Technological and Logistical Developments in Shipping: Case Studies—Shipping U.S. Beef to Japan

Bill Hahn, ERS

One of the reasons that I've been asked to talk about beef today is that beef has been one of our agricultural export success stories. We've had substantial growth in both the volume and value of beef exports since the early 1980's. In the past couple of years, the value of beef exports has not grown and has even shrunk while the volume has kept going up. We've had some lower beef prices in the past several years, and that is an important reason why our beef export value has not grown while the beef export volume has. Another is that we have had more growth in our low-price markets, like Mexico, than we have had in our higher priced markets.

Focusing specifically on Japan, rather than on beef exports in general, is not a bad idea because the Japanese beef export situation is very similar to our overall beef situation. Japan is by far our largest customer. In the mid- to late-1980's, Japan was our most important beef customer, accounting for over 70 percent of both our value and our volume. Since the early 1990's Japan's export share has fluctuated and is now around 60 percent. Japan is one of our higher priced markets; its share of the dollar value of U.S. beef exports is a bit higher than its share of the tonnage.

The general focus of this conference has been innovations in technology, or specifically, in transportation technology. And so the question is what have these innovations done for our exports of beef to Japan? To get to the bottom line in my story, the available technology for shipping beef overseas from the United States really hasn't changed much since 1988. Some minor improvements were discussed earlier, but our technology overall hasn't changed very much. The exporters have, over time, selected a different mix of transportation methods. I can't be very specific about what was done in the 1980's because there are no solid, reliable numbers. But impressionistically, in the 1980's most of the beef we shipped was frozen and went via ocean freight in the container systems that others discussed earlier. Also, there was some chilled beef sent to Japan via airfreight.

One of the curious things about the beef situation in Japan before 1988 is that they had a very limiting quota. And there was such a huge gap between the value of beef in the United States and the value of beef once it got to Japan, that you could ship beef by almost any feasible transportation method and still make money. As is often the case, Japan's beef quota had a loophole: live cattle imports did not count. Beef in Japan was so expensive that they would buy live cattle in the United States, air freight them to Japan, let them sit in a quarantined facility for 30, 40 days, and then slaughter them, and still make scads of money. I can't imagine a less efficient way of getting beef from the United States to Japan, but it worked.

Today, we're still shipping beef to Japan via ocean freight. Much of it is frozen. But we are now also sending significant amounts of fresh chilled beef to Japan via ocean liner in refrigerated containers. In the past few years, the Japanese have begun to keep statistics on chilled versus frozen imports, and their statistics show that the chilled beef volume is rapidly approaching the

frozen beef volume. Since shipping chilled beef is more expensive than shipping frozen beef, what is really driving this shift is not transportation cost-effectiveness but Japanese preferences. They prefer chilled beef over frozen beef.

I telephoned a salesman for one of the shipping companies and asked him if there was much difference between shipping chilled beef and frozen beef. I was surprised to find out that there is a huge difference. To get chilled beef to Japan, the carrier will deliver a container to the packing plant. The packing plant fills the container, hitches the container to the truck, and ships it to the dock where it is loaded on the ship. The frozen procedure is quite a bit different: a freezer boxcar full of frozen beef is shipped to the cold storage at the dock, then the boxcar is offloaded and put in a freezer container, which is then loaded onto the ship. All this extra handling should make the frozen procedure a lot more expensive, but the savings in shipping costs for frozen beef more than offset the costs of the extra handling.

The big disadvantage in shipping chilled beef is the more complex temperature control requirements. With frozen beef, temperature control is not that critical. You want to keep frozen foods around 20 degrees below zero, 10 degrees colder or warmer is okay, too. With chilled beef, you have much tighter specs on temperature control. You're only going to get really good shelf life if you can keep it just above freezing. The other disadvantage to this chilled shipping system is the cost of getting that container from the dock back to the plant. I'm not sure what kind of back-haul chances they've got with this technology. In some cases, the packers ship the containers from the dock to the plant using their own trucks. Since packers are not shipping companies, their back-haul opportunities might be more limited.

In any case, it turns out that it's much more expensive to do the chilled procedure than to do the frozen procedure. As other people have said, transportation costs are hard to compare. In this case, when you buy shipping services for chilled beef, you are buying a plant-to-destination service. When you buy frozen beef transportation services, one vendor handles the plant-to-dock shipment and another the dock-to-destination. It turns out that the total cost (plant to destination) is higher for chilled. It also appears that each leg is higher for chilled as well. The salesman I spoke to could not give me a breakdown on the cost of each part of the chilled beef shipment process. I would assume that someone at the shipping company knows that. Either they don't tell the salesmen or the salesmen aren't willing to share with the agricultural economist. But the salesmen that I talked to figured that the ocean part of shipping chilled beef was about 80 percent higher than the ocean part of shipping frozen beef. Based on what he told me, and if I understand him correctly, that works out to be $.04 or $.05 per pound to ship frozen beef from major West Coast ports to major Japanese ports, and about $.09 or so to ship chilled beef from the same ports in the United States to those same ports in Japan. There's also the complicating factor that whenever you read anything on these shipping rates you always see at the bottom of the paragraph, "quantity discounts available as well."

