REPORT TO CONGRESS
ON USE OF PERISHABLE COMMODITIES
AND LIVE ANIMALS IN FOOD AID PROGRAMS

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I. EXECUTIVE SUMMARY

The Farm Security and Rural Investment Act of 2002 directs the Secretary of Agriculture to report to Congress on the use of perishable commodities and live animals in food aid programs. The Foreign Agricultural Service (FAS), which is primarily responsible for USDA's overseas activities, prepared this report.

All U.S. agricultural commodities and products, except alcohol and tobacco, are eligible for use in international food aid programs. The cooperating sponsor, either a private voluntary organization (PVO), private entity, non-governmental organization (NGO), or the government of the recipient country, may request specific commodities, including livestock, as food aid. These requests must meet the requirements of both a "Bellmon Determination" and a Usual Marketing Requirement analysis[1]. These supporting documents to a food aid agreement ensure that the port infrastructure, storage, and handling capacity are adequate and that there is minimal impact of the program on local production or commercial exports.

This report focuses on the infrastructure currently available in traditional food aid recipient countries to accommodate perishable commodities or live animals as food aid. Although fairly good information is available on refrigerated container delivery capabilities, information regarding cold storage availability and capacity is limited. References to sources of information are provided in the report. Many traditional food aid recipients are presumed to have severe constraints in their refrigerated transportation and cold storage capacity. The information for this presumption is anecdotal and is derived from assessments made for feasibility studies and "cold chain" improvement efforts.

The report presents representative examples of perishable commodities and livestock shipments to provide a basis to assess the overall feasibility and costs of providing perishable commodity and live animal shipments as food aid. They were selected as reasonable possibilities based on assessments of commodity supply and the known refrigerated container handling infrastructure of the country. The examples are for illustrative purposes only and are not meant to endorse the commodities or countries used or exclude other potential considerations. For comparison purposes, each example is converted to a wheat equivalent basis to show the quantity of wheat that could be delivered to the same country for a similar cost. A wheat equivalent is provided because wheat is a common food aid commodity and food donation pledges under the Food Aid Convention are based upon wheat equivalents.

Although the infrastructure of many developing countries may have limitations, some traditional food aid recipients do have reasonable infrastructure for accommodating perishable commodities. The feasibility of providing lambs to Afghanistan was examined and the report concludes that air transport would entail

[1] A Bellmon Determination is a required (section 403 of P.L. 83-480 (P.L. 480) analysis for all food aid programs that, at the time of arrival, local facilities are adequate to handle and store the food aid commodities and no substantial disincentive to domestic production and marketing will result. An UMR is an analysis that ensures that food aid will not disrupt normal patterns of commercial trade.

less complicated logistics than ocean transport for such shipment.

II. SECTION 3207 REQUIREMENTS

Section 3207 of the Farm Security and Rural Investment Act of 2002 (Section 3207), enacted May 13, 2002, requires the Secretary of Agriculture to report to Congress on the use of perishable commodities and live animals in food aid programs.

Section 3207 reads as follows:

Report On Use of Perishable Commodities and Live Animals

Not later than 120 days after the date of enactment of this Act, the Secretary of Agriculture shall submit to the Committee on Agriculture of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry of the Senate a report on the international food aid programs of the United States that evaluates –

(1) the implications of storage and transportation capacity and funding for the use of perishable agricultural commodities and semiperishable commodities; and

(2) the feasibility of the transport of lambs and other live animals under the program.

III. FOCUS OF THIS REPORT

This report is structured to discuss separately the issues of providing perishable commodities or livestock as food aid, as required by Section 3207.

A. Perishable and Semi-perishable Commodities

Perishable commodities are those food commodities that require refrigeration, either chilling or freezing, to extend their self-life. Without refrigeration, perishable commodities are subject to rapid decay or deterioration from microbes and may present a health risk if consumed.

