Food and Radiation Q&A
Consumer Affairs Agency

(Newly added Q&As are printed in blue)

Contents

Q2. Can the radiation levels of vegetables be reduced by rinsing and/or boiling them? Is it true that consuming *konbu* and *wakame* seaweed, beer, or hydrogen-fortified water helps prevent exposure to radiation?

5. Vegetable safety

Q1: Under the consumption restrictions, how are the vegetables categorized?
Q2: What kinds of vegetables do radioactive materials tend to adhere to?
Q3: Is product origin labeling of fresh agricultural products being done adequately?

6. Rice safety

Q1: Will rice be tested thoroughly?

7. Fish safety
Q1: Are the fish that are currently on the market safe to eat?
Q2: Is product origin labeling of fresh marine products being done adequately?

8. Milk, meat and egg safety
Q1: Raw milk is tested at cooler stations, not at farms. Milk containing radioactive materials exceeding the provisional regulation values might get mixed with milk not exceeding the limits. Is this system sufficient to obtain accurate results?
Q2: Where is the place of origin of unprocessed milk written on the package label?
Q3: No provisional regulation values for radioactive iodine have been set for meat and eggs. Aren't standards necessary?
Q4: Beef has become a major matter of concern. What is happening, exactly?
Q5: I am wary of eating beef. What should I do?
Q6: I am also worried about chicken and pork. Are they safe?

9. Water safety

Q1: What guidelines are in place for radioactive materials in tap water?
Q2: Is testing of tap water being conducted properly?
Q3: Is there any reason to be concerned about drinking and cooking with tap water?
Q4: Is it safe to mix infant formula with tap water?

Food and Radiation Q&A
[provisional translation]
August 25, 2011

1. Radiation: Basic information and impact on humans

Q1: What is the difference between radiation, radioactivity and radioactive materials?

A:

1. "Radiation" is similar to light that has the ability to penetrate matter, e.g. alpha (α) rays, beta (β) rays, gamma (γ) rays, X-rays, and neutron beams. Different types of radiation differ in their ability to penetrate matter, so they can be blocked with different materials.

2. The ability to release radiation is called "radioactivity," and materials with such ability are called "radioactive materials." To illustrate this with a flashlight, the light is the radiation, the flashlight is a radioactive material, and the ability to emit light is radioactivity.

3. What is commonly called "leakage of radioactivity" is actually "leakage of radioactive materials," which is the leakage of radioactive materials releasing radiation outside nuclear power facilities.

Q2: What kind of impact does radiation have on the human body?

A:

1. The human body is made up of numerous cells, and healthy cells divide constantly. When cells are exposed to a large amount of radiation at one time, they die or their division is retarded. For this reason, when hematopoietic organ, the genital glands, the intestinal tract, the skin, and other organs where cell division takes place actively are exposed to a large amount of radiation at one time, problems occur within a few weeks.

2. Long-term exposure to a certain amount of radiation causes damage to genetic materials including DNA in the cells of the hematopoietic organs and in other organs, with their ability to recover unable to keep pace with the damage, thus causing cancer, leukemia, and other illnesses in some cases. Whether or not such illnesses occur in a person and when they occur differ from individual to individual.

3. Infants, children, and pregnant women (fetuses), whose cells divide more actively, are more susceptible to the effects of radiation than adults.

Q3: What is the difference between the units of measurement for radioactivity Bq and Sv?

A:

1. All matter is made up of atoms, each consisting of a nucleus with electrons spinning around it.

2. Radiation is released when a certain nucleus changes (disintegrates) into another nucleus. 1 Bq is the amount of radiation released by one nucleus in one second when it disintegrates. The greater the number of Bq, the greater the number of nuclei disintegrating.

3. However, the type and intensity of radiation released differ according to the type of radioactive material. Even for the same radioactivity of 1,000 Bq, different radioactive materials affect the human body to different degrees. Therefore, a common unit of measurement was devised to measure the effect of radiation on humans, and this is called the Sv (sievert). A measurement of 1 Sv always indicates the same effect on the human body.

Bq and Sv can be converted using the following method:

(Example 1)
When 1 kg of food containing 500 Bq/kg of radioactive cesium-137 is consumed, the effect on the human body is
500 x $\underline{1.3 \times 10^{-5}}$* = 0.0065 mSv (1 millisievert = 1/1,000 of 1 Sv)

(Example 2)
When 1 kg of food containing 300 Bq/kg of radioactive iodine-131 is consumed, the effect on the human body is
300 x $\underline{1.6 \times 10^{-5}}$* = 0.0048 mSv
Note: 1 μSv (microsievert) is 1/1,000,000 of 1 Sv.

*Effective dose coefficient (mSv/Bq): Coefficient for converting Bq, which is the unit of radioactivity, to mSv, which is the unit for measuring the effect on living organisms. This is set by the International Commission on Radiological Protection (ICRP) according to the type of radioactive material, chemical form, and mode of intake. The above examples use values (for oral intake by an adult) indicated in the Nuclear Safety Commission's guidelines (guidelines for assessing target radiation levels in areas near light water reactor facilities for power generation). Under these guidelines, the coefficients for iodine-131 are set differently for young children and infants at 7.5×10^{-5} and 1.4×10^{-4}, respectively.

Q4: What are the radioactive materials for which provisional regulation values in food are set?

A:

1. The Ministry of Health, Labor and Welfare (MHLW) has set provisional regulation values in food for four categories of radioactive materials: radioactive iodine, radioactive cesium, uranium, and plutonium and alpha nuclides of transuranic elements.

2. Based on past disasters at the Chernobyl nuclear power plant and elsewhere, the "urgent notice on radioactive materials" issued by the Food Safety Commission on March 29 also cited radioactive iodine (iodine-131) and radioactive cesium (cesium-134, 137) as substances requiring urgent study in relation to the accident at the Fukushima Daiichi Nuclear Power Plant.

