

## Current State of Losses from the Nuclear Accident and Support Measures by JA-Affiliated Organizations: The Response in Fukushima Two Years On

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### ■ Abstract

1. Two years have passed since the nuclear accident in Fukushima. Direct losses continue to mount due to ongoing bans and voluntary restraints on planting of paddy rice on some 13,600 ha of land and on shipping of agricultural produce (although the latter restrictions have decreased in scope). The region's reputation has also been damaged, as seen in a slump in both the absolute and relative prices of agricultural produce, forestry products, and seafood from Fukushima Prefecture, and the situation shows no sign of improvement. It is greatly feared that such reputational damage could become permanent, seriously undermining Fukushima's brand value.

2. On the other hand, radiation concentrations as measured by emergency monitoring inspections have diminished. For example, in the results of radiation testing on vegetables (giving the level of radioactive cesium) conducted between April 2012, when new standard limits came into force, and April 2013, 97.4% of samples fell below the detection limit. As for rice, a massive inspection program involving testing every bag has been implemented throughout Fukushima Prefecture, under which more than 10.31 million bags have been tested. Of that amount, 99.8% were below the detection limit. The system also makes data available for viewing, enabling consumers to check the test results themselves and thus fostering reassurance.

3. Japan Agricultural Co-operatives (JA) group has been acting on behalf of member farmers suffering losses due to TEPCO by gathering their claims and lobbying the company for prompt payment. The percentage of payments received from TEPCO declined at one point, but thanks to vigorous lobbying by the JA Group the figure climbed back to 89% by March, 2013. To alleviate cash-flow difficulties experienced by members due to delays in payment of claims, certain agricultural cooperatives in Fukushima Prefecture have extended the deadline for payment of unpaid amounts for purchases and started offering their own loans with subsidized interest. Some cooperatives have also established substitute payment programs.

4. In addition, agricultural cooperatives decontaminate farmland and advise on reducing the transfer of radionuclides to crops. They also supplement and reinforce monitoring inspections by systematically conducting independent testing for radioactive substances in produce destined for shipment. These efforts serve to strengthen trust between agricultural cooperatives and their member farmers. Further, agricultural cooperatives subsidize agricultural enterprises by member farmers with either their own funds or donations. Member farmers have been enthusiastic about applying for assistance, and this program is of great significance, for it will help ensure a bright future for both the farming business of cooperative members and the operations of agricultural cooperatives.

## Introduction

Two years have passed since the severe accident<sup>1</sup> at the Fukushima Daiichi Nuclear Power Plant operated by Tokyo Electric Power Company (TEPCO). The accident released large amounts of radioactive material in Fukushima Prefecture and the Tohoku and Kanto regions, contaminating soil, woodlands, the ocean and the atmosphere, and water sources, and triggering concerns about harm to human and livestock health and the effect on natural ecosystems. It has caused physical and mental anguish due to residential restrictions, relocation of residents, and anxieties about daily life; it has also inflicted economic losses owing to radioactive contamination, notably in the agriculture, forestry, and fisheries sector, and caused a drop in the value of farmland and woodland. And it has destroyed the bonds of community. Further, owing to an improper understanding of safety issues, there has been a marked tendency to avoid products from the afflicted region, particularly agricultural produce, forestry products, and seafood, and avoid it as a tourist destination; thus the region's reputation and brand value have been seriously undermined.

In the March issue of the *Review* I examined regulatory and legislative aspects of public policy on nuclear power in the run-up to the nuclear accident, problems with the response of the Japanese government and others in its aftermath, and support activities undertaken by JA-affiliated organizations.<sup>1</sup> In this paper I will observe that the severe damage, suffering, and problems created by the accident still linger. I will describe how steady efforts are being made to overcome these difficulties, and how JA-affiliated organizations are playing a central role in reviving and rebuilding the local agriculture industry and in supporting the business and livelihoods of member farmers. Finally, I will underscore the need for comprehensive long-term support measures.

## 1. Current agricultural losses in Fukushima Prefecture due to the nuclear accident

### 1.1. Direct losses from bans and voluntary restraints on planting and shipping

The standard limits for radionuclides in food established by the Japanese government under the Food Sanitation Act were revised as of April 1, 2012, becoming stricter than their counterparts in Europe, North America, and elsewhere abroad.<sup>2</sup> The standard limit for radioactivity in “general foods,” for example, was lowered from the previous (provisional) level of 500 Bq to 100 Bq/kg. In response the government and the private sector have, working together, redoubled their efforts, as will be described below. First, however, let us examine the present state of losses, which remain extensive even two years after the nuclear accident.