The category of semi-perishable foods can encompass a wide variety of foodstuffs that have varying shelf lives. Generally, semi-perishables require no refrigeration and are shelf stable, except under extreme temperatures, due to the presence of preservatives, specialized processing or packaging. Examples include dried fruit, ultra high temperature treated milk and pasteurized fruit juices in aseptic packaging. Since such foodstuffs generally require only reasonable care in handling to ensure that they retain their quality for their expected shelf live, there are no special requirements for transportation, handling, and storage infrastructure.

Infrastructure Capacity: The Section 3207 requirement focuses on the infrastructure necessary for the storage and transportation of perishable and semi-perishable agricultural commodities in their delivery to traditional food aid recipient countries. Typically, food aid recipient countries are developing countries, or emerging markets, that generally lack adequate infrastructure for handling perishable commodities. In developing countries, fresh produce typically goes directly from field to market and

may be only available in season. Livestock often are slaughtered just prior to sale of the meat to consumers without benefit of refrigeration or freezing. Consumers in developing countries typically buy perishable foods when needed, since many homes have little or no refrigerated storage. In many instances, consumers, particularly those that might distribute or receive food aid, have little knowledge of handling and preparing frozen foods.

Several developing countries are significant producers of perishables for export. For example, China is a leading exporter of deciduous fruits and citrus, while Vietnam and the Philippines are large exporters of seafood. Most of the available refrigerated and frozen storage and handling capacity (cold chain capacity) may be devoted to these export industries, with little space available for imported perishable foodstuffs.

The U.S. cold storage industry, cooperator groups representing chilled and frozen food products, the USDA and the United States Agency for International Development (USAID) recognize the lack of cold chain capacity in developing countries. Improvement of the cold chain capacity in developing markets for U.S. perishable commodities is the focus of an on-going project by the USDA's Foreign Agricultural Service, entitled the Cold Chain Improvement Program for Perishable Foods (Cold Chain Improvement Program). The program provides training and technical assistance about the proper handling of perishable commodities and the maintenance of the cold chain aimed at fostering local and foreign demand for perishable food products. Educating and assisting market constituents on proper practices and providing key linkages, from port refrigeration through retail display, enhances the quality and profitability of perishable food merchandising. USAID, the International Association of Refrigerated Warehouses (IARW), and the World Food Logistics Organization (WFLO) support USDA's Cold Chain Improvement Program. Perishable food cooperator groups, such as the Washington State Apple Commission, and refrigeration equipment manufacturers, such as York and Carrier, and the Department of Commerce, Foreign Commercial Service have also contributed to the program. The Cold Chain Improvement Program has been active since 1997 and has conducted activities in 21 countries.

B. Lambs and Other Livestock

Feasibility: This report focuses on the practicality of providing lambs or other livestock as food aid, including the transportation and logistics of shipping livestock economically by either ocean vessel or by air transport.

This report does not cover the developmental benefits of providing lambs, or other livestock, as food aid. Lambs or sheep, in particular, offer a dual purpose for both food and fiber and can reproduce, given adequate rangeland. It is assumed that any livestock provided would not be simply for near-term slaughter to provide food. The developmental benefit of providing lambs or other livestock as food aid needs to be weighed against the added expense of shipping, handling, and guarding against the mortality of the livestock, as compared to providing shelf stable foodstuff as food aid.

IV. APPLICABLE FOOD AID PROGRAM REQUIREMENTS

Commodity Eligibility: All agricultural commodities and products, other than alcoholic beverages and tobacco, are eligible for consideration in programming as food aid. U.S. food aid includes P.L. 480 programs (Title I, Title II and Title III), Section 416(b) donations and the Food for Progress program. The request for consideration of a particular commodity, including perishables or livestock, originates with the cooperating sponsor (PVO, private entity NGO, or foreign government) of the food assistance.

As a rule, only commodities in Commodity Credit Corporation (CCC) uncommitted inventory (in surplus above supplies traditionally needed for U.S. domestic feeding program requirements) are available for donation under section 416(b) of the Agricultural Act of 1949 (Section 416(b)). Consequently, CCC annually reviews its inventory to determine commodity availability and publicizes the results to assist PVOs in planning donation activities. Other than butter and cheese, CCC does not take perishables commodities into its inventories. By contrast, donations under the Food for Progress Act (FFP) are not limited to CCC inventory. CCC may purchase commodities for FFP donations to meet justified needs.