3. The MHLW's information on radioactive materials in food also includes test results for iodine-131 and cesium (134, 137).

Radioactive material	Provisional regulation values (Bq/kg) under Food Sanitation Law (Law #233, 1947)	
Radioactive iodine (representative nuclide of mixed nuclides: ^{131}I)	Drinking water	300
	Milk, dairy products*	
	Vegetables (except for root vegetables, potatoes)	2,000
	Seafood	
Radioactive cesium	Drinking water	200
	Milk, dairy products	
	Vegetables	500
	Grains	
	Meat, eggs, fish, etc.	
Uranium	Baby food	20
	Drinking water	
	Milk, dairy products	
	Vegetables	100
	Grains	
	Meat, eggs, fish, etc.	
Plutonium, alpha nuclides of transuranic elements (sum of radioactivity concentration of ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{242}Cm, ^{243}Cm, ^{244}Cm)	Baby food	1
	Drinking water	
	Milk, dairy products	
	Vegetables	10
	Grains	
	Meat, eggs, fish, etc.	

*Instructions should be issued not to use milk containing over 100 Bq/kg of radioactive materials for baby formula or for drinking for babies.

Q5: What is the difference between "external exposure" and "internal exposure"?

A:

1. There are two modes of exposure to radiation: external and internal. "External exposure" is exposure to radiation released by radioactive materials from outside the body.

2. On the other hand, "internal exposure" is exposure through the intake of air, water, food, and other substances containing radioactive materials into the body. There are four sources of internal exposure: (1) through the mouth with food (oral intake); (2) with air (intake by inhalation); (3) through the skin (dermal absorption) and (4) through wounds (wound penetration).

3. "External exposure" can be reduced by moving away from the radioactive material (for example, doubling the distance will reduce exposure to one-fourth). In the case of "internal exposure," since the radioactive materials in the body, exposure continues until this substance is discharged from the body.

4. We are exposed both externally and internally to natural radiation in our daily lives. Exposure to radiation released by radioactive materials leaked due to nuclear power plant accident means that we are exposed to such radiation in addition to natural radiation.

Q6: What is meant by the "half-life" of radioactive materials? What is the difference between the physical half-life and biological half-life?

A:

1. Radioactive materials do not remain in the natural environment forever. They release radiation, transform into different nuclei, and are ultimately devoid of any radioactive content. The amount of time required for the number of nuclei of the original radioactive material to be reduced by half differs according to the type of substance. For example, it is approximately 8 days for iodine-131 and 30 years for cesium-137. This is called the "physical half-life."

2. On the other hand, radioactive materials taken into the body with food, etc., enter the blood and are discharged from the body in such forms as exhalation, perspiration, urine, and stool. The amount of time required for radioactive materials to be reduced to half in the body through this process is called the "biological half-life."

3. The biological half-life for iodine-131 is approximately 11 days in infants, 23 days in five-year-olds and 80 days in adults. For cesium-137, it is approximately 9 days for one-year-olds, 38 days for children up to nine years of age, 70 days for adults up to 30 years of age, and 90 days for adults up to 50 years of age.

Therefore, when cesium-137, which has a long physical half-life of 30 years, is taken into the body, the amount remaining in the body is reduced by half in three months (in the case of 50-year-olds).

4. The physical half-life of radioactive materials depends on the type of substance and is unaffected by cooking or other applications of heat. Nor will freezing radiation-contaminated food reduce the physical half-life of the radioactive material.

Q7: I'm concerned about the impact on infants and pregnant women (fetuses). Is there anything special we should do to protect them?

A:

1. With regard to tap water, there were a number of localities where the concentration of radioactive materials exceeded the standard deemed suitable for intake by infants (100 Bq/kg for radioactive iodine) after March 21. At that time, the concerned local governments asked residents not to give infants tap water to drink. However, since the level of radioactive materials dropped subsequently, the restrictions were gradually lifted. As of July 1, no restrictions are in place regarding drinking water for infants or the general population.

2. The MHLW issued a "survey report on breast milk" on April 30.

This was a survey of the level of radioactive iodine (iodine-131) and radioactive cesium (cesium 134, 137) in the milk of breast-feeding mothers in Fukushima Prefecture and the Kanto region.

3. While the sample size and geographical coverage of the survey were limited, the results showed that either no radioactive materials were detected or only negligible amounts were found. Mothers whose breast milk was found to contain some radioactive materials were reexamined later, and no radioactive materials were found in the breast milk of any of them. (The results were published on May 17.)

4. The MHLW reached the following conclusions based on this survey:

(1) Measures are being taken to deal with radioactive materials, with evacuation orders and food intake restrictions being issued, so even if radioactive materials from the air, water, or food intake pass into breast milk, it is thought that this will not affect the health of infants.

(2) Since breast milk is nutritious and has other advantages, breast-feeding mothers are advised not to worry too much. There is no problem with continuing to lead normal lives.

5. The National Institute of Public Health also studied the concentration of radioactive materials in breast milk. While radioactive cesium was detected in the breast milk of some women, the amount was negligible. The assessment results published on June 7 showed that the health of infants will not be affected.

Reference

"Information for pregnant or breast-feeding women concerned about tap water" (excerpted from information provided by the Japan Society of Obstetrics and Gynecology on March 24, 2011)

1. Drinking 1 liter of tap water contaminated with a low-level of radiation (tap water containing about 200 Bq/kg of radioactive materials) each day during pregnancy (from the start of the last menstruation to delivery) (total of 280 days) would result in overall radiation exposure of 1,232 microsieverts (1.232 mSv).

2. It is believed that the fetus would only be adversely affected at an exposure rate of 50,000 microsieverts (50 mSv) or above.

3. It is estimated that the amount of radioactive iodine released into breast milk would be about one-fourth of the mother's total iodine intake, but conclusive proof is not yet available.