The most important factor in expanding beef markets for the United States has been policy reform. Policy reform for Japanese markets started in 1988. Before then, as I've said, Japan had a very strict beef quota. In 1988, Japan negotiated the Beef/Citrus Agreement with the United States, which opened up the Japanese market to all beef-exporting countries, or to be more

specific, all beef-exporting countries that don't have foot-and-mouth disease or other health problems. Also in 1988, Japan started to gradually phase out its quota. From 1988 to 1990, Japan set a higher quota level and in 1991 replaced the quota with a tariff. Even though Japan's 1991 tariff was 70 percent, it still amounted to a liberalization of the beef market. The tariff was reduced 10 percent per year until it reached 50 percent in 1993, where it was supposed to stay. But because of the Uruguay Round in 1995, Japan agreed to further phased-in reductions. Japan will hit its floor rate, or target in April 2000 when it drops to 38.5 percent. I think policy reform in Japan has been the big factor driving expansion of our exports there. In fact, policy reform around the world has been a big help to our beef exports.

Another factor has more to do with shipping. It's not actually a shipping innovation per se, but it's been the problem of improving shelf life. In 1990's when the Japanese were in the early stages of trade liberalization--and while we at ERS were getting geared up to do some analysis of the Uruguay Round of GATTCI was one of the authors of a report called, "The World Beef Market--Government Intervention and Multilateral Policy Reform." I said some things in that report that may not have been accurate. One potential inaccuracy was that I reported that Australians were able to ship their beef to Japan and achieve 100-day-plus shelf life after landing it in the port and that American beef, once it hit the Japanese port, had a 30- to 40-day shelf life. Later, someone in the meat industry, told me that that was a lie being spread by the Australians; that the U.S. really had much better shelf life than that. In any case, our packers did get to work on this problem and made a lot of improvements. There were also some problems with the quality of our boxes. The boxes used for shipping beef around the United States are not sturdy enough to handle ocean transport. The beef would arrive in Japan and be just a pile of smashed boxes once the container was unloaded. So they started using stronger and smaller boxes. The industry also moved to thicker films and higher vacuum levels on the vacuum bags the meat cuts are put into before they are boxed. All these small improvements have helped to extend shelf life. Also, just in the domestic market, we've had many food safety problems, or food safety challenges, and we've introduced a lot of innovations in beef packing and meat packing generically to improve control of food pathogens in the United States, which have also improved shelf life. The pathogen controls have helped our marketing efforts as well, since improved food safety is a selling point.

Another thing that's helped increase beef exports to Japan has been a reduction in that third type of distance that Professor Frankel mentioned this morning: cultural difference. The experience of shipping beef to Japan has improved communication between U.S. exporters and Japanese buyers.

Some structural changes in Japanese beef institutions also has allowed Japan to take better advantage of the overseas suppliers. Before the Beef/Citrus Agreement, the Livestock Industry Promotion Council (LIPC) of Japan had monopoly control over beef imports and was using some of the money earned from beef imports to subsidize programs for Japanese beef production. The Beef-Citrus agreement eliminated the LIPC's monopoly on beef imports and allows more direct contact between U.S. sellers and Japanese beef buyers, which is helping to bridge some of the cultural or perceived differences. Also, I said some things in the report I mentioned earlier that are probably unfair. I said that the Japanese food distribution system was arcane and inefficient, which is probably not entirely fair. The problem is that the Japanese distribution system is designed to solve a specific Japanese problem, which is that most of the stores are very small with limited

resources. Things that would be done in-house in the larger scale American stores have to be done out-of-house or contracted out because the smaller scale stores don't have the resources to do all the things that our stores do. And it's the Japanese wholesalers who get stuck doing all those things that would normally be done in American retail stores. Consequently, Japan needs a fairly complex distribution system because more of the work is being done within the distribution system and less is being done at the point of sale. The Japanese government has had a policy of protecting these small scale stores by making it very difficult to construct larger scale stores. They've reformed that law; now it's merely difficult instead of impossible to put up a Wal-Mart or the Japanese equivalent. Because of this, Japan has seen some rationalization in the retail sector. They've closed a lot of small scale stores, combined them to make medium scale stores, and they're opening more large scale stores. This change has provided more opportunity for direct contact. U.S. exporters are able to deal with people closer to the final consumer. These reductions in the cultural and institutional barriers have expanded our beef sales to Japan.

My bottom line conclusion is that rather than shipping technology adopting innovations to meet the needs of the beef trade, the beef trade has adapted to the shipping technology that exists. So more of the innovations have come in on the pre- and post-shipment handling phases rather than in the shipment phase of beef transport.

The Sunkist Experience

Michael Wootton, Sunkist Growers

I have been asked to speak about Sunkist's experience as a world marketer of perishable commodities--specifically citrus fruit—and how the evolution of transportation technologies has affected our ability to deliver that fruit to market.

In addressing this, I'd like first to talk about the experience of our early growers, the impact of rail transportation, then trucking, and, finally, ocean shipping on our major markets around the world and conclude by talking a little bit about some dramatic changes we see in the immediate future and the effects of deregulation on ocean shipping.

I should preface my remarks with a little bit about who Sunkist is. I assume most of you are familiar with our brand name, which is found on a number of citrus products: fresh oranges, lemons, grapefruit, clementines, tangerines, pummelos, orange drink, orange juice, lemon juice, and a range of other licensed products around the world from fruit roll-ups to vitamin C tablets to, most recently, fresh-cut flowers found in such retail outlets as Safeway and Giant.