Several adverse impacts on agriculture in the form of commercial losses can be identified: first, restrictions on planting of crops, bans and voluntary restraints on shipping and processing of farm products, and delays in product shipments; and second, loss of revenue and income due to falling prices and poor sales because concerns about radioactivity make consumers and markets reluctant to buy. The former may be termed “direct losses”; the latter are in Japan commonly referred to as “reputational damage.” In addition, contamination has reduced the property value of farmland and woodland. All these losses are the result of TEPCO's illegal conduct in spreading radioactive material due to the nuclear accident; the culprit is one and the same. Here we will examine the current state of losses to agriculture resulting from the nuclear accident under two headings, direct losses and reputational damage. We begin by enumerating the former, direct losses (Table 1).

In 2012, a considerable 8,000 ha of rice paddies in Fukushima Prefecture (below referred to simply as “the prefecture”) were subject to a planting ban as a result of the nuclear accident. (All figures for area are approximate.) Of that area, 7,600 ha were located in the former exclusion zone, and somewhat less than 400 ha were located elsewhere in the prefecture, being paddies where more than 500 Bq/kg of radionuclides were detected in the 2011 rice crop. In addition, several municipalities

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<sup>1</sup> Watanabe (2012a).

<sup>2</sup> Watanabe (2012a), p. 14.

Table 1. Examples of direct losses to agriculture in Fukushima Prefecture

(in ha)

Restrictions on planting of paddy rice	Year	2011	2012
	Planting ban		11,200
Voluntary moratorium		2,000	5,600
Total		13,200	13,600
Farm and meat products subject to shipping restrictions as result of monitoring inspections	29 as of March. 30		
Voluntary processing ban	Imposed on ampo-gaki and other processed persimmons in 7 municipalities in northern Fukushima		
Area under contract to sell leaf tobacco (subject to voluntary planting ban in 2011)		2010	2012
		992	320

SOURCES: Compiled from data from the Fukushima prefectural government (wet-rice farming section), the Ministry of Health, Labour and Welfare website, and the Fukushima Prefecture Tobacco Growers Association.

NOTE: The 29 items subject to shipping restrictions do not include rice subject to testing of every bag and beef cattle subject to testing of every animal on every farm.

(Minamisoma-shi [City], Hirono-machi [Town], Kawauchi-mura [Village], and Tamura-shi [City]) independently decided to call for voluntary restraints on planting of paddy rice over a total area of 5,600 ha. The combined total area of rice paddies subject to the above planting restrictions was 13,600 ha, equal to almost 13% of the area of paddy land in the prefecture in 2010 (105,300 ha).

Given that the above area of land was currently unavailable for planting, production targets equivalent to approximately 45,500 tons in volume terms, or an estimated 8,300 ha as converted to area ( $\approx 45,529 \text{ tons} \div 547 \text{ kg}$ , the average yield per 10 a in 2012) were reassigned to agricultural cooperatives etc. elsewhere in the prefecture.

Meanwhile shipping restrictions were imposed on agricultural products from areas where the above standard limits were exceeded in the emergency monitoring inspections for radionuclides performed by government agencies (referred to below simply as “monitoring inspections”). The area subject to those restrictions, however, has gradually diminished. Today restrictions remain in only a few specific municipalities embracing the exclusion zone and in certain other areas, and apply to a limited number of agricultural products such as wild plants, wild mushrooms, the meat of wild birds and animals, green vegetables, and fruit. Nonetheless, many of the agricultural products subject to shipping restrictions are local specialties that serve as a source of cash, and the impact on the income of farm households is not negligible.

Items subject to voluntary restraints on processing include *ampo-gaki* (a type of semi-dried persimmon) and dried persimmons. Processing of persimmons takes place throughout Fukushima Prefecture. The northern part of the prefecture in particular is said to be where the unusual technique for producing *ampo-gaki* originated, and before the nuclear accident this local specialty with its considerable brand cachet generated impressive revenues.<sup>3</sup> However, in 2012 voluntary restraints on processing were imposed in seven municipalities in the north of the prefecture for the second year in a row; this was the result of the cautious and difficult decision to establish an adequate system for testing for radioactive substances — one that could win the trust of consumers — before resuming production and shipping.

