CREATING A MORE COORDINATED AGRO-FOOD SYTEM FOR NON-GM GRAINS
-A CASE STUDY OF JAPANESE MANDATORY LABELING SYSTEM-

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ABSTRACT

In August 1999, the Japanese government decided to introduce mandatory labeling for genetically modified (GM) food starting from April 2001. Under the labeling system, certain types of processed food such as oil and sweeteners from corn are exempted from labeling, since scientific verification tests detecting GMO ingredient cannot be applied persuasively. The result of the introduction of labeling system was contrary to the initial expectation of the Japanese government. That is, the shift from conventional grain, which might contain GMO, to Non-GMO has been observed very rapidly among various actors consisting of the US-Japanese agro-food system.

Those actors made a major effort to create an identity preserved (IP) handling system to procure Non-GM grains from the US. The establishment of IP handling system, however, has raised various socio-economic issues, such as the distribution of additional costs among actors, further coordination among trading partners, liability issues for certification, and so on.

In this paper, we would like to focus on two major crops, soybean and corn, which represent strong relationships between the US-Japanese agro-food system and, try to understand what kind of outcomes are observed from the major shift to Non-GMO and what kind of factors are working behind those outcomes. The shift to Non-GMO forces all actors of the agro-food system to engage in IP handling, and vertical coordination will be much more typical among them as they move to procure Non-GM grains. This means that the US-Japanese agro-food system becomes a more coordinated one than before.

INTRODUCTION

Post-war development of Japanese agriculture and agro-food system cannot explain without considering the relationships with the US agricultural development. The Japanese agriculture and agro-food system have been playing a role as a major consumer of the US Fordist agriculture. This means that the Japanese agriculture was pursued under the condition that the Japanese agricultural development is consistent with the US Fordist agriculture. Concentration and expansion of farm size have been observed in the US, and bulk grains have been imported to Japan, which are provided for intensive livestock production and food processing industries. As far as bulk grains are concerned, we argue, the US-Japanese agro-food system has been established as a very efficient system, which enables Japanese end-users to enjoy the least expensive sources of major grains.

Today the US agriculture is going through industrialization (Welsh, 1996). As an effective response to end-users' need is a key to the industrialization of agriculture, the

industrialization tends to be pursued along with improving quality trait of food with advanced technologies. We argue the industrialization of agriculture would therefore have much more strong responsiveness to consumers' market, domestic or abroad. And sometimes this responsiveness works as vulnerability of agro-food system when unexpected shift of consumers' attitude to food occurs.

One of the best examples is the case of genetically modified (GM) food. Vulnerability was most clearly recognized by US farmers who had suddenly faced with the difficulty to find export market for their GM crops. Japanese importers also recognized vulnerability and food processors that need to procure Non-GM crops through establishing identity preserved handling. Identity preserved (IP) handling of Non-GM crops presents various challenges for Japanese traders who have little experience of this kind of procurement system[1].

We will argue that Japanese (and EU) traders' procurement of Non-GMO will call for further industrialization of US agriculture. Massive shift of consumers' market from conventional GM crops to Non-GM crops in Japan will create opportunities of production contract for growers in the US. In the following section, we will illustrate current reorganization of commodity networks referring to the example of Non-GM crops, and show how agricultural industrialization poses complex effects on both sides of agro-food system; US and Japan.

GMO AS A TRIGGERING FACTOR OF AGRO-FOOD SYSTEM CHANGE

In August 1999, the Japanese government decided to introduce mandatory labeling for GM food starting from April 2001. Under the regulation, twenty-four food items made from GM grains were identified to be included into the mandatory labeling system, while certain types of processed food such as oil and sweeteners are exempted from labeling, since scientific verification tests detecting GMO ingredient cannot be applied persuasively.

The result of the introduction of labeling system was contrary to the expectation of the Japanese government, which intended to provide information and options to consumers. In other words, the shift from conventional grain, which might contain GMOs, to Non-GM grains has been observed very rapidly among various actors consisting of the US-Japanese agro-food system. As a result, it might be fair to say that Japanese consumers do not have much opportunity to exercise their right to choose food items based on the labeling.

The establishment of IP handling system has raised various socio-economic issues, such as the distribution of additional costs among actors, further coordination among trading partners for the procurement of Non-GMO, liability issues for certification and accidental mingling of GMO, and so on.

