東日本大震災における被災動物対応の現状と今後の課題
―放射性物質汚染への対応を考える―

The Current Situation Concerning the Handling of Animals Affected by the Great East Japan Earthquake - Considering Responses to Radioactive Material Contamination

福島県 酪農業協同組合 生産部診療課 課長／獣医師・佐藤　利弘
Toshihiro SATO, Veterinarian, Medical Care Division Head,
Production Department, Fukushima Prefecture Dairy Farming Association

Unlike the previous speaker, who talked about small animals, my main focus will relate to industrial animals. I will of course also speak about the situation inside the evacuation zone but I should mention from the start that I have not been inside the zone myself. Nevertheless, as an industrial official of sorts, I have handled a variety of information resources including stories and reports made by colleagues from my Association who did make temporary visits into the evacuation zone. From such sources I have produced the materials I am going to share with you today.

As I am connected with Fukushima Prefecture Dairy Farming Association, I will be centering today's talk on dairy cattle. As an overview, I am first going to talk about the events that happened in Fukushima Prefecture approximately one year ago.

At present, I live in Koriyama City in Fukushima Prefecture. This is the newspaper delivered to my home on March 12th, the day after the earthquake. You saw a picture of the same newspaper in a slide shown by Dr. Ito earlier. I saved this copy, keeping it in a bag for more than half a year.

I remember that the March 13th edition of the newspaper didn't arrive, and I thought that the newspaper shown in Dr. Ito's slide must have been this particular edition. The news about the earthquake within the prefecture was like this. As you can see, the tsunami was reported in many places.

Regarding the disaster situation, as Dr. Kawamata was saying just now, Fukushima's situation was to some extent unique. There were fewer deaths due to the earthquake and tsunami in Fukushima than in the prefectures further north but it is unique in that it also suffered a major nuclear accident on top of the earthquake disaster.

This is a photograph taken using a mobile phone on March 11th, the day of the earthquake, just after the quake hit. Immediately after the shaking died down, I could see cracks in the ground here and there and I thought it would be a good idea to photograph them. However, I don't have any of the photos I took after this one so when I later show you photos of my office and other places, I will use photos taken by other staff members. This photo shows the scene of the earthquake. I heard that the force of the tremor here was measured as 6 upper. The side of this cattle shed has been crushed and the cows gathered here are almost in panic trying to get out. Here is my mobile health clinic and below this place is an embankment that was created by leveling a mountain. When I look back now, because the ground had been so weakened it would have buried the road below if it had collapsed and I would have been unable to get back. Inside this building is a processing room where the refrigerator has slid to one side and the roof has come down. This was the only actual photo I took under these conditions.

Here is a map of Fukushima Prefecture. At the time of the earthquake I was here, in Shirakawa City. I have homes in Shirakawa and in Koriyama, and the office where I work is in Motomiya City. The distance between Shirakawa and Koriyama is just under 50km. When driving between them I usually take the

expressway but even when I use the ordinary road the journey only takes about an hour. After the earthquake the expressway was obviously closed and, along the ordinary road, there were landslides or subsidence points in many places. Because such falls had narrowed the navigable road width, only one lane was available. This meant that both traffic directions had to alternate and congestion was inevitable. Because National Highway 4 was jammed with traffic I was unable to go directly home and I had to take an alternative road. But even taking advantage of this indirect route I remember how it took me about five hours to make the usual one-hour journey from Shirakawa to Koriyama. Once there I was able to confirm that my wife and children were safe and then checked on the situation at my work place. I also found out about my parents and their situation. They were at our old family home in Tamura City. All these checking activities filled the rest of the day. I was able to return home by 11pm but around 2am there was an after-shock so I hardly slept that night. That's my recollection of the day of the earthquake.

This is a photograph of my office building in Motomiya City. As Dr. Kawamata said earlier, the situation differed from place to place but I heard that the extent of damage to the buildings themselves was not so great. Dairy farmers reported no direct damage to cattle sheds, although processing room equipment units were a complete mess, of course.

The main immediate problem was not so much the destruction of buildings but the problem of broken "lifelines" for electricity, gas and water supplies. In the case of livestock farming, and dairy farming in particular, it is impossible to operate on a daily basis without electricity or water. In the northern area of Fukushima Prefecture, the lifeline situation was severe. Many farms were using subterranean water obtained by boring wells, but with no electricity to power the pumps, the water stopped flowing. I believe Fukushima City also experienced many power cuts. Due to past incidents, some farmers did have off-grid power generators but because most of these units had not been run on a regular basis their engines were not in perfect running order and they proved unreliable.

As for traffic, I placed marks to indicate places where the roads had collapsed to a serious extent and where the possibility for restoration were poor. This situation continued for a while. Also, most telecommunication links were completely severed. Even mobile phone connections were difficult to maintain and we had to dial several times to get through. So we had a lot of trouble contacting with other people at that time.

As for food, just after the earthquake I remember buying about twice as much bread, etc., as usual from a convenience store on my way home but, after that food had virtually disappeared from all the shops.

Then, gradually, fuel shortage became the big problem. Immediately after the earthquake things were not so bad but the situation grew worse little by little. On the evening of the earthquake day I filled up my car on my way to my parents' home in Tamura City. This was out in the countryside and the gas station was still open. On the morning of the next day, I saw lines of vehicles including private cars filling up at gas stations. After that, supplies were cut off completely and there was absolutely no prospect of refueling. In addition, because of the nuclear accident, everybody began thinking that they would need to find a way to evacuate to a far-off location. Obviously they needed to prepare enough gasoline to be able to travel distances beyond 100km when the time came.

News was reported on a piecemeal basis, and there was little information about the actual nuclear accident situation. People were saying, "I saw smoke coming out of the power station on TV, but what's going on?" There was little from the media in terms of specific evacuation information.

At work, I first checked on the safety of other staff members. When I got to my office I confirmed the damage status to our related facilities and buildings, discussed what we should do next, and tried hard to evaluate what we would need to do and prospects for the future. This work took about two or three days.

This is a communications record table from that time. If we were having trouble making contact with people, when I was able to reach them, I tried to keep a record of each instance like this. This is a photograph taken in the office. First of all, we systematically worked to confirm safety, fuel quantities, and staff member movements.

The next slide shows the congestion as vehicles waited for refueling at a gas station after the earthquake. The station was actually closed but a rumor had spread that it might be possible to obtain gasoline there which led to this queue of vehicles forming in front of the station. My impression is that, as time passed and information tools such as Twitter and Mixi began to be used more effectively, people became more aware of the opportunities that came along to obtain fuel.

However, the situation for refueling service vehicles remained severe. 'Emergency vehicle' designation as shown in this photograph became necessary. With such a designation certificate, drivers of hospital-related and other emergency vehicles could obtain limited amounts of fuel at gas stations involved in the scheme. However, because counterfeit documents also began to proliferate in Fukushima and Koriyama cities, local officials restricted the number of permits issued. Even with a designation certificate, separate identification documents became necessary. I heard that some people who already had emergency vehicle designation certificates resorted to driving onto the expressways just to obtain fuel at service area gas stations.

This photograph was taken in front of a supermarket. No rationing system had been introduced and a queue had already formed in front of the store before it opened. A system of letting customers enter in groups of 20 at a time was operated. Supplies in the store were running low, and naturally there were no natto or milk products available.

On the work front, we had to inform association members and other farmers about the association's own damage and our milk collection capability. Basically, milk collection could not be carried out because fuel supplies and other distribution-related items had been cut off. The milk processing plant itself was also damaged. Of course, we were also unable to continue to supply feed. Although farmers continued their milk production, the milk was not in a fit condition to be shipped. Conveying information of this kind to farmers was one of the association's first priorities.

I was overseeing medical care services and, due to the earthquake situation, we could only respond to emergency cases. I instructed staff "to minimize the distance travelled by our ambulances to provide medical care efficiently each and every time we go out." As for breeding dairy cattle and trading calves, the usual auctions could not be held because of damage to the livestock auction marketplace. The slaughterhouses and related facilities to which beef cattle are usually shipped were also damaged and there was no prospect of them reopening in the foreseeable future.

In the light of this situation, the Ministry of Agriculture, Forestry and Fisheries (MAFF) and the National Federation of Dairy Co-operative Associations (Zenrakuren) issued written notices concerning cattle rearing management. They asked farmers, for example, to nurse calves on whole milk in order to reduce the amount of milk having to be discarded. I will talk more about this later, but the MAFF sent us documents on livestock feed management following the nuclear accident, and we notified the association's members accordingly.

Our thinking with respect to the emergency was that, in the case of dairy farming, it would be difficult to suddenly stop milking the cows and, of course, in order to produce a lot of milk cows usually consume a lot of feed. So under a situation in which feedstuff supplies are interrupted we set out to manage things so that the cattle would get by on the available feed and live longer, even if leaner. But managing this plan in practice proved to be a problem. Reducing the amount fed to the cows did reduce the volume of milk they produced but, as the practice continued, the animals began to develop a variety of different illnesses.

Based on the above situation, we produced and distributed notices informing farmers about certain points of caution and advising "in such and such a case, please take the following course of action." Also, with regard to anticipated illnesses, I remember we sent out advice notices saying, "In this situation, please note that such and such a disease can easily occur."

Actually, well before the earthquake, we had experienced some similar situations. For instance, in 1980, Fukushima Prefecture suffered heavy snow which caused a breakdown in the distribution system. In 1998, heavy flooding had also affected the prefecture which resulted in similar distribution problems. But such past problems had been confined to limited areas whereas this time the situation affected the entire prefecture. So while we were able to apply know-how gained from past breakdown experiences it was still very difficult to gauge future recovery prospects for such a prefecture-wide problem.

For dairy farmers, throwing away good milk is obviously a hard thing to do both psychologically and from a business standpoint. To try and lessen this problem, I remember issuing guidance notices to ask farmers to pay attention to feeding details. For example I suggested they feed cows on grass only in order to reduce the amount of milk produced, etc.

Changing the subject to address damage to buildings, the March 11th earthquake caused little damage to buildings in Shirakawa. But one month later, on April 11th, there was an aftershock measuring above 5 on the Japanese earthquake intensity scale. I heard from many people that this tremor caused considerable damage to farm houses and other buildings.