With regard to livestock farming, roughage such as grass and rice straw may not be produced, used (fed to livestock), or distributed unless found to be under the standard limit during monitoring inspections (the provisional maximum level for fodder fed to cattle and horses, for example, is

<sup>3</sup> According to data from the JA Date Mirai (agricultural cooperative), that cooperative alone recorded some ¥1.9 billion in sales of *ampo-gaki* and the like in FY 2010.

100 Bq/kg). The use and distribution of compost are also prohibited unless monitoring inspections on each farm find radioactivity to be under the standard limit (the provisional maximum level for radioactive cesium being 400Bq/kg). The problem is that even if radioactivity is within the above levels, collaborative efforts between crop and livestock farmers to recycle resources locally — such as livestock farmers using compost on their own farmland or supplying it to crop farmers, or the growth of feed as an alternative crop and supply of it as fodder — have lost momentum. This has reduced the ability of livestock farmers to supply their own roughage or source it locally, and created serious difficulties with disposing of livestock manure and applying and circulating compost.

Leaf tobacco is also grown throughout the prefecture, especially the Nakadori area, and voluntary restraints were imposed on planting of tobacco in the prefecture in 2011. Meanwhile the area of land under contract to sell leaf tobacco plummeted from 992 ha in 2010, before the nuclear accident, to one-third that level, 320 ha, in 2012, in part because of the imposition of more stringent safety standards by Japan Tobacco Inc.

## **1.2. Fears of reputational damage becoming permanent and undermining brand value**

Since the nuclear accident, products from Fukushima Prefecture have been persistently plagued by reputational damage. Their impact can be observed not only in (1) trends in the absolute price levels at which Fukushima products are shipped and traded, but also in (2) their price levels relative to products from other prefectures. The problem is that the situation was certainly no better in 2012 than in 2011. It is greatly feared that reputational damage on both the above fronts could become permanent, despite the concerted efforts of farmers, JA-affiliated organizations and other concerned bodies, and prefectural and other governments to implement a full range of safety checks, as described below, and ensure proper management of growing and breeding practices.

Below we examine the current state of reputational damage, taking rice, vegetables, and beef as examples.

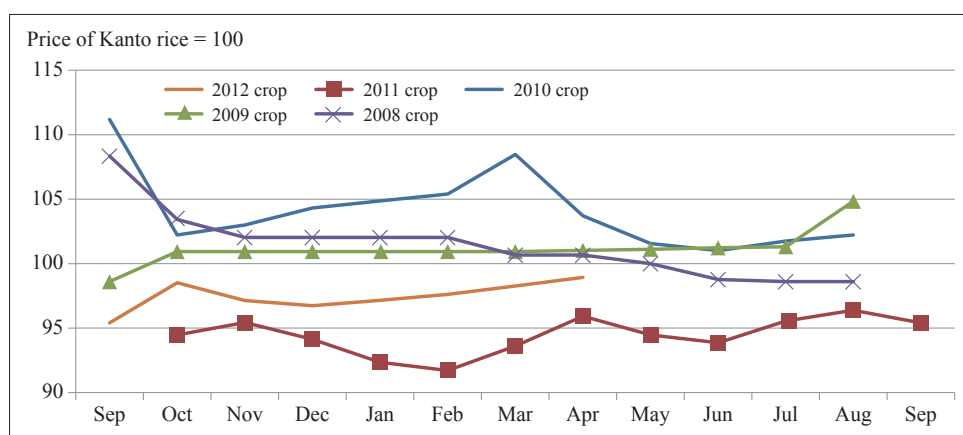
Fukushima Prefecture is one of Japan's top rice-growing prefectures. In 2010, before the nuclear accident, it ranked fourth in the country in volume of production, with rice accounting for some 40% of the value of the prefecture's agricultural output. Fukushima is broadly divided into three regions: the Hamadori region on the Pacific coast, the Nakadori region, and the Aizu region. Rice farming is practiced extensively in all three regions, and each has worked hard to cultivate its local brand. But then the nuclear accident struck, and in 2011 the price of Fukushima rice fell in both absolute and relative terms.

Data indicate that with the 2012 rice crop the price of rice has started to recover owing to a tighter supply-and-demand balance. Prices of rice from each region of Fukushima Prefecture too have bounced back in absolute terms. The pace of recovery, however, varies from region to region within the prefecture; compared with rice grown elsewhere, moreover, Fukushima rice continues to fare worse price-wise than before the nuclear accident.

