

# Radioactive cesium dynamics during food processing

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- Regulation of radioactive nuclides in foods
  - : Emergency response and the subsequent
    - Establishment of limits
    - Monitoring system
    - Publication of monitoring results
- Dynamics of the radioactive cesium in cooking and processing
  - Definitions for parameters
  - Distribution radioactive cesium during food processing
  - Change of concentration of radioactive cesium by food processing
  - Effective dose from radioactive cesium in dietary foods
- Presentation of information to consumers

**2011 March 11: The great east Japan earthquake**  
**March 12: Severe damages of Fukushima Daiichi Nuclear Power Plant**

## Provisional regulation values for radioactive iodine and cesium <sup>1)</sup>

Date of enforcement: March 17, 2011

| Nuclide  | Category  | Limit |
|--|---|-------|
| <b>Radioactive iodine</b><br>(Representative radio-nuclides among mixed radionuclides: <sup>131</sup> I) | Drinking water                                    | 300   |
|  | Milk, Dairy products <sup>1)</sup>                |       |
|  | Vegetables<br>(Except root vegetables and tubers) | 2,000 |
|  | Fishery products                                  |       |
| <b>Radioactive cesium</b> <sup>2)</sup><br>( <sup>134</sup> Cs plus <sup>137</sup> Cs)                   | Drinking water                                    | 200   |
|  | Milk, Dairy products                              |       |
|  | Vegetables  | 500   |
|  | Grains  |       |
|  | Meat, Eggs, Fish, etc.                            |       |

1) Provide guidance so that materials exceeding 100 Bq/kg are not used in milk supplied for use in powdered baby formula or for direct drinking.

2) These values take into account the contribution of radioactive strontium.

Operational intervention level : < **5 mSv/ year**

## Standard limits for radioactive cesium (<sup>134</sup>Cs plus <sup>137</sup>Cs) <sup>3)</sup>

Date of enforcement: April 1, 2012

| Category       | Limit      |
|----------------|------------|
| Drinking water | <b>10</b>  |
| Milk           | <b>50</b>  |
| Infant foods   | <b>50</b>  |
| General foods  | <b>100</b> |

3) These limits take into account the contribution of Sr-90, Pu, and Ru-106.

Operational intervention level : < **1 mSv/ year**

MHLW: [http://www.mhlw.go.jp/shinsai\\_jouhou/dl/shokuhin.pdf](http://www.mhlw.go.jp/shinsai_jouhou/dl/shokuhin.pdf)  
[http://www.mhlw.go.jp/english/topics/2011eq/dl/new\\_standard.pdf](http://www.mhlw.go.jp/english/topics/2011eq/dl/new_standard.pdf)

## **Government** (The Nuclear Emergency Response Headquarter, NERH)

- **Setting the guideline of monitoring plan (4<sup>th</sup> April, 2011)**  
( Areas, items, and frequency of inspection... )

\* focus on items especially in which higher level of radioactive cesium might be detected



Supported by Ministry of Agriculture, Forestry  
and Fisheries (MAFF) and NARO

## **Local governments**

- Design the monitoring plan according to each situation
- Implementation the monitoring
- Reporting all results of monitoring to the government.



## **Government**

(Ministry of Health, Labour and Welfare, MHLW)

- **Publication of all results reported from local governments**



The target local governments  
for the monitoring  
(17 prefectures)

## Establishment legal limits on radioactive nuclides in food (MHLW)

March 17, 2011 – March 31, 2012 : Provisional regulation values

April 1, 2012 – : Standard limits for radioactive materials

## Monitoring inspection of radioactive cesium in foods

**Excess the limit !**

### Recall and dispose of food

All the food produced in the same lot , in which a positive sample is detected , are recalled and disposed.

**Below the limit**

### Distribution of foods in a market

## Restrictions of distribution of foods (NERH)

Restriction of distribution is instructed on the basis of prefecture situation, if the contamination is found widely in the region. (March 21, 2011-)

## Derestriction (NERH)

Derestriction shall be allowed, when all the results of inspection are obtained below the standard limits at more than three locations in a municipality in the last one month.

