

Radionuclides in foods

-current situation and protective measures-

Public Health Bureau
Ministry of Health, Labour and Welfare

■ MHLW's Four Actions for Safety

**Establish
limits**

**Adopt Rigorous
Monitoring
System**

**Restrict
Distribution of
Contaminated Food**

Enhance Transparency

Provide Safe Foods for All Consumers

■ Control of radionuclides in foods

■ Establish limits for radionuclides in foods

- The indicator values given by the Nuclear Safety Commission were set as the provisional regulation values. (March 17, 2011 - March 31, 2012)
- The present limits for radionuclides in foods took effect. (April 1, 2012 -)



■ Monitor radionuclides in foods

- The monitoring is conducted by the local governments around the 17 prefectures. (March 18, 2011 -)
- The Nuclear Emergency Response Headquarters established guidelines on the local governments' formulation of monitoring plans for radionuclides in foods. (April 4, 2011)



■ Recall and dispose of foods containing radionuclides above the limits

All the articles in a lot in which the levels are exceeded are recalled or disposed of.



■ Restrict the distribution of foods [Nuclear Emergency Response Headquarters]

Distribution is restricted on a prefecture basis (or a smaller area basis in a prefecture), judging from the spreading of places where radionuclides above the limits are detected as a result of inspections. (March 21, 2011-)



■ Lift restrictions [Nuclear Emergency Response Headquarters]

Every testing result from samples collected within the past one month from at least three different locations in a municipality must be below the corresponding limits.

■ Concept of the Japanese limits

**1 mSv
/year**

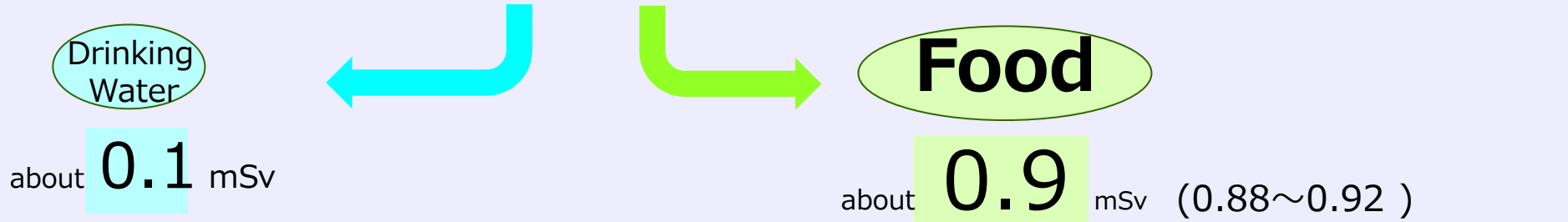
Category	Limit
Drinking water	10
Milk	50
General Foods	100
Infant Foods	50

(Bq/kg)

- ◆ **The limits are based on 1 mSv in a year consistent with an intervention exemption level adopted by codex**
- ◆ **The limits are based on more conservative assumption than codex**
 - Even if as much as 50% of the foods are contaminated at the limit value, effective dose of most vulnerable age group is expected to be below 1 mSv/year (the intervention level), including the exposure to strontium, etc.