One must exercise caution when comparing agricultural products grown in different regions, since prices can vary both absolutely and relatively depending on factors like the volume shipped from each region, how good the year's crop is, and quality. With that caveat in mind, let us compare the monthly average price for which Koshihikari, one of the brands of rice typically grown in the Nakadori region, was traded between dealers in Tokyo. Before the nuclear accident, Koshihikari grown in the Nakadori region sold for more than that grown in the Kanto region (based on the average price for the three prefectures of Ibaraki, Chiba, and Tochigi). In the period prior to the accident, between 2005 and February 2011, the Nakadori variety was, on average, 3.3% higher priced. By contrast, the 2011 crop of Nakadori Koshihikari was, on average, over 5% lower in price, falling at its lowest to over 8% less. The 2012 crop still remains almost 3% lower in price (Figure 1).

Next, vegetables. Wholesale market shipment prices of vegetables grown in Fukushima Prefecture in summer-fall (July-September) 2012 were in a few cases 20-30% lower in absolute terms than for

Figure 1. Relative price of rice grown in Nakadori, Fukushima Prefecture  
Compared to rice grown in the Kanto (Ibaraki, Chiba, and Tochigi)



SOURCE: Compiled by the author from Nikkei NEEDS FQ (commodity) data.

NOTE: Price at which 60 kg of Grade 1 Koshihikari trades between Tokyo dealers. Price of Nakadori rice ÷ price of Kanto rice.

2011; they were also weak compared to the price of vegetables grown elsewhere (Table 2). Because shipments of vegetables and fruits are by their nature concentrated in an extremely short period, market prices appear to be susceptible to downward swings once purchase supports are pared back.

The relative prices of summer-fall cucumbers and tomatoes are now examined. Fukushima Prefecture is a leading producer of summer-fall cucumbers. In 2010, before the nuclear accident, the Fukushima variety sold for about 10% more than the average for all producing regions at the Tokyo Metropolitan Central Wholesale Market. But in 2011 the price of Fukushima cucumbers fell more than 2% below the average, with the gap increasing to almost 10% in 2012. Likewise, tomatoes, which are shipped in large quantities to the Greater Tokyo region, were priced somewhat less than 8% below the average in 2011, then took a further drop in 2012 to over 11% below.

Livestock farmers find themselves in dire straits as a combination of factors puts pressure on their operations, as described in section 1.1: disposing of manure and compost in the aftermath of the nuclear accident, production and local sourcing of roughage, and deteriorating revenues. There are particular concerns about fattening of beef cattle, where the slump in wholesale prices is so severe that farmers may be unable to maintain enough revenue and motivation to stay in business.

We now trace the movement of monthly average prices for *wagyu* (Japanese beef cattle) bullock carcasses on the Tokyo Metropolitan Central Wholesale Market (Figure 2). Prices of beef cattle carcasses languished during the economic slump following the Lehman shock; they fell even further after the nuclear accident, and then plummeted from July 2011, when levels of radioactivity above the provisional standards then in force were detected in a few beef cattle that had been fed radioactively contaminated rice straw. In July-December 2011, the average price for all producing regions was 19% lower than for the same period the year before, with a particularly dramatic year-on-year drop of 25% in October.

Since then, both in Fukushima Prefecture and throughout Japan, controls on provision of fodder have been exhaustively applied and shipped cattle have been subject to a thorough inspection regime, with

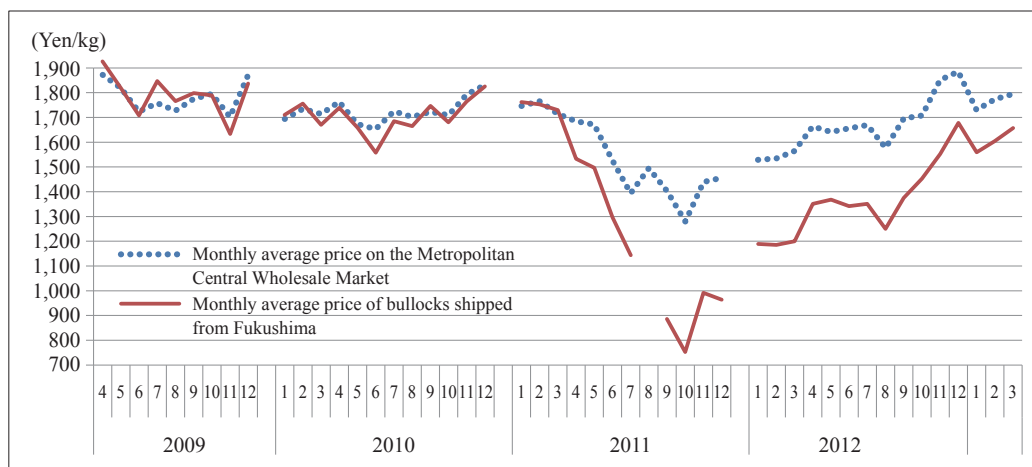
Table 2. Relative prices of Fukushima cucumbers and tomatoes  
(average wholesale market price = 100)