But, Sunkist is not a big corporation. We are a nonprofit, farmer-owned marketing cooperative that is owned by and serves some 6,500 citrus farmers in California and Arizona. Much to everybody's surprise, we do not yet have packing houses and operations in Florida, although that probably will come within the next year or so.

Sunkist growers produce about 65 percent of the citrus fruit produced in the western United States, and 30 percent of our fruit is exported to some 33 countries around the world. The export value of our fruit constitutes about 65 percent of our total return to our growers, so export markets are indeed a very high-value market for us, critically important to our economic well-being.

Now, for a little historical perspective: the California citrus industry, where we originated in southern California, greatly expanded between 1860 and the turn of the century. With the increased population that flocked to the state during the Gold Rush, there was increased consumer demand for citrus fruit to ward off scurvy in the gold mines and silver mines and timbering operations. Initially, the market for citrus fruit was pretty much limited to the perishable distance it could be transported by wagon, but the advent of the East-West Railroad changed everything. So the railroad was the first transportation development that really changed our marketing opportunities.

By 1887, with the advent of the ventilated freight car, upwards of about 2 million cartons of oranges were shipped east from California to Chicago, New York, and Philadelphia and the eastern seaboard states. The technology further improved with the development of the ice bunker car. Then, in April 1883, 1,000 cartons of oranges were shipped by rail to New York and then by steamer ship to Liverpool, England, with one box even being delivered to Queen Victoria. We have a letter from Queen Victoria in our headquarters in Sherman Oaks thanking us for the oranges. This was our company's and our industry's first export.

During the latter half of the 19th century, a number of mechanical cooling devices and systems were applied to ocean shipping. Much new technology was devised by the Europeans--things like ammonia cooling machines and the Coleman cold-air machine, which uses CO_2 technology. Thanks to advances in refrigeration techniques and increases in sailing speeds, exports of perishable commodities like citrus fruit, and bananas, and meat products to different consumer markets from production areas in the United States and Argentina, Brazil, and Australia became more common after 1900, and those products were regularly found on the meal tables of many European households.

After 1925, forced-air cooling found widespread application in shipping, and thereafter fruit transport increased exponentially. By the mid-1960's, reefer ships used automation with temperature recording devices to monitor cargo-hold temperatures, which assured greater reliability in transport. By 1972, refrigerated containers were being used for some perishable commodities aboard ships.

The use of controlled atmosphere has further enhanced the ability to preserve perishable fruit, both in storage and during transport. Depending on the product, this involves increasing the carbon dioxide and reducing oxygen. Because of this change in the gas composition of the atmosphere, the respiration rate of the fruit is greatly reduced, slowing the maturation and decomposition process. So, in effect, when we store or transport fruit, we basically put it to sleep.

The combination, therefore, of faster transport, shortened delivery times, and refrigeration and preservative technologies created a marketing environment for perishable food products that would have been unimaginable just a few decades before. It should be noted, however, that these changes have taken place over a span of 100 years. The change has been evolutionary, incrementally affecting our ability to expand our markets. Nevertheless, today only 7 percent of the world's fruit production is traded internationally in the form of fresh produce.

Over the past two decades, international trade has increased considerably as a result of growth in consumer demand for fresh fruit year round. No longer do seasons limit consumer options. Thanks to improvements in transportation and preservative technologies, producers are able to meet the demand year round. World imports of fresh fruit have grown in total value to well over $23 billion annually. In the last 5 years, importation of produce into the U.S. market from abroad has tripled. Much to the chagrin of the folks at APHIS at USDA, who are overwhelmed with inspections, and as a result of the import growth, we suffered 26 fruit-fly infestations in California last year.

EU fruit imports amount to more than $12 billion, half of which is intra-EU trade. For the major fruit producers; North America has an export share of 32 percent, Europe 31 percent, South America 23 percent, and Asia 13 percent. Exports of the principal fruit products are valued at more than $13 billion, with citrus the main product group at $3.8 billion; bananas $3.1 billion; and apples about $3.5 billion.

After Brazil, the United States is the world's largest producer of fruit. While the vast majority of U.S.-grown fruit is destined for the domestic market and exports account only for 7 percent of

total production, the United States is still the biggest exporter of fruit.

Until the early 1970's, our biggest overseas market for citrus fruit was Europe. Then, because of increased transportation costs and the EU's imposition of a discriminatory tariff of about 20 percent on our citrus fruit versus an 80 percent discount for citrus from Mediterranean countries, such as Israel, Algeria, Morocco, and then the inclusion of major citrus producers, Spain and Portugal, into the EU, we lost out on that market. The transportation cost for delivery of fruit there combined with the additional duty made us noncompetitive. Today, transportation costs for us to deliver a carton of oranges or a carton of lemons from California to Europe, dock to dock, is upwards of about $8 a carton. On the other hand, to move fruit from California to Hong Kong is less than $2 and to Japan is a little over $3. So, it's clear where our market has to be, at least with the current transportation cost parameters and tariffs. Even though we see significantly higher tariffs in the Asian markets, it still is a better market for us than Europe. The other factor driving that distinction is that European buyers, particularly the French, are low-cost produce purchasers. The British and the Germans typically will pay more than the French but not as much as the Asians, who will pay a premium for high quality.