All results of monitoring are shown on the web of Ministry of Health, Labour and Welfare (MHLW)

Home page of MHLW ( [http://www.mhlw.go.jp/english/topics/2011eq/index\\_food\\_radioactive.html](http://www.mhlw.go.jp/english/topics/2011eq/index_food_radioactive.html))

Level of Radioactive Contaminations in Foods Tested in Respective Prefectures



Information on the Great East Japan Earthquake> Food

Levels of Radioact

- Sum up of radionuclide test results of food
  - sampled since 19 March 2011 until 31 March 2012 (PDE:116KB)
  - reported in FY2012 (sampled since 1 April 2012) (PDE:160KB)
  - reported in FY2013 (PDE:138KB)
  - reported in FY2014 (PDE:152KB)
  - reported in FY2015 (PDE:160KB)
  - reported in FY2016 (PDE:157KB) *New* Sep 7, 2016

Annual reports

<Weekly Reported on>

- 11-17 July 2016 (PDE:862KB) (Excel:11,168KB) *New* Sep 7, 2016
- 04-10 July 2016 (PDE:1,141KB) (Excel:10,824KB) *New* Sep 2, 2016
- 27 June-03 July 2016 (PDE:830KB) (Excel:9,365KB)

Weekly reports

<Monthly Report of Test results of radionuclide in foods sampled since 01 April 2012 (by date)>

- June 2016 (PDE:6,660KB) (Excel:9,985KB) *New* Sep 1, 2016
- May 2016 (PDE:6,659KB) (Excel:9,013KB)
- April 2016 (PDE:4,286KB) (Excel:9,001KB)
- March 2016 (PDE:4,515KB) (Excel:8,544KB)
- February 2016 (PDE:7,578KB) (Excel:10,485KB)
- January 2016 (PDE:3,069KB) (Excel:6,693KB)
- December 2015 (PDE:8,289KB) (Excel:11,528KB)
- November 2015 (PDE:8,603KB) (Excel:11,654KB)
- October 2015 (PDE:5,384KB) (Excel:9,568KB)
- September 2015 (PDE:9,659KB) (Excel:5,237KB)
- August 2015 (PDE:7,599KB) (Excel:10,612KB)
- July 2015 (PDE:5,057KB) (Excel:9,482KB)
- June 2015 (PDE:6,945KB) (Excel:11,064KB)
- May 2015 (PDE:4,345KB) (Excel:7,743KB)
- April 2015 (PDE:3,692KB) (Excel:8,111KB)
- March 2015 (PDE:4,926KB) (Excel:8,941KB)
- February 2015 (PDE:5,090KB) (Excel:8,075KB)
- January 2015 (PDE:3,209KB) (Excel:6,058KB)
- December 2014 (PDE:5,473KB) (Excel:11,113KB)
- November 2014 (PDE:5,896KB) (Excel:10,703KB)
- October 2014 (PDE:4,898KB) (Excel:6,884KB)

Monthly reports

Weekly reports

Prefecture, Area

Cesium concentration (Bq/kg)

Levels of radioactive contaminants in foods reported on 11 - 17 July 2016 (Test results carried out since 1 April 2012)

Note: This data sheet compiles individual test results shown in corresponding press release written in Japanese, available at [http://www.mhlw.go.jp/stf/kinkyu/copy\\_of\\_copy\\_of\\_2r88520000016378.html](http://www.mhlw.go.jp/stf/kinkyu/copy_of_copy_of_2r88520000016378.html)