■ The concept of radionuclides to be regulated

Dose limit of 1 year per person for the standard limits
1 mSv



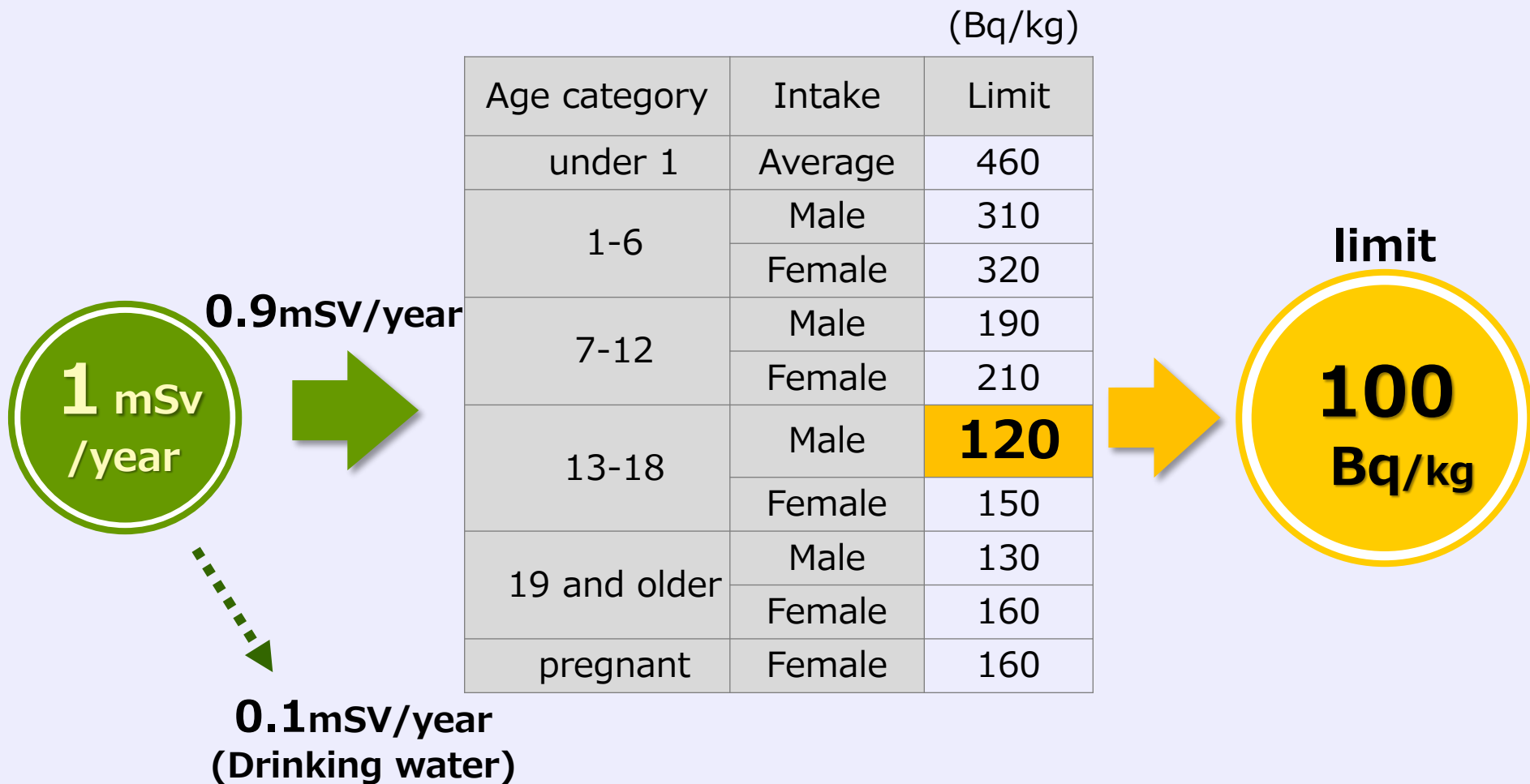
Radioactive cesium

Radioactive cesium

Assign equivalent dose where drink the 10 Bq/kg water for 1 year

Taking into account the effects of radionuclides other than cesium
(e.g. :by the largest computation, 12% of dose from food for age 19 and older)
※Sr-90, Pu, Ru-106

■ The Concept of the limit for “General Foods”



Calculate limit values, taking into consideration the intake and conversion coefficient according to age category.

■ The range of food categories

Food category	The reason to establish the limits	The range of foods
Drinking water	<ol style="list-style-type: none"> 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 the radionuclides in tap water. 	<ul style="list-style-type: none"> ○Drinking water, water used for cooking and tea drinks, which is substitute for water
Infant Foods	<ul style="list-style-type: none"> ○The Food Safety Commission pointed out that "the susceptibility to radiation may be higher in childhood than in adulthood." 	<ul style="list-style-type: none"> ○Foods approved to be labeled as "fit for infants" based on Article 26 Paragraph 1 of the Health Promotion Law ○Foods and drinks sold as intended for infants
Milk	<ol style="list-style-type: none"> 1 Children consume a lot. 2 Food Safety Commission pointed out that "a susceptibility to radiation may be higher in childhood than in adulthood." 	<ul style="list-style-type: none"> ○"Milk" and "milk drinks" refers to products specified in Article 2 Paragraph 1 and 40 of the Ministerial Ordinance concerning Compositional Standards Etc. for Milk and Milk Products.
General Foods	<p>For the following reasons, foods other than given above are categorized as "General Foods"</p> <ol style="list-style-type: none"> 1 It is possible to make the influence of individual differences in eating habits (deviation of the foods to be consumed) minimal. 2 Regulation intelligible for people 3 Consistency with international views, such as these of Codex Alimentarius Commission 	<ul style="list-style-type: none"> ○Foods other than given above

■ The concept of radionuclides to be regulated (1)

Standard limits set the radioactive cesium as an indicator

- Targets to be regulated are all radionuclides based on the evaluation of the Nuclear and Industrial Safety Agency as substances emitted by the Fukushima nuclear power plant accident, and whose half-life is over 1 year.

Regulated Radionuclides	Physical Half-life
Cs-134	2.1years
Cs-137	30years

Sr-90	29years
Pu	14years or more
Ru-106	374days

Note: The limits are not established for radioactive Iodine, which has a short half-life (8 days) and has been no longer detected, and for Uranium, whose level is almost the same in the nuclear power plant site as in the natural environment.

- Because radionuclides other than Cs-134 and Cs-137 require a longer time for measurement, the limits for radioactive cesium are established for effective dose of radionuclides (including Sr-90, Ru-106, Pu) not to exceed 1 mSv/year.