The April 11th earthquake had its epicenter near Iwaki (about 30km south of the Fukushima Daichi Nuclear Power Plant). This photograph shows where a seismic fault slipped during the quake. At that time I was visiting farms in Iwaki as part of my work, and I took this photograph during my journey. The fault jumped by about two meters. It was the first time I had ever seen a fault slip with my own eyes and I was very frightened. This is a photograph of a cypress plantation where the trees along the fault line have fallen and are standing at an angle. This continues for about 2km through the plantation. Witnessing this with my own eyes made a very powerful impression on me.

The industrial animals or livestock field can be broken down into a rough classification as shown here. Industrial animals include, first of all, cattle, which are sub-divided into dairy cattle, commercial cattle, and beef cattle. Other cattle classifications include breeding wagyu (Japanese cattle), so called stock cattle, and wagyu veal calves. Next come pigs, which include breeding pigs and meat pigs. As for chickens, there are broilers and layers, while horses are divided into breeding horses, commercial horses and tourism horses. Fukushima is well known for the Soma-Nomai Festival (in which participants dress as Samurai on horseback) and horses are kept specifically for this purpose.

This data is also from somebody related to the prefectural government. These figures show the numbers of animals being raised about a year before the earthquake. Actually, this data is for the Soso District, a costal jurisdiction with approximately 2,700 dairy cattle, 10,000 beef cattle, 400 horses, 40,000 pigs, as well as the figures for sheep, goats and chickens. Of these, the figures for animals being raised inside the evacuation zone were 1,400 dairy cows, 5,500 beef cows, 127 horses, and 34,000 pigs.

Let me repeat that the earthquake or the tsunami of March 11th, 2011 caused almost no direct damage to livestock in this region. I heard of only one farm being damaged, and that was no longer operating. An empty cattle shed was washed away in the tsunami. However, there were no reports of livestock having been taken by the tsunami.

The southern part of Fukushima Prefecture suffered little direct damage from the earthquake. Lifelines such as electricity, gas and water supplies were not affected in most places, and there were no problems with buildings or facilities. What was different after the

earthquake was that feedstuff was no longer delivered and milk-collecting trucks stopped coming to farms. Apart from that the situation on most farms was normal.

There was an animal feed manufacturing plant in Ishinomaki in Miyagi Prefecture, but it was badly damaged by the disaster, and it proved very difficult to make it operational again. So for feed supplies we had to turn to a plant in Kashima in Ibaraki Prefecture. The feed makers had a hard time, but they were able to respond to the emergency demand.

The milk from these farms is usually shipped to the dairy plant at Fukushima Prefecture Dairy Farming Association, where I work. Naturally, the earthquake caused damage to the plant and, while we tried as hard as we could to effect repairs, it took almost two weeks before we were able to resume operations.

After that, the number-one issue was physical distribution. Along with the fuel supply problem, this was an extremely severe problem.

In addition, we had the nuclear accident to deal with. Farmers living inside the evacuation zone, including those who kept animals, were ordered to evacuate. Of course, some people in designated areas were told to evacuate immediately after the earthquake, but most were instructed to evacuate afterwards as the nuclear accident unfolded. One problem was that the instructions given were changed. For instance, these instructions were finalized when the previous designated area was changed on April 22nd. Initially, designated 20km and 30km zones were established and the general agreement of all was requested. But later, after this was changed to a systematic evacuation zone, a considerable number of farmers found themselves on the borderlines. They faced a tough situation in which they had to evacuate.

As all this was going on, the feeding environment also changed. Surveys revealed that in the latter half of 2011 the situation had reached a point where many farmers were unable to use feed or maintain the production cycle, including the disposal of manure. In particular, because the livestock industry operates on a production cycle including the handling of feces and urine (as well as animal feed) radioactive contamination had become a big problem. Simply throwing away feces and urine would create enormous problems within a production cycle for producing products using raw materials. And naturally, this also touches directly on the “food safety issue”.

Earlier I mentioned the initial evacuation instructions given to people living in the 20km and 30km zones following the nuclear accident, which had a negative impact on livestock management. A major turning point came with the zoning designation that came into effect on April 22nd. Up until that time, even though farmers had evacuated from their homes, they were still able to keep their cows by commuting back and forth between their temporary homes and their farms. There were also some farmers who ignored the evacuation instructions and remained home while continuing to tend their animals. I have no way of confirming the story, but I did hear from a reliable source about an elderly couple living 3km from the Fukushima Daiichi Nuclear Power Plant who did not evacuate but instead continued to tend their cows.

Next we come to the topic of livestock evacuation. I heard that, immediately after the earthquake, some farmers requested livestock dealers to completely evacuate their livestock. But despite these measures, the actual situation was that animals taken out of Fukushima by dealers could not be sold. In the end, there was no alternative but to return them to their places of origin.

During this time, farmers considered various ways to evacuate their animals, such as putting cattle with the best pedigrees into the care of acquaintances living outside the evacuation zone. Some farmers inside the 20~30km zone (where residents were instructed to remain indoors) also attempted to temporarily move their animals.

This was a problem. As was shown in the slide a little

earlier, first of all, the evacuation zone was designated. The livestock were then tethered and left, or else put out to pasture. This remains the case even now because claims for compensation are involved. Many farmers are in a situation in which their livestock are being kept in this way while their dairy business is temporarily closed, or else they have gone out of business altogether.

As for the planned evacuation zone, in the beginning, according to the government ordinance, livestock were to be left in the same way as in the earlier evacuation zone. However, the new zone covered a very wide area, and on top of that, it would be hard for the industry if so many production resources were lost. So after discussing with Fukushima Prefecture about the method and procedure for transferring livestock, we decided on some rules including the issue of external radioactivity screenings. Then we transferred livestock to other areas within the prefecture on a temporary basis. It was decided that the transfers would be carried out during May, which was the time limit for the planned human evacuation. They went ahead in line with the procedures decided.

Regarding the area designated as the emergency evacuation preparation area, following the designation, milk shipment controls etc., were put into effect for the period until the end of June. After this period, normal production and shipments were resumed.

Many radioactive hot spots were found in Fukushima City. This problem affected farmers more than other residents. Some farmers were found to have hot spots on their land, others were declared to be OK after individual examinations were made and a third group had to close their businesses due to radioactive contamination.

When the earthquake struck, this place suffered direct damage and it took about two weeks before a recovery was achieved. Then there was an order to stop shipments because radioactivity was detected in raw milk. Indeed, except in the Aizu district, the production and shipment of milk has remained suspended until now. For almost two months following the earthquake up until early May, the situation was that no milk could be shipped to market throughout Fukushima Prefecture. However, although there were still various debates ongoing, milk processing factories began operating two weeks after the earthquake. Because local raw milk could not be used the business owners brought in raw milk from Iwate Prefecture.

The restoration of facilities such as the auction market and the slaughterhouses took between two or three weeks. Although beef cattle distribution, including to the slaughterhouses, did restart we then had a rice straw problem in July and radioactive cesium was detected in beef. So beef cattle shipments stopped again from July until the middle of August.

The general public was not informed about it but we also had a dead cattle problem. Any cattle that died on family farms had to be examined for BSE. Procedures dictated that such livestock carcasses were sent to the Livestock Hygiene Service Center to be examined for BSE, and then sent to Aomori Prefecture where they were handed over to industrial waste disposal operators for rendering. However, because radioactive contamination was detected in the meat and bone of some carcasses after disposal, the transport of livestock carcasses into Aomori was temporarily prohibited. Accordingly, a special measure was put into effect in Fukushima, under which farm households were instructed to bury any cattle that died on their premises. Before doing so they were required to obtain the permission of not only the Ministry of Agriculture, Forestry and Fisheries, but also of the local Public Health Department. The latter would issue orders that the burial must not take place anywhere near water sources and must be performed to a depth of so many meters. This order was related to the Rendering Plant Control Act. Later on, similar stories came out from inside the evacuation zone. In any case, with this special measure, the disposal of livestock carcasses was speeded up. Early on, the carcasses were kept refrigerated at the Livestock Hygiene Service Center. But it was when the center became full that the rendering plant was unable to process carcasses. Even

after the rendering plant restarted operation, within less than a week, processing halted again because radioactive material was detected in meat and bone. This situation continued until June.

When evacuees began to make temporary visits to their homes inside the evacuation zone, livestock carcasses were covered with blue sheets and sterilization carried out using hydrated lime. There was a suggestion to dispose of carcasses in advance of the visits in view of public hygiene issues and the potential psychological damage to evacuees.

The reason why carcasses could not be buried and why they had to be covered with blue sheets and sterilized with lime was because suitable instructions for processing matter contaminated with radioactivity was not specified in the Act on Special Measures Concerning Nuclear Emergency Preparedness.

With regard to the treatment of feeding livestock in the designated area, until April 22nd, farmers were allowed to move such animals independently. Up until that date, although there were gates in place, people were still allowed to enter and leave the evacuation zone. But from April 22nd onwards, solid barricades were set up and people were ordered to remain outside, with the result that farmers simply had to leave their livestock behind in the evacuation zone. As far as possible, some livestock in the planned evacuation zone were transferred to other locations within Fukushima Prefecture.

Eventually, in a so-called "mobile sellout", farmers elsewhere in the prefecture were asked to purchase as many cattle as possible at a temporary auction market, and in this way a significant number of cattle were transferred out of the zone. There were also some cases where farmers were able to sell their cattle outside of the prefecture. At that time, the prefectural government made a regulation under which the external exposure condition of cattle was to be checked prior to transfer, with one cow or bull per family farm to be examined as a monitoring animal. This animal was to be slaughtered and, provided that its meat contamination did not exceed the 50 becquerel standard, the other cattle from the same farm could be shipped outside of the prefecture. Even so, in reality, the cattle that were sold outside the prefecture did not sell at the subsequent December auction market and had to be returned to Fukushima.

Later, I will be showing some slides of livestock inside the evacuation zone. Problems such as the abandonment of livestock carcasses and so-called 'runaway' animals are happening even now. Also, the situation with pig and chicken farming is just as the previous speaker reported.

