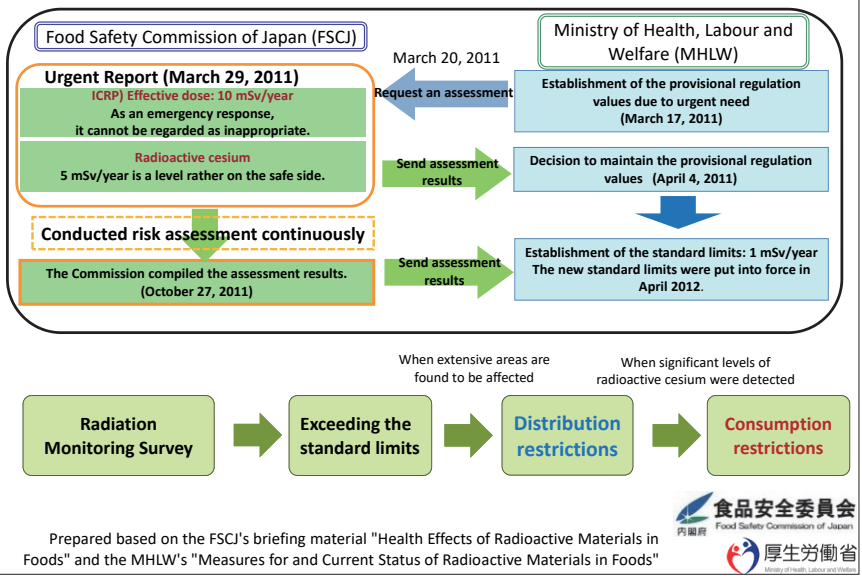
Measures for Radioactive Materials in Foods

Setting of Standard Limits for Radioactive Materials in Foods and Distribution/Consumption Restrictions



Prepared based on the FSCJ's briefing material "Health Effects of Radioactive Materials in Foods" and the MHLW's "Measures for and Current Status of Radioactive Materials in Foods"

Generally, health effects caused by consumption of hazardous materials in foods are assessed by the Food Safety Commission of Japan (FSCT), a risk assessment organization, which implements science-based risk assessments in an objective, neutral and fair manner. Based on the FSCJ's risk assessment, risk management organizations, such as the Ministry of Health, Labour and Welfare (MHLW) and the Ministry of Agriculture, Forestry and Fisheries (MAFF), formulate and implement risk management policies by establishing regulation values for each type of food.

However, under an emergency situation immediately after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, on March 17, 2011, the MHLW set the guideline values given by the Nuclear Safety Commission as the provisional regulation values for radioactive materials in foods. Then, the FSCJ held a total of five meetings, compiled the "Urgent Report on Radioactive Materials," and sent it to the MHLW on March 29, 2011. Based on this Urgent Report, the ministry decided to maintain the provisional regulation values as an interim measure.

In October 2011, the FSCJ notified the MHLW of the results of the risk assessment, and the MHLW reviewed the provisional regulation values and reduced the intervention level from 5 mSv/year to 1 mSv/year in order to further ensure security and safety considering the potential long-term effects of radiation exposure, in particular, radionuclides with relatively long half-lives. The new regulation was adopted on April 1, 2012.

Local governments conduct inspections of radioactive materials in foods based on their respective plans formulated in line with the guideline established by the Nuclear Emergency Response Headquarters. When any item with radioactivity concentration exceeding the standard values is found through an inspection, the relevant item is collected and disposed of. When extensive areas are found to be affected, the Director General of the Nuclear Emergency Response Headquarters (Prime Minister) issues distribution restrictions by designating the regions and the items.

When significant levels of radioactive materials are detected from a food item, consumption restrictions are promptly issued irrespective of the number of inspected samples of that item.

(Prepared based on the website of the Government's Public Relations Office (http://www.gov-online.go.jp/useful/article/201204/3.html, in Japanese) and the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" (March 24, 2017), Nuclear Emergency Response Headquarters)

Included in this reference material on March 31, 2013
Updated on February 28, 2018

Measures for Radioactive Materials in Foods

Publication of the Inspection Results Concerning Radioactive Materials in Foods

The national government proposes food items to be inspected and inspection frequencies, and respective prefectural governments formulate their inspection plans and carry out inspections accordingly.

Inspection results are publicized by the Ministry of Health, Labour and Welfare and respective local governments.

"Measures for Radioactive Materials in Foods," Ministry of Health, Labour and Welfare
http://www.mhlw.go.jp/shinsai_jouhou/shokuhin.html (in Japanese)

Database of radioactive substances in food:
http://www.radioactivity-db.info/ (in Japanese)

In response to the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS on March 11, 2011, the provisional regulation values concerning radioactive materials were established on March 17, 2011, based on the Food Sanitation Act (Act No. 233 of 1947). Then, the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" was compiled on April 4.

The "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" has been revised in light of the inspection results and accumulated knowledge on countermeasures to reduce radioactive materials (the latest revision was made on March 24, 2017).

Inspection results and information on distribution restrictions and consumption restrictions are positively publicized through websites of the national government and local governments.

Included in this reference material on February 28, 2018

Measures for Radioactive Materials in Foods

Standard Limits Applied from April 2012

○ Immediately after the accident, foods in conformity to the provisional regulation values were generally assessed to have no ill effects and their safety was guaranteed. However, the annual dose limit was reduced to 1 mSv from 5 mSv, which had been permitted under the provisional regulation values, and current standard limits were set based thereon from the perspective of further ensuring security and safety of foods.

○Provisional regulation values for radioactive cesium*1

Category	Regulation value
Drinking water	200
Milk and dairy products	200
Vegetables	500
Cereals	
Meat, eggs, fish and others	

*1 The regulation values were set also taking into consideration radioactive strontium.

○Present standard limits concerning radioactive cesium*2

Category	Standard limit
Drinking water	10
Milk	50
General foods	100
Infant foods	50

(Unit: Bq/kg)

*2 The standard limits were set also taking into consideration radioactive strontium, plutonium, etc.

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods"

Even based on the provisional regulation values applied up to March 2012, safety of foods in conformity thereto was guaranteed in terms of the effects on human health. However, from the perspective of further ensuring the security and safety of foods, the current standard limits were established and have been applied since April 1, 2012.

First of all, the provisional regulation values were based on the premise that the annual radiation dose from foods does not exceed 5 mSv.

The present standard limits are based on the idea that the annual radiation dose from foods should not exceed 1 mSv. Additionally, foods were classified into five categories for the provisional regulation values, but were newly classified into four for the present standard limits. The standard limit for drinking water was set at 10 Bq/kg. The standard limit for milk, which children generally drink a lot of, was reduced to 50 Bq/kg. Additionally, a new category, "infant foods," was made for ensuring safety for infants and the standard limit therefor was set at 50 Bq/kg, the same as that for milk. The standard limit for other general foods is 100 Bq/kg. All foods other than infant foods were categorized as general foods based on the idea to minimize gaps in additional doses caused by differences in individuals' eating habits. The present standard limits are easier to understand for the general public and are also consistent with international views.

(Related to p.44 of Vol. 2, "Food Categories [Reference]," and p.47 of Vol. 2, "Approach for the Establishment of the Standard Limits ◆ Grounds for the Standard Limits")

Included in this reference material on March 31, 2013
Updated on January 18, 2016

Measures for Radioactive Materials in Foods

Food Categories [Reference]

● **Basic idea**

Drinking water, infant foods and milk, for which special consideration is required, are separately classified into three different categories, while the others are all classified into a single category as general foods. In this manner, all foods and drinks are classified into four categories.

Food category	Reasons to establish the limits	Range of foods
Drinking water	1. Water is essential for human life and there is no substitution for water, and its consumption is large. 2. WHO's guidance level for radioactive cesium in drinking water is 10Bq/kg. 3. Strict management is possible for radioactive materials in tap water.	○ Drinking water, water used for cooking and tea drinks, which is a substitute for water
Infant foods	○ The Food Safety Commission pointed out that "the susceptibility to radiation may be higher in childhood than in adulthood."	○ Foods approved to be labeled as "fit for infants" based on Article 26, paragraph (1) of the Health Promotion Act (Act No. 103 of 2002) ○ Foods and drinks sold as intended for infants
Milk	1. Children consume a lot. 2. The Food Safety Commission pointed out that "the susceptibility to radiation may be higher in childhood than in adulthood."	○ Milk (cow milk, low-fat milk, processed milk, etc.) and milk drinks specified in the Ministerial Order concerning the Ingredient Standards for Milk and Dairy Products (Order of the Ministry of Health and Welfare No. 52 of 1951)
General foods	For the following grounds, foods other than given above are categorized as "general foods." 1. Can minimize the influence of individual differences in eating habits (deviation of the foods to be consumed) 2. Easy to understand for the general public 3. Consistent with international views, such as those of the Codex Alimentarius Commission	○ Foods other than given above

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

Standard limits concerning radioactive materials in foods are established respectively for the four food categories.

For "drinking water," the standard limit was set at 10 Bq/kg due to the following three grounds: (i) Water is essential for human life and there is no substitution for water, and its consumption is large; (ii) WHO's guidance level for radioactive cesium in drinking water is 10Bq/kg; and (iii) Strict management is possible for radioactive materials in tap water (p.31 of Vol. 2, "Waterworks System").

For "milk," the standard limit was set at 50 Bq/kg because (i) children consume a lot and (ii) the Food Safety Commission pointed out that "the susceptibility to radiation may be higher in childhood than in adulthood."

For "infant foods," the standard limit is the same as that for milk at 50 Bq/kg as the Food Safety Commission pointed out that "the susceptibility to radiation may be higher in childhood than in adulthood."

As reasons to set the limit at 100 Bq/kg for "general foods," the following three points are cited: Setting the value in this manner (i) can minimize the influence of individual differences in eating habits (deviation of the foods to be consumed), and is (ii) easy to understand for the general public and (iii) consistent with international views, such as those of the Codex Alimentarius Commission (an intergovernmental body created for the purpose of protecting consumers' health and ensuring fair-trade practices in the food trade, etc. that establishes international standards for foods).