■ The concept of radionuclides to be regulated (2)

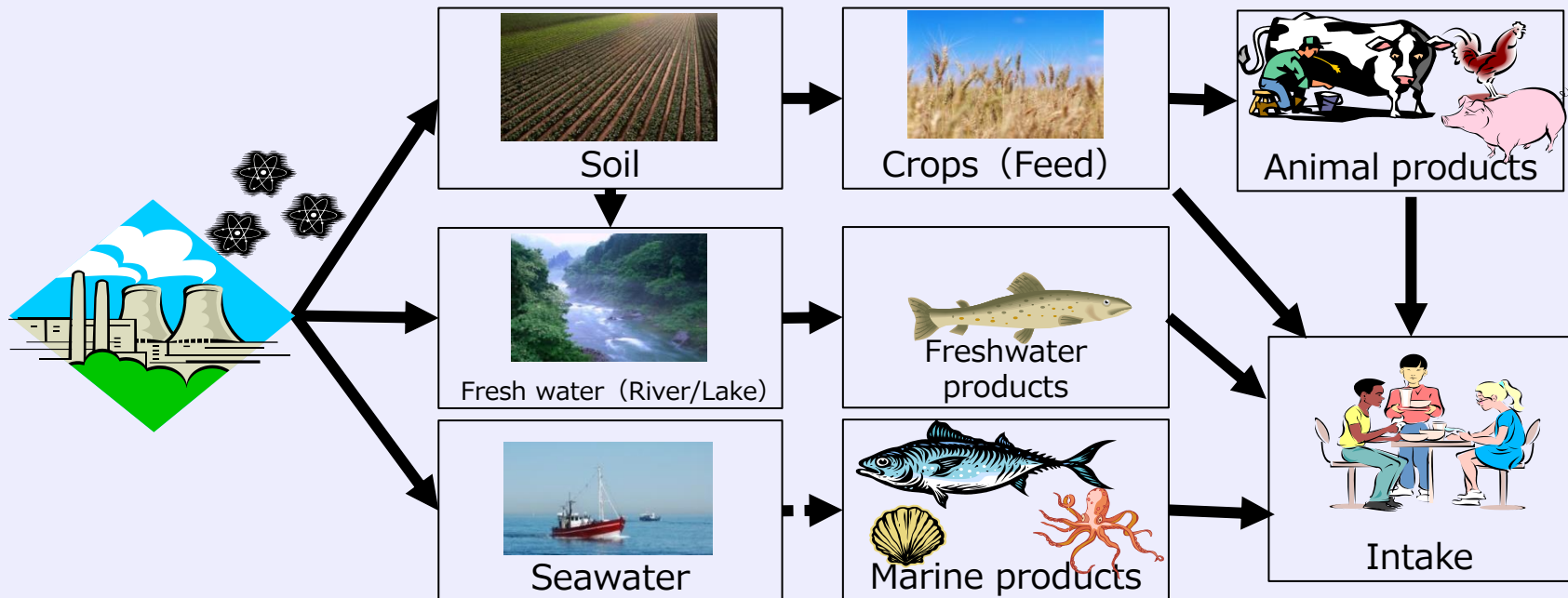
● The concept for establishment of the limits

The limits for radioactive cesium are established for effective dose of radionuclides (including Sr-90, Ru-106, Pu) not to exceed 1mSv/year.

Because radionuclides other than Cs-134 and Cs-137 require a longer time for measurement, following procedure is taken to establish the limits.

- Analyze the migration ratio of each radionuclide according to migration pathway, derive the contribution of radioactive cesium according to product and age categories, and establish the limits for radioactive cesium so that the sum of effective dose does not exceed 1mSv/year.

e.g.)The contribution of radionuclides other than radioactive cesium is about 12% (in case of people aged 19 and older)

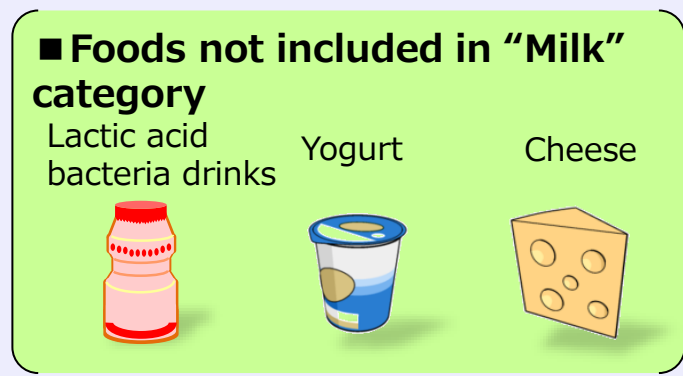
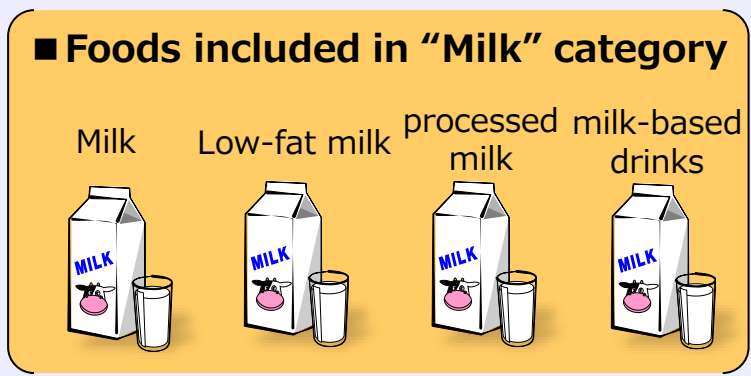


■ The range of “Milk” and limits for “Milk” and “Infant Foods”

<Foods included in “Milk” category>

The “Milk” category covers milk and milk drinks.