| No | Food origin |                  | Notes         | pre marketed/post marketed | Food Category         | item name                        | Notes | Inspection instrument | Sampling Date | Results Obtained Date | level of radioactive contaminants in food (expressed as radionuclide levels (Bq/kg)) |            |              |
|----|-------------|------------------|---------------|----------------------------|-----------------------|----------------------------------|-------|-----------------------|---------------|-----------------------|--|------------|--------------|
|    | Prefecture  | area             |               |                            |                       |                                  |       |                       |               |                       | Cesium-134   | Cesium-137 | Cesium total |
| 1  | Miyagi      | Kesennuma-shi    | Pacific ocean | post marketed              | fishery products      | Swordfish                        | -     | Nal                   | 7-Jul-16      | 8-Jul-16              | <10  | <10        | <20          |
| 2  | Iwate       | Yahaba-cho       | -             | post marketed              | agricultural products | Onion                            | -     | Nal                   | 7-Jul-16      | 8-Jul-16              | <10  | <10        | <20          |
| 3  | Ibaraki     | Hitachiotate-shi | -             | pre marketed               | milk*infant formula   | Cattle milk                      | -     | Ge                    | 5-Jul-16      | 11-Jul-16             | <0.6   | <0.65      | <1.3         |
| 4  | Ibaraki     | Kasama-shi       | -             | pre marketed               | milk*infant formula   | Cattle milk                      | -     | Ge                    | 5-Jul-16      | 11-Jul-16             | <0.51  | <0.62      | <1.2         |
| 5  | Ibaraki     | Joso-shi         | -             | pre marketed               | milk*infant formula   | Cattle milk                      | -     | Ge                    | 5-Jul-16      | 11-Jul-16             | <0.55  | <0.79      | <1.4         |
| 6  | Ibaraki     | Hokota-shi       | -             | pre marketed               | livestock products    | Pig meat                         | -     | Nal                   | 6-Jul-16      | 11-Jul-16             | -  | -          | <25          |
| 7  | Ibaraki     | Shirosato-shi    | -             | pre marketed               | livestock products    | Chicken meat                     | -     | Nal                   | 7-Jul-16      | 11-Jul-16             | -  | -          | <25          |
| 8  | Ibaraki     | Omitama-shi      | -             | pre marketed               | livestock products    | Chicken egg                      | -     | Nal                   | 6-Jul-16      | 11-Jul-16             | -  | -          | <25          |
| 9  | Ibaraki     | Yuki-shi         | -             | pre marketed               | agricultural products | Cabbage                          | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <10        | <21          |
| 10 | Ibaraki     | Yuki-shi         | -             | pre marketed               | agricultural products | Spring onion (just forming bulb) | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 11 | Ibaraki     | Chikusei-shi     | -             | pre marketed               | agricultural products | Spring onion (just forming bulb) | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 12 | Ibaraki     | Sakuragawa-shi   | -             | pre marketed               | agricultural products | Spring onion (just forming bulb) | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 13 | Ibaraki     | Joso-shi         | -             | pre marketed               | agricultural products | Spring onion (just forming bulb) | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 14 | Ibaraki     | Sakuragawa-shi   | -             | pre marketed               | agricultural products | Pumpkin                          | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <8         | <19          |
| 15 | Ibaraki     | Koga-shi         | -             | pre marketed               | agricultural products | Pumpkin                          | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <8         | <19          |
| 16 | Ibaraki     | Yuki-shi         | -             | pre marketed               | agricultural products | Pumpkin                          | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <9         | <20          |
| 17 | Ibaraki     | Yuki-shi         | -             | pre marketed               | agricultural products | Eggplant                         | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 18 | Ibaraki     | Sakai-machi      | -             | pre marketed               | agricultural products | Eggplant                         | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 19 | Ibaraki     | Yuki-shi         | -             | pre marketed               | agricultural products | Sweet corn                       | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <8         | <19          |
| 20 | Ibaraki     | Shimotsu-shi     | -             | pre marketed               | agricultural products | Sweet corn                       | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <8         | <19          |
| 21 | Ibaraki     | Koga-shi         | -             | pre marketed               | agricultural products | Bitter melon                     | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <8         | <19          |
| 22 | Ibaraki     | Sakuragawa-shi   | -             | pre marketed               | agricultural products | String bean                      | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 23 | Ibaraki     | Chikusei-shi     | -             | pre marketed               | agricultural products | Onion                            | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <8         | <19          |
| 24 | Ibaraki     | Daigo-machi      | -             | pre marketed               | agricultural products | Garlic                           | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <8         | <19          |
| 25 | Ibaraki     | Ushiku-shi       | -             | pre marketed               | agricultural products | Melon                            | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 26 | Ibaraki     | Shimotsu-shi     | -             | pre marketed               | agricultural products | Melon                            | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <9         | <20          |
| 27 | Ibaraki     | Joso-shi         | -             | pre marketed               | agricultural products | Melon                            | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <8         | <19          |
| 28 | Ibaraki     | Ami-machi        | -             | pre marketed               | agricultural products | Melon                            | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <9         | <20          |
| 29 | Ibaraki     | Ami-machi        | -             | pre marketed               | agricultural products | Watermelon                       | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <10  | <9         | <19          |
| 30 | Ibaraki     | Chikusei-shi     | -             | pre marketed               | agricultural products | Watermelon                       | -     | Nal                   | 6-Jun-16      | 11-Jul-16             | <11  | <10        | <21          |
| 31 | Ibaraki     | Joso-shi         | -             | pre marketed               | agricultural products | Watermelon                       | -     | Nal                   | 20-Jun-16     | 11-Jul-16             | <11  | <9         | <20          |

Food category

Instrument for measurement

## Annual data collection of radioactivity inspection results on agricultural, dairy, and fishery products, and foods in all Japan (April 2012 – January 2016).