In the following section, we would like to focus on two major crops, soybean and

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[1] Identity preserved handling is not a new phenomenon for those actors who have been importing NATTO soybeans and specialty corn, such as waxy and white corn. However, the amount of grains under these “traditional” IP systems is very limited compared with the Non-GM grains required today. In this regard, various actors related to the procurement of Non-GM grains are facing with the task to scale-up the traditional IP system. However, it is worthwhile to note that this prehistory of IP handling enables people to adapt to the new situation in such a short period of time.

corn, which represent strong relationships between the US-Japanese agro-food system and, at the same time, these two crops are typical in terms of GM crops for which genetic engineering have been intensively applied for the modification of crop traits.

SOYBEAN

Major Changes

Japan imports about 4.7 million tons of soybeans, and 80% of them are imported from the US. Major shift to Non-GMO has been observed in the demand for food-use soybeans, mainly for TOFU (0.3 million ton).

From the viewpoint of final use, imported soybean is categorized into two types; i.e., soybean for oil crashing and soybean for food-use. About eighty percent of imported soybean is for oil crashing, but soybean oil is exempted from the mandatory labeling of GMO. The latter, soybean for food-use contains various types of final products, such as "TOFU" (traditional bean curd), "NATTO" (fermented soybean, traditional soy food), "MISO" (traditional soy paste) and so on.

The largest impact of Non-GMO shift in soybean can be observed for the actors involved in the agro-food system of TOFU. Usually soybeans procured for the processing of TOFU are those called as IOM food grade soybeans. IOM represents the three states in the US; Indiana, Ohio and Michigan, where food grade soybeans imported by Japanese food manufacturers are grown around these areas. IOM soybeans do not have any specification of variety, but they are considered to be suitable for food processing in terms of protein content. This situation, however, seems to have changed completely since the decision of GM mandatory labeling. Put in short, just "IOM" does not constitute an enough criterion for the Japanese TOFU manufacturers any more. Today most of TOFU soybeans seem to be replaced by the soybeans with variety-specifications, although most of them are grown still within IOM areas (and, in Canada). And containerization becomes much more popular in terms of soybean transportation. The containerization has been already popular among the high-priced soy food, such as NATTO. As for NATTO (and MISO), most of those products have longer history in terms of the procuring soybeans with variety-specifications, which are grown under contract with US, China, and Canadian farmers. In these cases, varieties to be grown are specified in the contract, therefore, Non-GM is guaranteed, and handled from farm to Japanese processing plant in an identity-preserved manner (IP handling). In this sense, disruption from the introduction of the new regulation was minimal for the case of NATTO.

Impacts of Non-GMO Shift

Various impacts can be observed as the demand of Non-GM soybean appeared since Non-GMO shift became a *de facto* imperative for those who are involved in the procurement of food grade soybeans. Most visible impacts for upper stream and downstream of agro-food system can be summarized as follows.

(1) Increase of Contract Production

Actors related to TOFU production have faced with the increasing demand for Non-GM soybean and started to establish their IP handling system in a much larger scale than the case for NATTO. This move to IP handling means that a larger number of US farmers will be involved in contract production. If actors adopt the IP handling system, they (from farmers to end-users) need to engage various activities to segregate Non-GMO, including cleaning bins and machinery, GM testing, certificate exchange, and all

other requirements suggested by downstream buyers.

While the contract arrangements are coordinated by grain marketing companies of the exporting country, Japanese counterparts also play an important role in standard settings, logistics and, sometimes, provision of genetic resources. Those grain-marketing companies are organizing contract farmers and trying to disseminate various information to meet standards provided by Japanese buyers. In the US, local extension agents recognize the Non-GMO market, and we can observe that these extension agents are trying to organize producers groups to capture these new market opportunities. These producers groups are typically called as producers alliances.

So far we do not see major change as to exporting country except the case of Canada. Soybean imported from Canada is increasing (almost doubled in 1999) and tends to be priced higher. This is partly because of the poor production in the US in that year, and partly because Canadian soybean contains higher proteins, which is more suitable to TOFU processing, and GM soybean production is not so much popular in Canada. Just after Japanese traders started the procurement of Non-GM soybeans in the US, they thought that STS (Synchrony Treated Soybean), developed by DuPont, looked promising. Since STS is a Non-GM type of herbicide tolerant soybean, Japanese end-users was expected to pay for a premium. But, unexpectedly, present varieties of STS shows relatively low protein content and, therefore, is not suitable for the processing of "TOFU." Therefore, premium for SPS seems not to be realized in the Japanese market if there will be no change in terms of the protein content. These are some of the impacts of the Non-GMO shift found so far in the upper stream of the agro-food system.