Transportation: The Merchant Marine Act, 1936, as amended, requires that at least 75 percent of all U.S. food aid tonnage shipped on ocean vessels is required to be shipped on privately owned United States-flag commercial vessels. This requirement applies to shipments under P.L. 480, the FFP Act and Section 416(b).

Commodity Storage and Handling: The food aid programs have requirements to preserve the quality of the foodstuffs delivered as food aid and limit their impact on local production and commercial trade. These requirements are known as the Bellmon Determination and the Usual Marketing Requirements. These food aid program requirements are significant to the request in Section 3207 because specific food aid agreements must address the transportation, handling and storage issues in the recipient country.

Bellmon Determination: All food aid programs of the Department of Agriculture require that an analysis be conducted to support a determination under Section 403 of P.L. 480 by the Secretary of Agriculture, that "at the time of arrival of commodities, local facilities will be adequate to store the commodities and no substantial disincentive to domestic production and marketing will result." This is commonly referred to as a “Bellmon Determination.”

The Bellmon Determination includes three sections on port, storage, and transport capabilities as follows:
1. Port

- *Facilities:* Describes adequacy of port physical facilities in terms of the wharf, warehousing, equipment (particularly offloading capacity) and maintenance.
- *Operations:* Comments on the efficiency of port operations and management.
- *Projected Arrivals:* Notes to what extent port congestion might be a problem at the time of projected food aid arrival. For example, are imports, commercial and concessional, coordinated and planned to arrive at low points in domestic supply, but in a smooth fashion?

2. Storage
Describes the adequacy of port, central and regional storage facilities in terms of structure, capacity and management. Notes specifically the expected adequacy of storage at the time of projected food aid arrival.

3. Transport
Describes the adequacy of transport capabilities - road, railway and waterway, as applicable - with respect to equipment, operational status and maintenance facilities. Comments in particular on transport availability at the projected time of food aid arrival.

Usual Marketing Requirements (UMRs): Under all government–to-government food aid programs, a UMR analysis is required in order to ensure that food aid sales or donations will not unduly disrupt world agricultural commodity prices and normal patterns of commercial trade. The UMR is the level of commercial imports that a government recipient of food aid agrees to maintain.

V. HISTORY

Over the last fifty years, the USDA has shipped a variety of perishable commodities under its food aid programs. Commodities have included butter, cheese, beef, poultry, pork, veal, breeder chicks and fresh fruit. The largest quantity of any perishable commodity programmed under food aid programs was butter, with approximately 470,000 metric tons shipped since 1955.

The most recent shipment of a perishable commodity as food aid occurred in November 2001, when fresh apples were shipped to the Russian Far East under USDA's Food for Progress program. The apples were distributed to orphans and other underprivileged Russians. The 2,000 metric tons of apples were shipped in refrigerated containers to the port city of Pusan, South Korea. The refrigerated containers were transferred by barge for transit to Vladivostock. Other than a delay in Russian customs, the shipment from U.S. port to end-users was successful. Prior to this apple shipment, fresh fruit was last shipped under USDA food aid programs, in the 1950's and 1960's, to Iceland, Yugoslavia and the United Kingdom.

There have been very few shipments of live animals under USDA food aid programs over the past fifty years. Breeder chicks were sent to the Dominican Republic, Greece, Israel and Paraguay, all in the late 1970's. The most recent attempt to ship live animals occurred in 1999 during the Hurricane Mitch crisis. USDA gave consideration to sending pigs to Nicaragua under the Food for Progress program;

however, the program did not materialize due to concerns with animal heath and mortality.

VI. PERISHABLE COMMODITIES AS FOOD AID

A. Discussion of Refrigerated Containers Vs. Break Bulk Refrigerated Cargo

Break bulk (not containerized) refrigerated transport in dedicated vessels provides the lowest port-to-port ocean transportation costs. In general, for transport to traditional food aid recipients, break bulk refrigerated (reefer) vessels would need to be chartered for a full load and generally would not be available for partial loads. A fully loaded small reefer vessel charter would hold about 2,000 to 4,000 metric tons of product. The market for reefer vessels may have large seasonal fluctuations in freight rates mainly due to fruit and vegetable crops from the Southern Hemisphere being shipped to markets in the Northern Hemisphere during the early part of the year.