| All prefectures                             | 2012. April - 2013. March |                                    |              | 2013. April - 2014. March |                                    |              | 2014. April - 2015. March |                                    |              | 2015. April - 2016. January |                                    |              |
|---|---------------------------|------------------------------------|--------------|---------------------------|------------------------------------|--------------|---------------------------|------------------------------------|--------------|-----------------------------|------------------------------------|--------------|
|   | No. of samples            | No. of samples exceeding the limit | Excess ratio | No. of samples            | No. of samples exceeding the limit | Excess ratio | No. of samples            | No. of samples exceeding the limit | Excess ratio | No. of samples              | No. of samples exceeding the limit | Excess ratio |
| Grains                                      | 18,998                    | 123                                | 0.65%        | 12,962                    | 87                                 | 0.67%        | 6,094                     | 2                                  | 0.03%        | 4,765                       | 5                                  | 0.10%        |
| Vegetables                                  | 19,004                    | 7                                  | 0.04%        | 20,676                    | 0                                  | 0.00%        | 17,520                    | 0                                  | 0.00%        | 10,999                      | 0                                  | 0.00%        |
| Fruits                                      | 5,635                     | 15                                 | 0.27%        | 5,331                     | 0                                  | 0.00%        | 4,147                     | 0                                  | 0.00%        | 3,177                       | 0                                  | 0.00%        |
| Edible Fungi (cultivated)                   | 4,394                     | 328                                | 7.46%        | 3,956                     | 9                                  | 0.23%        | 4,440                     | 8                                  | 0.18%        | 3,901                       | 3                                  | 0.08%        |
| Fishery products (other than fresh water)   | 18,658                    | 831                                | 4.45%        | 20,261                    | 192                                | 0.95%        | 21,328                    | 50                                 | 0.23%        | 15,594                      | 0                                  | 0.00%        |
| Fishery products (fresh water)              | 3,343                     | 242                                | 7.24%        | 3,394                     | 109                                | 3.21%        | 3,251                     | 50                                 | 1.54%        | 2,028                       | 14                                 | 0.69%        |
| Cattle meat                                 | 187,176                   | 6                                  | 0.00%        | 231,072                   | 0                                  | 0.00%        | 235,583                   | 0                                  | 0.00%        | 228,216                     | 0                                  | 0.00%        |
| Livestock products (other than cattle meat) | 2,148                     | 2                                  | 0.09%        | 2,265                     | 0                                  | 0.00%        | 1,834                     | 0                                  | 0.00%        | 1,211                       | 0                                  | 0.00%        |
| Game meat                                   | 1,255                     | 493                                | 39.28%       | 1,411                     | 417                                | 29.55%       | 1,403                     | 349                                | 24.88%       | 650                         | 139                                | 21.38%       |
| Wild plants and wild edible fungi           | 2,474                     | 274                                | 11.08%       | 3,657                     | 186                                | 5.09%        | 4,133                     | 98                                 | 2.37%        | 3,663                       | 87                                 | 2.38%        |
| Milk, infants use                           | 5,215                     | 0                                  | 0.00%        | 4,973                     | 0                                  | 0.00%        | 4,461                     | 0                                  | 0.00%        | 2,900                       | 0                                  | 0.00%        |
| Tea and drinking water                      | 1,674                     | 13                                 | 0.78%        | 1,140                     | 0                                  | 0.00%        | 804                       | 0                                  | 0.00%        | 560                         | 0                                  | 0.00%        |
| Processed foods                             | 8,506                     | 69                                 | 0.81%        | 9,919                     | 25                                 | 0.25%        | 9,220                     | 8                                  | 0.09%        | 6,906                       | 15                                 | 0.22%        |
| Unclassified                                | 0                         | 0                                  | 0.00%        | 0                         | 0                                  | 0.00%        | 0                         | 0                                  | 0.00%        | 0                           | 0                                  | 0.00%        |
| <b>Total</b>                                | <b>278,480</b>            | <b>2,403</b>                       | <b>0.86%</b> | <b>321,017</b>            | <b>1,025</b>                       | <b>0.32%</b> | <b>314,218</b>            | <b>565</b>                         | <b>0.18%</b> | <b>284,570</b>              | <b>263</b>                         | <b>0.09%</b> |

- The standard limit for general foods is 100 Bq/kg ( except milk, infant use (50 Bq/kg), tea and drinking water (10 Bq/kg)).
- The results of all rice bags inspection in Fukushima prefecture are not included in these data.

MAFF: [http://www.maff.go.jp/e/quake/pdf/160401\\_eigo\\_part2.pdf](http://www.maff.go.jp/e/quake/pdf/160401_eigo_part2.pdf)

**Ratio exceeding the standard limits in each item decreases year by year.**

## The fate of radioactive cesium in processing and cooking ?



100 Bq/kg

$^{134}\text{Cs} + ^{137}\text{Cs}$



Cooked rice



? Bq/kg



For the risk assessment and management;  
Survey of the fate of radioactive cesium  
**Total activity & Concentration**  
(**Retention factor;  $F_r$  & Processing factor ;  $P_f$** )



$$\text{Food processing retention factor } (F_r) = \frac{A_{pf} \text{ (Bq)}}{A_{rf} \text{ (Bq)}}$$

$A_{pf}$  (Bq) : Radioactivity in the food After processing

$A_{rf}$  (Bq) : Radioactivity in the food Before processing

$$\text{Processing factor } (P_f) = \frac{SA_{pf} \text{ (Bq/kg)}}{SA_{rf} \text{ (Bq/kg)}}$$