Milk drinks are drink products which are made mainly of milk as the main ingredient, and they include those which are recognized by consumers as similar kinds of drinks to milk and processed milk.



“Milk” refers to products specified in the Ministerial Ordinance concerning Compositional Standards Etc. for Milk and Milk Products.

“Milk products” refers to products specified in the Ministerial Ordinance concerning Compositional Standards Etc. for Milk and Milk Products.

● Since “Milk” and “Infant foods” are categories provided in consideration for children, the limit for them is established as a level that is not affected even if all of the marketed foods are contaminated.

→ “50 Bq/kg” which is half of the limit for “General foods”(100Bq/kg) applies to “Milk” and “Infant foods”.



● Basic Concept

In principle, processed foods are subject to the limit for “General foods”. The limit applies to the various stages of products on a case by case basis, for example, to the finished products or raw materials. For the foods given in 1 and 2 below, the limit applies to products in a ready-to-eat state based on the view of Codex Commission.

1 Dry foods that are intended to be consumed in a reconstituted state, such as dried products of mushrooms, seaweeds, fish & shellfish and vegetables etc.

→ The limit for “General foods” applies to raw materials (in a natural state) and reconstituted products.

Notes: For foods that are intended to be consumed in a dried state, such as *nori*(dried laver), *niboshi*(dried sardines), dried cuttlefish, raisin, etc., the limit for “General foods” applies to ingredients (in a natural state) and finished products (in a dry state).

2 Foods that are consumed after brewing process, such as tea leaves, and foods that are produced through extraction process, such as vegetable oils, like rice oil.

→ There is a big difference in form between raw materials and finished products before consumption. The limit applies not to raw materials but to finished products. For tea leaves, the limit for “Drinking water” applies to a liquid extract obtained after brewing process. For edible oils, which are obtained through extraction from rice bran or oil seeds, the limit for “General foods” applies to oil as finished product.

■ Concepts of Inspection Plan for Radionuclides in Foods (1)

Formulation by The Nuclear Emergency Response Headquarters (Latest Revision: March 30, 2023)

Government sets and amends the guideline of monitoring plan, including items subject to inspection and frequency of inspections annually. The inspections are implemented by local governments and focused on items especially in which higher level of radioactive cesium might be detected.

The followings are instructed and annually revised based on the past inspection results

- Local governments subject to inspections
- Items subjected to inspections as follows;
 - Food items from which radioactive cesium above the limits has been detected (e.g.: wild mushrooms, wild plants and wild animal meat)
 - Items that are greatly influenced by the management of feeding (e.g.: milk, beef)
 - Items for which cultivation management are needed because of the influence of radionuclides to production materials (e.g.: log-grown mushrooms)
 - Fishery products
 - Food items that the restriction of distribution was removed
- The frequency of inspections
 - ⇒ *Inspection Plan of each local government is designed according to the level of detections and actual situation such as of production and shipment.*

■ Concepts of Inspection Plan for Radionuclides in Foods (2)

(Table1) ①The food item group for which cultivation/feeding control is difficult

【The local governments subject to inspections】

The local governments which need to continue inspections by taking into account difficulty of the management, etc.

【The local governments and items subject to inspections】

		Aomori	Iwate	Akita	Miyagi	Yamagata	Fukushima	Ibaraki	Tochigi	Gunma	Chiba	Saitama	Tokyo	Kanagawa	Niigata	Yamanashi	Nagano	Shizuoka
> 100 (Bq/kg)	Wild mushrooms and Wild edible plants etc.	□	⊙	⊙	⊙	⊙	⊙	□	□	●	□	□	□	□	⊙	⊙	⊙	⊙
	Wild bird and animal meat	□	⊙	□	⊙	●	⊙	●	□	⊙	□	□	□	□	●	□	□	□
> 50 (Bq/kg)	Wild mushrooms and Wild edible plants etc.	□	□	□	□	□	□	□	●	●	□	□	□	□	□	□	□	□
	Wild bird and animal meat	□	●	□	●	□	□	□	□	●	□	□	□	□	□	□	●	□
Marine fishery products		—	—	—	—	—	□	—	×	×	—	×	—	—	—	×	×	—
Inland water fishes		—	—	—	□	—	⊙	—	—	⊙	□	—	—	—	—	—	—	—

Categorized based on the results of inspections conducted between April 1, 2022 and February 28, 2023.

- ⊙ : Radioactive cesium above the maximum limits (for fishery products, 1/2 of the limits) has been detected.
- : Radioactive cesium above 1/2 of the maximum limits has been detected (excluding those from which radioactive cesium above the maximum limits has been detected).
- : Inspection required by considering items' difficulty of the management (e.g. Wild mushrooms, Wild edible plants), migratory behavior (for Wild bird and animal meat), and the status of restriction on distribution (for marine fishery products).
- : Not classified as subject to inspections in local governments, based on the results of inspection conducted previous year.
- ×



■ Concepts of Inspection Plan for Radionuclides in Foods (2)

(Table1) ② Log-grown mushrooms in food items group for which cultivation/feeding control is possible

【The local governments subject to inspections】

The local governments which need to continue inspections by taking into account the status of the influence of radionuclides to production materials.