The large quantity of perishable commodities delivered in a break bulk shipment may potentially overwhelm a developing country's cold chain capacity. The potential for product spoilage would make such food assistance and the cost savings of shipping via break bulk counterproductive. A Bellmon Determination would be required to determine the impact on the country's available cold chain infrastructure.

The world break bulk reefer fleet is only around 1,350 ships. The number of small ships available for point-to-point charter is extremely limited and the age of break bulk reefer vessels is causing supply to diminish rapidly. Twenty vessels were scrapped in 2001, while only three new vessels were delivered. All available break bulk refrigerated ocean vessels are currently foreign flagged vessels. The break bulk reefer market is in strong competition with the refrigerated container market for volume and pricing. Due to this competition, the break bulk reefer fleet has increasingly focused on rapid handling of specialized commodities, such as bananas.

The use of break bulk reefers for transportation of perishable commodities is not a viable option due to the larger quantities of commodity involved and the resulting impact on the recipient country's available cold chain capacity and the lack of U.S. flagged reefer vessels. Therefore, no break bulk reefer vessel movements were included in the following cost examples.

B. Cost Estimates For Selected Commodities And Transportation To Selected Countries

Funding: To address the issue of funding, we estimate the cost of providing likely available perishable commodities, as examples, to food aid recipient countries that have some measure of adequate cold chain capacity. Then, as a comparison, we determined the volume of bulk wheat that could be delivered to the same country for the estimated cost obtained.

Methodology: A survey was made of available resources providing information on the transportation and handling capabilities of traditional food aid recipient countries. The available information regards the general port handling facilities at open ports for general and containerized cargo. Two facts are key to effective handling of refrigerated containers. The first is related to regular port service by containerized vessel carriers, referred to as "direct liner service." The second is the number of electric plugs at port to power refrigerated containers, referred to as "reefer points." The availability of direct liner service to the port increases the ability to ship refrigerated containers on a continued and timely basis. The availability of direct liner service, the number of lines providing service and the number of reefer points, if available, for each traditional food aid recipient is shown in the appendix.

Countries were selected from those listed in the appendix that had a reasonable infrastructure to receive perishable shipments. The selected countries (Guatemala, Jordan, Russia, and Vietnam) are used to estimate landed costs (at current market prices for commodity, freight and miscellaneous expenses) for selected perishable commodities that would likely be available for disposition under P.L. 480. The perishable commodities selected for these examples are frozen chicken leg quarters (leg quarters) and apples**.** These countries and commodities were selected for illustrative purposes only.

Cost Estimates For Leg Quarters: Total cost estimate per container for shipment and port delivery of frozen chicken leg quarters is reported in the table below. Direct costs were estimated using conventional commercial transportation routes from the U.S. to Guatemala, Jordan, and Vietnam on U.S. flagged vessels. Estimates were based on a 40-foot container holding approximately 1,575 cartons of frozen chicken leg quarters, each weighing 15 kg (23.6 metric tons).

Assuming an average price of $0.21 a pound, the cost of filling one 40-foot container will be about $11,000. Inland transportation costs from a production / processing facility to port in Charleston, SC, Savannah, GA or Miami, FL is roughly $600 per container. The transportation cost by rail from an East Coast production facility to a West Coast port (Seattle, WA) is 2.75 cents per pound or about $1,433 per container.

Ocean Shipping Rates for Leg Quarters:

Miami, FL - Puerto Barrios, Guatemala	USD $2,150 per container
Charleston, SC - Aqaba, Jordan	USD $5,200 per container
Seattle, WA - Haiphong, Vietnam	USD $5,000 per container
Savannah, GA - Ho Chi Minh City, Vietnam	USD $5,000 per container

Other Costs:

A number of fixed miscellaneous moving and transfer costs (e.g., loading, unloading, transfer, short term temporary storage and inspection) total $650 per container.