(Related to p.166 of Vol. 1, "Comparison of Regulation Values for Foods")

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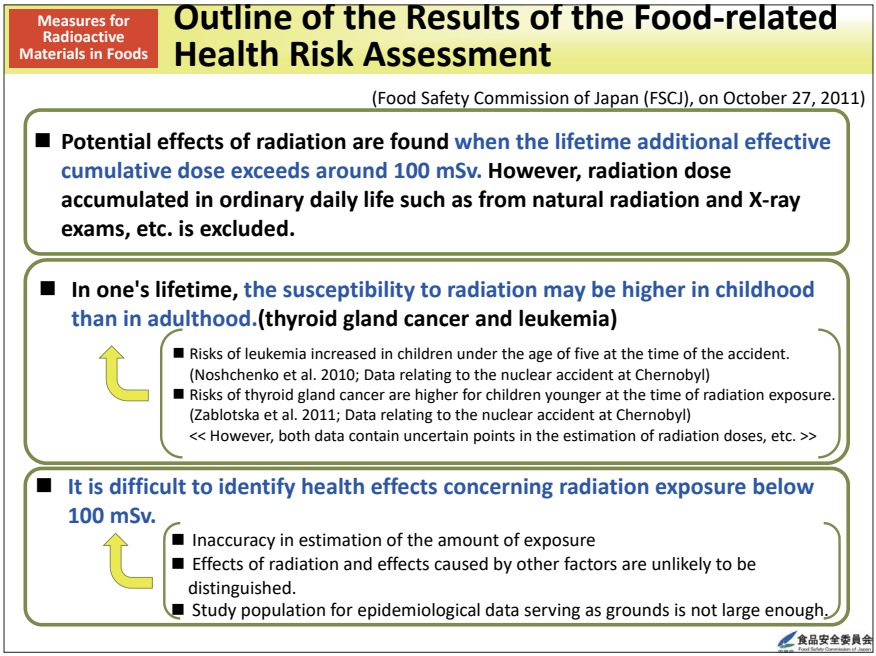


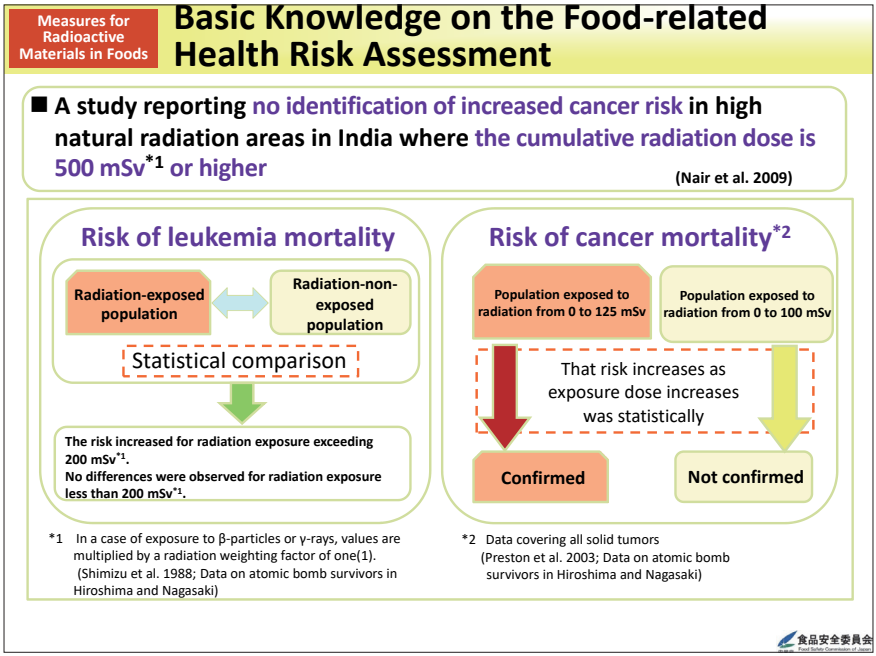
Based on currently available scientific knowledge, the FSCJ discussed additional radiation exposure through contaminated food consumption, and concluded that health effects could be found when the lifetime additional effective dose exceeds around 100 mSv, excluding radiation exposure from everyday life.

Although there are some unclear points in the estimation of radiation doses, etc., on the basis of findings of health effects after the accident at Chernobyl concerning risks of thyroid gland cancer and leukemia, it is likely that the susceptibility to radiation is higher in childhood than in adulthood (p.109 of Vol. 1, "Difference in Radiosensitivity by Age").

On the other hand, if any health effects may occur by exposure to radiation below 100 mSv, it would be very small. As effects of radiation and effects caused by other factors are unlikely to be clearly distinguished and the epidemiological data, due to the small study population, is insufficient to prove the health effects of additional exposure, such as a causal association with cancer, the FSCJ has concluded that it is difficult to identify health effects from the extra cumulative exposure to radiation doses below 100 mSv.

The lifetime additional effective cumulative dose of "around 100 mSv" is not a threshold meaning that radiation exposure below this level causes no health effects nor that radiation exposure above this level surely causes health effects. This is the dose value which risk management organizations should consider for appropriate management of foods.

Included in this reference material on March 31, 2013



This figure shows epidemiological data on which the Food-related Health Risk Assessment was based.

There was a study report that the increased cancer risk by radiation was not observed among persons exposed to radiation exceeding 500 mSv in total in areas in India where natural radiation doses are high (p.119 of Vol. 1, "Effects of Long-Term Low-Dose Exposure").

The data on atomic bomb survivors in Hiroshima and Nagasaki shows that the risk of leukemia mortality increased for the population exposed to radiation exceeding 200 mSv but that there was no statistically significant difference in the mortality risk between the populations exposed to radiation less than 200 mSv and not exposed to radiation (p.113 of Vol. 1, "Risks of Developing Leukemia").

Another report which analyzed the same data of atomic bomb survivors shows that for the population exposed to radiation from 0 to 125 mSv, it was statistically confirmed that the risk of cancer mortality increases as the exposure dose increases. However, for the population exposed to radiation from 0 to 100 mSv, no statistically significant difference was observed between radiation doses and the mortality risk. Based on these data, the result of the Food-related Health Risk Assessment was derived.

Included in this reference material on March 31, 2013

Measures for Radioactive Materials in Foods

Approach for the Establishment of the Standard Limits ◆ Grounds for the Standard Limits

Q. Why were the standard limits set based on the annual permissible dose of 1 mSv?

A. (i) They are in line with the international indicator based on scientific knowledge.

The Codex Alimentarius Commission, which establishes international specifications for foods, has set indicators so that the annual dose does not exceed 1 mSv.

Note) The International Commission on Radiological Protection (ICRP) considers that stricter requirements below 1 mSv/year would not achieve any significant additional dose reduction. Therefore, based on this, the Codex Alimentarius Commission specifies indicators.

(ii) They are intended to reduce radiation exposure as low as reasonably achievable.

Radiation monitoring surveys have shown considerable decreases over time in radioactivity concentrations measured in foods.

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

The standard limits concerning radioactive materials in foods were set based on the annual permissible dose of 1 mSv, which is adopted by the Codex Alimentarius Commission that establishes international specifications for foods. Originally, the International Commission on Radiological Protection (ICRP) publicized the idea that stricter requirements below 1 mSv/year would not achieve any significant additional dose reduction. Based on this idea, the Codex Alimentarius Commission specifies indicators.

Additionally, the standard limits are based on the principle of ALARA (As Low As Reasonably Achievable) (p.161 of Vol. 1, "Optimization of Radiological Protection"). Radiation monitoring surveys have shown considerable decreases in radioactivity concentrations measured in many of the food samples. Therefore, it was found that the reduction of the standard limit for radioactive cesium concentrations in general foods to 100 Bq/kg would not cause any problem for the dietary patterns of the Japanese people.

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Updated on January 18, 2016

Measures for Radioactive Materials in Foods

Radionuclides Taken into Consideration

Q. Why are the standard limits set only for radioactive cesium?

O The standard limits were set in consideration of all radionuclides whose half-life is one year or longer out of the radionuclides that are supposed to have been released due to the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS based on the assessment by the Nuclear and Industrial Safety Agency.

Regulated radionuclides	(Physical) half-life
Cesium 134	2.1 years
Cesium 137	30 years

Strontium 90	29 years
Plutonium	14 years -
Ruthenium 106	374 days

* The standard limits are not set for radioactive iodine, which has a half-life as short as 8 days and is no longer detected, nor for uranium that exists within the premises of TEPCO's Fukushima Daiichi NPS at the same level as naturally occurring uranium.

O However, as measurements of radionuclides other than radioactive cesium take time, the standard limits are not set for each of them but are calculated and set so that the total dose from other radionuclides does not exceed 1 mSv if only the standard limits for radioactive cesium are met.

* The maximum doses from radionuclides other than radioactive cesium that people may receive from foods can be calculated by age bracket based on such data as radioactivity concentrations in soil and easiness of transition of radioactive materials from soil to agricultural products. For example, for people aged 19 years or over, doses from radionuclides other than radioactive cesium account for approx. 12% of the total.

A. While also taking into consideration effects of other radionuclides in calculation, cesium that accounts for the largest percentage and is most easily measured is used as the indicator.

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

This figure shows the grounds why the standard limits are set only for radioactive cesium out of diverse radioactive materials.

All radionuclides whose half-life is one year or longer are taken into consideration, out of the radionuclides that are supposed to have been released due to the accident at TEPCO's Fukushima Daiichi NPS. Radionuclides shown in the table above, such as strontium 90, plutonium, and ruthenium 106, are taken into account in calculation, in addition to radioactive cesium. However, as the standard limits are intended for long-term regulations of radioactive materials in foods, radionuclides with a short half-life are not covered. For example, the standard limits are not set for radioactive iodine. Even if measurements are conducted for these other radionuclides by setting specific standard limits for each of them, it takes time to obtain measurement results. On the other hand, it is easy to measure radioactive cesium. Therefore, the standard limits are calculated and set so that the total dose from other radionuclides does not exceed 1 mSv if only the standard limits for radioactive cesium are met.

Specifically, effects of the radionuclides shown in the table above, such as radioactive cesium, strontium 90 and plutonium, were ascertained through surveys of soil, etc. For example, assuming the entirety of the effects caused by the consumption of foods containing radioactive materials released from TEPCO's Fukushima Daiichi NPS as 100, the effects of radioactive cesium account for around 88 in the case of people aged 19 years or over. On the other hand, the effects of the other radionuclides were found to account for around 12. In this manner, the standard limits were established also taking into consideration the effects of radionuclides other than radioactive cesium.

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Measures for Radioactive Materials in Foods

Approach for the Calculation of the Standard Limits (1/2)

How was the standard limit figured out to be 100 Bq/kg for general foods based on the annual permissible dose of 1 mSv?

1. Preconditions for calculation

- **For drinking water, the standard limit is set to be 10 Bq/kg in line with the WHO's guidance level.**
  → The annual permissible dose allocated to general foods is **approx. 0.9 mSv (0.88 to 0.92 mSv/y)**, which is obtained by subtracting that for drinking water (approx. 0.1 mSv/y) from the total annual permissible dose of 1 mSv.

- **Domestically-produced foods are assumed to account for 50% of all distributed foods.**
  * The standard limits are calculated on the assumption that domestically-produced foods contain radioactive materials at levels close to the maximum permissible limit.

2. Conversion from radioactivity concentrations (Bq) to radiation doses (mSv)

Radiation dose (mSv) = **Radioactivity concentration** (Bq/kg) × **Amount of consumption** (kg) × **Effective dose coefficient** (mSv/Bq)

Under the preconditions mentioned in 1. above, the maximum limit for radioactive materials in 1 kg of general foods is calculated so that doses from general foods do not exceed the annual permissible dose for general foods.

(e.g.) < In the case of males aged between 13 and 18 >

0.88 mSv = X (Bq/kg) × 374 kg (50% of the annual consumption of foods) ×

X = 120 (Bq/kg) (rounded off to three digits)

0.0000181 (mSv/Bq)
(effective dose coefficient in consideration of the effects of all covered radionuclides)

* For adults, the effective dose coefficient for Cs-134 is 0.000019 and that for Cs-137 is 0.000013. The effective dose coefficient thus differs by radionuclide. Therefore, based on respective radionuclides' concentration ratios in foods, the effective dose coefficient in consideration of the effects of all covered radionuclides was used for the calculation of the maximum limits.
* Concentration ratios change over time as each radionuclide has a different half-life. Therefore, the coefficient on the safest side over the coming 100 years was adopted.
* The above explanation is just the outline. For more detailed calculation methods, refer to the reference material of the Pharmaceutical Affairs and Food Sanitation Council.

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

This figure shows the approach for the calculation of the standard limits, explaining the relation between the annual additional dose limit (1 mSv) and the standard limit for general foods (100 Bq/kg).

First, the annual permissible dose allocated to general foods is assumed to be 0.88 to 0.92 mSv by subtracting approx. 0.1 mSv permitted for drinking water from the total annual permissible dose of 1 mSv. Next, domestically-produced foods and imported foods are assumed to account for 50% each of all distributed foods. Then, in the case of males aged between 13 and 18, it is assumed that 374 kg of foods or 50% of the total annual consumption per person (approx. 748 kg) is domestically produced. The effective dose coefficient in consideration of the effects of all covered radionuclides (0.0000181 mSv/Bq) is to be used for calculation.

Then, the calculation formula is as follows.