Sunkist's market niche is that upper 5 percent in terms of quality and price. We cannot compete with low-cost producers like Brazil, Argentina, and South Africa.

This kind of successful world market would not be possible, obviously, without the kinds of technologies that have made it possible to deliver fruit—or for that matter, any perishable commodity—to consumer markets far from production areas around the world. Today, southern hemisphere summer production is meeting northern hemisphere winter consumer demands. Chilean fruit is a good example of a country that has been able to enjoy significant increased volumes into the U.S. marketplace.

Let me talk briefly here about deregulation. In addition to the technological changes that have improved transportation and preservation of perishable commodities, the increased economic efficiency of transportation has played a significant part in market expansion for American agriculture. With governmental deregulation of rail and trucking, shipping rates have become much more competitive. With deregulation, the railroads had to take a hard look at their costs. Instead of prices set by rate bureaus, which meant monthly examining the docket and setting rules and rates, predicating them on the most inefficient player, deregulation took away the railroad's antitrust protection for setting these rates.

To give you an example of California-based transportation, deregulation meant that Santa Fe and Southern Pacific, lines with parallel track systems, found themselves competing rather than cooperatively conspiring in a rate bureau to set the charges. Almost overnight, expensive networks of railroad sales offices around the country disappeared after being identified as extraneous expense items. Instead of winning over shipping clients by hosting lunches and dinners and golf outings, since the rates were all predetermined and equal, railroads had to win clients by beating their competitors with better rates and service, differential pricing to reflect potential loss, lower shipping rates for easier-to-handle cargo and increased rates for more risky cargo, like perishables. Railroads stopped fussing about claims and cleaned up and simplified the claims

process. Armies of railroad claims adjustors were replaced by contracts limiting railroads' liability.

Railroads began sitting down with shippers and working out creative cargo contracts: offering rebates if shippers met certain volume targets by year's end, devising customized contracts, and committing to equipment purchases in exchange for volume guarantees by shippers. The prevailing principle then, as now, is that the big guy gets a better deal than the small guy. Fortunately for us, Sunkist is the big guy. We're the biggest fresh-fruit, citrus-brand marketer in the world.

Today, domestically we ship by truck—refrigerated truck. We do not ship by rail anymore. The trucking industry went through the same kind of transformation after its deregulation. But, rail delivery for us from West Coast markets to East Coast markets became very unpredictable. Time for delivery varied from 12 to 16 days. For a perishable commodity, that means significantly reduced shelf life. It costs more for us to ship by truck, but it means absolutely guaranteed delivery in not more than 4 days. The reliability factor just far outweighs the added cost. So, we have dramatically shifted. We ship virtually nothing by rail anymore.

It should also be mentioned that since deregulation, trucking has become all nonunion now. You don't see teamsters driving trucks anywhere in the country. They're virtually out of that except for UPS or something like that. But, virtually all of the produce that's shipped around the country goes by nonunion trucking.

Talking about ocean shipping moves us into the export market. In May of this year, ocean shipping will be deregulated for the first time. We believe this will result in dramatic changes in the way business is done in ocean shipping trades. We're expecting to see major cost-cutting, greater competitiveness, and market-based rates. We anticipate that ocean shipping by common carriers, such as APL and Sea-Land, will change in some of the same ways that rail shipping did after deregulation.

Up to now, common carriers in ocean shipping trades have operated with the same kind of antitrust immunity previously enjoyed by the railroads. Like the old railroad rate bureaus, ocean shipping firms held conferences where they set prices and terms. Terms and rates were published and publicly available for all to see through the Federal Maritime Commission. These common carriers were nondiscriminatory and noncompetitive, offering the same rates to all shippers large or small.

For the first time, shippers and common carriers will be free to negotiate contracts without having to make public their essential terms. This confidentiality will enable shippers to keep strategic information from industry rivals. Carriers will be free to form alliances that make their operations more efficient and competitive. The rates set by the conference were mandatory. In fact, we are the only country left with a public tariff regulatory system and that is about to change. Shippers from other countries already enjoy the ability to negotiate freely confidential contracts with carriers allowing goods competing with U.S. products to be sold on a CIF-delivered basis. This has given foreign shippers considerable flexibility and competitive advantage in pricing practices that has worked to the disadvantage of many U.S. firms.

On May 1, as I said, all of this changes. Conferences will break up; carriers can enter into confidential contracts with shippers; and judging by what happened with trucking and rail, rates will come down and shippers will have more options. At least that's what we look forward to. One-on-one negotiations will be a prerogative, along with the ability to enter into long-term contractual relationships that are custom-designed, capitalizing on carrier expertise and shippers' specific needs. Alliances will supplant conferences as the dominant forum for rationalizing services. There is the potential for partnership not only between carriers, but also between carriers and a host of other players, such as shippers, intermediaries, ports, possibly even labor unions. Large carriers will likely cannibalize small, less-efficient rivals, and a few culturally compatible large carriers will probably emerge. Some experts predict that liner shipping will soon consolidate into three or four major alliances. Common carriage will yield to customized contracts with the most favorable terms reserved for the larger shippers.

The infrastructure of U.S. ports will also be affected. As ocean carriers work to contain their costs and remain competitive, the ships themselves will come under scrutiny. With fixed costs, the same carriers will look to build bigger, more economical and efficient ships. Increased ship size and draft will limit the number of ports capable of handling them.