Year	2010	2011	2012
Cucumbers	109.7	97.8	90.4
Tomatoes	98.2	92.4	88.9

SOURCES: Compiled from Ministry of Agriculture, Forestry and Fisheries statistics on distribution of fruits and vegetables, and monthly statistics of the Tokyo Metropolitan Central Wholesale Market.

NOTE: Average prices for July-September.

Figure 2. Price movement of wagyu bullock carcasses (slaughtered on site)



SOURCE: Compiled from monthly statistics posted on the website of the Tokyo Metropolitan Central Wholesale Market.

safety checks being implemented against the standard limits. Due to the reassurance about safety so fostered, prices have since the beginning of 2012 gradually recovered. By the end of 2012 the average price for all producing regions, although still under ¥2,000 per kg, finally returned to its level of three years previously, in part because demand is high at that time of year.

The price of beef cattle from Fukushima Prefecture declined even more precipitously than the average for all producing regions, and its recovery has been slower. The price of wagyu bullock carcasses from Fukushima Prefecture fell to under ¥800 per kg in October 2011, an unprecedented drop of some 50% compared to the same month of the previous year. Further, it was more than 30% lower than the average price for all producing regions.

Since 2012 the price of Fukushima bullock carcasses has been recovering. But it still remains more than 10% lower than the average for all producing regions, although the gap has shrunk.

In the area of fruit growing and greenhouse horticulture, many places previously attempted to boost profitability through agritourism. Quite a few farmers have, however, seen profitability erode as direct sales have fallen due to a decline in the number of tourists, especially from outside the prefecture.

Thus many of Fukushima Prefecture's agricultural products have lost the price advantage they enjoyed before the nuclear accident and have fallen in price relative to the competition in its aftermath. The decline in the value of the Fukushima brand caused by the nuclear accident has been truly immense, and governments and others will need to take a full range of policy measures to restore the brand and endow it with premium value in the future.

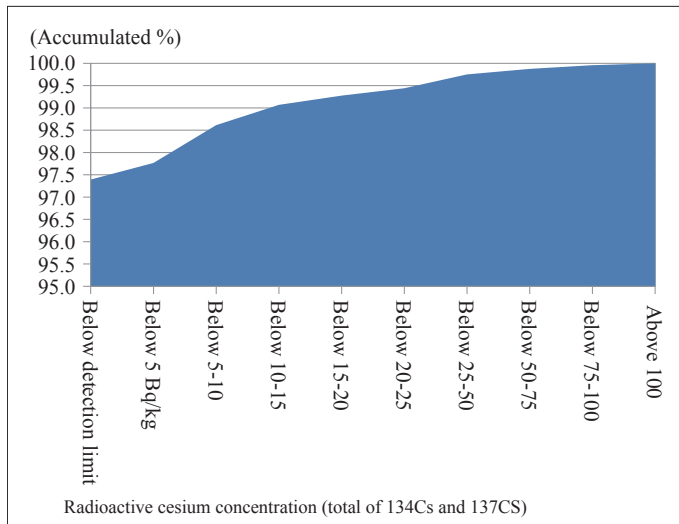
## 2. Public-private sector action to improve safety and peace of mind

### 2.1. Present conditions as seen in monitoring inspection results

Testing for radionuclides in foods takes the form of monitoring inspections by local governments, which are conducted after formulation of a testing plan in accordance with directions from the national government. As of the end of April, 2013, the program covers 17 prefectures including Fukushima. Fukushima Prefecture's monitoring inspections are generally carried out at the prefectural testing center using a germanium semiconductor detector. Testing is conducted on agricultural products decided in light of the findings from previous testing for radionuclides, a set number of samples of each (1-3 or more) being examined.

Of the types of radioactive cesium listed in the test results, cesium 134 (<sup>134</sup>Cs) has a half-life of 2.06 years, while cesium 137 (<sup>137</sup>Cs) has a half-life of 30.17 years. Thus cesium 134 decays rapidly,

Figure 3. Results of radiation testing on Fukushima vegetables  
April 2012 (after standard limits revised)-April 2013



SOURCE: Compiled from emergency monitoring inspection information posted on the Fukushima prefectural government's website.

radioactive cesium level in excess of 50Bq/kg, considered the detection limit, represented 9.8% of the total.