(2) Additional Cost

The Japanese soy food processors need to pay at least 10 to 20 percent more for the price of imported Non-GM soybeans today. And as to the additional cost of the procurement of Non-GM soybean for TOFU, the cost seems not to be passed over to the consumer price. Since the retailers have a much greater bargaining power compared with TOFU processors, which usually run as a small-scale firm or family business, the additional cost tends to be borne by these TOFU processors. If the increased cost results in substantial cost-profit squeeze for TOFU processors and the situation might deteriorate through the change of world market price of soybean, the industrial structure of TOFU industry might be affected, i.e., more concentration to larger scale firms would be realized.

(3) Certification

Compared with corn, GMO detection tests, i.e., PCR and ELISA, have been well established for the certification for (Non-) GM soybean during distribution. This is mainly because Monsanto's Roundup Ready Soybean has a dominant share in the soybean seed market and no stack trait variety has been introduced so far. As for soybean, 5% tolerance level of contamination is set by the Japanese government as the guidelines for grain handlers, however, processors are demanded for much more strict standard, e.g., less than 1%, by the large retailers. Since every stage of distribution and processing poses contamination risks, these retailers also demand GMO detection tests to do at manufacturing plants for every kinds of soy products in a regular basis, even though those products claim using organic soybeans or domestically produced soybeans. Therefore, the issue of bargaining power appears here again in terms of setting the appropriate level of tolerance and testing scheme.

CORN

Major Changes

As for corn, Japan has been the largest importer in the world for a long period after the WWII. Japan imports about 14.7 million tons of corn and 87% of them is from the US. This means that 37% of US corn export is directed to Japan (1998/99). More than 70% of imported corn is consumed as feed for livestock, and the rest is consumed as various food (oil, starch, flour, grits, sweeteners, etc.) and industrial material (paper, paste, starch, etc.).

Major shifts to Non-GM corn can be found in the sector related to starch and corn grits, the former is the product of wet milling and the latter is that of dry milling. A non-GM shift in corn feed is also under way in a smaller scale to be mentioned below. In 2000, more than two million tons of Non-GM corn was reported to be procured by the Japanese traders.

Impacts of Non-GMO Shift

(1) Cornstarch: Complicated Commodity Complex

Cornstarch manufacturers have faced with much more complex tasks caused by the Non-GM shift. Just after the decision of the Japanese government to introduce mandatory GMO labeling, a major beer brewery announced that the company would make a complete shift to Non-GMO (i.e., cornstarch and grits) as soon as possible. All other beer breweries in Japan followed this company's policy. So far, major shift to Non-GM regarding starch has been occurred for beer and other food-use purposes.

However, as a starch plant consists of various sub-manufacturing lines, which produces various commodities simultaneously, this Non-GMO shift poses a difficult task for starch producers. Products of such plant include cornstarch, sweeteners, paste for industrial use, and so on. Many products for industrial use need not to be Non-GMO, therefore, additional costs for using Non-GM corn cannot be passed over to such end-users. In addition, the manufacturers usually do not afford to duplicate starch plant solely for Non-GM products line; therefore, switching GM and Non-GM material temporally in order to produce Non-GM starch. Before switching material from GM to Non-GM, the product lines must be cleaned carefully to remove all possible GM material from the line. This cleaning work is also counted as an additional cost for starch companies[2]. While a major beer company and starch companies are reported to reach a conclusion to raise the purchase price to 28%, this does not seem to cover all additional costs caused by the shift to Non-GMO.