I suppose many of you find it difficult to imagine the shape of the map of Fukushima Prefecture. Actually, it has a shape a little like that of Australia basically. Lake Inawashiro is located in the center; the Aizu district is on the west side; Nakadori, with the cities of Fukushima, Koriyama and Shirakawa, occupies the central area; and Hamadori, with cities such as Iwaki and Soma, is on the east side. Here are the Abukuma Mountains. There is a concentration of livestock farmers around here. There is a nuclear power plant here, and here is Iitate Village. From Iitate to the nuclear power plant flows the Ukedo River. This river supports salmon, which swim slowly upstream through this gorge.

Regarding the evacuation zone, as decided after the earthquake, at first an order was given for people living between 20 and 30km from the Fukushima Daiichi Nuclear Power Plant to remain indoors. Among livestock farmers, there were those who wanted to continue operating their dairy businesses and others who took the disaster as an opportunity to stop dairy farming. (Eventually, some of them moved to other places and reestablished their dairy businesses there). At first, dairy farmers naturally complied with the evacuation orders for the 20km and 30km zones. But, later, when the designated areas order was issued, while some farmers were delighted (because it meant they were still all right), there were others who felt, "I've already made my decisions, so it's too late now." Also, as I mentioned earlier, with the detection of hot spots, two family farms were identified in zones where

hot spots were discovered and, following a second survey, one household had to close down its business.

As Dr. Ito mentioned, notices such as "Don't feed cows on grass" and "Don't put cows out to pasture" were sent out to give guidance with feeding management.

As I mentioned during my outline explanation there was a period after the earthquake when raw milk shipment was impossible. A ban on the raw milk shipment was imposed which was later replaced by the present raw milk shipment stop order. So, after the earthquake, Fukushima Prefecture made sure that no local milk circulated in the market at all and, when the milk processing plants did start up two weeks later, the raw milk used was produced in Iwate Prefecture.

I'm afraid this slide is somewhat detailed and hard to see. Monitor surveys uncovered about 15 samples with readings above the standard levels. In the beginning, it was radioactive iodine that was detected. I heard that the highest levels recorded were approximately 50,000 becquerels. These days the highest levels are for cesium at about 5,200 becquerels.

These black circles are dairy processing plants. There are two places in the Fukushima City area and one each in Motomiya, Koriyama and Aizu. I don't believe the plant in Aizu was subject to any shipment controls.

It is a very tough job for farmers to dispose of raw milk on their own. One method is to sprinkle the milk onto fields or grassland, but this cannot be carried out repeatedly in the same place. This is because, in small amounts the milk can be a fertilizer, but if too much is spread on the ground rancid milk prevents grassland from being used. At one farm I visit, their shipment volume is 4 to 5 tons per day which is far too large a quantity to sprinkle on grassland. So they have dug deep holes and pour the milk into them. In the hole shown here, about 50 tons of milk has been thrown away. With the passing of time, the milk has evaporated and the volume reduced, but the milk surface has become so hard that a cat can walk on it. The farmer has dug such holes in four places and disposed of about 200 tons of milk this way.

Concerning the resumption of milk shipments, several procedures have had to be followed. The basic rule is that the raw milk must be examined every week. If the radioactivity level is found to be below 100 becquerels for three successive weeks, the milk can be shipped. Raw milk shipments were resumed under this rule. Eventually, the monitoring examinations were carried out weekly in the cooler station units at the dairy plants. These examinations are continuing even now.

There have been no cases of milk found to have a higher reading than the standard level since shipments were resumed. Basically, raw milk collection was restarted on April 18th and milk shipments resumed on May 3rd apart from in the designated areas.

However raw milk collection has not been resumed within the evacuation zone or the planned evacuation zone. Some of the dairy cows remain there but others have been transferred according to a set of procedures.

Regarding dead cattle, because radiation was detected from carcasses as well as from meat and bone, carcasses could not be rendered "up-stream". So, instead, the method of burying carcasses was employed. Now, however, we have changed rendering operators and carcass rendering is proceeding as normal.

We had cattle at many stages of life, including calves, newly pregnant heifers, etc., Until April 21st, the decision to transfer these animals was left up to the judgment of their owners. But after that, designated area movement restrictions were imposed.

Regarding the planned evacuation zone, under the situation at the time, it was impossible for individual farmers to sell all their animals and transfer them, so the Dairy Farming Association secured temporary places to hold them. We renovated closed-down or empty cattle sheds and moved the animals in groups. At first, during discussions on what to do about the evacuation zone, Fukushima Prefecture considered leaving or transferring all livestock, including those

that were in the planned evacuation zone. The local authorities and the organizations involved held discussions and came to a decision about how to proceed. Consequently, the Dairy Farming Association secured temporary evacuation places and transferred the cattle from the planned evacuation zone to these facilities.

This photo shows one of the empty cattle sheds we restored. In moving the cows, we faced a lot of limitations. In keeping with the Act on Domestic Animal Infectious Diseases Control, we had to check that the animals were not infected with diseases such as Johne's Disease (which would mean they could not be transferred). And we had to follow procedures under the 'livestock friendly insurance system'. If, in the event of an accident during transfer, there were any reports mishandled when applying for insurance payments, insurances would not be paid. Moreover, since cattle were gathered from various stock farms, we had to perform a certain degree of preventative sanitation. So we carried out the minimum necessary vaccinations, dermatological measures, tick treatments, etc.

In particular, cattle sheds that have been left empty are prone to harbor ticks due to the likelihood of wild animals having used or visited them. There is also likely to be mold growing in such places.

Following the earthquake, a variety of concerned organizations sent aid supplies and donations to the disaster site and to organizations working on the front lines. The largest donation came from Hokkaido, consisting of several consignments of wrapped roll-bale silage. In particular, there are many farmers in Hokkaido's Ashoro district who originally came from Fukushima. Centered on an association formed by these people, JR Ashoro launched its own disaster site support activities, including a periodic provision of aid supplies in April, May and June. Just the other day, similar aid supplies were delivered to the Dairy Farming Association, and a portion was used as feed for animals kept in the temporary evacuation cattle sheds. The rest was distributed among the members of our Association.

Regarding transfer of the cattle living in the planned evacuation zone, there are various rules to follow as well. One is that we must carry out radiation exposure screening tests before cattle transfers. The same applies when shipping cattle to auction markets or to slaughterhouses.

According to a veterinarian working for the Prefectural Government, the very highest readings obtained from these tests were about 12,000cpm. Decontamination is required in cases where the rate exceeds 100,000cpm.

Even after cattle have been transferred from the designated evacuation area, farmers are not necessarily allowed to transfer or resell their animals without specific permission. Once resold, the cattle are presumed to be "for human consumption" so there are rules. For this reason, evacuated cattle destined for sale have to undergo a monitoring examination first. In the case of slaughterhouse shipments, the first animal in every group will be subject to animal product monitoring tests without fail.

In the case of Fukushima Prefecture, there is only one slaughterhouse having a processing capacity of only 36 animals per day, in Koriyama City. Given its small scale, it is impossible for this facility alone to deal with general shipments from the prefecture's commercial cattle farms. So after their monitoring tests are done, farmers have to use slaughterhouses outside of Fukushima Prefecture. The procedures are needed because of this. The same also applies to raw milk. The produce from the first cow is subject to a monitoring examination. In the case of meat, a certificate is issued for products where radioactivity levels of less than 50 becquerels are recorded, allowing them to be shipped outside of Fukushima Prefecture. At present, many of the animals are shipped to a slaughterhouse in Yuki City, Ibaraki Prefecture. The governors of both prefectures discussed and agreed to introducing the examination system I just outlined.

Moreover, it has been decided to set the validity period of these certificates at three months and make the certificates subject to renewal. So in cases when the

period between testing and shipment is extended, the animals in question have to receive additional monitoring inspections in Fukushima before they begin to be shipped outside the prefecture. This regulation is still in effect. The same procedures apply to beef cattle, dairy cattle and to shipments of raw milk from primiparous cows.

Regarding external radioactive exposure, there is a rule that animals found to have readings above the standard 10,000cpm should be decontaminated.

Changing the subject, I will next talk about the restarting of dairy businesses by evacuated farming households. Naturally, everybody living within the evacuation zone was evacuated leaving their cows behind so the number of farmers who have restarted their operations inside the zone is zero. These people are living in temporary accommodation and have suspended their operations. For the farmers in the planned evacuation zone, the situation was a little different because they had a period of preparation. Invitations came from Yamagata, Hokkaido and elsewhere for Fukushima dairy farmers to move to a new prefecture and restart their farming operations there. However, diary farmers usually have strong attachments to their land and find it difficult to decide to move. Nevertheless, two dairy farming families from within the planned evacuation zone did find vacant, closed-down, dairy farming facilities elsewhere and moved their own cows in to restart operations, after milk shipments from their original farms were no longer possible. Also, one dairy farmer voluntarily closed down due to a hot spot being found on his land. Some dairy farmers in the designated area discontinued their businesses by taking the crisis as an opportunity. Business discontinuation rates of diary farmers outside the designated area and outside of Fukushima Prefecture have risen since the time of the disaster.

Let me go back now to the sprinkling of hydrated lime on the carcasses of dead animals, the emergency euthanasia of dying animals and the emergency measures for runaway cattle. Since temporary visits resumed at the beginning of May, the prefectural government has tried to deal with all dead animals in the same way. However, due to problems in the working environment such as the air radiation dosages, etc., while there were some places accessible to people, some other places were too dangerous to enter. So not all dead animals could be treated.

Animals are still having to be destroyed inside the evacuation zone. The animal is first captured and its individual identification established. This allows the owner to be identified. Then, with the owner's consent, the animal is destroyed. (Without the owner' s agreement, the animal cannot be destroyed). The procedure used to destroy the animal is to use a sedative, followed by an anesthetic and lastly a muscle relaxant. Then the death of the animal is confirmed, the individual information recorded and the external radioactivity exposure dosage measured. Finally the animal is buried.

According to a report, as of the end of January 2012, a total of 1,142 cattle had been destroyed, as well as about the same number of pigs and 80,000 chickens. The veterinarian working for Fukushima Prefecture also made this report. Actually, the prefectural government funded all the procedures carried out in the evacuation area, and there was no support from the central government at all.