Also, the ability to quickly load and unload the vessel will be critical to port competitiveness. Ports will be played off one another by the big shipping firms. There will be a scramble to land the big contracts. Ports able to meet these demands may be further away from shippers, imposing added overland transportation costs.

Port improvement costs will be passed on to shippers and, in turn, to their clients. So, pressure on prices will operate, really, both ways. Downward pressure will be exerted by cost containment and rate reductions made for competitive purposes; at the same time, infrastructure changes will result in passed-through costs that will push prices upward.

The importance of quick turnaround time in the port that a previous speaker talked about is illustrated in another deregulated industry by the success of Southwest Airlines. Today, Southwest is the country's most profitable airline because it has the fastest fleet turnaround time at an average of 20 minutes versus 90 minutes for the rest of the industry. They enjoy other economies and efficiencies from flying only one type of plane, the 737. All their pilots can fly all their planes, eliminating a lot of cross-training. Employees also serve multiple functions. If you've ever flown Southwest, the people that sold you the ticket also unload the luggage and clean up the airplane and serve the snacks and all the rest. These same realities are likely to confront the shipping industry. Ships won't be able to afford to sit in port. They'll need to be on the water generating revenue.

Union labor at ports will also be affected significantly, we suspect. Current work rules and pay scales are very noncompetitive, resulting in high handling costs. It will become necessary to confront this problem and to rationalize work rules.

Before deregulation, the unions and the carriers used to be able to sit down, cut a deal in

conference, and then go to the government regulating body--in this case, the Federal Maritime Commission--with their proposal, arguing that while they're in agreement, there is no way to meet the higher costs other than raising shipping rates. With deregulation, that is going to change.

Let me note also, from the point of view of a shipper like Sunkist, technological improvements in transportation are of limited value if the destination of the export doesn't have handling facilities. I think the previous speaker talked a little bit about that in terms of having the chain in place to be able to accommodate these products. We learned that the hard way at Sunkist a few years ago when we were approached by Russia when it was still the Soviet Union--they wanted to buy three shiploads of third-grade lemons, which we had an abundance of at that time. The shipments were to go into what was then Leningrad and is now St. Petersburg.

The first shipment went fine and on the second shipment a few months later in addition to the third-grade lemons we put 1,000 cartons of top-grade Sunkist lemons in the hold to test the consumer market in Russia. When it came time for the third shipment, the Russians came to us and said, We want to be sure that you don't put those Sunkist lemons in the hold this time. We thought that was kind of strange since we had just given them 1,000 cartons worth about $40 a carton, so we asked why and they replied: When we transported all that stuff down to markets in Moscow, the Sunkist grade lemons were the only ones that people wanted to buy.

From that we discovered that there is a consumer market in Moscow for our lemons if we could find people there with the money to buy them. We have not shipped to Russia since then, though, because in the third shipment we ran into real difficulties, and this gets to the infrastructure question. On that third trip, when our ship reached Leningrad the port was all backed up, and we had to pay a demurrage fee of $10,000 a day as we sat there for two weeks, which took the fun out of doing business with the Russians real fast. Until they get their act together and have more resources, we're not likely to get back into that market. We just don't take those kinds of risks anymore. We sell, typically, all of our export produce fob our dockside.

In conclusion, let me just suggest that given the fact that there is going to be this dramatic change in ocean shipping with deregulation, I think it would be of value if ERS were interested in undertaking an analysis of the economic conditions that exist under a regulated environment and the kind of transition that's likely to take place, possibly reaching some conclusions here in a year or two as to where things are after deregulation. It would be educational and I think it would also benefit public policy to have an understanding of the effects of deregulation in a business environment.

If there are any questions, I'll be happy to try to answer them.

MR. BAILEY: Bill Bailey from Massey University, New Zealand. You talked in the beginning about Sunkist going into fresh-cuts, fresh flowers?

MR. WOOTTON: Fresh-cut flowers.

MR. BAILEY: Fresh-cut flowers.

MR. WOOTTON: It's a licensing arrangement.

MR. BAILEY: Okay. I was going to ask, is this driven by your distribution structure, or could you talk about it?

MR. WOOTTON: It's driven primarily by the brand name--having such a positive consumer response to that brand. So, capitalizing upon the brand identity.

MR. McGREGOR: Brian McGregor with Agricultural Marketing Service. How much of the Sunkist export business goes freight bulk and how much container?

MR. WOOTTON: It's getting to be more and more container. It used to be very little container; it used to be mostly into the holds on pallets, cartons on pallets into the holds of reefer ships. But now we find that some ports like, for example, Singapore, we will go by container. But we still do both. It's probably 60 percent container/40 percent pallet.

Supply Chain Management in New Zealand's Dairy Industry

William Bailey, Massey University, New Zealand

I will talk about how seaports and the New Zealand dairy industry have reacted to technological and structural changes in their respective industries. I wish to review the role of supply chain management in adjusting to those changes. My comments will be not just about transportation, but also about supply chain management. The Dairy Board views supply chain management, and not price, as *key* to their worldwide competitiveness. First, I'd like to spend just a couple of minutes describing the dairy industry in New Zealand.