$SA_{pf}$  (Bq/kg) : Radioactive concentration in the food After processing

$SA_{rf}$  (Bq/kg) : Radioactive concentration in the food Before processing

## Wheat



**Flour**



**Bran**



**Udon noodles**

(Japanese noodles made from flour)

## Brown rice



## White rice

(Polished rice)



**Rice bran**



**Cooked rice**

## Buckwheat



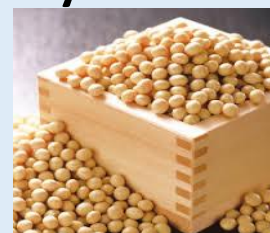
**Buckwheat flour**



**Soba noodles**

(Japanese noodles made from buckwheat flour)

## Soy bean



**Soy milk**



**Natto**

(Fermented soybeans)

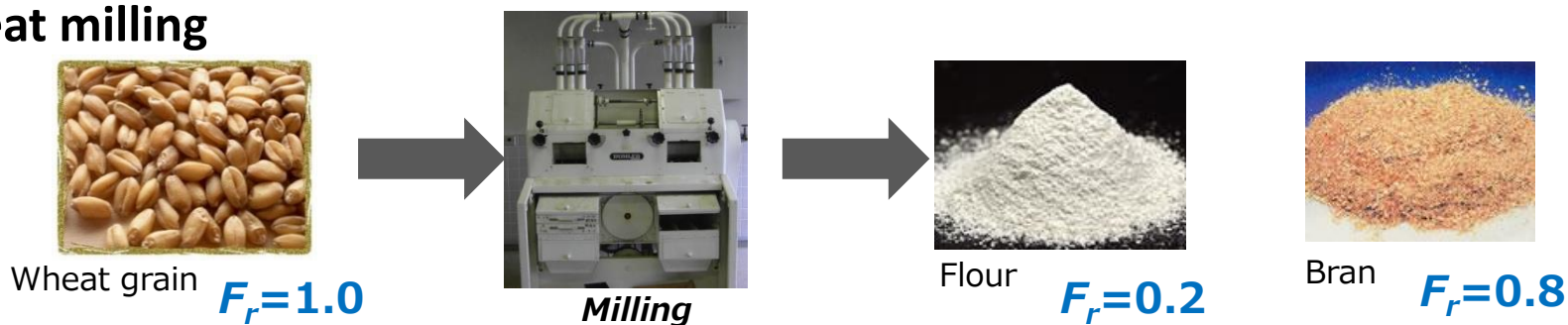


**Tofu** (Soybeans curd)

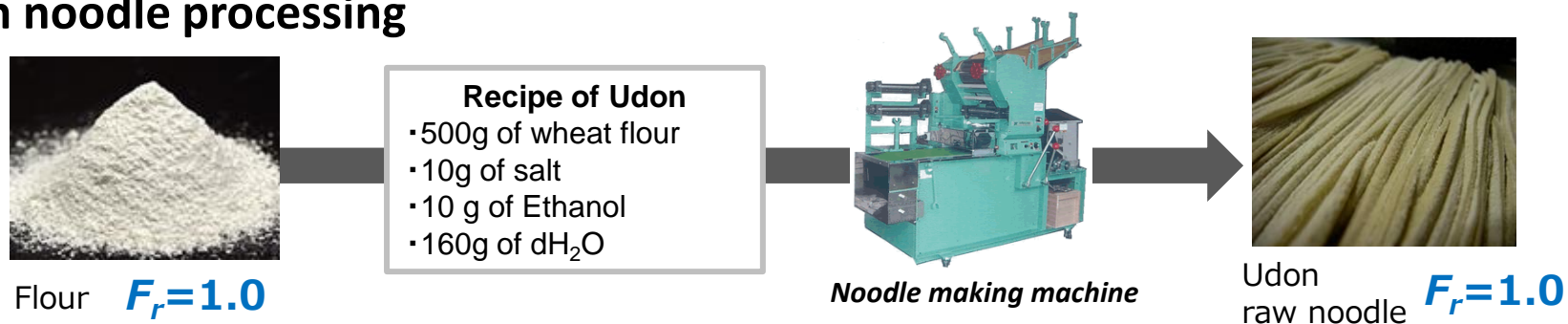
# Wheat processing and udon noodle cooking