2. Regulations regarding radioactive materials in food

Q1: What are the regulations pertaining to radioactive materials in food and tap water? Is processed food covered too?

A:

1. The MHLW has set provisional regulation values for radioactive materials in food (bottled drinking water and food) based on the guidelines drawn up by the Nuclear Safety Commission. Food with radiation levels exceeding these values should not be consumed.

2. The following are the "provisional regulation values" for radioactive iodine and radioactive cesium in food:

Food item	Radioactive iodine (nuclide representative of mixed nuclides: ^{131}I)
Drinking water	300 Bq/kg
Milk, dairy products*	

Vegetables (except for root vegetables, potatoes)	2,000 Bq/kg
Seafood	

*Instructions should be issued not to use milk containing over 100 Bq/kg of radioactive materials for baby formula or for drinking for babies.

Food item	Radioactive cesium
Drinking water	200 Bq/kg
Milk, dairy products	
Vegetables	500 Bq/kg
Grains	
Meat, eggs, fish, etc.	

3. The MHLW has also set the following levels for the intake of tap water based on the guidelines drawn up by the Nuclear Safety Commission:

Other than infants	Radioactive iodine: 300 Bq/kg
	Radioactive cesium: 200 Bq/kg
Infants	Radioactive iodine: 100 Bq/kg
	Radioactive cesium: 200 Bq/kg

4. Processed food is also covered by the provisional regulation values. Monitoring of vegetables, raw milk, and other food items is conducted at the raw material stage to prevent problems from arising.

Q2: Are Japan's provisional regulation values different from those in other countries?

A:

1. The provisional regulation values set by the MHLW are guidelines drawn up by the Nuclear Safety Commission based on recommendations from the ICRP, so they are in accordance with international thinking.

2. With only regard to iodine-131, the Codex guidelines is stricter than Japan. It is set at the safest level, so that even in cases where radiation-contaminated food is traded internationally in an emergency, the importing country will not have to worry about taking countermeasures. Several countries use the Codex guidelines as their standards.

3. The MHLW collates the results of testing and emergency monitoring conducted by the prefectures on radioactive materials in food and publishes these results. They are sorted by "date of publication" and "place of origin" in a user-friendly manner. They can be viewed on the MHLW website.

Q3: Is it true that there will be no health impact even if for a brief period you eat food that contains radioactive materials above the provisional regulation values?

A:

1. With regard to the figures on which the provisional regulation values are based (50 mSv/year for radioactive iodine since this is the equivalent dose indicating an effect on the thyroid gland; 5 mSv/year for radioactive cesium since this is the effective dose regardless of the part of the body exposed), the Food Safety Commission's "urgent notice on radioactive materials" (March 29) stated:

(1) The ICRP proposed in 1984 setting the radiation level that requires mandatory countermeasures at 50 mSv/year and the level below which countermeasures are not warranted at 5 mSv/year to protect the public from radiation (50 mSv/year for each organ). In light of this, the Nuclear Safety Commission decided in 1998 to set the ICRP's lower limit of 5 mSv/year as the level at which a decision must be made on whether to implement protective measures. With regard to radioactive iodine, in consideration of its effect on the thyroid gland, the Commission also set a regulatory standard of 50 mSv/year, which is the lower limit of radiation exposure level for each organ.

(2) Based on various available data, setting the standard at 50 mSv/year for radioactive iodine took into account a very high level of safety in preventing the intake of radioactive materials through food.

(3) The standard of 5 mSv/year for radioactive cesium is a very safe level in terms of preventing radiation exposure from food. (There is also no justification for claiming that the ICRP's 1992 standard of 10 mSv/year is inappropriate in an emergency.)

2. The provisional regulation values are set based on the assumption that the radiation level will drop in accordance with the half-lives of radioactive materials and that the continuous intake of food contaminated with radiation at this level will not affect health. These provisional regulation values are set very conservatively. There should be no health concerns even if food that has been banned from shipment was consumed for a brief period before the ban was implemented.

Q4: The government initially said that "there will be no immediate impact on health," but the word "immediate" was eliminated later. Why?

A:

1. At first, Consumer Affairs Minister Renho stated in her message: "It is believed that even if food with radiation levels exceeding the standard under the Food Sanitation Law is consumed for a brief period, there will be no immediate impact on health."

2. Even if food with radiation levels exceeding the provisional regulation values were consumed for a brief period, this amount would be very negligible when converted into a radiation dose. Such an amount is not expected to cause any acute disorders in the body. As stated in Q3, there should also be no concerns about health problems in the future. However, the possibility of

radioactive materials accumulating in the body cannot be ruled out completely. Therefore, the expression "there is no immediate impact on health" was used.

3. However, this expression may also give the wrong impression that there is certain to be an impact on health in the future. Therefore, the word "immediate" was eliminated from messages issued on April 1 and thereafter.

*The ICRP says that exposure to 100 mSv of radiation increases the mortality rate due to cancer by around 0.5%. Continuous exposure to radiation below this level is not completely harmless either. However, currently available statistics show no significant difference indicating the effect of exposure to a low level of radiation.

Q5: Is monitoring and testing of agricultural products being conducted properly?

A:

1. The testing of radioactive materials in food is conducted by the prefectural governments based on the "inspection plans of the local governments" issued by the MHLW in accordance with the "guidelines on inspection plans and the implementation and lifting of shipment restrictions" (revised on June 27, 2011) drawn up by the Nuclear Emergency Response Headquarters (chaired by the prime minister).

2. The MHLW aggregates and publishes the results of testing for radioactive materials in food by the prefectural governments.

3. "Shipment restriction" versus "consumption restriction" and the policy on lifting these restrictions

Q1: What is the system for shipment restriction and consumption restriction?