【The local governments and items subject to inspections】

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

Categorized based on the results of inspections conducted between April 1, 2022 and February 28, 2023.

- ⊙ : Radioactive cesium above the maximum limits has been detected.
- : Radioactive cesium above 1/2 of the maximum limits has been detected (excluding those from which radioactive cesium above the maximum limits has been detected).
- ▲ : Cultivation management and monitoring inspection required taking into account the status of the influence of radionuclides to production materials.

■ Concepts of Inspection Plan for Radionuclides in Foods (2)

(Table2) The food item group for which cultivation/feeding control is possible (Log-grown mushrooms are excluded)

【The local governments subject to inspections】

The local governments which need to continue inspections such as cases where food items from which radioactive cesium above 1 /2 of the maximum limits has been detected, based on the inspection results in the previous 3 years.

【Food items subject to inspections】

	Fukushima
Wild edible plants (cultivation)	●
Rice	■

※ Inspections of milk are conducted in Fukushima prefecture. Inspections of beef are conducted in Iwate, Miyagi, Fukushima and Tochigi prefecture.

Categorized based on the results of inspections conducted between April 1, 2022 and February 28, 2023.

- ⊙ : Radioactive cesium above the maximum limits has been detected.
- : Radioactive cesium above 1/2 of the maximum limits has been detected (excluding those from which radioactive cesium above the maximum limits has been detected).
- : Instructed as subject to inspections on the Attachments.
- : Not classified as subject to inspections in local governments, based on the results of inspection conducted previous year.

■ Restriction of Distribution and/or Consumption of Foods

Order by Act on Special Measures Concerning Nuclear Emergency Preparedness

“Restriction of Distribution”

When areas producing the items exceeding the limits have been spread out, relevant areas and items become subject to restriction.

“Restriction of Consumption”

When significantly high level of concentration is detected in items, the restriction of consumption is immediately established.

■ The requirements for establishing items and areas of restriction

- When it is considered that areas producing the items exceeding the limits have been spread out, relevant areas and items become to restriction.
- Unit of Restriction is prefecture basis. Prefectures can be divided into multiple number of areas if they can be administered by prefectures and municipalities.

■ The requirements for cancellation of restriction

- Based on the application of the relevant prefecture.
- Prefectures can be divided into a multiple zones, in the light of the actual situations of the shipments of the items.
- As a general rule, the results of radioactive cesium inspections conducted at 3 or more locations per municipality within the last month must all fall below the limits.



※ Monitoring of radionuclides in food are mainly conducted before shipment. Most of the food items exceeding the limits are derived from areas where restrictions of distribution have been instructed.

The list of Instructions on the Restriction of Distribution of Food

Prefecture	Restriction of Distribution (As of the end of August 2023)
Fukushima	(Limited areas) Raw milk, Non-head type leafy Vegetables (e.g. Spinach, Komatsuna), Head type leafy vegetables (e.g. Cabbage), Flowerhead brassicas (e.g. Broccoli, Cauliflower), Turnip, Log-grown shiitake (outdoor・indoor cultivation) ¹⁾ , Log-grown pholiota nameko (outdoor cultivation), Wild mushrooms ²⁾ , Bamboo shoot, Wasabi (field cultivation), Wild Aralia cordata, Ostrich fern, Koshiabura, Japanese royal fern, Wild Uwabamisou, Wild Aralia sprout, Giant butterbur, Wild Japanese butterbur scape, Pteridium aquilinum, Japanese apricot (Ume), Yuzu, Chestnut, Kiwi fruit, Rice (produced in 2011・2012・2013・2014・2015・2016・2017・2018・2019・2020・2021・2022・2023) ¹⁾ , Land-rocked cherry salmon (Yamame)(excluding farmed fish), Japanese dace, Ayu sweetfish (excluding farmed fish), Char (Iwana)(excluding farmed fish), Crucian carp (excluding farmed fish), Black rockfish, Beef, Bear meat (Whole area) Boar meat, Spot-billed duck meat, Green pheasant meat, Hare meat, Copper pheasant meat
Aomori	(Limited areas) Wild mushrooms ³⁾
Iwate	(Limited areas) Log-grown shiitake (outdoor cultivation) ¹⁾ , Log-grown brick cap (outdoor cultivation), Log-grown pholiota nameko (outdoor cultivation) ¹⁾ , Wild mushrooms, Bamboo shoot, Koshiabura, Japanese royal fern, Wild Pteridium aquilinum (Whole area) Deer meat ¹⁾ , Bear meat, Copper pheasant meat
Miyagi	(Limited areas) Log-grown shiitake (outdoor cultivation) ¹⁾ , Wild mushrooms ⁴⁾ , Bamboo shoot ⁴⁾ , Koshiabura, Japanese royal fern, Wild Aralia sprout, Wild Pteridium aquilinum, Char(Iwana)(excluding farmed fish), Land-rocked cherry salmon(Yamame) (excluding farmed fish), Japanese dace (Whole area) Boar meat, Bear meat, Deer meat ¹⁾
Yamagata	(Limited areas) Wild mushrooms (Whole area) Bear meat ¹⁾
Ibaraki	(Limited areas) Log-grown shiitake (outdoor・indoor cultivation) ¹⁾ , Wild Koshiabura, Wild mushrooms (Whole area) Boar meat ¹⁾
Tochigi	(Limited areas) Log-grown shiitake (outdoor・indoor cultivation) ¹⁾ , Log-grown brick cap (outdoor cultivation), Log-grown pholiota nameko (outdoor cultivation), Wild mushrooms, Bamboo shoot, Wild Ostrich fern, Wild Koshiabura, Wild Japanese pepper, Wild Japanese royal fern, Wild Aralia sprout, Wild Pteridium aquilinum (Whole area) Boar meat ¹⁾ , Deer meat
Gunma	(Limited areas) Wild mushrooms, Wild Koshiabura, Wild Aralia sprout (Whole area) Boar meat, Bear meat, Deer meat ¹⁾ , Copper pheasant meat
Saitama	(Limited areas) Wild mushrooms
Chiba	(Limited areas) Log-grown shiitake (outdoor・indoor cultivation) ¹⁾ , Silver crucian carp, Common carp (Whole area) Boar meat ¹⁾
Niigata	(Limited areas) Wild Koshiabura, Bear meat ¹⁾
Yamanashi	(Limited areas) Wild mushrooms
Nagano	(Limited areas) Wild mushrooms ⁵⁾ , Koshiabura, Deer meat ¹⁾
Shizuoka	(Limited areas) Wild mushrooms