When most people think of New Zealand agriculture, they think of the Dairy Board and have a knee-jerk reaction to it as a single-seller, a monopoly, a bad thing with huge government subsidies involved. Well, there are no subsidies involved. It's simply a single-desk seller. Anybody can export dairy products from New Zealand. The Dairy Board has to give them permission to do that. I think there are around 20 different companies exporting dairy products. But, by and large, for the products we're going to talk about, the Dairy Board is the single-seller. The Dairy Board is a cooperative and as such has a structure with significant implications for its ability to manage the supply chain. All the milk that is processed is processed by cooperatives just as all of the milk exported is exported through the cooperatively managed Dairy Board.

Dairy exports constitute 25 percent of the value of the country's exports. In a country like New Zealand, the level of milk production is national news. If there is an outbreak of some type of disease in the dairy industry, it is on the national television news that night. Not necessarily ahead of rugby, but nevertheless, it's national news. If you talk with dairy farmers, they are very clued in about what's going on internationally. They know the exchange rates, they know all the ins and outs of the dairy trade internationally. The production formula is low cost, high volume. Production has increased 45 percent since 1990. While production has increased, the number of cooperatives has declined. A few years ago there were 15 cooperatives. There are now, at least there were when I left, nine cooperatives in New Zealand. We have experienced this increase in milk production and decrease in the number of cooperatives processing the milk. As a consequence, economies of scale have really begun to drive the industry. Combined with these factors is the seasonal nature of milk production. There's a huge variation in production over the course of the year. Deliveries range from zero during parts of the year to over 4 million gallons in a single day. Plants have been built to accommodate this huge shift in volume. So, we have seasonality combined with huge production increases and fewer processing cooperatives. All of these factors are driving the industry to embrace economies of scale.

Now, just a quick look at the dairy situation in New Zealand. The country is divided into the North Island and South Island. Most of the milk is produced on the North Island and moved to a number of facilities. Kiwi, for instance, has trucks moving milk from the west side of the North Island to its major plant on the east side, a distance of about 400 kilometers one way. Some South Island milk also feeds into the North Island plants. As I said, during the flush production period, as much as 4 million gallons of milk per day is delivered to one facility. That's a lot of milk. In order to move this, Kiwi uses milk trains. Milk is collected at a number of farms, taken to a rail facility, put into a milk silo, honest, a milk silo, and then pumped into a milk train. Trains operate

back and forth from one side of the North Island to the other during the peak season. Each train carries around 800,000 gallons of milk. Again, this volume of milk is required to feed the plant at Hawera. This is an example of the economies of scale used in the industry.

And what makes all of this a challenge is the export focus of the industry.

There was a question this morning in reference to deregulation in the ocean shipping industry about what happens when a shipping cartel is done away with. At one time, there was a very tight cartel between New Zealand and Australia for ocean shipping. But about 5 years ago that cartel was opened. As a result, ocean-freight rates have come down over 50 percent during the past few years.

While Australia remains an important destination for dairy exports, the majority of exports are moving a long way—to Europe, Russia, and South America. Exports of nonfat dry milk don't go quite as far—to Malaysia, The Philippines, Indonesia, Japan, and Thailand, but these destinations are still 9-10 days by boat away from New Zealand.

The situation faced by the New Zealand dairy industry includes these givens: 1) it is export driven; 2) it depends on volume and the volume of milk arriving at plants fluctuates enormously over the course of a year; 3) the milk must be moved a long distance—either to processing facilities or to export markets.

In addition to the above, the external environment is changing in ways that the Dairy Board has no ability to influence. Most of these changes we've talked about previously. Shipping lines have rationalized their services. Today's larger ships and larger containers require larger volumes. As a consequence, we're seeing hubbing; that is, scheduled carriers are servicing a reduced number of ports in New Zealand. When the carriers do arrive, they have big boats. They want attention. They want to arrive on fixed days. They want guaranteed facilities. They want fast turnaround of their vessels. Those are demands that the Dairy Board must respond to.

The major ports in New Zealand are Auckland on the North Island and Christchurch on the South Island. Altogether, there are 13 commercial ports throughout the country. But this hubbing is creating considerable competitive pressure on the smaller ports. The question is how can these ports survive, and how can the dairy industry work in concert with the ports to remain competitive?

The ports can't change their location. I mean, where they are is where they are. And so what are they doing to remain competitive? The ports no longer offer just a facility, just some place for a boat to stop. They are expanding their range of services so that they can monitor products all the way through the system. They will work with shippers to make sure that the products are delivered on time to the various ports and that they have sufficient facilities for a quick turnaround on the boats that arrive.

A good example is the port of Auckland, which is New Zealand's biggest and busiest port. This is where the America's Cup is going to be held, for those of you who are sailors. Don't know how

long the Cup will need to be in New Zealand before it's called New Zealand's Cup, but this is a big deal for Auckland. It's creating some problems in Auckland because as the large container ships arrive, the 12-meter yachts are running back and forth. The port itself is in downtown Auckland, which creates some intermodal and environmental problems. Unloading empty containers at 3:30 in the morning makes a lot of noise just as trucks moving containers to and from the port during rush hour creates some issues. Nevertheless, 52 percent of all products brought into New Zealand by sea come through Auckland.