At first, the biggest problem was that burying the carcasses of destroyed livestock was not permitted. Carcass disposals were restricted under the Basic Act on Nuclear Energy Measures although, from July 8th, it became possible to temporarily bury carcasses with measured radioactivity levels below 8,000 becquerels. Because such burying was not generally allowed, there were severe problems from the decay and stench of rotting carcasses and from maggots and flies. While hydrated lime was spread as a countermeasure, at the time, it was said to be only of limited effectiveness.

When we came to ask owners for their agreement to destroy carcasses, many of them wanted confirmation that they would be compensated for their losses. However, at that time, compensation for individual

animals having to be destroyed had not yet been decided. My understanding is that the administration's standpoint was that they could not pay such compensation. Eventually, claims for compensation were made to TEPCO. But, in the event, I have heard that obtaining agreement to destroy livestock was difficult.

I also heard that it was a huge task looking for cattle carcasses because the remains were badly spoiled by runaway pigs, etc. Even when traps were set to capture cows in some cases the animals were later released. So the task of capturing them was a tough one.

Early on, Tomioka Town was against taking action against this problem. But when the number of runaway animals increased and the amount of damage they caused became greater, the town changed its policy and encouraged people to capture and destroy such animals. But there are some livestock farmers who lived in the evacuation zone who still wish to continue their operations, and the administration has had difficulties dealing with them.

Another problem concerned handling cattle that did not have individual identification earmarks. In principle, all cattle should have earmarks. But in quite a few cases the tags had dropped off. Also, those cattle later born in the wild naturally do not have an earmark. As Dr. Ito mentioned earlier, after discussions with legal professionals, it was decided to treat these animals as being ownerless.

In addition, there was the problem of securing land for the burial of carcasses. Burial became permissible on July 8th. But in the same order it was stated the owners of the carcasses had the right to appoint the planned sites for the burials. I have heard that there were many cases in which agreement could not be reached because the administration had to ask the owner, "where is the land you are appointing as the burial site?" This resulted in strong feelings among many owners. Moreover, as this burial would only be temporary, the question of how to later proceed with intermediate processing and final disposal of the carcasses remained for the future.

Although it is widely surmised that no livestock were evacuated from the evacuation zone, in fact this was not the case. For instance, Fukushima Prefecture approved the transfer of 31 horses kept for the Soma-Nomaoi festival. These animals were approved as the result of an examination performed by Dr. Ito. Also, 26 pigs were approved for transfer to Tokyo University for examination purposes. Their movement was approved under the condition that their meat would not be used for food.

I must warn you in advance that the next photos depict some very unpleasant things. They are actual scenes from inside the evacuation zone. This photograph shows mostly dead cows but some are still alive here too. Basically, about 90% of these Holstein cows died while the other 10% became runaways.

I've heard from people who paid temporary visits to the evacuation zone that Holstein cows somehow move around as if they have a type of homing instinct. They are always found hanging around cattle sheds even though they would be better off roaming far away to where there is plenty of vegetation for foraging. On the other hand, in the case of Japanese Black cattle, about 90% became runaways and only 10% stayed behind and starved to death.

This next photograph shows some runaway cattle. Even some Holstein cows and calves became runaways.

At the 33rd annual meeting of the Japanese Society of Clinical Veterinary Medicine, President Yamane expressed his concern that the processing of carcasses in Fukushima was not progressing. Since then, the situation has gradually moved from burying heaps of carcasses to tidying up. But despite this progress, I have heard that the work remained unfinished even into 2012.

I also heard that people have attempted to catch runaway animals by making trap-like fences, but it is actually very difficult to capture livestock that

have turned feral. Moreover, population proliferation due to mating between runaway farm animals or between livestock and wild animals is a very serious development from the perspective of containing common infectious diseases between animals. This also relates to the issue of abandoned cultivated land and to the "satoyama" problem (i.e., common land between areas of human-habitation and the wild) including that of destructive wild animals such as boar and deer. Abandoned cultivated land has been a problem for many years. With the nuclear power plant accident, it is very important for the livestock industry that livestock farmers are able to produce their own animal feed, and this year will be a turning point in seeing whether this is practical. If they can't produce their own feed, they will not be able to claim compensation, but on the other hand, they are asking the question, "If I can't feed my livestock, how can I raise them?"

The situation is that the number of dairy farmers in Fukushima has been reduced by 22~23% in the wake of this disaster. There are three dairy organizations in the prefecture, and the overall volume of dairy produce they handle has fallen to 80% of the pre-disaster level. These are the figures for number of cows and the volume of milk produced in the designated area, and this amount has been lost.

Just after the earthquake, raw milk production volumes were down to 30% compared to the year before, but then they recovered to about 70%. However, due to the exceptionally hot summer, milk shortages continued through to the end of the year. Even moving into January of this year, production volumes have only recovered to 80% of the previous January's level.

This is a report on the monitoring examinations conducted by Fukushima Prefecture. According to this report, high levels of radioactive contamination were detected in the meat of wild boar, although not so high that the meat could not be used as food. However, even after the hunting season began, these animals were not used for food.

The nuclear power plant accident led to an allowed standard value being established for animal feed. The tentative value was 300 becquerels. For compost, the tentative value was 400 becquerels. The feed grown by dairy farmers themselves is examined while the grass is still growing, but further tests become problematic after the grass is cut and made into hay. During this process, the hay is turned over and becomes dusted with soil. So if the soil is contaminated, the hay will be affected and cannot be used as feed. The three organizations discussed this problem and decided not to use the first, second and third crops of cut grass for feed.

On the other hand, the use of dent corn as a feed crop was not a problem. Because the corn is cut up and carried away by a harvester there is no contamination from the soil. So it was decided that dent corn could be used as feed.

Regarding the dos and don'ts of feeding, one particularly troubling problem is that different cities, towns and villages within Fukushima Prefecture have drawn between what can and what cannot be used as livestock feed. This may be OK from the standpoint of judging final products but, in the case of animal produce, it is very difficult to make judgments about using grass from here and not using grass from over there. This is because the animals may be fed on hay made from grass grown in neighboring municipalities. That is why the three organizations felt the need to make an overall decision.

You are probably aware of the rice straw problem, as this has been reported in the media. Radioactivity was detected in meat from cattle in Fukushima fed on rice straw that had been harvested after the earthquake. Regarding this meat, since beef from cattle shipped from Minamisoma City and Asakawa Town exceeded the standard value, beef cattle producers in Fukushima were initially requested to implement a voluntary ban on shipments of beef. This was then followed by shipment restrictions which meant that the producers became unable to slaughter their animals.

These restrictions were lifted at the end of August and replaced by a set of procedures that had to be followed

before shipments could restart. Under these procedures, the first animal of each farmer's shipment has to be tested. The slaughtered animal's meat must have a radioactive contamination level below 40 becquerels. If the meat passes the examination, the rest of the animals in the shipment can be transferred outside of Fukushima Prefecture. But the situation has been made serious due to the fact that, even before the earthquake, there was a serious shortage of slaughterhouse facilities in Fukushima Prefecture. Most cattle produced in Fukushima have long had to be slaughtered outside of the prefecture at facilities in Ibaraki and Saitama Prefectures. Also, nowadays, all meat from slaughtered animals raised in Fukushima is examined in Shibaura. Initial cattle monitoring examination results have a three-month limit, so if another slaughter takes place, the figures can be renewed based on the newer meat examination results, eliminating the need for follow-up monitoring of livestock in Fukushima Prefecture.

Another difficulty in livestock farming has been the compost problem. For fattening cattle and dairy cattle, the standard radioactive contamination limit for feed is 300 becquerels. On the other hand, for breeding wagyu cattle that are not due to be shipped for some time, it has been decided that feed with levels below 3,000 becquerels is OK. However, if farmers feed their cattle materials with high concentrations of radioactivity, then contamination levels in the animals' manure also becomes high. This compost problem is an ongoing issue right now. At present, the permitted limit for fertilizer such as compost is a value below 400 becquerels, but in actuality, according to individual test results, more than three-quarters of specimens have radioactivity levels exceeding the limit. Because this radioactive material was allowed into the animals' feed, a serious situation has developed. It is now questionable whether setting that regulation value was a wise decision.

When radioactivity in compost exceeds 400 becquerels it cannot be sold to the public but farmers are allowed to re-use their own compost. However, if the radioactivity exceeds 8,000 becquerels, it must be treated as nuclear waste and put into temporary storage.

This is an outline of the present problems. A new standard has been decided for feed and farmers have begun to adjust to it. Under the present temporary standard, if cows are fed on feed with a radioactivity level of less than 300 becquerels, their milk can be shipped, as can their calves. These calves will go on to become fattening cattle and people will consume their meat. The milk will also be for human consumption. In the case of breeding wagyu cows, the calves are sold at auction, and then fattened to produce beef.

Breeding dairy cows and breeding wagyu cows are allowed to feed on materials with radioactivity levels below 3,000 becquerels. At these levels there are no problems when their calves become fattening cattle and are turned into meat. However, after the cows have delivered five or six calves and are sent for slaughter as retired breeding cows, a problem occurs. The meat from these cows can't be shipped. As a result, their carcasses have been accumulating in great numbers and this is now a major problem. This is why we hear questions such as, "since they can't be used as meat, why can't they be euthanized?" or "Can't they be used for testing?" I think this problem foreshadows what Dr. Ito said about the desire to check on the internal exposure condition of cattle.

Next, I would like to talk a little about the present business situation of diary farmers in Fukushima Prefecture. Those who were evacuated from the designated area are receiving compensation from TEPCO under the assumption that they have temporarily suspended their operations, not that they have closed down their business. (If a farmer closes down his business, this compensation will no longer be paid). Another issue concerns for how long this compensation will be paid. This uncertainty is extremely demanding on the farmers mentally, a factor which itself has become a barrier to them restarting their businesses.

The present business environment is also a problem for the disaster victims. Within the livestock industry,

which includes compost, the need now exists for the environmental cycling of production which makes the business situation severe. Even if dairy farmers re-start their operations, this problem will remain from now on. Furthermore, working farmers who evacuated from the evacuation zone or designated area now have to commute in from their temporary housing. This is not a situation they will be able to cope with over the long term.

Already almost a year has passed since the earthquake struck and they are struggling to maintain their motivation for their business. There are also many cases in which the wife or other members of the farmer's family have evacuated to places outside Fukushima Prefecture. As the designated areas become reconfigured, the time is drawing near when these people - including farmers who have temporarily suspended their operations - will have to decide what to do for the future.