0.88 mSv = (Radioactivity concentration: Bq/kg) × 374 kg × 0.0000181 (mSv/Bq)

(Radioactivity concentration: Bq/kg) = 120 Bq/kg

If radioactivity concentrations in general foods do not exceed 120 Bq/kg, the annual additional dose will be within 0.88 mSv.

Therefore, the standard limit for general foods (100 Bq/kg), which is lower than 120 Bq/kg, is the value set on the safe side to guarantee safety.

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Measures for Radioactive Materials in Foods

Approach for the Calculation of the Standard Limits (2/2)

3. Calculation of the upper limits by age bracket

Intervention level: 1 mSv/y

Age brackets are divided more finely than for the provisional regulation values

Subtract permissible dose for drinking water (approx. 0.1 mSv)

Permissible dose to be allocated to general foods (approx. 0.9 mSv) determined

The upper limit is calculated in consideration of **the amount of consumption** and **the conversion factor (effective dose coefficient)** by age bracket.

* **Effects of radionuclides other than cesium** are also taken into account.

Age bracket	Gender	Upper limit (Bq/kg)
Under 1 year old	Total average	460
1 to 6 years old	Male	310
	Female	320
7 to 12 years old	Male	190
	Female	210
13 to 18 years old	Male	**120**
	Female	150
19 years old or older	Male	130
	Female	160
Pregnant women	Female	160
Minimum value		**120**

→ **Standard limit 100** Bq/kg

The standard limit is set based on the strictest upper limit (the minimum value) out of those for all age brackets.

- **The standard limit results in reflecting requirements for all age brackets.**
- **The standard limit secures an extra margin of safety from the upper limit especially for infants.**

4. Standard limits for milk and infant foods

These categories are established in consideration of young children. Therefore, the standard limits should be stricter so that consumption of these foods would not cause any harmful effects even if all of them contain radioactive materials up to the upper limits.

→**The standard limits for milk and infant foods are both set to be 50 Bq/kg**, namely half of the 100 Bq/kg for general foods.

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods"

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The idea of figuring out dose limits for each age bracket underlies the basic approach for setting the standard limits.

The annual permissible dose allocated to general foods is approx. 0.9 mSv, subtracting that for drinking water from the total.

The table above shows upper limits (Bq/kg) by age bracket calculated based on the annual consumption and the effective dose coefficient for each age bracket.

As a result, the strictest upper limit was found to be 120 Bq/kg for males aged between 13 and 18.

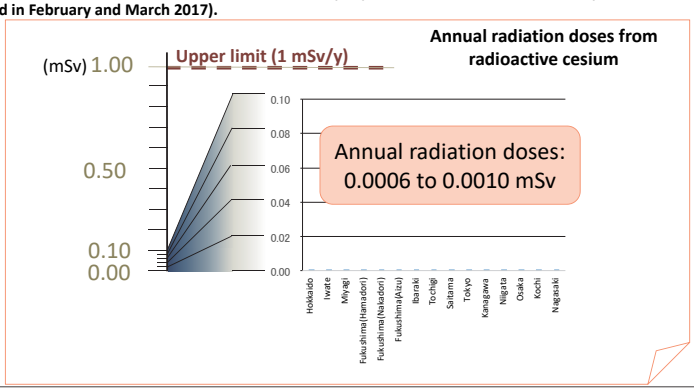
In order to ensure safety for all age brackets, the standard limit was set to be 100 Bq/kg on the safe side, below the strictest upper limit of 120 Bq/kg.

Included in this reference material on March 31, 2013
Updated on January 18, 2016

Measures for Radioactive Materials in Foods

Survey of Distributed Foods (Market Basket Survey)

- **A survey was conducted by purchasing foods distributed nationwide and precisely measuring radioactive cesium contained therein.**
  Foods were purchased based on average food consumption by region (based on the National Health and Nutrition Survey) and purchased foods were mixed for measurement.
  - ◆Purchased foods were simply cooked in line with ordinary dietary circumstances and measurement was conducted.
  - ◆Regarding fresh foods, those produced in the relevant region or the neighboring areas were chosen if possible.
- **Based on the measurement results, radiation doses that people would intake from foods in a year were calculated (surveyed in February and March 2017).**



Measured effective doses were 1% or lower of 1 mSv/y, based on which the standard limits were established.

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

From February to March 2017, the Ministry of Health, Labour and Welfare conducted a survey by purchasing distributed foods in 15 areas across Japan and measuring radioactive cesium contained therein to estimate annual radiation doses received from radioactive cesium in foods.

Annual radiation doses received from radioactive cesium in foods were estimated to be 0.0006 to 0.0010 mSv, 1% or lower of the annual permissible dose of 1 mSv/y, based on which the standard limits were established. Thus, annual radiation doses were confirmed to be extremely small.

Market basket survey:
One of the survey methods for estimating daily consumption of various chemical substances
(Source: Ministry of Health, Labour and Welfare's website: http://www.mhlw.go.jp/shinsai_jouhou/market_basket.html, in Japanese)

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Updated on February 28, 2018

Measures for Radioactive Materials in Foods

Prefectures and Food Items to be Inspected (Items for which Cultivation/Feeding Management is Difficult and Log-grown Mushrooms)

Food items for which cultivation/feeding management is difficult and relevant prefectures to be inspected

		Aomori	Iwate	Akita	Miyagi	Yamagata	Fukushima	Ibaraki	Tochigi	Gunma	Chiba	Saitama	Tokyo	Kanagawa	Niigata	Yamanashi	Nagano	Shizuoka
Items with radioactivity concentrations exceeding the standard limits	Wild mushrooms and wild plants	□	●	□	◎	◎	◎	●	◎	◎	●	□	□	□	◎	◎	◎	◎
	Wild bird and animal meat	□	◎	□	◎	●	◎	◎	◎	◎	●	□	□	□	●	□	□	□
Items with radioactivity concentrations exceeding half of the standard limits but not exceeding the standard limits	Wild mushrooms and wild plants	□	□	●	●	□	●	□	●	□	□	□	□	□	□	□	□	□
	Honey	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—
Marine fish		—	□	—	□	—	◎	◎	×	×	◎	×	—	—	—	×	×	—
Inland water fish		—	◎	—	◎	—	◎	◎	◎	◎	◎	—	—	—	—	—	—	—

Log-grown mushrooms to be inspected and relevant prefectures to be inspected

	Aomori	Iwate	Akita	Miyagi	Yamagata	Fukushima	Ibaraki	Tochigi	Gunma	Chiba	Saitama	Tokyo	Kanagawa	Niigata	Yamanashi	Nagano	Shizuoka
Log-grown mushrooms	▲	●	▲	●	▲	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲

Classification based on inspection results for the latest one year (from April 1, 2016, to February 28, 2017)

◎ :Items wherein radioactivity concentrations exceeding the standard limits were detected (for fishery products, those wherein radioactivity concentrations exceeding half of the standard limits were detected)

● :Items wherein radioactivity concentrations exceeding half of the standard limits were detected (excluding those wherein radioactivity concentrations exceeding the standard limits were detected)

□ :Items requiring inspections in consideration of the difficulties in management (wild mushrooms and wild plants), the mobility (wild bird and animal meat), or the status of distribution restrictions (marine fish)

▲ : Items requiring cultivation management and monitoring based on the influence of radioactive materials on materials used for production

— :Items that are not classified by relevant prefectures as those requiring inspections based on inspection results for the latest one year

× :Nothing applicable

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

In FY2016, more than five years after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, radioactivity concentrations had decreased as a whole and food items with radioactivity concentrations exceeding the standard limits had become limited. Therefore, the national government reviewed inspection methods to make them more reasonable and efficient by reconsidering prefectures to be inspected, while ascertaining opinions of consumers and other related parties.

Based on the results of such review, inspections were streamlined centered on items whose cultivation/feeding is manageable to enhance efficiency. At the same time, as inspection results had been accumulated, the approach for deciding prefectures and items to be inspected and lifting distribution restrictions was reviewed and inspection targets are as shown in the table above as of FY2017.

With regard to items for which cultivation/feeding management is difficult, prefectures where inspections need to be continued are specified for each item in consideration of the difficulties in management therefor.

With regard to log-grown mushrooms, prefectures where inspections need to be continued are also specified considering the influence of radioactive materials on materials used for production.

Included in this reference material on February 28, 2018

Measures for Radioactive Materials in Foods

Prefectures and Food Items to be Inspected (Items whose Cultivation/Feeding is Manageable (excl. Log-grown Mushrooms))

Food items whose cultivation/feeding is manageable (excl. log-grown mushrooms) and relevant prefectures to be inspected

		Iwate	Miyagi	Fukushima	Tochigi
Items with radioactivity concentrations exceeding half of the standard limits but not exceeding the standard limits	Vegetables	–	–	●	–
	Fruits	–	–	●	–
	Beans	–	–	●	–
	Meat	–	●	●	–
Rice		–	–	■	–
Soybeans		–	–	■	–
Buckwheat		■	–	–	–

* Items requiring continued monitoring as being significantly affected by feeding management (milk and beef meat) are inspected in Iwate, Miyagi, Fukushima, Tochigi and Gunma Prefectures.

Classification based on inspection results for the latest one year (from April 1, 2016, to February 28, 2017)
- ● : Items wherein radioactivity concentrations exceeding half of the standard limits were detected (excluding those wherein radioactivity concentrations exceeding the standard limits were detected)
- ■ : Items that are classified as inspection targets in the Appendix
- – : Items that are not classified by relevant prefectures as those requiring inspections based on inspection results for the latest one year

Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

With regard to items whose cultivation/feeding is manageable (excluding log-grown mushrooms), prefectures where inspections need to be continued are specified for each item based on inspection results for the latest three years, such as prefectures where items with radioactive cesium exceeding half of the standard limits were detected.

In other prefectures, inspections are to be conducted as needed.

Included in this reference material on February 28, 2018

Measures for Radioactive Materials in Foods

Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies

	Local governments marked with ◎ and ● (those marked with ■ and ▲ should conduct inspections correspondingly)	
	Municipalities (exceeding half of the standard limits)	Other municipalities
Exceeding half of the standard limits	3 or more samples	1 or more samples*1
Beef meat	Once every three months for each farm household*2	
Milk	Periodically for each cooler station*3	
Inland water fish Marine fish	Periodically*4	

*1: It is permissible to divide a prefecture into multiple zones across municipalities and conduct inspections for three or more samples in each of those zones.
*2: For farm households whose feeding management has been recognized as appropriate by the relevant local government, it would suffice to conduct inspections once every 12 months or so.
*3: This does not apply in cases where the relevant local government recognizes appropriate feeding management and there are no areas subject to distribution restrictions for raw milk and where inspection results for the latest three years are all below half of the standard limits.
*4: Inspections of marine fish by Iwate Prefecture are to be conducted in consideration of the past inspection results.