Note) Excluding:

- 1) Items which are managed based on test and shipment policy set by each local government.
- 2) Honey mushroom, Bunaharitake, Pholiota nameko, Late fall oyster mushroom, Brick cap and Grifola frondosa(maitake) and Matsutake which are managed based on test and shipment policy set by each local government.
- 3) Honey mushroom, Bunaharitake, Pholiota nameko, Late fall oyster mushroom, Brick cap, Hypholoma capnoides and fried chicken mushroom.
- 4) Matsutake and bamboo shoot which are managed based on test and shipment policy set by each local government.
- 5) Matsutake



■ Monitoring of radionuclides in foods

The monitoring of radionuclides in foods is conducted by the local governments around the 17 prefectures on the basis of the inspection plan.

March 18, 2011 – March 31, 2012

137,037 of which 1,204 were detected as above the provisional regulation values. (excess rate:0.88%)

April 1, 2012 – March 31, 2013

278,275 of which 2,372 were detected as above the present limits. (excess rate:0.85%)

April 1, 2013 – March 31, 2014

335,860 of which 1,025 were detected as above the present limits. (excess rate:0.31%)

April 1, 2014 – March 31, 2015

314,216 of which 565 were detected as above the present limits. (excess rate:0.18%)

April 1, 2015 – March 31, 2016

340,311 of which 291 were detected as above the present limits. (excess rate:0.09%)

April 1, 2016 – March 31, 2017

322,563 of which 461 were detected as above the present limits. (excess rate:0.14%)

April 1, 2017 – March 31, 2018

306,623 of which 200 were detected as above the present limits. (excess rate:0.07%)

April 1, 2018 – March 31, 2019

299,424 of which 313 were detected as above the present limits. (excess rate:0.10%)

April 1, 2019 – March 31, 2020

284,931 of which 166 were detected as above the present limits. (excess rate:0.06%)

April 1, 2020 – March 31, 2021

54,412 of which 127 were detected as above the present limits. (excess rate:0.23%)

April 1, 2021 – March 31, 2022

41,361 of which 157 were detected as above the present limits. (excess rate:0.38%)

April 1, 2022 – March 31, 2023

36,309 of which 135 were detected as above the present limits. (excess rate:0.37%)

※The number of food samples tested includes test results of foods distributed in the market and test results implemented by the local governments other than the 17 prefectures designated by the guideline.

※The sampling is purposive to detect the contamination or to remove restrictions and the majority of occurrence (exceeding JML) is limited to wild harvest monitored at area where distribution is already restricted.