A:

1. A "shipment restriction" is implemented when food with radiation levels exceeding the provisional regulation values as set in the Food Sanitation Law is found to have been distributed widely in a region, in order to prevent internal exposure to radiation through the consumption of food containing radioactive materials. Based on the Act on Special Measures Concerning Nuclear Emergency Preparedness, the head of the Nuclear Emergency Response Headquarters (prime minister) will issue the order to the governors of applicable prefectures. Based on this order, the governors will ask the relevant business operators to refrain from shipping such products.

2. If and when, for example, an extremely high-level concentration of radioactive materials is detected in produce, the head of the Nuclear Emergency Response Headquarters (prime minister) directs the governors of the prefectures concerned to restrict their citizens' consumption of the affected farm products, in addition to restricting (or banning) the shipment

thereof. Accordingly, the producers have to refrain from consuming their own farm products. As well, the local people must refrain from consuming products they grow in home gardens.

3. The agricultural cooperatives and prefectural governments sometimes ask producers to refrain from shipping agricultural products with radiation levels above the provisional regulation values before the national government issues such an order. Such information can be found on the websites of the prefectural governments and the Ministry of Agriculture, Forestry, and Fisheries (MAFF).

Q2: Over 10,000 bundles of spinach harvested in Katori City, Chiba Prefecture, were shipped and most of them were consumed even though a shipment restriction order had been issued. What happened?

A:

1. It was learned at a news conference by the Chiba prefectural government on April 26 that spinach harvested in Katori City, Chiba Prefecture, had been shipped even though a shipment restriction order had been issued. Subsequently, the shipment volume and distribution routes were determined through the prefectural government's investigation of the wholesalers and other parties involved. The prefectural government issued a business improvement order to the Yokaichiba Local Fruits and Vegetables Wholesale Market Company under Chiba's ordinance on wholesale markets.

2. Based on this order, the company took business improvement steps and began to check the names and addresses of the producers when accepting deliveries of fruits and vegetables.

3. Chiba Prefecture also conducted an urgent survey of other fruit and vegetable wholesale markets in the prefecture (a total of 30) and confirmed that except for the Yokaichiba Local Fruits and Vegetables Wholesale Market Company, none of them had received any deliveries of spinach or other items under shipment restriction.

4. The provisional regulation values based on the Food Sanitation Law were set very conservatively, so the short-term consumption of food with radiation levels above these limits would presumably not have any impact on health. However, the distribution of food items under shipment restriction in the market should never happen again. The national and local governments and the relevant bodies are closely checking the distribution network.

5. The Consumer Affairs Agency conducted its own field survey of the case of the Katori spinach and issued a report on June 13. The report suggested the following steps to prevent the occurrence of similar accidents:

(1) Thorough implementation of shipment restrictions by the governors

It is necessary for the governors to check if all the producers are being notified of shipment restrictions and if shipment control is being thoroughly enforced, and to issue appropriate instructions.

(2) Adequate explanations to the producers on shipment restrictions

It is important for the relevant local governments to make efforts to provide detailed explanations to the producers on why shipment restrictions have been imposed, so that they can fully understand and accept restriction orders.

(3) Thorough shipment control at wholesale markets and direct-sales stores

When shipment restriction orders are issued at the municipal level, it is important for the wholesale markets and direct-sales stores, which are the major channels of distribution, to verify the place of origin.

(4) Promotion of the inclusion of places of origin (names of cities, towns, or villages) on labels in order to give consumers peace of mind

The Consumer Affairs Agency presented this report to the departments in charge in the local governments through the MHLW and the MAFF and requested their thorough implementation of shipment restrictions on food items.

Q3: Why is it possible to lift shipment restrictions on vegetables when new no-entry zones are still being designated?

A:

1. Based on the Act on Special Measures Concerning Nuclear Emergency Preparedness, the national government declared the area within a radius of 20 kilometers from the Fukushima Daiichi Nuclear Power Plant (including the sea area) a “no-entry zone” as of 12:00 a.m. on April 22, thereby banning entry into this area.

This area had previously been designated an “evacuation zone” and upon coordination with the relevant local authorities, the designation was changed to a no-entry zone which would legally authorize the prohibition of entry into the area by local residents. This had nothing to do with an increase in the amount of radioactive materials released by the nuclear plant or any new problems relating to food safety.

2. The lifting of shipment restrictions is undertaken by the prime minister, who heads the Nuclear Emergency Response Headquarters, based on the “guidelines on inspection plans and the implementation and lifting of shipment restrictions” (revised on June 27, 2011) when the required conditions are met.

3. The following are the specific requirements for lifting shipment restrictions:

(1) For shipment restrictions based on the monitored amount of radioactive iodine

Weekly inspections are conducted in multiple municipalities in each area. (Inspections are mandatory for municipalities previously found to have radiation levels exceeding the provisional regulation values. As for other municipalities, inspections are in principle conducted in different municipalities for each inspection. Restrictions are lifted if radiation levels are below the provisional regulation values for three consecutive weeks.

(2) For shipment restrictions based on the monitored amount of radioactive cesium

At least three locations are inspected in each municipality in the relevant area. (Inspections are mandatory for municipalities previously found to have radiation levels exceeding the provisional regulation values.) Restrictions are lifted if radiation levels are below the provisional regulation values in all inspections for the past month.

(3) The situation at the Fukushima Daiichi Nuclear Power Plant is taken into consideration when making decisions on lifting restrictions.

4. As of July 1, shipment restrictions had been lifted for spinach and other farm products harvested in certain areas in Fukushima, Ibaraki, Tochigi, Gunma, and Chiba after the above conditions were met.

4. Food safety and prevention of exposure to radiation

Q1. Are vegetables cultivated in home gardens safe to eat?

A:

1. Since the nuclear accident occurred, testing has been conducted on major types of vegetables in each of the surrounding prefectures. Shipment restrictions and other necessary measures have been taken for vegetables whose level of radioactive materials exceeds the provisional regulation values established under the Food Sanitation Law. The results of testing thus far indicate that since mid-May, the concentration of radioactive materials has been low across all vegetables (with the exception of shiitake mushrooms), regardless of whether they were field-grown or grown in greenhouses, with no cases of vegetables exceeding the provisional regulation value.