## <Food processing retention factor>

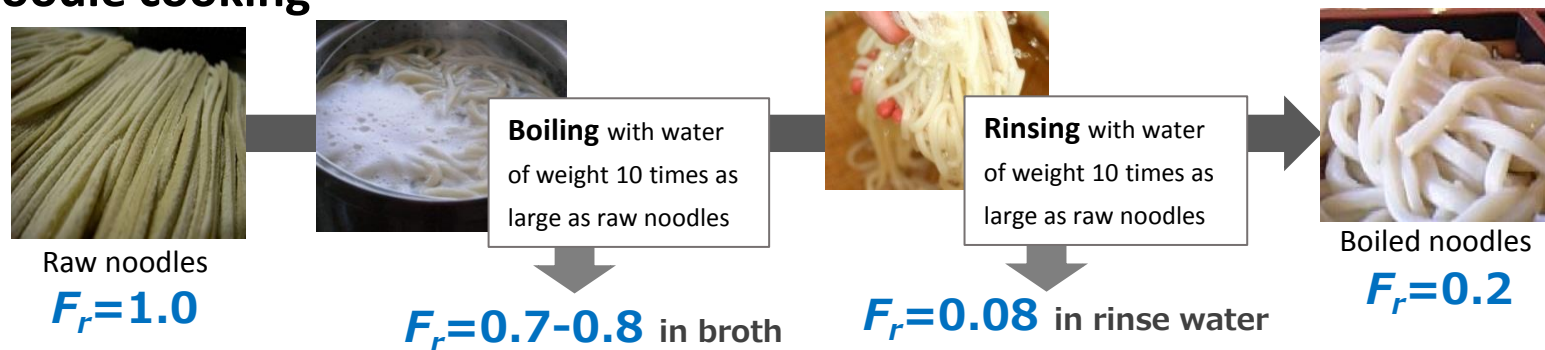
### Wheat milling



### Udon noodle processing



### Udon noodle cooking





## Rice polishing



Brown rice

$F_r=1.0$



*Polishing machine*

**Polishing**

Removal rice bran from white rice



White rice

$F_r=0.4$



Rice bran

$F_r=0.6$

## Rice cooking



White rice

$F_r=1.0$

**Washing**

Wash 5 times by water of the weight as same as white rice



$F_r=0.4$  in washing water



*Rice cooker*

**Cooking**

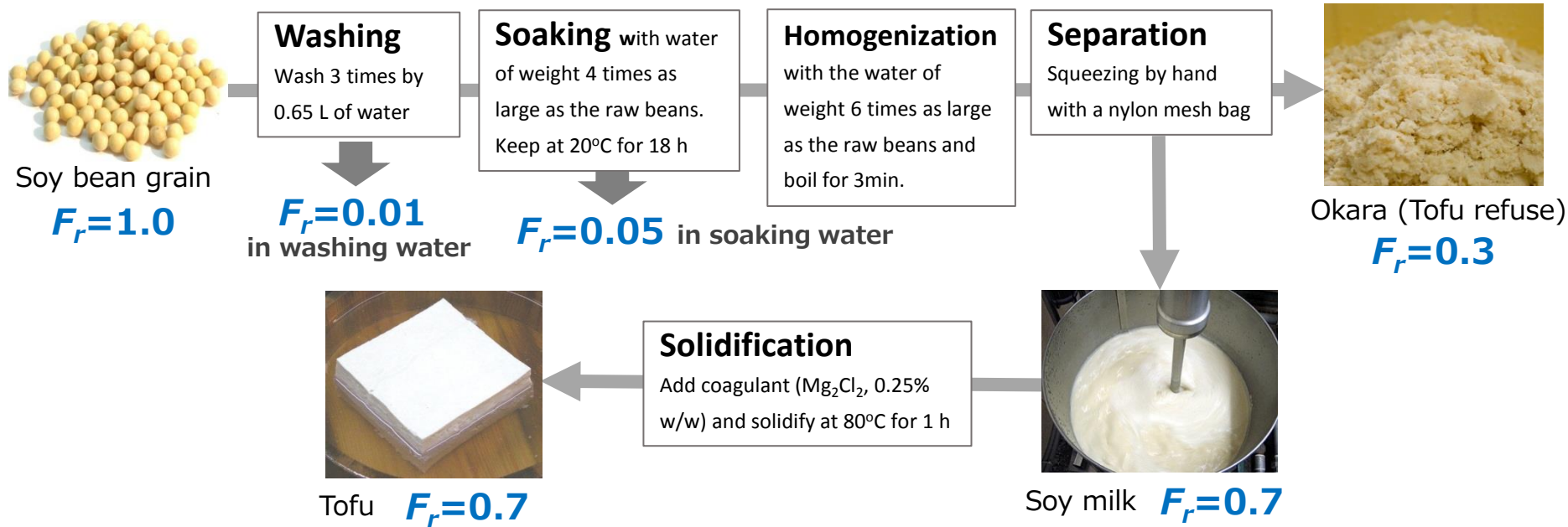
Add water of weight 1.5 times as large as white rice using rice cooker