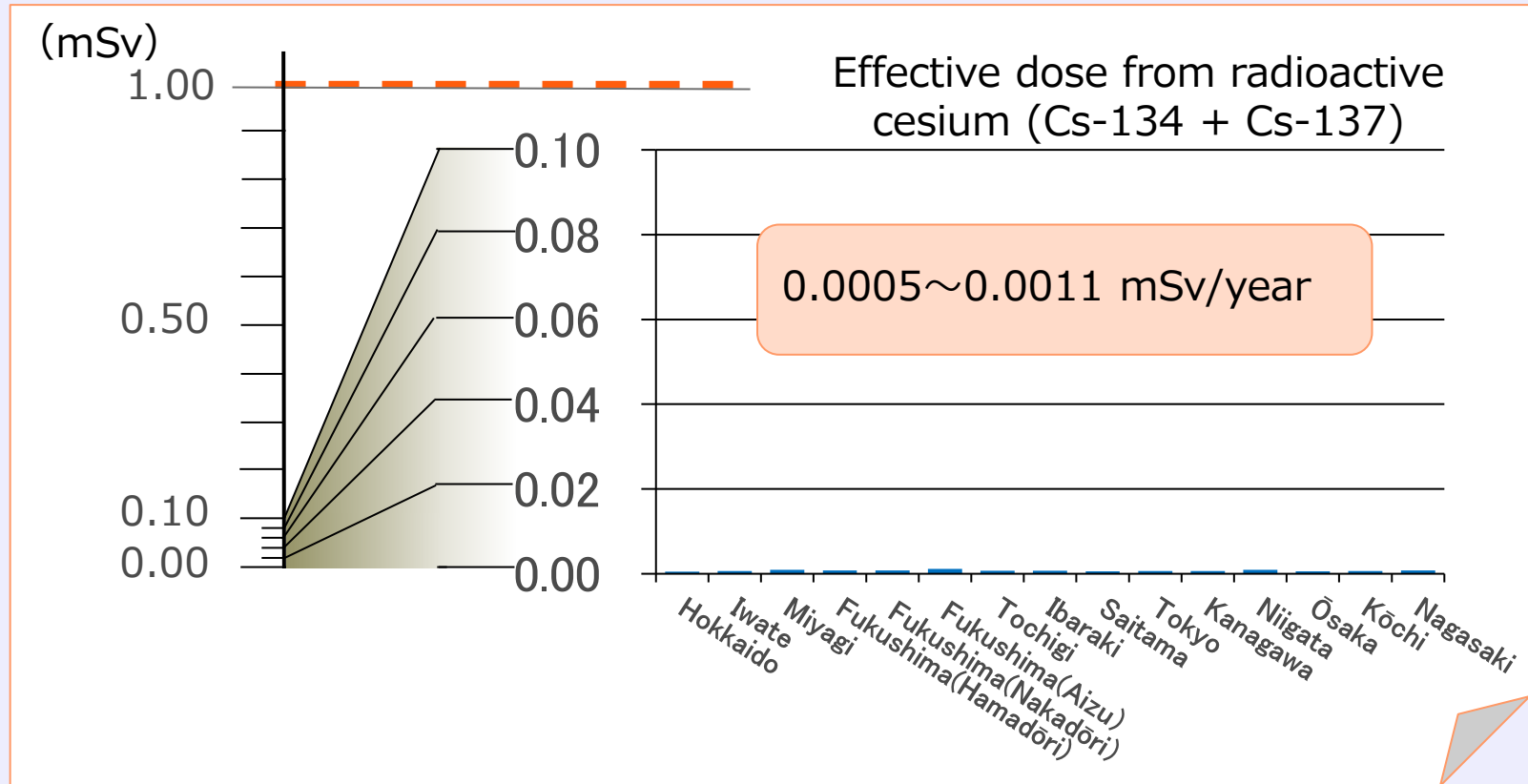
※Total number of samples has drastically decreased in JFY 2020, due to the conclusion of all-cattle-monitoring in four prefectures, i.e. Iwate, Miyagi, Fukushima and Tochigi.