(For marks, ◎, ● ■ and ▲, refer to p.52 and p.53 of Vol. 2, "Prefectures and Food Items to be Inspected")

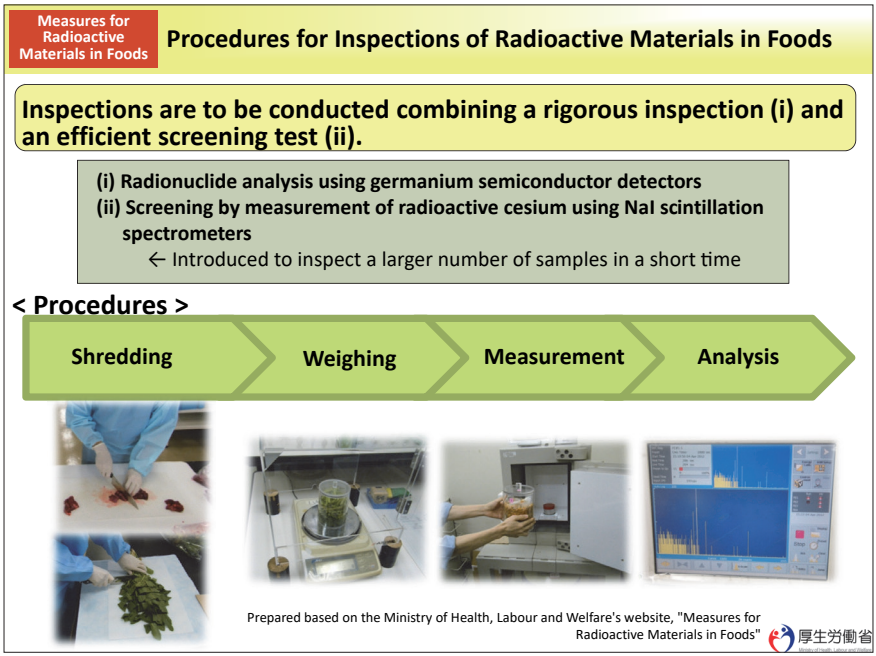
Prepared based on the Ministry of Health, Labour and Welfare's website, "Measures for Radioactive Materials in Foods" 厚生労働省

This table shows the required number of samples and frequencies of inspections for local governments whose inspections detected radioactive cesium concentrations exceeding the standard limits (those marked with ◎) and local governments whose inspections detected radioactive cesium concentrations exceeding half of the standard limits (those marked with ●).

The "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" (March 24, 2017) by the Nuclear Emergency Response Headquarters specifies as follows.

"Regarding local governments that have detected radioactive cesium concentrations exceeding half of the standard limits in any food under this food classification since April 2016, inspections should be conducted for three or more samples for each municipality in the areas where radioactive cesium concentrations exceeding half of the standard limits were detected (marked with ◎ in the table). In other areas (marked with ○ in the table), inspections should be conducted for one or more samples for each municipality (it is permissible to divide a prefecture into multiple zones across municipalities and conduct inspections for three or more samples in each of those zones).

Included in this reference material on March 31, 2013
Updated on February 28, 2018



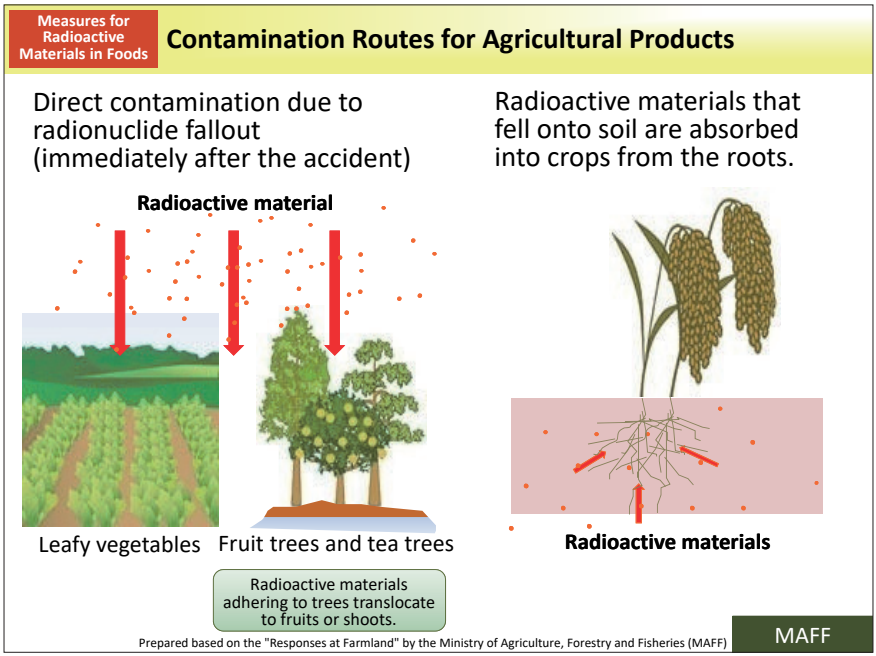
This figure shows procedures for inspections of radioactive materials in foods.

There are two ways to inspect foods, i.e., a rigorous inspection and an efficient screening test.

As a rigorous inspection, radionuclide analysis is conducted using a germanium semiconductor detector. After shredding a food sample, its weight is measured accurately. Then, the shredded sample is put in a prescribed container. The container is set in a detector, which is structured like a box covered with a thick layer of lead, and the amount of radioactive cesium is measured. Lastly, measurement results are analyzed.

For an efficient screening test, a NaI (Tl) scintillation spectrometer is used. A NaI scintillation spectrometer is inferior to a germanium semiconductor detector in terms of measurement accuracy, but can shorten the time required for inspections and is less expensive. If the measurement using a NaI scintillation spectrometer suggests the existence of radioactive cesium exceeding the standard limits, an inspection is conducted again using a germanium semiconductor detector.

Included in this reference material on March 31, 2013
Updated on March 31, 2017



Contamination routes due to radioactive fallout are roughly divided into three.

(i) The figure on the left shows the route of how radioactive fallout directly adheres to crops. High radioactivity concentrations were often detected in leafy vegetables that were grown in the fields at the time of the accident. This is considered to be due to direct contamination.

(ii) The figure in the center shows the route of how radioactive materials that adhered to fruit trees and tea trees immediately after the accident penetrate into trees and translocate* to fruits and tea shoots.

(iii) The figure on the right shows the route of how radioactive materials that fell onto soil are absorbed into crops from the roots. Contamination of crops planted after the accident is considered to have followed this route.

* Translocation: Phenomenon wherein nutrients absorbed in a plant or metabolites produced by photosynthesis are transported from one tissue to another tissue

(Related to p.171 of Vol. 1, "Transfer to Plants")

Included in this reference material on March 31, 2013
Updated on March 31, 2017

Measures for Radioactive Materials in Foods

Measures for Reducing Transfer of Radioactive Materials to Crops (1/5) - Decontamination of Farmland -

Stripping of topsoil (Topsoil removal)

Scrape away the topsoil to remove radioactive materials which remain in shallow depth

Inversion tillage

Replace topsoil with subsoil, thereby reducing radioactivity concentrations in the soil layer where plants take root

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

Radioactive materials that were released into the air and fell onto uncultivated farmland stay on topsoil.

Therefore, at farmland where high radioactivity concentrations are detected, the topsoil is scraped away to remove radioactive materials which remain in shallow depth.

In the meantime, at farmland where detected radioactivity concentrations are relatively low, topsoil is replaced with subsoil (inversion tillage) to reduce radioactivity concentrations in the soil layer where plants take root.

In this manner, efforts have been made to reduce radiation doses released from farmland and inhibit growing crops from absorbing radioactive materials.

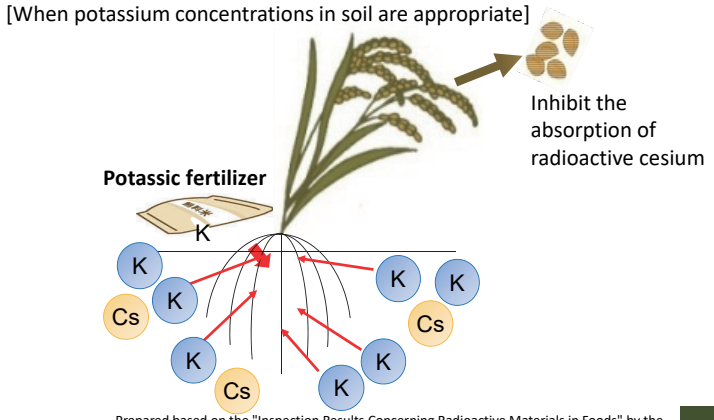
Included in this reference material on March 31, 2013
Updated on March 31, 2017

Measures for Radioactive Materials in Foods

Measures for Reducing Transfer of Radioactive Materials to Crops (2/5)

- Measures to Inhibit Radioactive Cesium Absorption through Potassic Fertilization -

- **In paddy fields where detected radioactive cesium concentrations in brown rice are higher, potassium concentrations in soil tend to be lower.**
- **Potassium in soil has similar chemical characteristics as cesium and proper use of potassic fertilizer can inhibit growing crops from absorbing cesium.**



Prepared based on the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

It is known that crops, such as rice, absorb more radioactive cesium when potassium concentrations in soil are lower.

Potassium and cesium have similar chemical characteristics, and when the soil contains sufficient potassium, less cesium is absorbed into crops.

Therefore, at farmland where potassium concentrations in soil are low, a sufficient amount of potassic fertilizer is applied to increase potassium concentrations above a certain level to inhibit absorption of radioactive cesium into crops.

Included in this reference material on March 31, 2013
Updated on March 31, 2017

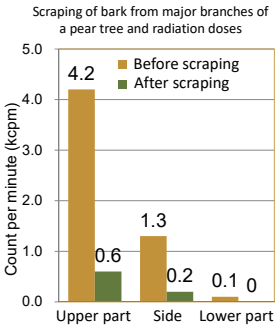
Measures for Radioactive Materials in Foods

Measures for Reducing Transfer of Radioactive Materials to Crops (3/5) - Washing of Fruit Trees and Removal of Bark -

Wash off radioactive cesium adhering to trees with high-pressure water and scrape away bark to reduce radioactive cesium concentrations

High-pressure washing of a persimmon tree

Scraping of bark from a pear tree



Prepared based on the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

In order to prevent translocation of radioactive materials from fruit trees to fruits, trees are washed with high-pressure water and bark is scraped off from trees to remove adhering radioactive materials.

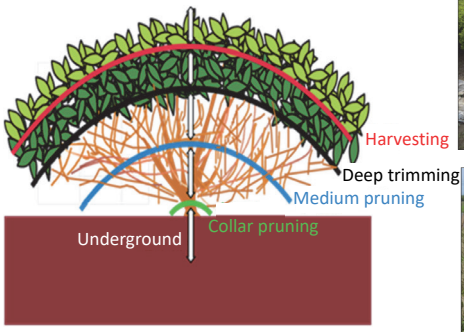
In the case of pear trees, there is data that radiation doses from major branches are reduced by nearly 90% by scraping off the bark.

Included in this reference material on March 31, 2013
Updated on March 31, 2017

Measures for Radioactive Materials in Foods

Measures for Reducing Transfer of Radioactive Materials to Crops (4/5) - Pruning of Tea Trees -

Reduce transfer of radioactive cesium from leaves and trees to new leaves by pruning and deep trimming



Prepared based on the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

In the case of tea trees, in order to prevent transfer of radioactive materials from the surface of leaves to new leaves, leaves and branches are trimmed or pruned deeper than usual to remove contaminated parts.

Included in this reference material on March 31, 2013
Updated on March 31, 2017

Measures for Radioactive Materials in Foods

Measures for Reducing Transfer of Radioactive Materials to Crops (5/5) - Management of Fertilizers, etc. -

- In order to prevent farmland soil from being contaminated with radioactive cesium, the reference value of 400 Bq/kg in fertilizers, soil amendments and soils for cultivation was set.(*)
- Several local governments and other organizations have conducted inspections and imposed a voluntary ban or other measures for reduction of radioactive cesium on fertilizers and materials in which radioactive cesium concentration exceeded the reference value.

* The reference value was set so as not to exceed the normal range of radioactive cesium concentration in soil before the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, even with continuous application of these agricultural materials for long periods.

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

Regarding materials used for agricultural production, such as fertilizers, soil amendments and soils for cultivation, the reference value of 400 Bq/kg was set in order to prevent expansion of contamination of farmland soil by use of materials contaminated with radioactive cesium.