Now, what is the Port of Auckland doing to become the main competitor, the main hub, in New Zealand? They've improved turnaround times. A boat that arrived during 1989 required 39 hours for containers to be offloaded and new containers onloaded. As a result, in part, of improved technology, turnaround time has been reduced to 14.9 hours. I don't think it's unique to New Zealand, but when a vessel arrives, the people at the port of Auckland know exactly where the containers are in the vessel. This means that when a boat arrives the cargo is quickly moved off, stacked at the appropriate place, and new cargo positioned for export is loaded onto the vessel. The intention is to minimize the movement of containers that don't generate revenue. As a consequence of the new technology, the vessel can be turned around more quickly, and more importantly, the liner companies can be kept happy. The improved handling procedures have resulted in a 30 percent increase in container traffic in 4 years and a reduction in the number of employees.

The major port or hub for the South Island is Lyttleton near Christchurch. One of the important operational things Lyttleton has been working on is truck turnaround time. When a truck arrives at the port with a container, the container is offloaded and the truck is out of there in 11 minutes. The focus of the port is on the paperwork. Lyttleton uses technology to make sure documentation is handled as quickly and efficiently as possible. Lyttleton sees the use of technology to speed and improve documentation as their competitive advantage.

How has the Dairy Board responded to these controllable and uncontrollable events? For dairy products exported from New Zealand, ocean shipping is 30 percent of the total marketing bill, so any opportunity to reduce the cost of ocean freight will significantly benefit the industry. What can the Dairy Board do so that it can return more money to the dairy farmers of New Zealand? In the past, the response has been to go out and sell more cheese, or more butter, or more nonfat dry milk, to increase sales. But over the past year or two, the industry seems to have changed its attitude. While increasing sales is still good, it doesn't necessarily mean increasing profits. Furthermore, while ocean freight is an important cost component, if the industry focuses just on the cost of shipping, that won't be enough. What happens, for example, if the cost of shipping is reduced considerably but the products don't arrive on time, or they're damaged, or there's some delay in the handling of documents? The industry has significantly improved documentation. Each exported container of dairy product requires approximately 10 documents. During the past 3 years, there's been an 80 percent increase in the number of containers exported. At the same time, the Dairy Board has reduced by 50 percent the number of employees working on documentation. We cut costs, but it may not help at all.

True story: I was flying from Auckland to Singapore to meet Bill Coyle and some of his friends. As I got on the airplane in Auckland and sat down way back in steerage, the airline brought on

board a large styrofoam container and put it down in the seat next to me and strapped it in. Naturally I was curious and I asked what it was. It's some chocolate, I was told. There is a company in New Zealand that makes fine chocolate and this was a very large block of chocolate carved into an intricate design. It was going somewhere to become part of a big celebration. So, we have this exquisite chocolate, carved up in I don't what sort of design, sitting next to me on the airplane. We arrive in Bali and it was a 100+ degrees, 110 percent humidity. This box of fine chocolate, which was sitting next to me very calmly all the way up, then disappeared. I don't know what happened to it, but I had visions of someone taking the box off the plane and putting it on the tarmac next to the airplane to wait for someone else to come pick it up. I imagined that it sat there in the sun and heat and humidity for maybe four or five hours, and that the finely crafted, carved piece of chocolate turned back into a block of chocolate. And it wasn't because it wasn't well handled between Auckland and Bali. Something happened in the supply chain. And that's why the Dairy Board says if we just look at the cost, it doesn't mean we're going to become more competitive. Instead it said, let's improve the whole supply chain. If we reduce the total cost of delivering a product from our factories to the end-user overseas, the money saved goes straight to the bottom line. It's not like sales where you have to take some out for cost of goods sold, some out for marketing, some out for overhead. These savings go straight to the bottom line. The first six months that the Dairy Board focused on improving the supply chain, it saved millions of dollars. Those savings went straight to the farmers' pockets, which made the Dairy Board very popular.

Improvements in the supply chain put money directly into farmers' pockets. In addition, the improvements will increase the ability of the Dairy Board to compete, not on price but on service. Because the Dairy Board can deliver products at guaranteed times to specific places and at specific quality standards. The challenge of improving the supply chain is that it requires participation by everybody in the chain. We've talked about ocean shippers, we've talked about ports, we've talked about a number of things today that affect the New Zealand dairy industry. The Dairy Board says we can't look at those in isolation. For the chain to improve, all parts of the chain must improve.

Now, let us turn to some conclusions. The New Zealand Dairy Board is a single-seller organization. I don't know if having a single seller is necessary in order to have an efficient supply chain in agriculture. But I do know that the single-seller status of the Dairy Board enhances its ability to be competitive by improving the supply chain. While exports drive the industry, domestic movement of milk remains critical and very costly. Product movement is high-volume, low-value. While such a relationship is great for ships, it's tough with trucks. As competition between the seaports increases, as the drive for hubbing increases, and as scale requirements increase, the demand for movement of huge product volumes through ports will increase. The industry has responded to these challenges. The industry has embraced innovative ways to pick milk up at the farm, it uses global satellite positioning on the trucks that go to the individual dairy farms; it uses milk trains that carry nothing but milk from outlying areas to processing facilities. The Dairy Board looks at all the links in the chain, not just at facilities or at a particular mode of transportation, but at the whole chain. While distribution costs may go up, overall revenue will increase as overall costs go down. In my view, however, the most important improvement is information technology. We can get the straddle carriers to drive faster around the ports and pick

two containers up at a time instead of one, but if the documents aren't there, it doesn't do any good. If we've lost a container, if potatoes go to Albany, Georgia, instead of Albany, New York, we have problems. Information technology permits us to keep track of the containers--makes sure that we have maximum container loads. We know how much is required, how much we have available in various inventories to assure maximum payloads for the containers. Information technology makes sure the necessary documents precede the containers so that those documents are there when the containers arrive. Product flows throughout the system are much better managed, and the time in port for the containers and the ships is reduced dramatically.