2. It is believed that the concentration of radioactive materials found in vegetables cultivated in home gardens is similar to that found in vegetables produced in and/or shipped from the surrounding area. Consequently for areas other than Emergency Evacuation Preparation Zones and other such areas for which shipment restrictions are ongoing, eating vegetables harvested in home gardens should have no impact upon health.

Q2. Can the radiation levels of vegetables be reduced by rinsing and/or boiling them? Is it true that consuming *konbu* and *wakame* seaweed, beer, or hydrogen-fortified water helps prevent exposure to radiation?

A:

1. As previously stated, food with radiation levels above the provisional regulation values set under the Food Sanitation Law is not allowed to be shipped and placed on the market. Therefore, there is no need to take any special measures for vegetables being sold in the market.

2. Incidentally, while radiation levels cannot be reduced by heating vegetables, the National Institute of Radiological Sciences says that “rinsing, boiling (and discarding the water after

boiling), and removing the skin and outer leaves of vegetables can potentially reduce their radiation contamination."

If you are particularly concerned about radioactivity, please take the precautions described above.

3. While *konbu, wakame,* and other types of seaweed do contain iodine, the amount is inconsistent and they sometimes contain only negligible amounts of iodine. The preventive effects of such items are uncertain.

4. An iodine tablet is a pharmaceutical product used for the prevention of radiation exposure. Iodine tablets should be taken only upon instructions by administrative authorities due to possible side effects.

5. There is no clear scientific proof that beer or hydrogen-fortified water helps to prevent exposure to radiation. Do not drink them expecting the protective effect regarding radiation exposure.

5. Vegetable safety

Q1: Under the consumption restrictions, how are the vegetables categorized? Is green tea included in the vegetable category?

A:

1. There are a variety of different types of vegetables. By utilizing the international food classification system, vegetables are categorized according to shape and the size of the leaf that absorbs chemical substances from the air.

2. Specifically, vegetables are classified as follows:

(1) Vegetables whose "leaves" are mainly consumed: leafy vegetables
*Leafy vegetables are categorized as follows depending on the shape of their leaves:
- Vegetables with leaves that remain separated and do not clump together: "non-head type leafy vegetables" → spinach, *komatsuna, mizuna*, bok choy, *kakina*, loose-head lettuce (Romaine lettuce, red leaf lettuce, etc.), chrysanthemum leaves.
- Vegetables with leaves that clump together in a ball: "head type leafy vegetables" → cabbage, Chinese cabbage, head lettuce.

(2) Vegetables whose "flowers and buds" are consumed: flower bud or flower head vegetables →broccoli, cauliflower

(3) Vegetables whose "fruit" is consumed: fruit vegetables
- Cucurbitaceous fruit vegetables → cucumber, pumpkin

- Solanaceous fruit vegetables → tomato, eggplant, green pepper

(4) Vegetables whose "stems and leaves" are mainly consumed: stem vegetables → celery, asparagus

(5) Vegetables of the leek family whose "leaves" are consumed: alliaceous vegetables → leeks, Chinese chives

(6) Vegetables whose immature "beans and pods" are consumed: immature beans → green soybeans, kidney beans, field peas

(7) Vegetables whose "underground roots" are consumed: root crops → white radish, turnip, carrot

3. "Tea leaves" are included in the vegetable category. There are three different types of tea leaves depending on the stage of processing: fresh tea leaves that have just been picked; dried and unrefined tea leaves; and further dried and processed tea leaves. These are all subject to the provisional regulation values (500 Bq/kg for radioactive cesium) in accordance with the Food Sanitation Law. However, because hot water is used when drinking tea, the density of radioactive cesium of brewed tea will generally be reduced to about 1/35 of that of processed tea leaves, according to calculations by the Consumer Affairs Agency.

Q2: What kinds of vegetables do radioactive materials tend to adhere to?

A:

1. It is believed that after the nuclear power plant accident, dust in the air containing radioactive materials, such as radioactive iodine, descended together with rain and adhered to the surface of leaves. As such, there have been many cases in which non-head type leafy vegetables, such as spinach, have shown high levels of radioactive materials compared with other types of vegetables.

2. Also, when compared at the same weight, bulky vegetables tend to show high levels of radioactive contamination. *Kakina, kukitachina* and *shinobu-fuyuna,* which have become subject to consumption restrictions in Fukushima Prefecture, also belong to this type of leafy vegetables.

3. It is less likely for dust containing radioactive materials to adhere to root crops, such as radishes, because most of their roots for consumption remain underground.

4. At the same time, it is necessary to pay close attention to how much radioactive materials can be absorbed from the soil.

5. Radioactive cesium has a long half-life (30 years in the case of Cesium-137) in contrast to radioactive iodine, which has a short half-life of eight days. For this reason, it is important to check for radioactive cesium for many years to come.

Q3: Is product origin labeling of fresh agricultural products being done adequately?

A:

1. The domestic fresh food quality labeling standard under the JAS Law requires producers to indicate the place of origin of domestically produced agricultural products by prefecture, municipality, or other well-known place name.

2. Given the area-specific shipment restrictions in the same prefecture, producers are expected to rigorously indicate the names of municipalities and regions.

3. Any violation of this labeling obligation is subject to administrative measures, such as instruction and disclosure, or a criminal penalty in accordance with the JAS Law. The Consumer Affairs Agency will tighten controls on false place-of-origin labeling in cooperation with the Ministry of Agriculture, Forestry, and Fisheries, and the prefectural governments.

6. Rice safety

Q1. Will rice be tested thoroughly?

A:

1. The Ministry of Agriculture, Forestry and Fisheries officially announced “Concerning the fundamental approach to a survey on radioactive materials in rice.”