By contrast, in the results of radiation testing of vegetables (excluding wild plants) released between April 2012, when the new standard limits were adopted, and the end of April 2013, 97.4% of samples fell below the detection limit. Only 0.04% exceeded 100 Bq/kg, the standard limit for general foods (Figure 3).

These changes indicate that the radiation concentrations detected by emergency monitoring inspections have diminished. Among the reasons that can be cited for this decline in detected radiation levels is the success of decontamination efforts and measures to reduce the transfer of radionuclides, which will be described below.

## 2.2. Exhaustive safety checks, including testing every bag of rice

To supplement and reinforce the monitoring inspections, the prefecture and agricultural cooperatives and related organizations have implemented extensive testing of crops destined for shipment and made the results available. This program is conducted under the supervision of the Fukushima Council on Food Safety Measures, established in May 2012, and similar taskforces based in each region. With regard to rice in particular, the prefecture has adopted the unprecedented policy of testing every bag of rice, including that intended for consumption by the growing household. These safety checks are designed to afford consumers peace of mind, and all results are released<sup>5</sup> (Table 3).

As of April 30, 2013, more than 10.31 million bags of brown rice from the 2012 rice crop had, by dint of great effort, been tested in the prefecture. Of that amount, 99.8% was below the detection limit.

During what is termed screening, grower information — who grew the rice, and where — is read

<sup>4</sup> See the website of Professor Haruaki Tasaki of the Department of Physics, Gakushuin University, and Tasaki (2012).

<sup>5</sup> In areas where radioactivity concentrations of 100-500 Bq/kg were detected during inspection of the 2011 rice crop, planting was in principle allowed on condition that production was carefully controlled to reduce absorption and transfer of radionuclides and every bag was tested. It was further decided to test all bags of rice elsewhere in the prefecture as well.

Table 3. Results of testing every bag of Fukushima rice, 2012 crop

(Bq/kg)

Becquerel level	Below detection limit (<25)	25-50	51-75	76-100	Above 100 (standard limit)	Total
Bags tested	10,291,512	20,284	1,678	389	71	10,313,934
Percentage	99.78260	0.19667	0.01627	0.00377	0.00069	100.00

SOURCE: Compiled from data posted on the Boon of Fukushima Taskforce on Safety Measures website.

NOTE: Combined total from screening and further testing, August 25, 2012-April 30, 2013. Radioactive cesium represents total for cesium 134 and cesium 137.

into the system by means of the barcode attached to the bag.<sup>6</sup> The bag is then passed through the detector. If it is found to be below the standard limit for radionuclides, a QR code is separately affixed to it recording the testing information, including data on production history such as place of production and use of agrochemicals. Retailers and consumers can obtain the identification number by accessing the QR code information, and use that to view the test results for each individual bag of rice.

Rice that exceeds the designated screening level, on the other hand, is sent to the prefectural testing center or elsewhere for more precise testing with a germanium semiconductor detector. Rice found to be above the standard limit is stored in complete isolation. Thus all rice grown in any region of Fukushima Prefecture is tested for radionuclides, and only that backed up by objective data is distributed on the market. The data are available for viewing and sharing, enabling consumers to check the test results themselves and thus fostering peace of mind.

In FY 2013 (according to plans as of the end of April 2013) the taskforce will expand the range of items to a total of 41: 5 grains including rice, and 36 major vegetables and fruits. Test results and production history information on all of them will be made available to consumers.

As for beef cattle reared in the prefecture, all animals on all farms are tested for radionuclides at time of shipping. As of May 2013, the national Ministry of Agriculture, Forestry and Fisheries requires testing of all heads of beef cattle for radionuclides in the four prefectures of Fukushima, Iwate, Miyagi, and Tochigi, and testing on all farms in the three prefectures of Ibaraki, Gunma, and Chiba. In practice, however, all heads of cattle are tested at publicly and privately operated meat-processing plants in the Tohoku and Kanto regions and indeed throughout Japan.