This is the actual air dose situation. Our association has a branch office in Kodaka in Minamisoma City, approximately 13km from the Fukushima Daiichi Nuclear Power Plant. The air dose in this building is 6 microsieverts per hour. This is the office in Motomiya City where I work. It has a comparatively high air dose figure. Earlier Dr. Kawamata said that he had to stop working because the accumulated dose he received was high. I personally have been exposed to a cumulative dose of about 1.8 milisieverts.

Seminars such as the one shown here are being held in Fukushima Prefecture.

In the prefecture, radioactivity tests are conducted using germanium-testing equipment, but these tests are expensive and take a considerable amount of time to carry out. So some organizations are performing their tests using a sodium iodide scintillator. Our association already has two of these devices and we will obtain another one soon. But even then, we will have nowhere near enough capacity to meet all the demands for testing. In addition to milk, which naturally has to be tested in Fukushima, we are called upon to test feed, compost, feed crops, etc. Sodium iodide scintillators have been introduced by each agricultural cooperative for testing rice but, in order to test other items, a difficult adjustment procedure is needed to correct for the background. In particular, for testing rice straw, a very fine adjustment is needed which requires great care.

Two days ago, at a meeting of Fukushima Veterinary Medical Association's Farm Animal Group, the following point was brought up. "Although monitoring information is announced on the prefectural website, who is actually looking at it?" Regarding product safety awareness, there is huge discrimination against Fukushima products. Although the prefectural government has been publicizing their countermeasures, many question if this is enough and the subject remains a major issue. At first, a descriptive term "ND" (No Detection) was used in the announcements but, since around November, the notation system has changed to read "ND" and "Detection Limit Value".

It is good to display the figures but the most important thing is to change the public's zero-risk-oriented attitudes. Since this new notation system started, "ND" readings have continued. It is the same with beef, where occasional low radiation readings such as 13 becquerels are being detected. But as I mentioned earlier, all beef shipments are examined, and most of them are classified as "ND".

A shipment embargo remains on mushrooms and vegetables, but monitoring examinations are still carried out on these products and results announced.

Concerning monitoring examinations, the existing temporary standard will be replaced by a new standard from next April. However, I am concerned that instead of making consumers feel more safe this change may result in their zero-risk orientation becoming stronger.

Compared with beef, for which all shipments are examined, raw milk monitoring tests, which are performed on mixed milk in CS units and factory units, are subject to random inspections. For this reason,

there have been requests for raw milk to be examined in each farmer's bulk unit. But if this were actually carried out there would be so many samples that it might not be physically possible to examine them all. It would be very difficult in practice.

Once a product's standard value has been decided, the standard value for the feed is also determined by means of a transfer coefficient, etc. This itself raises another problem; whether it is OK to simply to cut feed and examine it by unit acreage sampling or not. Yet another problem is that the detection limit differs according to the type of detector used. In the case of the NAI scintillator, when it detects a figure of 10 or 20 becquerels, these figures fall within the device's error range of plus or minus 30. So it is difficult to decide if such a reading is OK or not.

Under the new set of standards that will start in April, for milk, the cesium level tolerance will change from the present 200 becquerels to 50 becquerels. In the case of meat, it will change from the present 500 becquerels to 100 becquerels. Consequently, for feed, the tolerance will change from the present 300 becquerels to 100 becquerels. Whether or not a given feed crop is considered acceptable to use will be determined according to the new standards and, on the farms, this issue is considered to be a crucial point this year.

On the front lines in Fukushima Prefecture we are carrying out a variety of examinations based on these conditions. For example, in the case of meat, radioactive contamination is tested for by performing antemortem inspections. But I would ask, instead of this type of inspection, could we not check meat prior to shipment by taking and examining blood samples or carrying out a decontamination test? In this context, we have held a research results meeting to discuss possible methods of decontamination.

As Dr. Kawamata also mentioned earlier, how to decontaminate soil is yet another problem. What is being recommended is to remove the surface layer of the soil and turn the remaining soil over with a plough. But in reality, even if such decontamination is carried out, the soil can still show higher levels of radioactivity later.

This is a demonstration video made by Fukushima Prefecture. It shows the process of removing the surface layer from a meadow. This image shows a plough turning over the land to reduce the amount of radioactivity measured. But although the levels do decline temporarily when the soil is turned over, it will still require further decontamination at a later date. So even after decontamination is carried out, the basic problem remains. Also, when radioactive particles are blown or washed down from the mountains, the radioactivity levels within the hydrological system (such as freshwater springs and mountain runoff) rise again.

Because of these increasing biological concentrations of radioactive contamination, a number of tasks still remain within the livestock industry related to the feeding of raw materials to livestock, animal product distribution control, and risk analysis.

Because the government's initial reaction to the nuclear accident was so poor, the people have little trust in them. That lack of trust is resulting in many problems in many areas including food safety. Cattle farmers in particular are facing a severe situation in which they are, in many cases, being asked to agree to the destruction of their own cattle and they have had restrictions imposed on the movement of these animals.

Regarding food safety, unless validation and proof of safety can be established with greater assurance, it will be difficult for producers in Fukushima to regain the consumer confidence. At the end of the day, essentially, "trust" is the most important consideration.

Finally, I believe there needs to be a general review of how to respond to nuclear accidents from now on. It will not be easy to regain the public's confidence in food safety unless some such process is undertaken. However, the effectiveness of the information released is impacted by problems on the information issuing side. Plus there is the quality of the information itself

and the receiving side's level of knowledge. So for the dairy industry, the biggest and most important item on our agenda is food risk management.

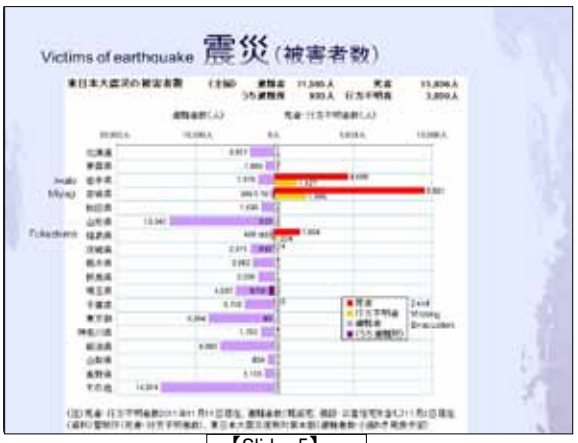
Thank you very much for listening.