2. Rice is the staple food of Japan and has various distinctive characteristics. The amount of rice intake is large, the production volume surpasses that of other kinds of food, such as vegetables, and it is possible to store it for extended periods. In addition, the number of rice producers is extremely large, and the distribution of rice takes a wide variety of forms, including direct sales by farming households.

3. For this reason, restrictions on planting were implemented in April in areas in which radioactive materials in the rice produced would have a high possibility of exceeding the provisional regulation values under the Food Sanitation Law. In other regions, in municipalities in which the concentration of radioactive cesium in the soil is relatively high, surveys of radioactive materials are conducted in two stages, with preliminary surveys conducted prior to harvesting and main surveys conducted post-harvest.

4. In municipalities in which the results of the preliminary survey indicate a concentration of radioactive cesium exceeding a certain level (200Bq/kg), priority surveys will be conducted at the time of the main surveys. Careful testing is being done, with material sampling taking place at one location in approximately every 15ha of rice crop acreage (the equivalent of roughly one location per farming settlement).

5. Should the results of the main survey detect radioactive cesium at levels above the provisional regulation values, shipment restrictions will be imposed on all rice from that area, with the municipality as the unit by which the restrictions take place (or former municipalities).

6. Insofar as rice is planted only once a year, should shipment restrictions be imposed, for the 2011 rice crop there will be no lifting of restrictions midway through the season. Furthermore, on the basis of ministerial ordinances stipulating points with which rice shipping and sales business operators are to comply, shipping and sales will be banned and disposal of the rice as waste will be mandatory.

7. Rice from the 2010 crop and from previous years was harvested and stored before the nuclear power plant accident occurred. Such rice will not have been exposed to gas or dust containing radioactive materials if it has been properly stored indoors following the accident.

7. Fish safety

Q1: Are the fish that are currently on the market safe to eat?

A:

1. No fishing activities are being conducted in the sea near the Fukushima Daiichi Nuclear Power Plant, so no fish from the sea in the vicinity of the power plant is available on the market.

2. Radioactive materials exceeding the interim limits under the Food Sanitation Law have been detected in “young sand lance” unloaded in Fukushima Prefecture. They were caught for the purpose of testing fish safety. Following the results, the head of the Nuclear Emergency Response Headquarters (prime minister) on April 20 issued an instruction to the governor on restricting shipment and consumption.

3. Radioactive materials exceeding the interim limits under the Food Sanitation Law have also been detected in landlocked salmon (excluding farmed fish), chub, and Japanese trout (excluding farmed fish) caught in some rivers, lakes and ponds in Fukushima Prefecture. As a result, an instruction on restricting shipment has been issued for June and beyond.

4. Before resuming fishing activities in sea areas in prefectures adjacent to Fukushima Prefecture, each prefecture is required to test marine products for radioactive materials. They are allowed to resume fishing activities only after the results have been confirmed to be lower than the provisional regulation values.

5. Even after fishing activities are resumed, tests for radioactive materials are to be conducted about once a week.

Q2: Is product origin labeling of fresh marine products being done adequately?

A:

1. The "name of the sea area where the product originated from" must be indicated on the packages of fresh marine products in accordance with the fresh food quality labeling standard under the JAS Law. (e.g., off Ibaraki Prefecture, off Sanriku, off Choshi).

2. However, when it is difficult to list the name of the sea area, such as when fishing activities are conducted in a sea area straddling prefectures, it is acceptable to list the "name of the port of landing or of the prefecture supervising the port" in lieu of the name of the sea area.

3. Any violation of this labeling obligation is subject to administrative measures, such as instruction and disclosure, or a criminal penalty in accordance with the JAS Law, as in the case of fresh agricultural products. The Consumer Affairs Agency will tighten controls on false place-of-origin labeling in cooperation with the Ministry of Agriculture, Forestry, and Fisheries, and the prefectural governments.

8. Milk, meat and egg safety

Q1: Raw milk is tested at cooler stations, not at farms. Milk containing radioactive materials exceeding the interim limits might get mixed with milk not exceeding the limits. Is this system sufficient to obtain accurate results?

A:

1. Raw milk from healthy dairy cattle is cooled to below 10 degrees centigrade in the dairy farms' tanks and is kept there for about two days.

2. Raw milk is collected from each farm using tank trucks and the milk is then stored at a refrigeration facility called a cooler station. After that the raw milk is generally transported to a milk processing plant.

3. As explained above, raw milk produced at dairy farms is stored at cooler stations and then shipped to milk processing plants. This means that consumers do not drink raw milk directly shipped from dairy farms.

4. As such, in order to ensure the safety of milk and dairy products for consumers, testing for radioactive materials is conducted at cooler stations, not at dairy farms.

Q2: Where is the place of origin of unprocessed milk written on the package label?

A:

1. For milk and dairy products, it is required under the Food Sanitation Law to include not the place of origin but "the location of the dairy plant" on the package label.

2. Given this, there are cases in which the place of origin is not shown on the package label. The place of origin could change according to the season and for other reasons. If you would like to obtain such information for milk and dairy products, please contact the producer's customer support center, etc.

3. If a level of radioactive materials exceeding the provisional regulation values set under the Food Sanitation Law is detected in unprocessed milk as a result of contamination, the head of the Nuclear Emergency Response Headquarters (prime minister) instructs the relevant governor to restrict the shipment of the product. In this case, the agricultural cooperative or the dairy producer is required to confirm the name of the shipper and the place of origin before the product is shipped to a cooler station or to a dairy plant. Therefore, it is impossible for the processed milk produced in shipment-restricted areas to be marketed and used as a raw material in the production of milk and dairy products.

Q3: No interim limits for radioactive iodine have been set for meat and eggs. Aren't standards necessary?

A:

1. There are no provisional regulation values set for iodine in meat and eggs. That is because the levels of radioactive iodine that accumulate in meat and eggs and are transmitted to humans are considered to be low, as the period from production to consumption exceeds radioactive iodine's half-life of eight days.