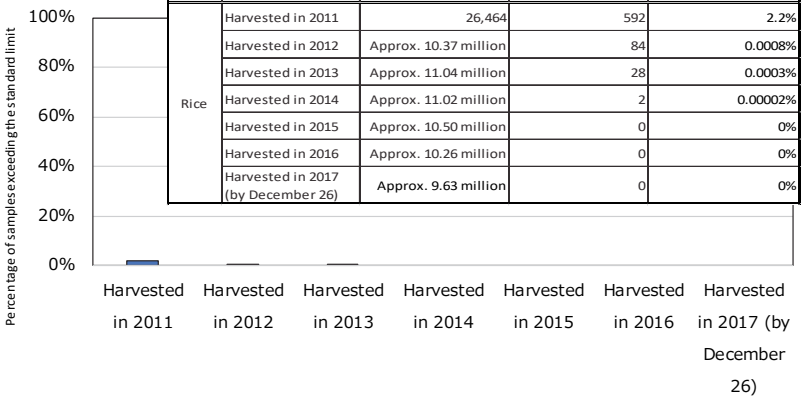
Several local governments and other organizations have monitored radioactive cesium concentration in these materials, and provide guidance to ensure that materials containing radioactive cesium exceeding the reference value should not be used at farmland.

Included in this reference material on March 31, 2013
Updated on March 31, 2017

Rice

Changes in Inspection Results for Rice (Incl. Inspection of All Rice Bags)

	Inspection period	Number of samples	Number of samples exceeding the standard limit	Percentage of samples exceeding the standard limit
Rice	Harvested in 2011	26,464	592	2.2%
	Harvested in 2012	Approx. 10.37 million	84	0.0008%
	Harvested in 2013	Approx. 11.04 million	28	0.0003%
	Harvested in 2014	Approx. 11.02 million	2	0.00002%
	Harvested in 2015	Approx. 10.50 million	0	0%
	Harvested in 2016	Approx. 10.26 million	0	0%
	Harvested in 2017 (by December 26)	Approx. 9.63 million	0	0%



* Coverage: 17 prefectures including the Tokyo Metropolis designated as inspection targets in the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies," which compiles basic approaches concerning radioactive materials in foods

Prepared based on the "Inspection Results Concerning Radioactive Cesium Concentrations in Agricultural Products" by the Ministry of Agriculture, Forestry and Fisheries and the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Health, Labour and Welfare

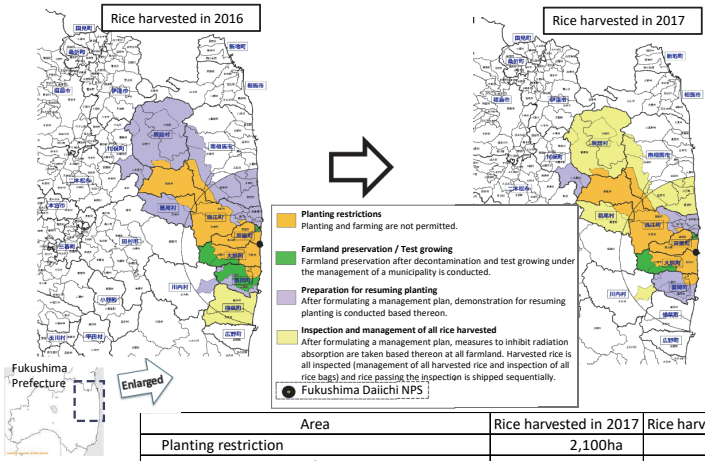
The production and distribution of rice are managed through measures to inhibit radioactive cesium absorption by the use of potassic fertilizer and inspection of all bags of harvested rice. In Fukushima Prefecture, planting has been restricted and measures to inhibit radioactive cesium absorption have been taken at Areas under Evacuation Orders and distribution of rice has been strictly controlled through inspection of all rice bags since FY2015 based on the "Policies on Planting of Rice."

Rice containing radioactive cesium at a level exceeding the standard limit decreased year by year, and there has been none since FY2015 (as of December 26, 2017).

Included in this reference material on March 31, 2014
Updated on February 28, 2018

Rice

Areas Subject to Planting Restrictions for Rice to be Harvested in 2017



Area	Rice harvested in 2017	Rice harvested in 2016
Planting restriction	2,100ha	2,100ha
Farmland preservation / Test growing	300ha	500ha
Preparation for resuming planting	1,700ha	4,600ha
Inspection and management of all rice harvested	3,200ha	500ha
Total	7,300ha	7,800ha

Prepared based on the "Areas Subject to Planting Restrictions for Rice to be Harvested in 2016" and the "Areas Subject to Planting Restrictions for Rice to be Harvested in 2017" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

Entry and farming are restricted in Areas under Evacuation Orders. In Habitation Restricted Areas, farmland preservation after decontamination and test growing under the management of the relevant municipalities may be conducted, and in Preparation Areas for Lift of Evacuation Order, demonstration for resuming planting may be conducted under a management plan formulated by the prefecture and the relevant municipalities (preparation for resuming planting).

In areas not subject to evacuation orders that were under evacuation orders in the previous year or where rice containing radioactive cesium exceeding the standard limit was detected in the previous year, the prefecture and the relevant municipalities formulate a management plan and measures to inhibit radioactive cesium absorption are taken thoroughly and all rice harvested in respective areas is managed and all bags are inspected (inspection and management of all rice harvested).

In areas where inspection and management of all rice harvested were obliged in the previous year and there was none harvested in the previous year wherein radioactive cesium exceeding the standard limit was detected, measures to inhibit radioactive cesium absorption are taken thoroughly by each farm household and all farm households are inspected (inspection and management of all farm households).

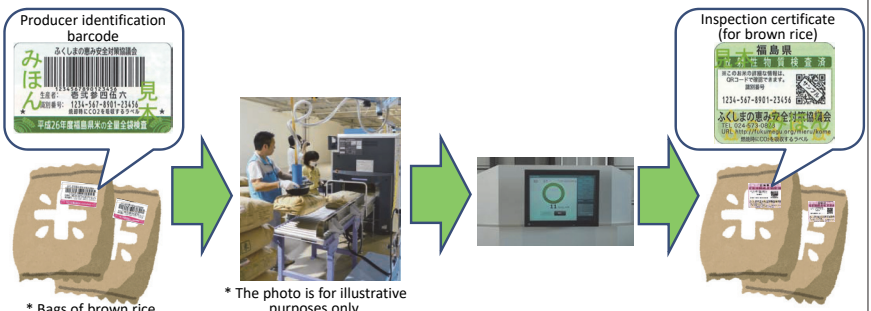
In other areas, measures to inhibit radioactive cesium absorption are taken as needed and random inspection is conducted for each area.

Included in this reference material on February 28, 2018

Rice

Radioactivity Inspection of All Rice Bags by Fukushima Prefecture

Fukushima Prefecture has been inspecting all bags of rice harvested throughout the prefecture since 2012, apart from inspections based on the inspection guideline.



Rice producers attach their identification barcodes to all bags of rice and bring them to inspection stations.	A belt conveyor-type survey meter scans barcodes and measures radioactive cesium levels.	Only rice bags for which measured values were below the standard limit pass the inspection.	Inspection certificate is attached to bags of brown rice that passed the inspection.

Radioactivity Inspection results can be checked using QR (quick response) codes.
"Fukushima Association for Securing Safety of Agricultural Products (https://fukumegu.org/ok/kome)(in Japanese)"

* Prepared based on the website of the Fukushima Prefectural Government

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

Since 2012, Fukushima Prefecture has been inspecting all bags of rice harvested throughout the prefecture, not limited to the areas instructed by the national government, as an initiative by the prefecture. For radioactivity inspections, belt conveyor-type survey meters are used.

Whether the rice has passed the inspection can be checked as follows. In the case of brown rice packed in a 30-kg paper bag that passed the inspection, an inspection certificate is attached to the paper bag.

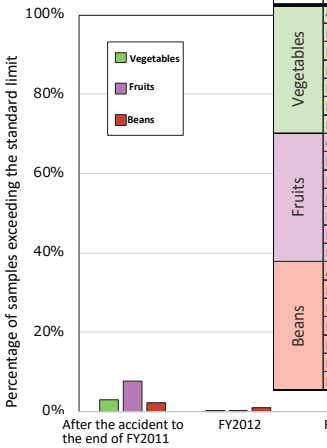
In the case of polished rice, a polished rice label to prove that it is made from brown rice that passed the inspection is attached. However, as this label is attached on a voluntary basis, some polished rice that passed the inspection may be distributed without the label.

(Cited from the website of Fukushima Prefecture "Frequently Asked Questions about Radioactivity Inspection of All Rice Bags": http://www.pref.fukushima.lg.jp/sec/36035b/suiden-zenryozenhukurokensa-faq.html, in Japanese)

Included in this reference material on March 31, 2013
Updated on February 28, 2018

Vegetables, Fruits and Beans

Changes in Inspection Results for Vegetables, Fruits and Beans



	Inspection period	Number of samples	Number of samples exceeding the standard limit	Percentage of samples exceeding the standard limit
Vegetables	After the accident to the end of FY2011	12,671	385	3.0%
	FY2012	18,570	5	0.03%
	FY2013	19,657	0	0%
	FY2014	16,712	0	0%
	FY2015	12,205	0	0%
	FY2016	10,810	0	0%
	FY2017 (up to December 26)	6,919	0	0%
Fruits	After the accident to the end of FY2011	2,732	210	7.7%
	FY2012	4,478	13	0.3%
	FY2013	4,243	0	0%
	FY2014	3,302	0	0%
	FY2015	2,783	0	0%
	FY2016	2,155	0	0%
	FY2017 (up to December 26)	1,484	1	0.1%
Beans	After the accident to the end of FY2011	689	16	2.3%
	FY2012	5,962	63	1.1%
	FY2013	5,167	21	0.4%
	FY2014	3,459	4	0.1%
	FY2015	1,813	0	0%
	FY2016	957	0	0%
	FY2017 (up to December 26)	477	0	0%

* Coverage: 17 prefectures including the Tokyo Metropolis designated as inspection targets in the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies," which compiles basic approaches concer radioactive materials in foods

* Values for beans are those compiled based on production years.

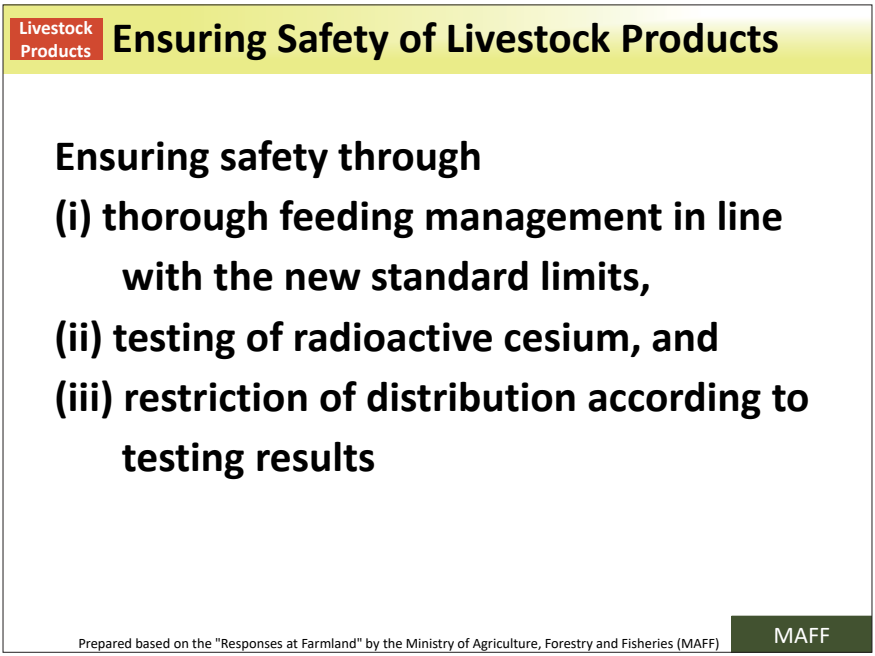
Prepared based on the "Inspection Results Concerning Radioactive Cesium Concentrations in Agricultural Products" by the Ministry of Agriculture, Forestry and Fisheries and the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Health, Labour and Welfare

Upon production and shipment of vegetables, fruits and beans, measures to inhibit radioactive cesium absorption by the use of potassic fertilizer are taken.