### 3. Support by JA-affiliated organizations to member farmers and the local agriculture industry

#### 3.1. Support by the JA Group with damage claims

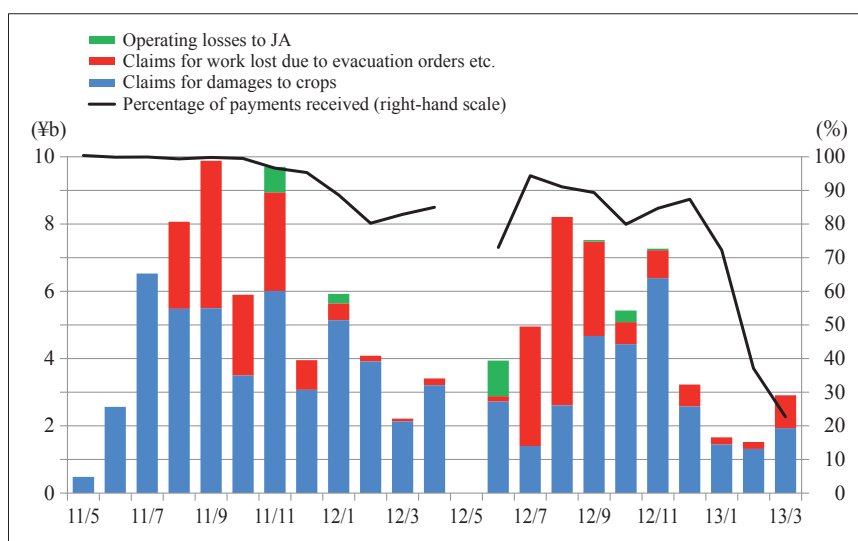
The Fukushima Prefecture JA Group established the Fukushima Prefecture Taskforce on Damage Claims (the Fukushima Taskforce) on April 26, 2011. It also set up a section devoted to the issue at the Fukushima Prefectural Union of Agricultural Cooperatives. Lawyers have been hired, and the prefecture and the JA Group have mounted a joint campaign and drawn up a compensation scheme estimating the amount of damages.

The Fukushima Taskforce files claims for damages gathered from agricultural and dairy cooperatives acting on behalf of members. As of mid-April 2013, a total of ¥109.3 billion worth of claims had been filed with TEPCO through the Fukushima Taskforce, while ¥97.2 billion in compensation had been received. Progress in paying out money was slowed by delays in TEPCO's review process and demands for further documentation, and at one point the percentage of payments

<sup>6</sup> Screening refers to a test conducted at a fixed level (confidence interval) to determine whether a sample could exceed the standard limit. According to the Fukushima Council on Food Safety Measures, the detector's screening level may vary depending on the background level at the test site and the testing equipment used, but is generally set in the range of 50-80 Bq/kg.



Table 4. Claims for damages against TEPCO by the Fukushima Prefecture JA Group



SOURCE: Compiled from Fukushima Prefectural Union of Agricultural Cooperatives data (up to March 2013).

received (= the amount of compensation received ÷ the amount claimed) declined; but thanks to vigorous lobbying by the JA Group the pace of payments finally picked up at the end of 2012, and the percentage of payments received climbed back to 89% (Table 4).

TEPCO is supposed to advance half the amount of each claim by the month following that in which it was filed, but it takes considerable time to pay the full amount; at present almost a year is required to complete payment. In the interim member farmers face cash-flow difficulties as they struggle to pay their expenses now that they have lost all or part of their income. In January 2013 TEPCO established a new organization within the company, the Fukushima Revitalization Headquarters, headed by a vice president. TEPCO should also take action to pay claims promptly, systematically, and without fail by redefining powers, revising procedures, and improving responsiveness.

To alleviate cash-flow difficulties experienced by member farmers due to delays in payment of claims, certain agricultural cooperatives in Fukushima Prefecture have, along with extending the deadline for payment of unpaid amounts for purchases, started offering what are in effect interest-free loans by subsidizing the interest. Some have also established their own substitute payment programs.

### 3.2. Decontamination, advising on reducing transfer of radionuclides, and independent testing

Decontamination measures are governed by the Act on Special Measures Concerning the Handling of Environment Pollution by Radioactive Materials. The Act classifies areas to be decontaminated into two types: Special Decontamination Areas, where decontamination is performed by the national government; and Intensive Contamination Survey Areas, where there are locations with radiation levels of more than 0.23 µSv (microsieverts) per hour and decontamination measures are implemented as necessary.

Fukushima Prefecture has 11 municipalities designated in the former category and 40 designated in the latter. At present (as of the end of April 2013) 36 municipalities have drawn up action plans under the Act and are engaged in decontamination.