2. Meanwhile, the half-life of radioactive cesium is as long as 30 years. Given this, the Food Sanitation Law sets the maximum limit for cesium in food at 500 Bq/kg.

Q4. Beef has become a major matter of concern. What is happening, exactly?

A:

1. It was learned that there had been shipments of cattle which had possibly been fed rice straw contaminated with radioactive materials. As of August 24, the number of cattle has reached 4,675 in 15 prefectures. Among these, the meat from 1,259 cattle was tested and radioactive cesium has been detected at levels above the provisional regulation values in the meat of 92 cattle (roughly 7.3% of the cattle tested).

2. Because it lies longitudinally on the ground, rice straw left in paddy fields after harvesting has a large surface area over which to take in falling materials, making it more likely to be affected by falling radioactive materials. As the precautions to use feed that had been cut before the nuclear accident and stored indoors was not heeded sufficiently, a portion of beef cattle were fed rice straw that had been left lying in paddy fields even after the nuclear accident. Some of that rice straw had radioactive cesium exceeding the target for roughage feeding of 300Bq/kg.

3. The Ministry of Agriculture, Forestry and Fisheries is once again thoroughly engaged in having cattle farmers and others adhere to the precautions mentioned above. In addition, the Ministry requested all prefectures to conduct a survey on the situation regarding the use of rice straw since the nuclear accident, thereby gaining an understanding of the cattle that may have been fed rice straw contaminated with radioactive materials (with the results of these surveys disclosed to the public daily).

4. Voluntary restraint on shipping is being practiced in cases of cattle that may have been fed rice straw contaminated with radioactive materials but have not yet been shipped. In addition, the head of the Nuclear Emergency Response Headquarters (the Prime Minister) issued an order restricting shipments from Fukushima, Miyagi, Iwate, and Ibaraki Prefectures (with a partial lifting of these restrictions already underway in all four prefectures as of August 25, 2011).

In addition, as for the meat from the 4,675 heads of cattle that were already shipped, the individual identification number of each of these cattle has been publicly disclosed. Prefectures are moving forward with surveying the meat from these cattle, and in cases in which the meat has been distributed into the market, first of all sales are halted and then testing for radioactive cesium is conducted, with recalls conducted for any meat that exceeds the provisional regulation values.

5. On the webpage of the National Livestock Breeding Center (an incorporated administrative agency), consumers can also enter the individual identification numbers indicated on the beef

they have purchased. It is therefore possible for anyone to investigate a cattle's production history by using the Internet (see the following page).

Reference

About the traceability of beef and the individual identification of cattle:

(1) All domestically-born cattle as well as imported cattle are fitted with an ear tag on which there is a ten-digit individual identification number printed.

(2) Through its individual identification number, each cattle has recorded in a database its sex and type (for example, Japanese Black Cattle) as well as information from birth to, in the case of beef cattle, its fattening and slaughter (its slaughter and processing to make meat for consumption) or, in the case of dairy cattle, the location where it was raised, through its production of raw milk to its disuse and slaughter.

(3) After a cattle is slaughtered and becomes meat, it undergoes the processes of dressing, cutting, and meat packing and then enters distribution. During these operations, the individual identification number is indicated by the distributors involved in the transaction and it is recorded and archived in the ledgers of the purchasing party.

(4) Through this process, it is possible to grasp tracking/retroactive trails from a cattle's birth until it is supplied to consumers, that is, information on the animal's production and distribution history (beef traceability).

*From the Ministry of Agriculture, Forestry and Fisheries pamphlet, "Beef traceability and the individual identification of cattle"

Q5. I am wary of eating beef. What should I do?

A:

1. Through cooperation between the national and each of the relevant prefectural governments, efforts have been made to strengthen the testing of all heads of cattle at

slaughterhouses and the testing of all farms within each prefecture so that beef whose level of radioactive cesium exceeds the provisional regulation values does not enter into distribution.

2. Because a portion of meat from cattle that had possibly been fed rice straw contaminated with radiation had already been shipped before these efforts were put in place, along with publicly disclosing the individual identification numbers of the cattle in question, the date of slaughter, wholesale market shipping destination, and other information, in cases in which meat from these cattle is discovered to be in the course of distribution, sale of the meat is halted and priority testing of the concentration of radioactive materials, a recall of the meat, etc. are conducted (cf. Section 8, question 4).

3. The results of testing for radioactive cesium in the meat from cattle which had possibly been fed rice straw contaminated with radioactive cesium and which have been confirmed as having entered distribution, as well as their individual identification numbers, can also be found on the Consumer Affairs Agency's web site.

Should you discover the meat of the cattle in question in your refrigerator at home or elsewhere, contact a local health center in your area.

Reference

Provisional calculation of impacts upon the human body

(Example)

In the case of someone eating 1kg of beef in which 500Bq, the provisional regulation value, of radioactive cesium (assuming cesium 134 and 137 in equal amounts) has been detected, the impact upon the human body would be 500 x (1.6×10^{-5})*1 = 0.008mSv (millisievert = 1/1,000 of a Sv).

The impact upon the human body from the 0.008mSv calculated in this example is approximately one-fiftieth of the annual effective dose (on average approximately 0.4mSv in Japan*2) received through the intake of natural radioactive materials (such as radioactive potassium), excluding the impact from the recent nuclear power plant accident.

(This is approximately one-thirteenth of the impact of radiation on the human body arising during a one-way flight from Tokyo to New York [approximately 0.1mSv].)

(In the case of someone eating 1kg of beef in which 4,350Bq, an amount exceeding the provisional regulation value, of radioactive cesium [assuming cesium 134 and 137 in equal

amounts] has been detected, the impact upon the human body would be 4,350 x (1.6×10^{-5})*1 = 0.07mSv.)