【Slide 1】

【Slide 2】

【Slide 3】

【Slide 4】

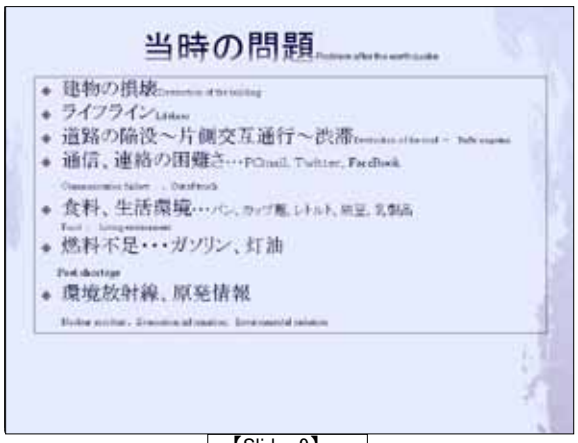


【Slide 5】

【Slide 6】

【Slide 7】

【Slide 8】

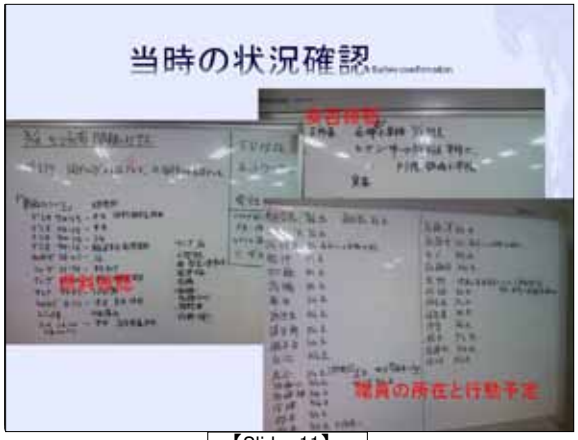


【Slide 9】

【Slide 13】

【Slide 10】

【Slide 14】

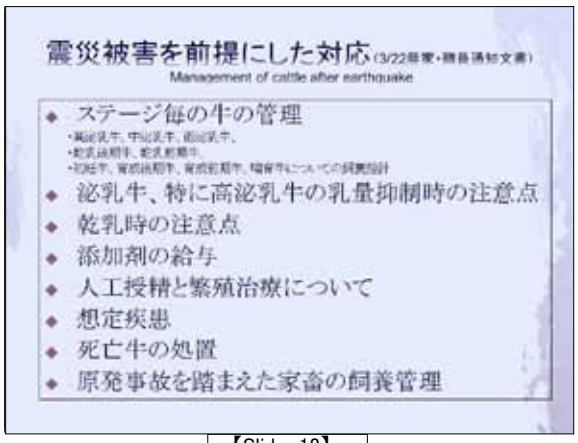


【Slide 11】

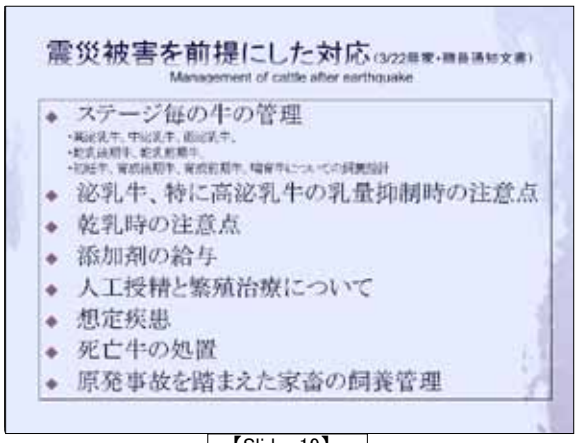
【Slide 15】

【Slide 12】

【Slide 17】



【Slide 18】

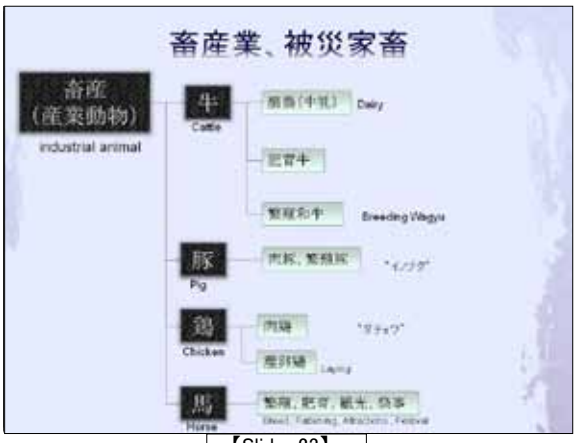


【Slide 19】

【Slide 20】

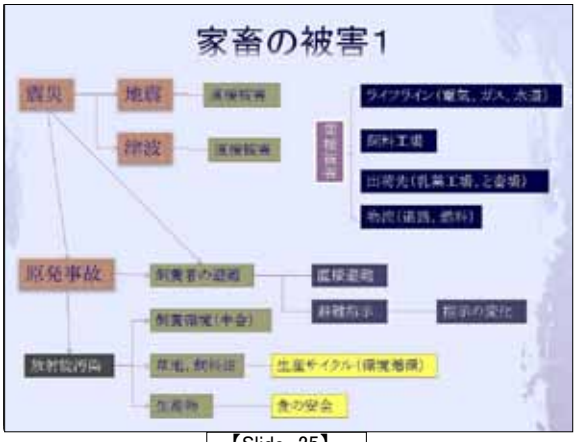
【Slide 21】

【Slide 22】

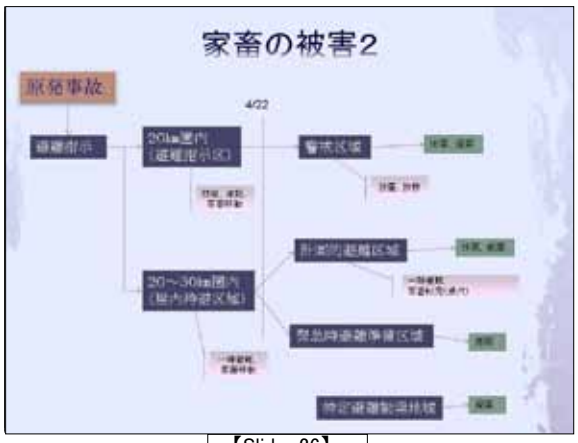


【Slide 23】

【Slide 24】



【Slide 25】



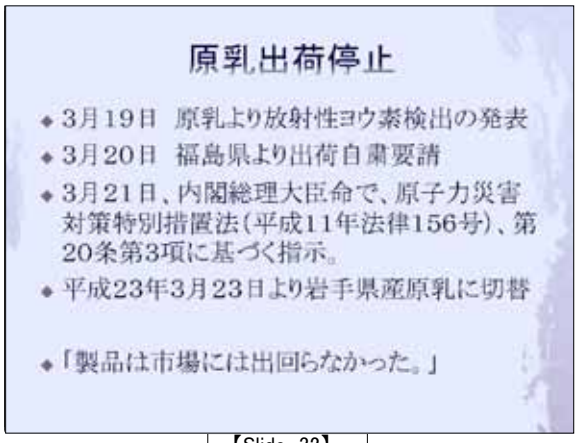
【Slide 26】

【Slide 30】

【Slide 27】

【Slide 31】

【Slide 28】



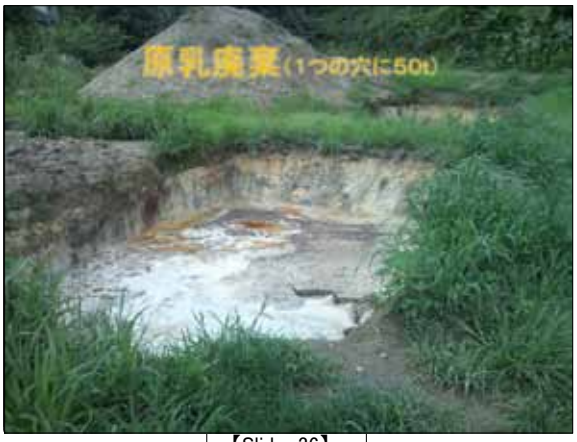
【Slide 32】

【Slide 29】

【Slide 33】

【Slide 34】

【Slide 35】



【Slide 36】

原乳出荷停止解除の要件

- 県内のCS（クーラーステーション）および乳業工場単位で原乳の試料採取する。
- 概ね1週間毎に、継続的に原乳を採材～モニタリング検査を実施。（財）日本分析センターまたは福島県原子力センター福島支所の行い、翌日に結果が出るのでこれを公表する。
- 3回連続で100Bq／kg以下となる場合、CSあるいは乳業工場単位で出荷停止を解除する。
- 解除後も毎週火曜日に定期的に検査を実施する。

【Slide 37】

原乳出荷停止から再開までの流れ

日付	事象	給与・乳業工場
3月11日（金）	震災	
3月18日（金）		乳業工場再開、原乳受入（SCC）
3月23日（土）	首都圏産（以北茨城県）の原乳より基準値超過の放射性物質	原乳受入（SCC）、放射性物質の自主検査
3月30日（日）	福島県より原乳および牧草放射性物質検出	県内産乳製品停止
3月31日（月）	国より原乳出荷制限指示	
4月2日（水）		岩手県産原乳（SCC）受入開始
4月 4日（月）		出荷再開に伴うモニタリング検査方法の協議
4月 7日（木）		第1回原乳モニタリング検査
4月 9日（金）	金津地域の原乳出荷停止解除	4月11日より集乳再開
4月12日（火）		第2回原乳モニタリング検査
4月16日（土）	千葉（いわき地域）の原乳出荷停止解除	4月18日より集乳再開
4月19日（月）		第3回原乳モニタリング検査（418サンプル）
4月21日（木）	飯舘村・福島市の原乳出荷停止解除	4月23日より集乳再開
4月25日（月）		第4回原乳モニタリング検査
4月27日（水）		乳業工場より「福島県産牛乳」としての販売開始
5月 1日（日）	指定区域を除く（市町村・市町村単位の原乳出荷停止解除	5月3日より集乳再開、指定区域以外の出荷が全て再開

【Slide 38】

現在の原乳出荷制限の解除状況

【Slide 39】

死亡牛問題

- 3月15日：震災により物流が途絶え、死亡牛のBSE検査後の死体の処理ができなくなった。検査所の冷蔵庫が満杯になり検査中止、死亡牛の搬入が困難となる。
- BSE検査の除外特例の施行。化成埋法第2条第2項但し書きの規定に基づき、死体を埋却。（所轄の保健所、県保健福祉事務所の許可を取る。「死亡獣畜取扱場外処理許可申請書」の提出。）

※死亡牛の解剖：実施（化成埋法）か省略（焼却）かを1頭ごとの解剖で判定。

- 3月25日、死体の輸送が可能となり、死亡牛BSE検査が再開。
- 4月より、死体受入れ先で肉骨粉より放射性物質が検出。育成場への全ての堆肥搬入が禁止となる。
- 再び、死亡牛のBSE検査が不可能となり、埋却に戻る。
- 6月1日、死亡牛処理業者の変更により、処理再開となる。