Estimations of effective dose from radionuclides in foods

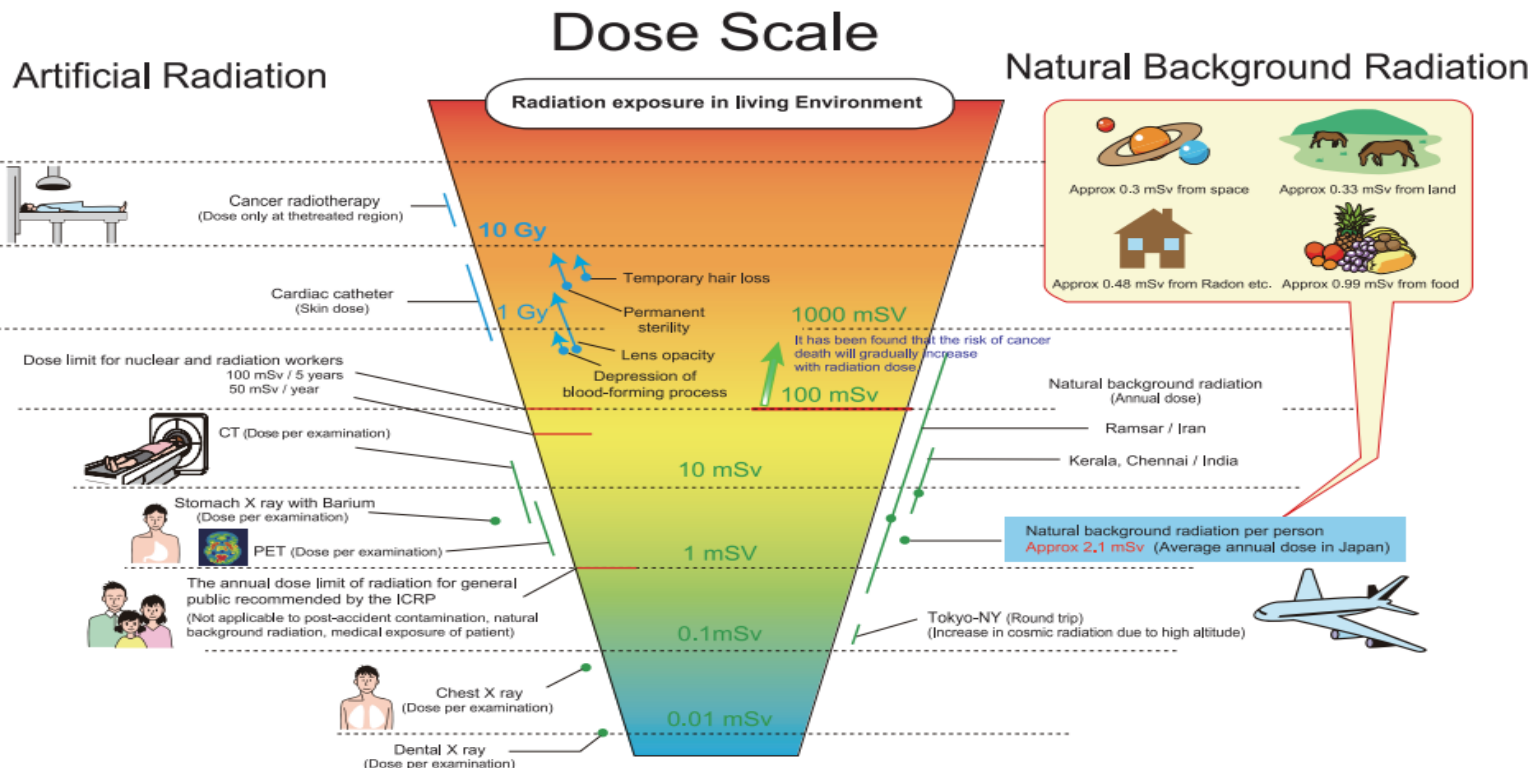
- The Ministry of Health, Labour and Welfare (MHLW) surveyed the dietary intake of radionuclides in 15 areas across Japan in the September–October 2022 period and estimated the annual effective doses from radionuclides derived from standard meals.

※ Foods were purchased in 15 areas in Japan including three areas in Fukushima Prefecture. Local grown products were selected, wherever possible.



The annual effective doses from radioactive cesium in foods were around 0.1 % of 1 mSv/year that is the basis of setting of the current limits.

Natural Background Radiation



Illustrated by NIRS (April 2013)

Reference:

- UNSCEAR 2008.
- ICRP 2007 Recommendations.
- The Guidelines for Medical Exposure by Japan Association of Radiological Technologists.
- Radiation in the living environment, new version. (Radiation Safety Research Association, 2011) etc.

[Note]

1. The numerical values are approximate figures based on significant digits.
2. The scales shown by the dotted lines are a logarithmic display. Each step up on the scale represents ten times more than the previous step.
3. This chart is subject to revision without notice.

Units of dose

Absorbed dose to each organ or tissue: Gy

The unit to show energy received per unit weight (J/kg) at each organ or tissue exposed to radiation.

Effective dose: mSv

The dose of radiation to the entire human body considering sensitivity of each organ or tissue to cancer and hereditary effects. This unit of dose is used for radiation protection.

When the entire human body is evenly exposed to gamma rays at an absorbed dose of 1 Gy, the dose is equivalent to 1000 mSv as effective dose.



QST National Institutes for Quantum and Radiological Science and Technology

National Institute of Radiological Sciences

<http://www.qst.go.jp>

Reference:



Ver 180516

Compared with natural background radiation, additional radioactive cesium from the accident is quite small.



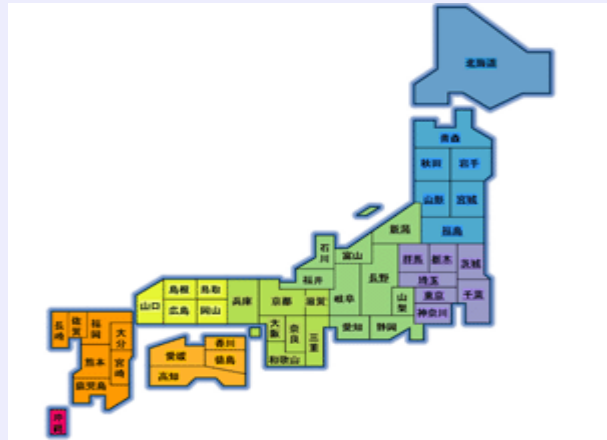
Enhancing Transparency

Information dissemination on MHLW website

The website are revised and updated materials that summarize the new limits and FAQ are posted for media and consumers. All testing results of radionuclides in foods of local governments are reported immediately to MHLW, and they are also available on this website:

JP https://www.mhlw.go.jp/shinsai_jouhou/shokuhin.html

EN https://www.mhlw.go.jp/english/2011eq_food_0001.html



Dialogues with consumers and producers, etc. (Risk communication)

Informal meetings about radionuclides in foods were held in cooperation with the Consumer Affairs Agency, Food Safety Commission of the Cabinet Office, MAFF and local governments across the country. Consumers, producers, academics, and other interested parties are participated in and share information and their concern.