No vegetables and beans harvested in FY2015 onward have been found to contain radioactive cesium exceeding the standard limit up to December 2017.

No fruits harvested in FY2013 through to FY2016 were found to contain radioactive cesium exceeding the standard limit, but there was one case where radioactive cesium exceeding the standard limit was detected among fruits harvested in FY2017 (as of December 2017).

Included in this reference material on February 28, 2018



Measures for reducing radionuclides in livestock products include (i) thorough feeding management, such as feeding livestock with safe feed, (ii) testing of radioactive cesium before shipment, and (iii) restriction of distribution according to testing results. Through these measures, safety of livestock products has been ensured.

Included in this reference material on March 31, 2013

Livestock Products

Feed Management (1/2)

The reference values for feed were established in order to prevent distribution of any livestock products with radioactivity concentrations exceeding the standard limits (100 Bq/kg for general foods and 50 Bq/kg for milk).

	Reference value (Bq/kg)
Cattle	100
Pigs	80
Chickens	160
(Cultured fish	40)

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

The reference values were established for feed so that livestock products would not contain radioactive cesium exceeding the standard limits.

Also for feed for cultured fish, the reference value was established in the same manner.

Included in this reference material on December 1, 2015
Updated on March 31, 2017

Livestock Products

Feed Management (2/2)

1. Thorough implementation of feeding management, including feeding forage (grass, hay, etc.) whose radiation levels are below the reference values

and

2. Promotion of decontamination measures including inversion tillage in pastures where production of grass whose radiation levels are below the reference values is difficult

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

On farms, thorough implementation of feeding management, including feeding forage whose radiation levels are below the reference values is ensured.

In pastures, efforts to produce forage crops whose radiation levels are below the reference values by decontamination measures, including inversion tillage, are making progress (p.57 of Vol. 2, "Measures for Reducing Transfer of Radioactive Materials to Crops (1/5) - Decontamination of Farmland -").

Included in this reference material on December 1, 2015
Updated on March 31, 2017

Livestock Products

Inspections for Radioactive Cesium in Livestock Products (FY2017)

(i) Beef

Five prefectures (Iwate, Miyagi, Fukushima, Tochigi and Gunma) inspect beef once every three months or so for each farm household. However, for farm households whose proper feeding management was confirmed by relevant local governments, inspections are conducted once every 12 months or so.

(ii) Milk

Five prefectures (Iwate, Miyagi, Fukushima, Tochigi and Gunma) inspect milk periodically at least once every two weeks. However, this does not apply in cases where a local government recognizes appropriate feeding management and there are no areas subject to distribution restrictions for raw milk and where inspection results for the latest three years are all below half of the standard limits.

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF) and the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" (March 24, 2017) by the Nuclear Emergency Response Headquarters

MAFF

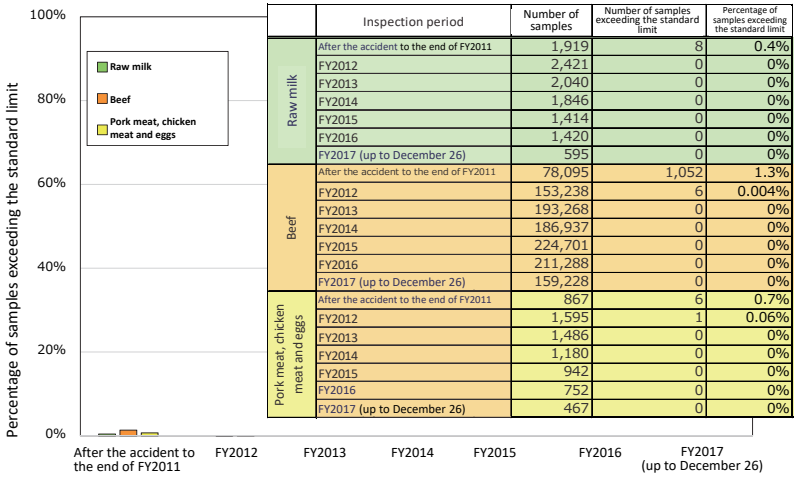
For beef, five prefectures (Iwate, Miyagi, Fukushima, Tochigi and Gunma) conduct inspections covering all relevant farm households.

Milk is also inspected periodically by these five prefectures.

Included in this reference material on March 31, 2013
Updated on February 28, 2018

Livestock Products

Changes in Inspection Results for Livestock Products



	Inspection period	Number of samples	Number of samples exceeding the standard limit	Percentage of samples exceeding the standard limit
Raw milk	After the accident to the end of FY2011	1,919	8	0.4%
	FY2012	2,421	0	0%
	FY2013	2,040	0	0%
	FY2014	1,846	0	0%
	FY2015	1,414	0	0%
	FY2016	1,420	0	0%
	FY2017 (up to December 26)	595	0	0%
Beef	After the accident to the end of FY2011	78,095	1,052	1.3%
	FY2012	153,238	6	0.004%
	FY2013	193,268	0	0%
	FY2014	186,937	0	0%
	FY2015	224,701	0	0%
	FY2016	211,288	0	0%
	FY2017 (up to December 26)	159,228	0	0%
Pork meat, chicken meat and eggs	After the accident to the end of FY2011	867	6	0.7%
	FY2012	1,595	1	0.06%
	FY2013	1,486	0	0%
	FY2014	1,180	0	0%
	FY2015	942	0	0%
	FY2016	752	0	0%
	FY2017 (up to December 26)	467	0	0%

* Coverage: 17 prefectures including the Tokyo Metropolis designated as inspection targets in the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies," which compiles basic approaches concerning radioactive materials in foods

Prepared based on the "Inspection Results Concerning Radioactive Cesium Concentrations in Livestock Products" by the Ministry of Agriculture, Forestry and Fisheries and the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Health, Labour and Welfare

Feed for livestock is controlled to reduce radionuclides contained therein as low as possible.

■ Reference values for radioactive cesium in feed

Feed for cattle and horses: 100 Bq/kg

Feed for pigs: 80 Bq/kg

Feed for chickens: 160 Bq/kg

Feed for cultured fish: 40 Bq/kg

Since April 2011, inspection results for raw milk have all been below 50 Bq/kg. Regarding beef, pork meat, chicken meat and eggs, radioactive cesium concentrations exceeding the standard limit have not been detected since FY2013.

Raw milk is inspected for each cooler station, while beef is inspected covering all relevant farm households once every three months in Iwate, Miyagi, Fukushima, Tochigi and Gunma Prefectures.

Included in this reference material on February 28, 2018

Mushrooms and Wild Plants

Measures to Ensure Safety of Mushrooms and Non-Wood Forest Products

- Introduce safe production materials in order to reduce radioactive contamination
- Provide information on gathering of wild plants and mushrooms

Specific measures

1. Secure safe mushroom logs
   (Support for the purchase of mushroom logs and bed logs, matching of supply and demand of mushroom logs)
2. Decontaminate mushroom logs and bed logs and introduce makeshift greenhouses, etc.
3. Disseminate cultivation management in line with the guideline and give guidance therefor
4. Disseminate cultivation technology to reduce radioactive contamination
5. Provide information using the website and pamphlets and conduct guidance tours

Prepared based on the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

Other than wild plants and mushrooms for which cultivation management is impossible, *shiitake* mushrooms, etc. cultivated using mushroom logs show variation in radioactivity concentrations.

Therefore, efforts are being made, such as the offering of support for the purchase of safe mushroom logs and measures to reduce contamination of mushroom logs and bed logs (mushroom logs wherein mushroom fungi are planted).

In order to prevent distribution of wild plants and mushrooms with radioactivity concentrations exceeding the standard limit, each local government imposes distribution restrictions on producers and farmers markets and provides them with inspection results or other information.

Included in this reference material on March 31, 2013
Updated on March 31, 2017

Mushrooms and Wild Plants

(Reference) Provisional Safety Standards for Mushroom Logs, etc.

- Mushroom logs and beds may be distributed nationwide.
- In order to ensure the safety of supplied mushrooms, provisional safety standards for mushroom logs and beds were established.

Provisional safety standards (from April 2012)	
Mushroom logs and bed logs	50 Bq/kg
Culture media for beds and mushroom beds	200 Bq/kg

Bed logs: Mushroom logs wherein mushroom fungi are planted
Mushroom beds: Culture media mixed with sawdust and nutrients wherein mushroom fungi are planted

Prepared based on the "Responses at Farmlands" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

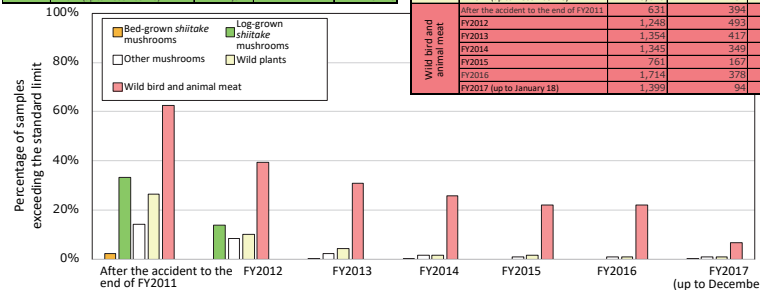
Mushroom logs and beds may be distributed nationwide in the same manner as livestock feeds. Therefore, in order to cultivate safe mushrooms, provisional safety standards were set at 50 Bq/kg for mushroom logs and bed logs and at 200 Bq/kg for mushroom beds, and they are managed properly so that contained radioactive materials do not exceed those standards.

Included in this reference material on March 31, 2013
Updated on March 31, 2017

Mushrooms, Wild Plants and Wild Bird and Animal Meat

	Inspection period	Number of samples	Number of samples exceeding the standard limit	Percentage of samples exceeding the standard limit
Bed-grown *Shiitake* mushrooms	After the accident to the end of FY2011	358	9	2.5%
	FY2012	868	0	0%
	FY2013	869	0	0%
	FY2014	830	0	0%
	FY2015	754	0	0%
	FY2016	617	0	0%
	FY2017 (up to December 26)	435	0	0%
Log-grown *shiitake* mushrooms	After the accident to the end of FY2011	1,093	364	33.3%
	FY2012	1,513	213	14.1%
	FY2013	1,298	2	0.2%
	FY2014	1,996	3	0.2%
	FY2015	2,139	0	0%
	FY2016	2,362	0	0%
	FY2017 (up to December 26)	1,947	4	0.2%

	Inspection period	Number of samples	Number of samples exceeding the standard limit	Percentage of samples exceeding the standard limit
Other mushrooms	After the accident to the end of FY2011	1,881	268	14.2%
	FY2012	2,257	195	8.6%
	FY2013	2,230	50	2.2%
	FY2014	2,169	38	1.8%
	FY2015	2,117	24	1.1%
	FY2016	2,084	23	1.1%
	FY2017 (up to December 26)	1,641	16	1.0%
Wild plants	After the accident to the end of FY2011	524	138	26.3%
	FY2012	1,950	197	10.1%
	FY2013	3,184	142	4.5%
	FY2014	3,562	62	1.7%
	FY2015	3,423	63	1.8%
	FY2016	4,178	46	1.1%
	FY2017 (up to December 26)	3,029	34	1.1%
Wild bird and animal meat	After the accident to the end of FY2011	631	394	62.4%
	FY2012	1,248	493	39.5%
	FY2013	1,354	417	30.8%
	FY2014	1,345	349	25.9%
	FY2015	761	167	21.9%
	FY2016	1,714	378	22.1%
	FY2017 (up to January 18)	1,399	94	6.7%



* Coverage: 17 prefectures including the Tokyo Metropolis designated as inspection targets in the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies," which compiles basic approaches concerning radioactive materials in foods

* For only wild bird and animal meat, data up to January 18, 2018, is presented.