【Slide 40】

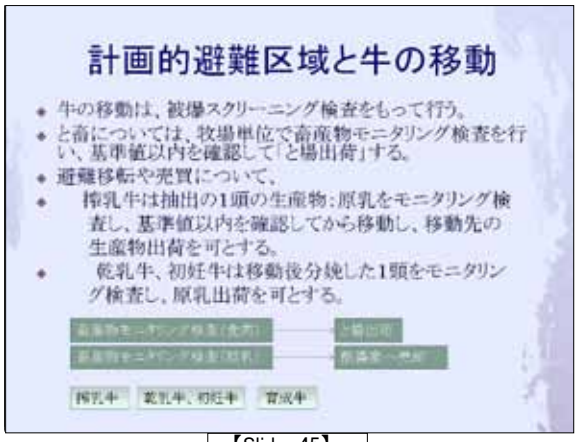
指定区域

【Slide 41】

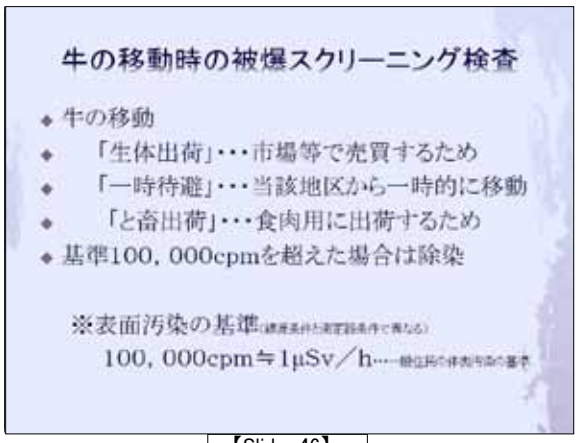
【Slide 42】

【Slide 43】

【Slide 44】

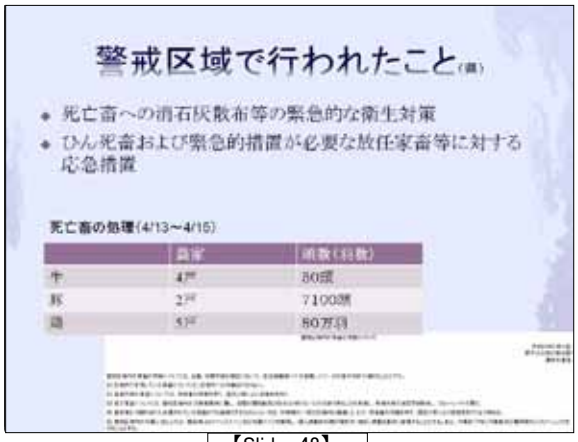


【Slide 45】

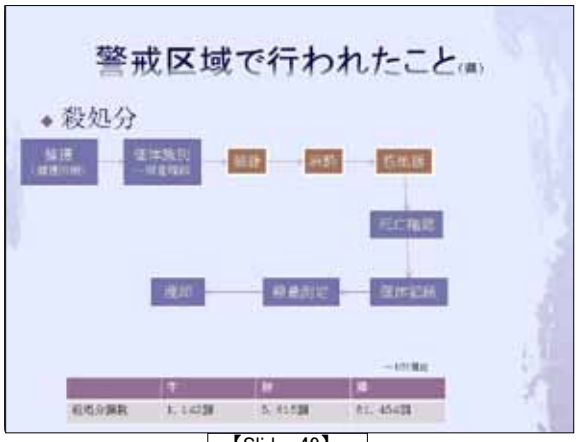


【Slide 46】

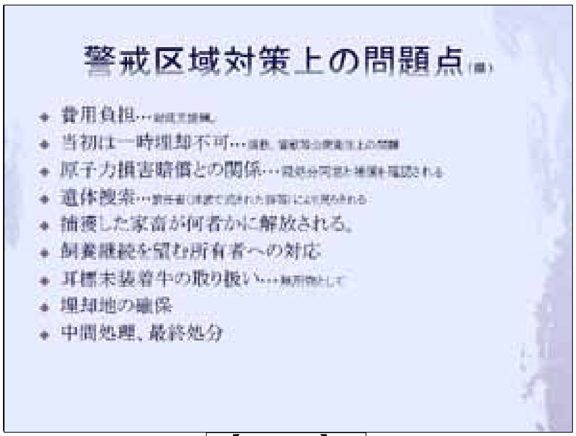
【Slide 47】



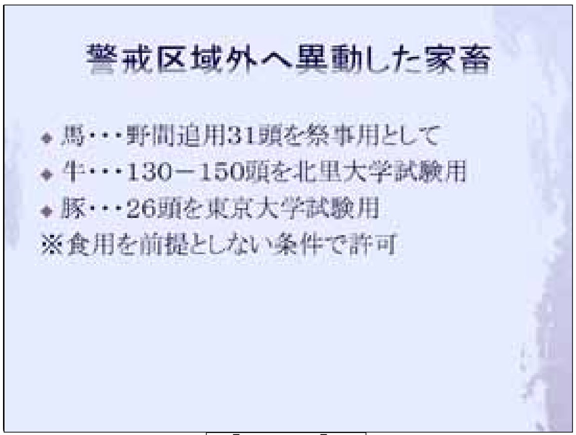
【Slide 48】



【Slide 49】



【Slide 50】



【Slide 51】

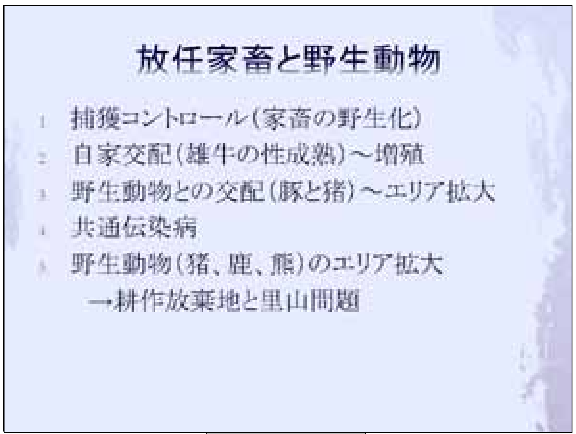
【Slide 52】

【Slide 53】

【Slide 54】

【Slide 55】

【Slide 56】



【Slide 57】

酪農家戸数の状況（H23.9.30現在）

【県酪農協全体】

	酪農家戸数	乳牛頭数	乳量
2010年	307戸	9,996頭	152t/日
2011年	239戸(77.9%)	8,281頭(82.8%)	121t/日(80.1%)

地区	酪農家戸数	乳牛頭数	備考
県北	33戸(－10)	1,113頭(－ 273)	山木屋地区
安達	30戸(0)	739頭(－ 31)	
県中	40戸(0)	1,216頭(＋ 18)	
田村	38戸(－2)	454頭(＋ 15)	
東石	31戸(0)	1,753頭(＋ 39)	
浜	10戸(－38)	361頭(－1100)	[illegible]
いわき	6戸(－3)	151頭(－ 31)	
会津	10戸(－1)	318頭(－ 15)	
県南	44戸(－3)	2,176頭(－ 90)	
JAそうま	0戸(－11)	0頭(－ 249)	飯舘村

【Slide 58】

福島県内酪農家状況

[illegible]

酪農団体名	出荷戸数	受託日乳量(t)	飼養頭数(頭)			
			経産牛	育成牛	育成牛	総頭数
県酪農協	293	159	7,035	794	2,122	9,951
全農	172	77	3,687	451	995	5,133
小野地区	51	18	774	63	168	1,005
合計	516	254	11,496	1,308	3,285	16,089

原発事故による指定区域(県全体)

指定区域	出荷戸数	受託日乳量(t)	飼養頭数(頭)			
			経産牛	育成牛	育成牛	総頭数
警戒区域	26	13.5	644	132	149	925
計画的避難区域	32	18.9	680	94	216	990
緊急時避難準備区域	13	6.2	291	40	65	396
合計	71	38.6	1,615	266	430	2,311

【Slide 59】

現況：事故後の生乳生産、乳業の状況

【生乳生産状況】

	4月	5月	6月	7月	8月	9月	計
受託乳量	3,455t	6,042t	5,807t	5,957t	6,046t	5,931t	32,277t
前年比	30.3%	72.0%	74.3%	75.7%	79.8%	82.1%	68.8%

【乳業プラント工場の状況】

◆3月 ・・・工場復旧、製造開始、[illegible]で製造再開
◆4、5月 ・・・[illegible]
◆6月 ・・・[illegible]
◆7、8月 ・・・[illegible]
◆9月 ・・・[illegible]による学校給食の落ち込みが影響
◆12月 ・・・乳量は80%弱に回復

【Slide 60】

畜産物のモニタリング検査（福島県、～8/31）

対象	検査開始	回数	検体数	備考
原乳	3月16日	51	326	[illegible]
鶏卵	3月26日	11	60	
鶏肉	3月28日	15	39	
豚肉	3月30日	32	67	
牛肉	3月15日	17	104	
馬肉	4月6日	3	3	
羊肉	7月25日	1	1	

※南相馬市の猪肉より5，720Bq／kg検出。
11/9付けで福島第1原発周辺12市町村で捕獲されたイノシシの肉の出荷停止と摂取制限を県に指示した。
狩猟解禁になるも、食用にはならず。

【Slide 61】

原発事故を踏まえた粗飼料中の放射性物質の暫定許容値（4/14通達）

対象＼核種	放射性ヨウ素（許容最大値）	放射性セシウム（許容最大値）
乳用牛(経産牛及び初回交配以降の牛)	70Bq／kg(実重量)	300Bq／kg(実重量)
肥育牛(出荷前短くても15ヶ月程度以降の牛)	暫定値で出荷制限を受けていない地域で生産された粗飼料	300Bq／kg(実重量)
その他の牛(種付け前の未経産牛、繁殖用和牛等)	暫定値で出荷制限を受けていない地域で生産された粗飼料	5000Bq／kg(実重量)

【Slide 62】

飼料の暫定許容値

・飼料の暫定許容値＝300Bq／kg
・粗飼料は水分含量80%ベース
・その他飼料は製品重量

・当分の間と畜を予定しない繁殖雌牛や育成牛は、3000Bq／kg(水分80%ベース)以下の利用が可能。ただし、これらを摂取した牛は12ヶ月以上肥育した後にと畜出荷する。
また、これより生産された堆肥は、400Bq／kgを超える可能性あり。

・放射性セシウムの飼料から畜産物への移行係数（最大値）

	肉	乳
牛	0.096	0.068
羊	1.3	0.32
山羊	1.9	0.33
豚	2.8	

厳格な飼養管理＝敷料も含め使用しない。放牧を行わない。

【Slide 63】

自給粗飼料に関する判断

月日	事項	備考
4月14日	自給粗飼料の収穫・利用・放牧の自粛要請(県)	
5月2日	牧草の放射性物質モニタリング検査結果発表(県)	
5月13日	牧草利用および放牧の自粛要請(県)	会津地区除く
7月8日	事故後収穫稲ワラ給与による放射性セシウムの規制値超え牛肉が発覚	
7月19日	牛肉出荷制限(国)	8月25日解除
8月23日	2番草給与自粛(団体間協議で決定)	会津地区除く 部分的には解除
9月13日	3番草給与自粛(団体間協議で決定)	会津地区除く 部分的には解除
9月30日	飼料作物(デントコーンサイレージ、稲WCS等)給与可	
10月31日	稲ワラの給与可(警戒区域等を除く全地域)	

【Slide 64】

飼料作物の使用可否（9/30）

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	○ [illegible]	○ [illegible]	○ [illegible]	－
[illegible]	[illegible]	○ [illegible]	○ [illegible]	○ [illegible]	－
[illegible]	[illegible]	○	○	○	－
[illegible]	[illegible]	○ [illegible]	○ [illegible]	○ [illegible]	－

○ [illegible] ＊ [illegible]

【Slide 65】

牧草の使用可否

【Slide 66】

稲ワラ問題

月日		事項
7月9日	南相馬市	出荷された1頭の牛肉から暫定許容値を超えるセシウム検出
7月11日	南相馬市	立ち入り調査、稲ワラから規制値上回るセシウム検出
7月11日	鳥取	緊急立ち入り検査
7月12日	浅川町	白河市の稲ワラ生産組合から購入した、稲ワラ約260個から30～35μSv／hを検出
7月14日	農水省	農水省より稲ワラの使用に関する指導の徹底）
7月14日	福島県	稲ワラの給与中止と緊急立入調査開始（7/18迄）の牛の出荷・移動の自粛要請
7月19日	政府	福島県産牛の食肉処理場への出荷制限を指示 以降、他県にもセシウム汚染牛肉拡がる（岩手、宮城、栃木にも出荷停止拡がる）
8月25日		肉牛の出荷制限解除

【Slide 67】

福島県からの肉牛出荷の要件

- 各農家から1頭モニタリング検査を実施。
- 50Bq／kg未満であれば、県外出荷を可能とし許可証発行。有効期間は3ヶ月で、その後は郡山食肉センターで再度モニタリング検査を実施し許可を更新する。
- 指定区域、出荷牛肉500Bq／kgを超過した農家、汚染稲ワラを給与した可能性がある農家については全頭検査を実施する。
- 緊急時避難準備区域については11月1日付けで、指定区域が解除され、牛肉や給与環境を満たしていれば全頭検査対象とはならなくなった。
- 実際には、出荷牛は全てモニタリング検査が継続され、県外のモニタリング検査値も更新用検査として採用。