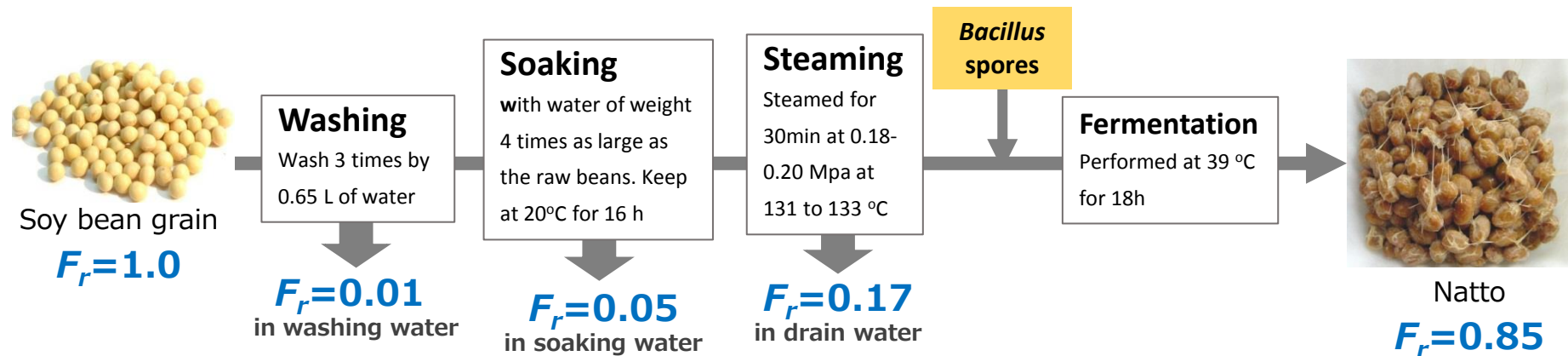
Cooked rice

$F_r=0.6$

## Tofu processing (Soybeans curd)



## Natto processing (Fermented soybeans)



# Buckwheat processing and cooking

<Food processing retention factor>

## Buckwheat milling



Buckwheat grain  $F_r=1.0$



*Milling and sieving machine*



Buckwheat flour  
 $F_r=0.3-0.5$



Husk  
 $F_r=0.3$



Bran  
 $F_r=0.3-0.4$

## Soba noodle processing



Buckwheat flour  $F_r=1.0$

### Recipe of Soba

- 70 g of buckwheat flour
- 30 g of wheat flour
- 50 g of dH<sub>2</sub>O



Soba raw noodle  
 $F_r=1.0$

## Soba noodle cooking



Soba raw noodles  
 $F_r=1.0$



**Boiling** with water of weight 10 times as large as the raw noodles



**Rinsing** with water of weight 10 times as large as the raw noodles

$F_r=0.3-0.5$  in broth and rinse water



Soba boiled noodles  
 $F_r=0.5-0.7$

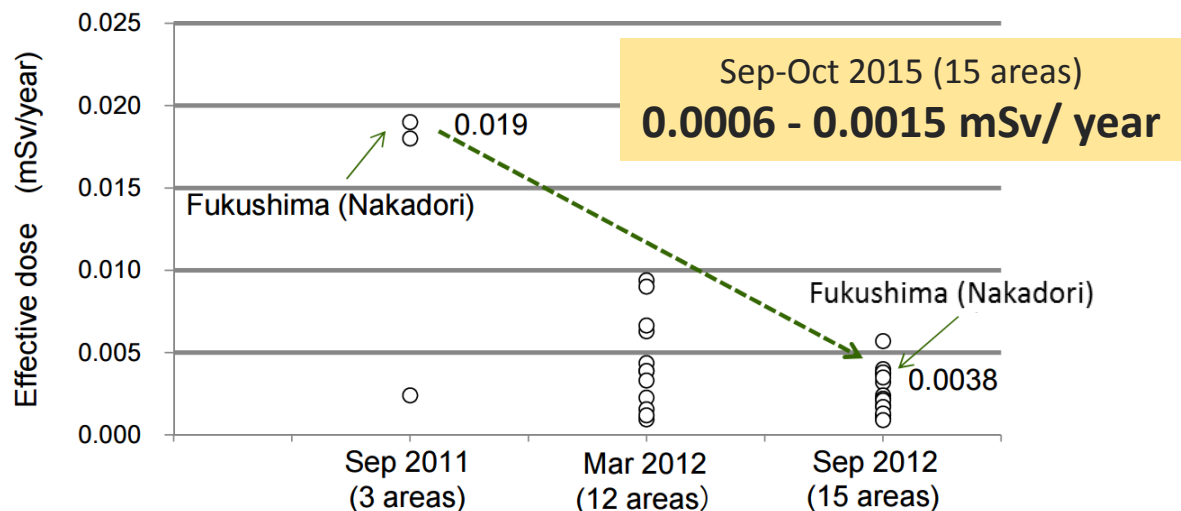
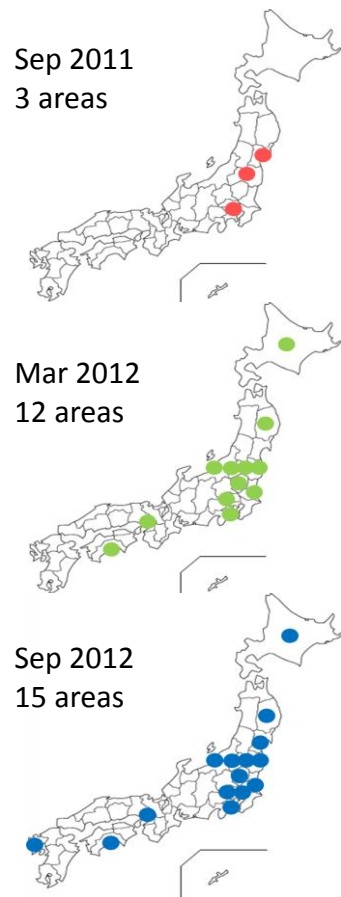
Processing factors is the ratio of the radioactive cesium concentration in the food after and before processing.