Prepared based on the "Inspection Results Concerning Radioactive Cesium Concentrations in Agricultural Products" by the Ministry of Agriculture, Forestry and Fisheries and the "Inspection Results Concerning Radioactive Materials in Foods" by the Ministry of Health, Labour and Welfare

Regarding mushrooms, thanks to efforts for securing safe logs and the introduction of makeshift greenhouses, etc., radioactive contamination has been reduced through the use of production materials in conformity to the standards. The percentage of mushrooms with radioactive concentrations exceeding the standard limit is decreasing.

■ Provisional safety standards for mushroom logs, bed logs, culture media for beds and mushroom beds

Mushroom logs and bed logs: 50 Bq/kg

Culture media for beds and mushroom beds: 200 Bq/kg

Radioactive concentrations exceeding the standard limit are still detected in some wild mushrooms and wild plants, for which cultivation management is impossible, although the number and percentage of samples exceeding the standard limit show declining trends. Therefore, their shipment is thoroughly controlled continuously.

Wild bird and animal meat, such as boar meat and deer meat, still show radioactive concentrations exceeding the standard limit. Feeding management like that for livestock animals is difficult for wild birds and animals that move around freely. Therefore, shipment of wild bird and animal meat is restricted by each prefecture in principle, and in some cases, only meat managed based on shipment and inspection policies formulated independently by respective local governments is permitted to be shipped out.

Included in this reference material on February 28, 2018

Fishery Products

Approach for Inspections of Fishery Products

○ Inspections were strengthened by increasing the fish species to be inspected and the inspection frequencies.

- **The fish species in which radioactive cesium exceeding 50 Bq/kg has been detected and major fishery products are intensively inspected.**
- **Inspection results of neighboring prefectures are taken into account.**

Coastal fish (e.g., Japanese sandlance, seabass, flounders, etc.)	Sea areas off prefectures are divided into zones in consideration of catch landing, fishery management and seasons, etc. and samples are collected at major ports. Samples are collected considering the habitats of fish such as surface layer, middle layer or bottom layer.
Migratory fish (e.g., Skipjack tuna, sardines and mackerels, Pacific saury, etc.)	Fishing grounds are divided into zones off each prefecture from Chiba to Aomori (by lines extending along the prefectural borders to the east) in consideration of migration of fish, etc., and samples are collected at major ports of each zone.
Inland water fish (e.g., YAMAME (land-locked cherry salmon), Japanese smelt, Ayu sweetfish, etc.)	Prefectural areas are divided into zones appropriately in consideration of fishery rights, and samples are collected in major zones.

Prepared based on the "Responses at Farmland" by the Ministry of Agriculture, Forestry and Fisheries (MAFF)

MAFF

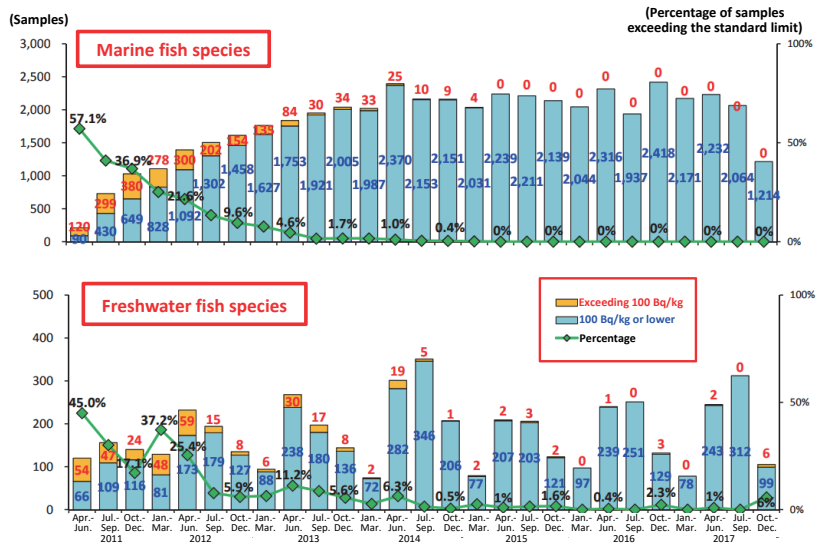
Inspections of radioactivity in fishery products cover major fish species and fishing grounds, and species in which radioactive cesium exceeding 50 Bq/kg has been detected.

Analysis of accumulated inspection results, etc. has revealed that radioactive contamination levels differ depending on the habitats of relevant fish species, etc.

For example, contamination levels differ depending on whether the habitat is close to the sea surface, or the sea bottom, or in between. Therefore, inspections are conducted by classifying the fish species based on their habitats and fishing seasons, while also taking into account inspection results of neighboring prefectures. Regarding migratory fish, such as bonito and Pacific saury, which migrates over a wide area in the ocean, inspections are conducted broadly by multiple prefectures based on their migratory routes.

Included in this reference material on March 31, 2013
Updated on March 31, 2014

Fishery Products **Inspection Results for Fishery Products (Marine Fish Species Caught off the Coast of Fukushima Prefecture and Freshwater Fish Species Caught in Fukushima Prefecture)**



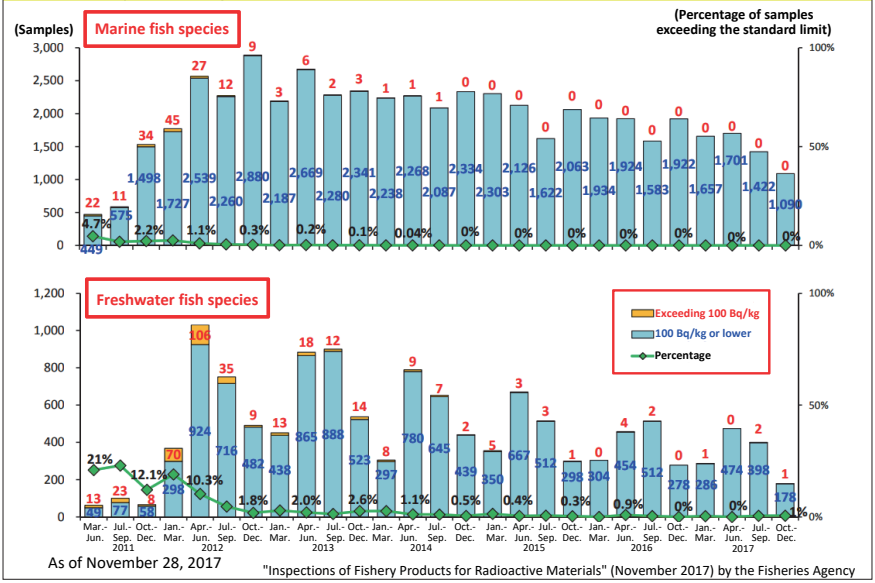
As of November 28, 2017

"Inspections of Fishery Products for Radioactive Materials" (November 2017) by the Fisheries Agency

The percentage of samples exceeding the standard limit (100 Bq/kg) was 57% for marine fish and 45% for freshwater fish during the period from April to June 2011, but the percentage decreased by half in one year after the accident. Since April 2012, inspections have been focused on the fish species in which radioactive cesium concentrations exceeding 50 Bq/kg had been detected, and the percentage of samples with radioactive cesium concentrations exceeding the standard limit is continuing to decrease. There have been no such marine fish samples since FY2015, but some freshwater fish samples still show radioactive cesium concentrations exceeding the standard limit.

Included in this reference material on March 31, 2014
Updated on February 28, 2018

Fishery Products **Inspection Results for Fishery Products (Marine Fish Species Caught off the Coast of Prefectures Other than Fukushima Prefecture and Freshwater Fish Species Caught in Prefectures Other than Fukushima Prefecture)**



As of November 28, 2017

"Inspections of Fishery Products for Radioactive Materials" (November 2017) by the Fisheries Agency

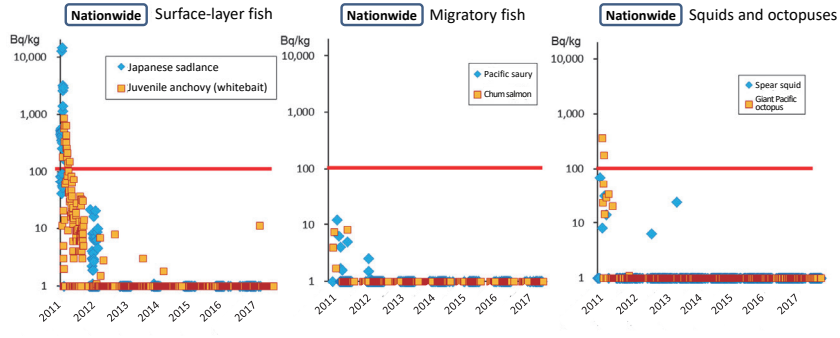
The percentage of samples with radioactive cesium concentrations exceeding the standard limit (100 Bq/kg) has also been decreasing among samples collected off or in prefectures other than Fukushima Prefecture. There have been no such marine fish samples since FY2015, but some freshwater fish samples still show radioactive cesium concentrations exceeding the standard limit.

Included in this reference material on March 31, 2014
Updated on February 28, 2018

Fishery Products

Trends of Radioactive Cesium Concentrations by Fish Species (1/2)

- At present, all samples of surface-layer fish, such as Japanese sandlance and whitebait, migratory fish such as bonito and tunas, chum salmon and Pacific saury, bottom fish such as flounders, flatfishes and cods, as well as squids and octopuses, shrimps and crabs, shellfish and seaweeds, show radioactive cesium concentrations below the standard limit in all prefectures.
- The environment of habitats and feeding habits correlate to changes in radioactive cesium concentrations in the respective groups of fish.



Results of inspections from March 24, 2011, to December 26, 2017, compiled by the Fisheries Agency

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The above figures show inspection results concerning radioactive cesium concentrations in fish by fish species with different habitats and feeding habits.

Japanese sandlance, whitebait and other species of surface-layer fish showed high radioactive cesium concentrations immediately after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, but radioactive cesium concentrations in samples of these fish species at present are all below the standard limit.

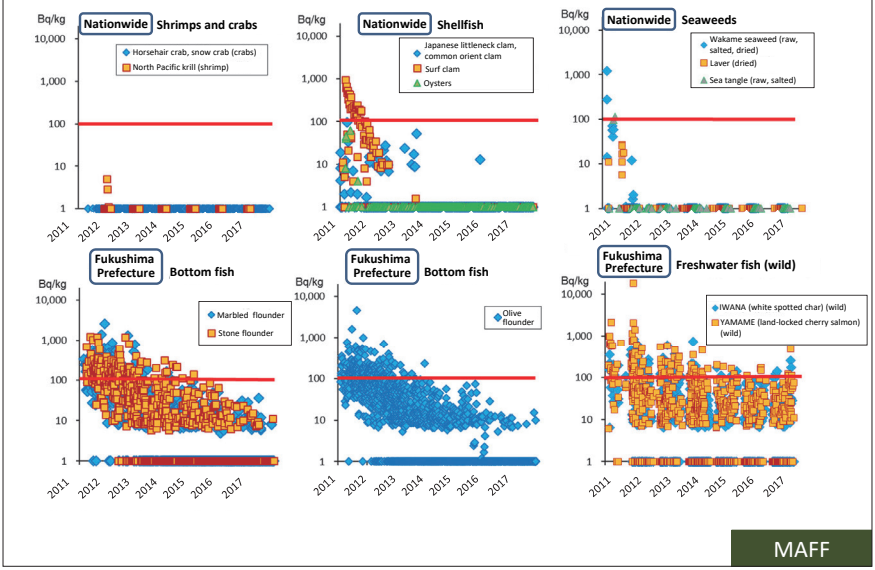
Regarding Pacific saury, chum salmon and others that migrate over a wide area in the ocean, radioactive cesium exceeding 100 Bq/kg or exceeding 50 Bq/kg was not detected at all even immediately after the accident.