Under the Act, in the north of Fukushima Prefecture agricultural cooperatives, municipalities, and cooperative members joined forces in a large-scale effort to decontaminate fruit trees using

high-pressure washing equipment in blustering winter winds (Photo 1). Fruit trees have also been decontaminated in other areas throughout the prefecture.

However, priority for decontamination inevitably goes to residences, public facilities, and their surroundings. In some cases, therefore, agricultural cooperatives have, in order to accelerate decontamination of farmland, spearheaded decontamination efforts themselves with the intention of billing the cost directly to TEPCO (Photo 2).

Although decontamination imposes a heavy burden in terms of manpower, it is clearly effective in reducing the transfer of radionuclides to produce. It is therefore hoped that farmland at risk of contamination will be promptly decontaminated by effective means.

Besides implementing decontamination, agricultural cooperatives also assist on the production



Photo 1. Decontaminating fruit trees in the winter wind  
(JA Date Mirai)



Photo 2. Decontaminating pastureland using “reverse tillage”  
(JA Iwaki City)



Photo 3. JA’s own testing program for radioactive substance  
(JA Shin Fukushima)

control front by providing advice, in partnership with Fukushima Prefecture and others, on measures to reduce the transfer of radionuclides. Specifically, these include (1) the application of potassium-based fertilizers, such as potassium silicate, and the spraying of zeolite, a natural mineral effective in improving soil quality, both of which have been proved scientifically effective in reducing the transfer of radionuclides to crops; (2) using combines for harvesting in order to reduce adhesion of soil; and (3) abating the impact of ambient radiation by avoiding the practice of drying harvested rice plants naturally in the sun. These measures are implemented optionally depending on the degree of impact of radionuclides in the region in question. In some cases the local agricultural cooperative provides assistance to members.

In addition, to supplement and reinforce the monitoring inspections described earlier and enhance the peace of mind of consumers, markets, and other purchasers, agricultural cooperatives conduct their own testing using analytical equipment such as a NaI scintillation spectrometer (Photo 3), whether purchasing it themselves or borrowing it from a government agency.

Before shipping their produce, member farmers bring crop samples to the agricultural cooperative’s testing site to be tested in accordance with the procedure in the manual. The measuring process takes about 30 minutes per crop. Things become extremely busy during times of year when vegetables and fruits are shipped, as large numbers of samples are brought in, but agricultural cooperatives ensure the necessary personnel

are on hand and conduct testing for free. Many agricultural cooperatives in the prefecture have in place systematic testing regimes covering every farm and item, under which all members are in principle required to have their produce tested at a cooperative before shipping.

These wide-ranging efforts serve to strengthen trust between agricultural cooperatives and member farmers.

Dealing with the aftereffects of the nuclear accident requires heavy inputs of labor on the farm, and conditions for farmers remain harsh on the business front as well. With the intention of promoting local agriculture, agricultural cooperatives subsidize various agricultural activities by member farmers with either their own funds or donations.<sup>7</sup> These assistance programs focus primarily on greenhouse horticulture and livestock farming. Many member farmers have been enthusiastic about applying for assistance, and the eagerness to succeed in the farming business they display is encouraging. The use of assistance from agricultural cooperatives to grow new crops, adopt new cultivation techniques, and increase scale of operations is of great significance, for it will help ensure a bright future for both the farming business of cooperative members and the operations of agricultural cooperatives.

## Afterword

Certain emotions must be shared by all victims of a massive disaster such as the Great East Japan Earthquake: a sense of powerlessness at having been suddenly struck by catastrophe through no fault of your own; the disruption caused by seeing the lifestyle and career you have worked diligently to build cut off, with no inkling of what the future holds; a feeling of alienation because no one appears to understand your predicament. Japan is vulnerable to frequent disasters because of the lay of the land, the climate, and seismic activity. The national government and other bodies should therefore, as a matter of course, give priority to preparing for disasters and providing relief when they strike; after all, Japan is an advanced country where the right to lead a meaningful life is guaranteed.

As indicated by the investigation committee reports cited at the outset, the Fukushima nuclear accident may have been avoidable or need not have been as serious as it in fact was. Thus the disaster was to a large extent man-made, and on that premise Japan's nuclear-power program and energy policies cannot escape blame. Owing to the nature of radioactivity, the effects will continue to be felt for a very long time; thus the impact on both individuals and communities is immense.

It is therefore incumbent on us as citizens to share a common commitment to understanding the damage from and impact of the nuclear accident and maintaining appropriate support. In providing that support, it should be kept in mind that assisting victims of the nuclear accident and rebuilding communities will require a great investment of time and policy resources.

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