## Processing factors ( $P_f$ ) of radioactive cesium for domestic food products

| Item  | Raw materials      | Processing and cooking methods | Products            | Processing factor |
|---|--------------------|--------------------------------|---------------------|-------------------|
|   | Wheat              | Milling                        | Flour               | 0.4-0.5           |
| <p>Based on these result,</p> <ul style="list-style-type: none"> <li><math>P_f</math> value of wheat bran is <b>2.1</b>.</li> <li><math>P_f</math> value of rice bran is <b>6.5 – 7.8</b>.</li> </ul> <p>Ministry of Agriculture, Forestry and Fisheries (MAFF)<br/>have issued a notification to ensure safety of products using bran or rice bran.</p> <p>Wheat bran(September 15, 2011) :<br/><math>P_f</math> value of <b>3</b> should be applied for estimation of the concentration.</p> <p>Rice bran (December 19, 2011) :<br/><math>P_f</math> value of <b>8</b> should be applied for estimation of the concentration.</p> |                    |                                |                     |                   |
| Buckwheat   |                    |                                | Buckwheat flour     | 0.6-0.8           |
|   | Buckwheat flour    | Noodle making                  | Fresh soba noodles  | 0.4-0.5           |
|   | Fresh soba noodles | Boiling                        | Boiled soba noodles | 0.4-0.5           |



The MHLW surveyed the dietary intake of radioactive cesium in several areas across Japan from September 2011 to September 2012 and estimated the annual effective doses from radioactive cesium derived from standard meals.



|   |  |
|---|--|
| <span style="color: red;">●</span> Sep 2011<br>3 areas    | Miyagi, Fukushima, Tokyo   |
| <span style="color: green;">●</span> Mar 2012<br>12 areas | Hokkaido, Iwate, Fukushima (3 area), Tochigi, Ibaraki, Saitama, Kanagawa, Niigata, Osaka, Kochi                          |
| <span style="color: blue;">●</span> Sep 2012<br>15 areas  | Hokkaido, Iwate, Miyagi, Fukushima (3 area), Tochigi, Ibaraki, Saitama, Tokyo, Kanagawa, Niigata, Osaka, Kochi, Nagasaki |

**Estimation of exposure (effective dose) to radioactive cesium from the dietary intake for the individuals is decreasing constantly. The effective dose for the individuals in all surveyed area are less than 1 % of 1 mSv/year now.**



## Main concerns of consumers about radioactive nuclides in foods

Reason for standard limits setting

Technologies for decontamination of agricultural lands

Status of implementation of the inspection for foods

Safety of foods distributed in the markets ...etc

Surveyed by Consumers Affairs Agency;  
[http://www.caa.go.jp/policies/policy/consumer\\_safety/release/pdf/160420kouhyou\\_2.pdf](http://www.caa.go.jp/policies/policy/consumer_safety/release/pdf/160420kouhyou_2.pdf)



The seminar for consumers by MAFF and NARO

## Leaflets for consumers are jointly provided by governmental 4 organizations

MAFF: [http://www.maff.go.jp/j/fs/radio\\_activity.html](http://www.maff.go.jp/j/fs/radio_activity.html)



About the standard limits of radionuclides in foods



Activity for decontamination in farm land



Radionuclides and health influence

Thank you for your attention.



The mascot character of NARO, Narorin