So, that is how the Dairy Board looks to technology to become more competitive in the world marketplace. It doesn't look just at the transportation costs, but at the whole chain. As you do your research, I think that's something you have to keep in mind. Simply reducing your transportation costs does not mean that service will increase, that market share will increase, or that customers will be happy. The Dairy Board has said the supply chain is where the action is and it is developing that supply chain to meet consumer needs.

Thank you very much. If anybody has any questions or suggestions, I'll be more than happy to entertain them.

MR. ARMBRUSTER: Walt Armbruster, Farm Foundation. Could you give us a couple of examples of exactly how the New Zealand Dairy Board has dealt with the supply chain phenomena?

MR. BAILEY: For example, the Dairy Board was working with maybe 60 different companies that provide packaging. It said, "60 companies, come on, that's too many, how complicated is a cardboard box?" And part of the Board said, "Now, hold it. If we want the lowest possible prices, we have to have this bid-and-offer system. We have to have a situation where companies compete against each other to give us the lowest possible price for cardboard boxes." Fair enough. The other half, the supply chain management people said, "It's not the price, it's the service. If we get the service right, if we get the products right, if we get the containers right, if we get the packages right, it will reduce our overall costs." So, the board went from working with 60 packaging people to two and, as a result, forged a much closer linkage between the packaging people and the processing plant so that the packages are designed and delivered when they're needed. It's reduced the inventory costs of both the suppliers and the processors, reducing total cost in the chain.

Another example is working with containers. What do you do with a container? I mean with these packaging/processing plants in the middle of New Zealand there aren't any back hauls. I guarantee you, going to Harewa, there are very few back-haul opportunities. So, what do you do with the containers? Well, maybe, if the containers were pre-positioned at the ports, shipments could be consolidated at the ports rather than at the factory and maybe you could save some money instead of moving around empty containers. When working with the supply chain, you probably won't find one place that saves $1 million, but you'll find a lot of places where $1 can be saved. The key is having everybody talk and having the information flow back and forth. Any other questions?

MR. SPINELLI: I'm Phil Spinelli at GPSA (Grain Inspection, Packers and Stockyards Administration). I was wondering if you see the same kinds of structural changes that you identified in the dairy industry in other big export commodities from New Zealand, like beef?

MR. BAILEY: There are marketing boards for several commodities--apples, kiwi fruit--and these industries are moving quickly toward the supply chain management approach. When we look at the beef side, that's not necessarily true. The beef industry is fragmented. It doesn't take as full advantage of supply chain management as these vertically integrated industries do. Now, from a research perspective, do you have to have that vertical integration? Does it have to be a cooperative? Can these linkages take place strictly because it benefits everybody? It's a lot more difficult that way. It's great in theory, but the implementation is very difficult. So, the boards are doing well in the supply chain area, but the beef industry is not doing well at all.

MR. [INAUDIBLE]: Do you see the success of the New Zealand Dairy Board as a single-desk seller acting as a role model for other entities in New Zealand? I mean, is this the wave of the future? Is it going to be more moving backward toward other more broken up or disaggregated industries?

MR. BAILEY: Someone will provide the services provided by the Dairy Board. That is Marketing 101. The middleman adds value in some way. And so the services provided by the Dairy Board will be provided by someone even if the Dairy Board disappears tomorrow. But, the Dairy Board remains a model for other industries in New Zealand, because it's doing a good job. It's selling the products and taking care of the markets; it's looking at the whole chain and returning good value to the farmer. The farmer controls the product all the way through. The Dairy Board may change its name, but I think the idea of a single seller will remain in New Zealand for a number of years, at least for dairy products.

MR. [INAUDIBLE]: My question was: Can you see other industries emulating the Dairy Board?

MR. BAILEY: The success of the Dairy Board is due in part to the statutory basis for its existence. If a company wants to export a product, it goes to the Dairy Board for permission. I do not see the beef industry doing that. I don't see other industries in New Zealand requiring that permission. And so, while people look with envious eyes at the Dairy Board, I don't see that its statutory powers will be extended to any other industry in New Zealand.

MR. [INAUDIBLE]: Doesn't the New Zealand Dairy Board have established subsidiaries in several countries?

MR. BAILEY: That's a good question. The Dairy Board has maybe 50 subsidiaries in a 100 or so countries around the world. The challenge with supply chain management is that it takes communication. If the Dairy Board has 50 subsidiaries around the world, it has to be communicating with them. An offshoot of this has been that the Dairy Board had to bring responsibility and authority back into New Zealand and away from the subsidiaries, and that is creating some tensions. This is a little bit counter to some of the theory we read about in the *Harvard Business Review* where you want to move authority down with responsibility at the

lowest level. The responsibility will remain with the subsidiaries, but the authority is coming back to Wellington, New Zealand.