Marine invertebrates, such as squid and octopus, also showed high radioactive cesium concentrations immediately after the accident, but declines in radioactive cesium concentrations in samples of marine invertebrates were more prompt than in the case of surface-layer fish, and their radioactive cesium concentrations at present do not exceed even 50 Bq/kg. This is considered to be due to the nature of marine invertebrates through which ions freely move in and out to seawater. Due to this nature, radioactive cesium concentrations in marine invertebrates decrease according to radioactive cesium concentration decreases in seawater.

In this manner, the results of the past inspections show correlation between the environment of habitats and feeding habits and changes in radioactive cesium concentrations in the respective groups of fish.

Included in this reference material on March 31, 2013
Updated on February 28, 2018

Fishery Products — Trends of Radioactive Cesium Concentrations by Fish Species (2/2)



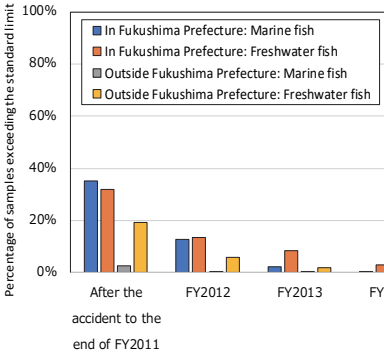
Inspections of shrimps and crabs (horsehair crab, snow crab and North Pacific krill) showed no results exceeding 100 Bq/kg even immediately after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS. Most results were below the detection lower limit. Regarding shellfish (Japanese littleneck clam, common orient clam, surf clam, and oysters) and seaweeds (Wakame seaweed, laver and sea tangle), radioactive cesium exceeding the standard limit was detected in some samples immediately after the accident, but radioactive cesium concentrations decreased promptly thereafter. Radioactive cesium concentrations in samples of bottom fish (flatfish and flounders, etc.) caught off the coast of Fukushima Prefecture decreased over time and are all below the standard limit at present.

Inspection results for wild freshwater fish caught in Fukushima Prefecture (the figure right at the bottom) show that the percentage of samples in which radioactive cesium concentrations exceeded 100 Bq/kg was 51.3% in FY2011 but decreased as low as 1.4% in FY2016. Although some samples still show values exceeding 100 Bq/kg, but the percentage of samples exceeding the standard limit is decreasing over time.

(Prepared based on the "Inspections of Fishery Products for Radioactive Materials (December 2017)" on the website of the Fisheries Agency)

Included in this reference material on March 31, 2014
Updated on February 28, 2018

Fishery Products Chronological Changes in Inspection Results for Fishery Products



	Inspection period	Number of samples	Number of samples exceeding the standard limit	Percentage of samples exceeding the standard limit
In Fukushima Prefecture: Marine fish	After the accident to the end of FY2011	3,074	1,077	35.0%
	FY2012	6,270	791	12.6%
	FY2013	7,847	181	2.3%
	FY2014	8,753	48	0.5%
	FY2015	8,633	0	0%
	FY2016	8,842	0	0%
	FY2017 (up to November 28)	5,510	0	0%
In Fukushima Prefecture: Freshwater fish	After the accident to the end of FY2011	545	173	31.7%
	FY2012	655	88	13.4%
	FY2013	683	57	8.3%
	FY2014	938	27	2.9%
	FY2015	635	7	1.1%
	FY2016	701	4	0.6%
	FY2017 (up to November 28)	662	8	1.2%
Outside Fukushima Prefecture: Marine fish	After the accident to the end of FY2011	4,361	112	2.6%
	FY2012	9,917	51	0.5%
	FY2013	9,540	12	0.1%
	FY2014	8,994	2	0.02%
	FY2015	7,745	0	0%
	FY2016	7,086	0	0%
	FY2017 (up to November 28)	4,213	0	0%
Outside Fukushima Prefecture: Freshwater fish	After the accident to the end of FY2011	596	114	19.1%
	FY2012	2,723	163	6.0%
	FY2013	2,625	52	2.0%
	FY2014	2,237	23	1.0%
	FY2015	1,788	7	0.4%
	FY2016	1,537	7	0.5%
	FY2017 (up to November 28)	1,053	3	0.3%

* Coverage: 17 prefectures including the Tokyo Metropolis designated as inspection targets in the "Concepts of Inspection Planning and Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies," which compiles basic approaches concerning radioactive materials in foods

Prepared based on the "Inspections of Fishery Products for Radioactive Materials" (November 2017) by the Fisheries Agency

Inspections of fishery products have focused on the fishery products in which radioactive cesium concentrations exceeding 50 Bq/kg were detected in the previous fiscal year and major fishery products in relevant prefectures. Monitoring is conducted once a week or so in principle. The number of fishery product samples showing radioactive cesium concentrations exceeding the standard limit is decreasing gradually.

Analysis of inspection results revealed that radioactive cesium exceeding the standard limit was not detected in fish that migrate over a wide area in the ocean even immediately after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS. Since FY2015, there have been no samples of marine fish species caught off the coast of Fukushima Prefecture and other prefectures that contained radioactive cesium exceeding the standard limit.

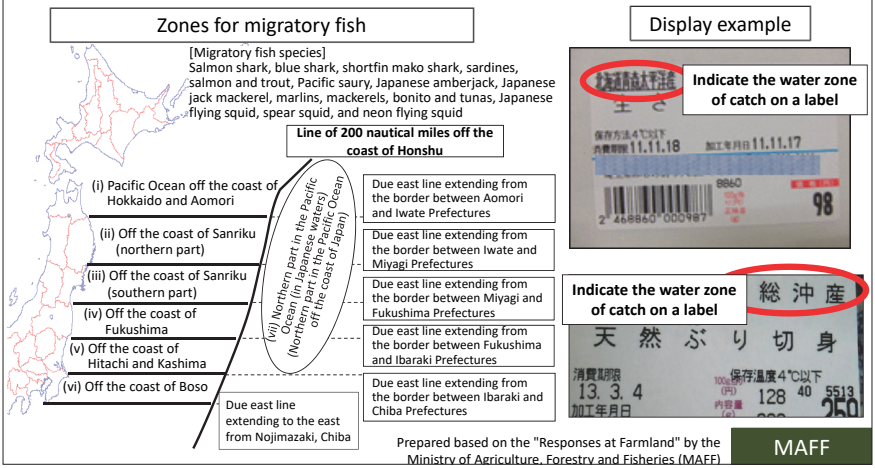
Some freshwater fish caught in and outside Fukushima Prefecture still show radioactive cesium concentrations exceeding the standard limit even in FY2017, but the number of such fish is decreasing year by year.

Included in this reference material on February 28, 2018

Fishery Products

Provision of Information on Place of Product Origin to Consumers

○Since October 2011, it has been recommended to display places of origin of fresh fishery products, mainly those caught on the Pacific side of eastern Japan, by dividing the sea areas into 7 zones and clarifying these zone names.



Since October 2011, the national government has been encouraging producers to display places of origin of fresh fishery products, mainly those caught on the Pacific side of eastern Japan so that consumers can easily understand where the relevant fishery product was caught. Related parties are providing consumers with information on inspections of fishery products for radioactive materials in an easy-to-understand manner, thereby striving to prevent harmful rumors.

Included in this reference material on March 31, 2013

Import Restrictions by Other Countries

Outline of Lifting and Easing of Food Import Restrictions by Other Countries after the Accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS

Food import restrictions by other countries (as of January 12, 2018)

Details of regulatory measures / Number of countries and regions					Countries and regions
Imposed import restrictions after the accident: 54	Completely lifted regulatory measures: 26				Canada, Myanmar, Serbia, Chile, Mexico, Peru, Guinea, New Zealand, Colombia, Malaysia, Ecuador, Viet Nam, Iraq, Australia, Thailand, Bolivia, India, Kuwait, Nepal, Iran, Mauritius, Qatar, Ukraine, Pakistan, Saudi Arabia, Argentina
	Continuing import restrictions: 28	Suspended import of items from some prefectures: 9	7		South Korea, China, Singapore, Hong Kong, Macao, Taiwan, Russia
			2		(Suspended import of items whose shipment is restricted in Japan) US, Philippines
		Requests issuance of inspection certificates for items from some or all prefectures: 17			Indonesia, Polynesia, Oman, Bahrain, Egypt, Congo, Morocco, Brazil, EU*, EFTA (Iceland, Norway, Switzerland, Liechtenstein), Brunei, New Caledonia, UAE, Lebanon * 28 EU member countries are collectively counted as one region.
		Strengthen inspections in the country: 2			Israel, Turkey

Note 1) Classification in accordance with the details of the regulatory measures; Prefectures in Japan subject to respective regulatory measures differ by country or region.
Note 2) The government of Thailand lifted its regulatory measures but requests the issuance of inspection certificates for some wild animal meat

Examples of recent complete lifting of regulatory measures

Date of lifting	Countries
January 2014	Iraq
January 2014	Australia
May 2015	Thailand * Excluding some wild animal meat
November 2015	Bolivia
February 2016	India
May 2016	Kuwait
August 2016	Nepal
December 2016	Iran
December 2016	Mauritius
April 2017	Qatar
April 2017	Ukraine
October 2017	Pakistan
November 2017	Saudi Arabia
December 2017	Argentina

Examples of recent easing of import restrictions

Date of easing	Countries and regions	Major content
Apr., Jul., Aug., Sep., Oct. and Dec. 2016	US	Suspension of import (targeting Fukushima Prefecture, etc.) → Lifted import suspension for some items sequentially
June and September 2016	Polynesia	Decreased items and regions for which inspection certificates and certificates of origin are required (such as the exclusion of vegetables, fruits (except for persimmons), livestock products, buckwheat, tea, etc. produced in Fukushima Prefecture from items requiring inspection certificates) (September)
July 2016	Qatar	Inspection certificates (targeting all 47 prefectures) → Sample inspections at the time of import
July 2016	Israel	Decreased items and regions for which sample inspections at the time of import are required
October 2016	New Caledonia	Suspension of import (all foods and feed from 12 prefectures) → Lifted import suspension (attaching certificates is also no longer necessary for vegetables, fruits (except for persimmons), livestock products, buckwheat, tea, etc.)
December 2016	UAE	Decreased regions for which inspection certificates are required (all foods and feed from 15 prefectures → Targeted prefectures are now only five.)
March 2017	Lebanon	All foods and feed attached with inspection reports may be imported.
April 2017	Russia	Attaching an inspection certificate is no longer necessary for fishery products produced at facilities in Aomori Prefecture.
September and November 2017	US	・Safety certificates (concerning radioactive materials) at the time of import are no longer necessary for milk and dairy products from five prefectures including Fukushima. ・Suspension of import (targeting Fukushima Prefecture, etc.) → Lifted import suspension for some items
January 2018	EU*	・Decreased items and regions for which inspection certificates and certificates of origin are required (such as the exclusion of rice, etc. from Fukushima Prefecture from items requiring inspection certificates)
December 2017	Turkey	Decreased items for which all lot inspections at the time of import are required (exclusion of cut flowers and *bonsai* plants, etc. from items requiring inspections)

* EFTA member countries (Switzerland, Norway, Iceland, Liechtenstein) also eased regulations with reference to the EU.

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In response to the accident at TEPCO's Fukushima Daiichi NPS, countries and regions all over the world imposed various restrictions on imports from Japan. However, as a result of all-out efforts by the government of Japan, such regulatory measures have been lifted or eased. The number of countries or regions imposing restrictions has decreased from 54 immediately after the accident to 28.

Included in this reference material on February 28, 2018