(2) PHF-Non-GM Corn as Feed

The National Federation of Agricultural Co-operative Association (NFACA, or Zen-Nou in Japanese) plays a major role in feed grain import from the US. From 1991, the NFACA started their business of PHF-corn, which means that post-harvest chemical is

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[2] In 2000, most of starch companies are reported to move to the complete shift to Non-GMO use. Few companies, which have multiple starch plants, decided to assign one of those plants for totally Non-GM, and other plants for GMO. These solutions have caused various costs that cannot to be retrieved by downstream purchasers. This change has been accelerated by the increasing demand for Non-GM sweetener, which is a by-product of starch manufacturing plant. We have observed the Non-GMO shift in the case of several food items, which are exempted from the mandatory labeling, such as corn sweetener (HFCS), soy sauce.

free (not applied), just after Cargill started the same sort of business. PHF-corn is procured from the producers with certain premium price and handled to the final end users in Japan through an identity-preserved manner. Typical end-users in Japan are livestock farmers who have marketing contracts with consumers' cooperatives. From 1996, when GM crops were widely introduced into farming in the US, the PHF-corn had been upgraded to PHF-Non-GMO, based on the request of consumers cooperatives, who have strong concerns about food safety issues of GMO.

This Non-GM shift gives a major incentive for the CGB (Consolidated Grain & Barge, grain handling company, subsidiary of the NFACA and the ITOCHU Trading Co.) to expand its growers' association and share technical information for the IP handling targeted to the Japanese market. Other Japanese trading companies also found their own business partners in the US to achieve secure procurement of Non-GM grains under similar strategies. This change means that corn producers in the US will face more opportunities for contracting and vertical coordination, although coordination for corn production seems weaker compared with the case of soybean production. As we mentioned above, producers alliances are also a direction in which farmers are heading for to take economic opportunities related to the demand for Non-GM corn.

StarLink Situation in Japan

StarLink issue has posed a various challenge for various actors involved in corn in many countries. Japan as a major importer of US corn has been facing many problems, mainly because the StarLink corn is not approved for either human food or animal feed in Japan. So far two cases were reported by a consumers organization that detect StarLink event within corn-related food in Japan, and those food items are recalled by the manufacturing companies.

Today, food manufacturers are now very sensitive for their vulnerable position for possible contamination of StarLink corn. For food manufacturers, protection of their brands is their critical issue. Compared with wet milling products, corn dry milling products have greater chances of detection of StarLink event (US-EPA, 2001). Therefore, flour or grits using companies (e.g., confectionary) are trying to find an alternative source other than the US. In fact, France and South Africa are now considered to be the countries for this purpose. This situation poses a great challenge to grits manufacturing companies, since import of final dry milling products means the loss of their domestic market. Anyway, US share of dry milling corn (about 0.3 million tons in 1999) is expect to decline in the near future.

The protocol of StarLink testing between the US and Japan reached an agreement in December 2000, but details are still under negotiation among governments and business entities. It might be fair to say that StarLink testing cost would be borne by not only by US exporters but also Japanese purchaser, such as starch and sweetener manufacturers and feed processors. As to the possible contamination of StarLink into the imported corn, all people involved in corn use, either feed or food, need to be concerned about who would pay for the testing cost and who should be in charge of liability issues. At this point of time (March 2001), it is still difficult to forecast what happens to importers and exporters in the case imported corn shows positive result from the StarLink detection test under the new law, which takes effective in April 2001.

Implications

The following are the tentative list of implications that we can learn from the Japanese case of the Non-GMO shift now under way.

(1) The shift to Non-GMO forces all actors participating in the agro-food system to engage in IP handling, and vertical coordination will be much more typical among them as they move to procure Non-GM grains. This means that the US-Japanese agro-food system interplay will occur in a more coordinated fashion even in the area of bulky commodity trade.

(2) The additional costs generated from the IP handling are not always passed over to consumers' price or borne equally by each participants of the agro-food system. As we have seen in the cases of TOFU and cornstarch, it depends on the many factors, such as industrial organization, buying power of products, technical complexity of manufacturing plant, and so on.

(3) We argue that the broad establishment of IP handling system will pave the way for the future distribution system, where differentiated, value-added products needs to be handled in a proper fashion. As the agricultural industrialization advances in the future, demands of end-users will be incorporated into the development and delivery of food. And if various quality traits are introduced to develop value-added crops, these value-added products need to be handled through the IP handling. As the US agriculture continuously pursue this direction through the industrialization, we will find some day in the future that the current changes responding to the demand of IP handling constitute a one of the greatest turning point for the US-Japanese agro-food system.

(4) The StarLink issue has raised various challenges for agro-food system related to all kinds of corn use, since the StarLink event is not approved for any use in Japan so far. All people involved in Japan are now very concerned about testing costs and liability issues anticipated by the possible contamination of the StarLink.

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