*1 The effective dose coefficients (mSv/Bq) for adults, in the case of oral intake
Cs134 = 1.9×10^{-5}, Cs137 = 1.3×10^{-5}
(Source: "Guidelines for assessing target radiation levels in areas near light water reactor facilities for power generation" [Decided by the Japan Atomic Energy Commission on September 28, 1976; partially revised March 29, 2001])

Radioactive cesium (assuming cesium 134 and 137 in equal amounts) = $1.9 \times 10^{-5} \times 1/2 + 1.3 \times 10^{-5} \times 1/2 = 1.6 \times 10^{-5}$
*2 Source: Documents from the Pharmaceutical Affairs and Food Sanitation Council, Ministry of Health, Labour and Welfare (convened July 12, 2011)

*Taken from the Food Safety Commission's "Concerning the Results of the Survey on Meat from Cattle that May Have Been Fed Rice Straw containing Radioactive Materials (Documents for release to the press from relevant ministries and agencies)"

Q6. I'm also worried about chicken and pork. Are they safe?

A:

1. In addition to corn and the like, the beef cattle that we eat are fed rice straw, which is more likely to be affected by radioactive materials falling (see Section 8, Q4). Dairy cattle are fed not rice straw but rather raw pasturage or silage, which is pasturage that has been fermented in a silo or other structure.

2. Because the digestive organs of pigs and chickens are different from those of cattle, they are unable to digest rice straw or pasturage. Consequently, they are given grains, grain by-products, and the like as feed. They are not given rice straw.

3. The Ministry of Health, Labour and Welfare aggregates and publishes the results of testing undertaken by each prefecture of radioactive materials in food. Until now (current as of August 24), the highest concentrations of radioactive cesium detected in eggs, chicken meat, and pork are 11.4, 12.2, and 270Bq/kg respectively, and are thus all below the provisional regulation value of 500Bq/kg for radioactive cesium.

9. Water safety

Q1: What "guidelines" are in place for radioactive materials in tap water?

A:

1. Based on "the guideline values for food and drink intake restrictions" set by the Nuclear Safety Commission of Japan, the maximum levels for radioactive materials in tap water are:

(1) 300 Bq/kg for radioactive iodine (100 Bq/kg for infants)
(2) 200 Bq/kg for radioactive cesium (same for infants)

2. If levels of radioactive materials higher than the guidelines are measured in tap water through monitoring by water utility entities (operated by local governments), residents should refrain from drinking tap water. (See Q3)

3. Even if water is found to contain radioactive materials at levels exceeding the guidelines, it can be used for almost anything other than consumption, such as bathing, because the amount of radioactive materials taken into the body is considered to be considerably smaller than in the case of drinking the water.

Q2: Is testing of tap water being conducted properly?

A:

1. Prefectural governments are testing their tap water for radiation.

2. (Monitoring method)
The Ministry of Health, Labor and Welfare (MHLW) compiled on April 4 guidelines for radiation monitoring. The guidelines require local water utilities to measure more than once a week the levels of iodine and cesium, for the time being, in samples taken from taps or purification plants. (If radiation levels exceeding the guidelines are detected, the levels should be monitored every day in principle.)

3. (Monitored areas)
In the aftermath of the accident at the Fukushima Daiichi Nuclear Power Plant, levels of radioactive materials exceeding the guidelines were detected in tap water in parts of Fukushima, Ibaraki, Tochigi, Chiba, Tokyo, and Saitama prefectures, so restrictions were temporarily placed on water intake there.

4. For this reason, the MHLW has urged the following prefectures to monitor their tap water: Fukushima Prefecture; its neighboring prefectures (Miyagi, Yamagata, Niigata, Tochigi, and

Ibaraki prefectures); and prefectures in the Kanto Region where there is a possibility of a certain amount of radioactive materials being detected.

5. (Restrictions on water intake)
The MHLW guidelines for monitoring also specify:

(1) If the average levels of radioactive materials in tap water samples taken for three consecutive days exceed the guidelines, the relevant local governments are required to notify the residents and restrict their water intake.

(2) If markedly high levels of radioactive materials are detected in a single test, the relevant local governments are required to notify the residents and restrict their water intake.

6. Concerning water intake, please follow the instructions of local water utilities.

Q3: Is there any reason to be concerned about drinking and cooking with tap water?

A:

1. In areas where radioactive materials exceeding the guidelines are not detected in tap water through monitoring by local water utility entities operated by local governments, the water is safe to drink or cook with.

2. If the relevant government restricts water intake after radioactive materials exceeding the guidelines are detected, residents should refrain from drinking and cooking with tap water.

3. Even so, the guidelines were set with consideration given to the possible negative effect of radiation on human health on the assumption of consuming for a long period of time. Therefore, if there is no alternative drinking water available, it is unlikely that human health will be affected even if the water is consumed for a brief period. Since rehydration is particularly essential for infants, please place priority on rehydration and give infants tap water in such situations.

4. Water purifiers are not necessarily an effective way to remove radioactive materials as their capabilities differ according to the type of equipment.

Q4: Is it safe to mix infant formula with tap water?

A:

1. It is safe to mix infant formula with tap water in areas where the levels of radioactive materials do not exceed the guidelines (radioactive iodine: 100 Bq/kg for infants).

2. If levels of radioactive materials exceeding the guidelines are detected, residents should refrain from using tap water to dissolve infant formula. (See Paragraph 3 of Q3 if alternative drinking water is unavailable).

3. In response to the detection of radioactive materials exceeding the guidelines in some areas on March 21 and after, restrictions were imposed on water intake for infants.

4. Afterward, the intake restrictions were removed, as the levels of radioactive materials in tap water were lower in subsequent monitoring. As of July 1, there are no areas where restrictions on water intake are imposed for both adults and infants.

5. The water packaged in plastic bottles is classified as very hard water, hard water, mildly soft water, and soft water in descending order of mineral content. For dissolving infant formula, it is not advisable to use “very hard water” or “hard water.”