【Slide 68】

堆肥問題（放射性セシウム検査結果）

堆肥の放射性セシウム検査の結果について

平成23年11月15日

	堆肥の種類	検査月日	製造所の場所	放射性セシウム測定値の合計（Bq/kg）	現在の対応状況等（出荷自粛や回収等）	備考
1	牛ふん堆肥	H23.11.10	伊達市	100		
2	牛ふん堆肥	H23.11.10	伊達市	200		
3	牛ふん堆肥	H23.11.10	伊達市	400		
4	牛ふん堆肥	H23.11.10	伊達市	ND		
5	牛ふん堆肥	H23.11.10	伊達市	100		
6	牛ふん堆肥	H23.11.10	伊達市	700	自粛要請	
7	牛ふん堆肥	H23.11.11	伊達市	ND		
8	牛ふん堆肥	H23.11.11	伊達市	3,200	自粛要請	
9	牛ふん堆肥	H23.11.11	伊達市	300		
10	稲わら等堆肥	H23.11.11	伊達市	800	自粛要請	
11	稲わら等堆肥	H23.11.11	伊達市	400		
12	稲わら等堆肥	H23.11.11	伊達市	3,300	自粛要請	
13	稲わら等堆肥	H23.11.11	桑折町	3,500	自粛要請	
14	牛ふん堆肥	H23.11.10	二本松市	3,700	自粛要請	
15	牛ふん堆肥	H23.11.10	二本松市	3,900	自粛要請	
16	牛ふん堆肥	H23.11.10	二本松市	4,200	自粛要請	
17	牛ふん堆肥	H23.11.11	二本松市	400		

【Slide 69】

肥料に係るセシウム検査

- 肥料の分類
- 牛ふん堆肥
- 稲わら堆肥
- 雑草堆肥
- パーク堆肥（原木の樹皮）

- ※暫定基準値 400Bq/kg以下
- 10/12現在の個別検査では75%が暫定基準値越え

【Slide 70】

堆肥の取り扱い基準

・当分の間、と畜を予定しない繁殖雌牛や育成牛は、飼料3000Bq／kg（水分80%ベース）以下の利用が可能。
・ただし、これより生産された堆肥は、400Bq／kgを超える可能性あり。

・400 Bq／kg未満は一般流通可能。
・400～7999Bq／kgは自家消元。（自給飼料または耕畜連携の取り組み等）
・8000Bq／kg以上は利用せず、一時保管。

【Slide 71】

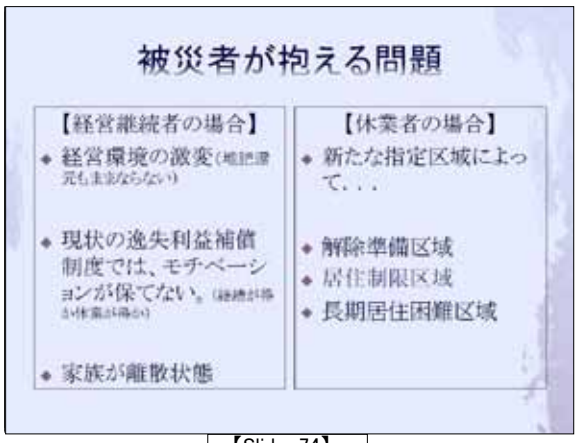
酪農、肥育、繁殖和牛の問題

【Slide 72】

避難指示区域の事業状況（酪農）

	避難指示	継続	再開	廃業	休業
南相馬市（30km）	4戸	2戸（再開）			2戸
緊急時避難準備区域	9戸	3戸	1戸	1戸	5戸
計画的避難区域	26戸	2戸（移転）			24戸
警戒区域	22戸				22戸
特定避難勧奨区域	1戸／2戸				1戸
計	62戸	7戸	1戸	1戸	54戸

【Slide 73】



【Slide 74】

【Slide 75】

【Slide 76】

【Slide 77】

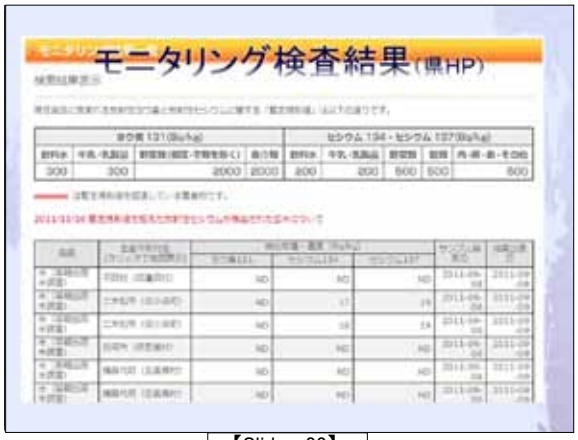
【Slide 78】

【Slide 79】

【Slide 80】

【Slide 81】

【Slide　82】



【Slide　83】

【Slide　84】

【Slide　85】

【Slide　86】

【Slide　87】

【Slide　88】

【Slide　89】

放射性物質の新基準

○放射性セシウム(Bq/kg)

2012年4月施行

食品群	暫定規制値
飲料水	200
牛乳・乳製品	200
野菜類	
穀類	500
肉・卵・魚・その他	

食品群	新基準値
飲料水	10
牛乳	50
一般食品	100
乳児用食品	50

牛乳　＝牛乳、加工乳等、乳飲料
乳製品＝乳酸菌飲料、発酵乳、チーズ等

【Slide　90】

家畜用飼料の暫定許容値(放射性セシウム)

飼料中の暫定許容値(Bq/kg)＝ 畜産物中の新基準値(Bq/kg) ／ 飼料の給与量(kg/日) × 移行係数(日/kg)

【新基準に基づく牛用飼料の見直し】

	畜産物の新基準(Bq/kg)	飼料給与量(粗飼料＋濃厚飼料)	移行係数(試験から求めた最大の係数)	飼料に含まれる放射性セシウム濃度
乳	50	64kg/日(実重量)	4.6×10^{-2}日/kg	170Bq/kg
肉	100	21kg/日(実重量)	3.8×10^{-2}日/kg	125Bq/kg

乳用牛、肉用牛に許容される飼料中の放射性セシウム濃度は、

100Bq/kg(水分80%換算として)

【Slide　91】

放射セシウム規制値

	改正後	現行
肥料・土壌改良資材・培土	400Bq/kg	400Bq/kg
牧草・稲わら等飼料	300Bq/kg	300Bq/kg
牛用飼料	100Bq/kg	300Bq/kg
養殖魚用飼料	100Bq/kg	100Bq/kg
きのこ原木用培地	150Bq/kg	150Bq/kg

【Slide　92】

農業分野における放射性物質試験研究成果説明会(第4回の演題)

1. 「放射性セシウム吸着能力を有する牛用資材について」
2. 「肉用牛における血液と筋肉の放射性セシウムの関係について」
3. ブドウ・ナシ・リンゴの葉および果実中の放射性Cs濃度の経時的推移について」
4. 「樹園地における樹皮の汚染状況について」
5. 「レーザープレス等建設機械を用いた水田の放射性物質の除去工法」
6. 「ヒマワリの放射性物質吸収とナタネの油への移行について」
7. 「野菜における放射性物質の吸収について」
8. 「農産物加工における放射性物質の動態について」

【Slide　93】

除染

【Slide　94】

セシウム沈着量地図(文部科学省)

【Slide　95】

農地土壌、除染技術

5000Bq/kg以上の農地をそれ未満にする

土壌中放射性セシウム濃度	畑、水田
～5,000Bq/kg	・反転耕 ・移行抑制栽培技術
5,000～10,000Bq/kg	地下水位:低…表土削り取り、反転耕 地下水位:高…表土削り取り 水田は水による土壌攪拌・除去
10000～25000Bq/kg	表土削り取り
25,000Bq/kg～ (高線量下作業技術必要)	表土削り取り(5cm) 土壌防止の固化材

【Slide　96】

農地土壌、除染技術

- 表土の削り取り
  - ・基本的な削り取り(5cm90%、6cm97%、7cm100%)
    (4cm／排土40t／10a)
  - ・固化剤を用いた削り取り
  - ・芝、牧草の剥ぎ取り(芝、リター層、ルートマット、…)
- 水による土壌撹拌・除去
- 反転耕
- 高吸収植物による除染(ヒマワリ低い、糸状菌、…)

【Slide　97】

【スライド 98】

【スライド 99】

再除染

- 除染しても、再び線量が上がる。
- 山から粉塵と共に放射性物質が飛来
- 山の清水の流れと共に空間線量が上がる（水系濃縮）

【スライド 100】

「放射性物質（セシウム）は濃縮する」

- 除染後下がった空間線量が再び上昇（雨等）
- 雨、水系、泥・土砂の流れ等
- 森林の除染
- 借り置きから一時保管

- 生物濃縮を考える。
- 流通管理
- 畜産物、原材料（飼料）のフローダイアグラム
- リスク分析

【スライド 101】

「原発事故によって見えてきたもの」

【スライド 102】

実感する課題

- リスクマネージメント（想定リスクと準備）
  …情報が無いとリスクへの理解が得られない
- 初動環境：情報錯綜（避難情報、統制）
- 避難者～所有動物～行動制限
- 農政の問題
- 食品安全の問題

【スライド 103】

リスクコミュニケーション Risk communication

安心＝安全＋信頼

communication　Silence Validation　trust

- 公正な情報を出し続ける
- ゼロリスクは無いということ
- 的確に情報発信
- 見えないもの（リスク）をわかりやすく説明
- 同じ目線に立つ
- 受け手が判断できる尺度を持たせる
- リスクの物差しを作り、受け手が判断
- 双方向の対話機会

【スライド 104】

「放射性物質によって、従来からの課題がクローズアップされた」

- 危機管理
- 放射性物質は濃縮する。
- 放任家畜と野生動物
- 食品モニタリング検査環境
- 食のリスクマネージメント
- ・・・

【スライド 105】

【スライド 106】