Cost Estimates For Apples

Total cost estimate per container for shipment and port delivery of apples is reported in the table below. Direct costs were estimated using conventional commercial transportation routes from the U.S. to

Guatemala, Russia and Vietnam on U.S. flagged vessels. Estimates were based on a 40-foot container holding approximately 1,000 boxes of apples, each weighing 19.05 kg (19 metric tons).

Assuming an average price of $11.00 a box, the cost of filling one 40-foot container will be about $11,000. Inland transportation costs from a production/processing facility in Wenatchee, WA to port in, Seattle, WA is roughly $550 per container.

Ocean Shipping Rates for Apples

Seattle, WA - Puerto Barrios, Guatemala	USD $5,000 per container
Seattle, WA - Ho Chi Minh City, Vietnam	USD $2,900 per container
Seattle, WA - Vladivostock, Russia	USD $4,952 per container

Other Costs:
A number of fixed miscellaneous moving and transfer costs (e.g., loading, unloading, transfer, short term temporary storage, and inspection) total $280 per container, sometimes included in the total freight quote.

Table 1: Cost of U.S. Shipments of Selected Perishable Products by Port of Destination (Cost per 40' Reefer Container)

Commodity/ Country	U.S. Port	Port of Destination	FOB Cost to Port	Ocean Freight	Misc. Cost 1/	C&F Landed 2/	Value 1,000 MT 3/	Wheat Equiv. 4/
Leg Quarters								
Guatemala	Miami	Puerto Barrios	$11,600	$2,150	$650	$14,400	$610,000	2,585
Jordan	Charleston	Aqaba	$11,600	$5,200	$650	$17,450	$739,357	3,286
Vietnam	Seattle	Ho Chi Minh	$12,433	$5,000	$650	$18,083	$766,178	3,390
Apples								
Vietnam	Seattle	Ho Chi Minh	$11,550	$2,900	Included	$14,400	$760,415	3,364
Russia	Seattle	Vladivostok	$11,550	$4,952	Included	$16,502	$868,485	3,530
Guatemala	Seattle	Puerto Barrios	$11,550	$5,000	$280	$16,830	$883,464	3,743

Note: 1/ Miscellaneous costs include loading, transfer and inspection costs.
2/ Represents the total value of one container of the commodity delivered to the recipient country including the cost of commodity, freight and miscellaneous handling costs.
3/ Represents the total value for 1,000 metric tons (MT) delivered to the recipient country including the cost of commodity, freight and miscellaneous handling costs. 1,000 MT was used as a base tonnage in these examples to provide a consistent quantity because, due to packing and density, more frozen chicken (23.6 MT) can be loaded per container than apples (19.05 MT).
4/ Wheat equivalent is the quantity in metric tons of U.S. No. 2, Hard Red Winter Wheat that could be shipped in bulk on a U.S. flag carrier to the destination country for a cost similar to the perishable commodity.

C. Assessment of Cold Storage Capacity Issues in Food Aid Recipient Countries

Information on cold storage facilities in most food aid recipient countries is not readily available. The International Association of Refrigerated Warehouses (IAWR) and World Food Logistics Organization (WFLO) confirmed that,

in most cases, comprehensive information on the cold storage capacity available in developing countries must be obtained on a case-by-case basis.

Sources of Information: Although a comprehensive directory of cold storage capacity in developing countries is not available, there are good sources of information for some countries. Key sources of information on cold storage facilities in developing countries are:

1. Cold Chain Resource Directory for Southern Africa. According to IARW/WFLO, this resource is a first for a developing country. The directory lists the refrigerated and chilled warehouses in South Africa including, where available, the amount of storage space, the shipping and transportation companies capable of handling frozen or chilled products, suppliers to the industry, ports of entry, and the available infrastructure.
2. The development of cold storage associations that are promoted by the IARW/WFLO and the Cold Chain Project of USDA/FAS/ICD. Associations have been formed in South Africa, Egypt, Vietnam, and the Philippines. A cold storage association in Indonesia is expected in 2003.
3. USDA, Agricultural Marketing Service, Transportation and Marketing Division, Country Transportation Reports. These reports include transportation handling and cost information for agricultural commodities, including refrigerated containers often compiled from in-country assessments of transportation and cold chain infrastructure.
4. USDA, Foreign Agricultural Service, Emerging Markets Program, in addition to funding the Cold Chain Improvement Program, has funded several feasibility studies and other assessments involving cold storage infrastructure in emerging markets.
5. The Trade and Development Agency (TDA) has funded recent feasibility studies involving cold storage infrastructure, including a refrigerated warehouse near the port of Poti, Georgia, a cold storage facility in Puerto Cortes, Honduras, a refrigerated bonded warehouse in Conakry, Guinea and a meat processing plant in the Ukraine.

Overview of Findings: A review of reports on the Cold Chain Improvement Program and feasibility studies funded by the TDA for cold storage facilities provide general observations of the conditions of handling and storage of perishable products in developing countries. It should be noted that many of the problems observed in developing countries' cold chain operations also occur in facilities in developed countries, although with less frequency or severity. In general, developing countries do have some capacity to handle a refrigerated container at the port of arrival. The number of "reefer points" for electric power supply may be limited, or a more costly electric generator may be used to provide power to the container refrigeration unit.

Within a few days after arrival, the container is generally unloaded into either a cold storage warehouse in close proximity to the port or directly into trucks for transport to an inland cold storage warehouse or to a distribution point. In many situations, the truck transport is not refrigerated due to the lack of availability or high expense of refrigerated trucks. Frequently, chilled and frozen products are moved at night with possibly some insulation of the product. Cold storage facilities in developing countries are not generally designed or operated in a manner to handle product rapidly and to protect against damage to product quality. When the trucks arrive at a cold storage warehouse the product may sit until unloaded at a later

time. If the products are in a refrigerated truck, in many cases they are unloaded into an unrefrigerated staging area before movement to a cold storage room. The handling of boxes can be rough. Boxes may be dropped, crushed or water soaked.

The stacking of boxes in cold storage may be too high for the box construction contributing to product damage. In cold storage, inadequate space may be given between boxes and rows to permit efficient airflow. Storage temperatures in refrigerated warehouses may be poorly maintained. Refrigeration equipment may be old and may leak ammonia. Refrigeration coils may be iced over and airflow in cold rooms may be inadequate to maintain even temperatures throughout the room. Products are sometimes stored at inappropriate temperatures. Refrigeration cycling or the loss, or deliberate turning off of, power supplies during the night or other times can cause product degradation from repeated freezing and thawing. Inappropriate products may be stored together causing a loss in product quality. Examples include high ethylene producing products stored with products that spoil quickly in the presence of ethylene.

When products are distributed to consumers, they often do not benefit from refrigeration. Produce and meats are most frequently sold in "wet markets" that have little to no refrigeration. Sellers try to only have enough supply to sell in a day. Meat is often thawed because consumers want "fresh" product rather than frozen and generally do not have adequate home refrigeration.

Improper refrigeration of perishable commodities and foodstuffs in handling, storage, transportation and distribution results in a loss of product quality, shelf life and consumer acceptance. For chilled products such as produce, the spoilage of product due to lack of refrigeration results in an economic loss because product cannot be sold. However, food borne illnesses are generally not an issue. In frozen products, such as meats, the impact of improper refrigeration, in addition to economic loss due to product degradation, also may cause food borne illness due to microbial growth.

VII. LIVE ANIMALS AS FOOD AID

There are a number of issues related to shipping live animals under food aid that would need to be addressed before a food aid program could be developed. These issues include adequate supply, transportation costs, infrastructure and veterinarian requirements of the recipient country. For purposes of this report, it is assumed that any livestock shipped under a food aid program would serve to repopulate the recipient country's herd and not be used for direct slaughter. The logistics of shipping livestock also encompasses the need for quarantine facilities, as necessary, to ensure that the animals do not carry unwelcome diseases and pests to the recipient country. To ensure the health and viability of the livestock, veterinary services and treatment are often required. Local transportation of livestock after arrival in country is typically required for distribution of the animals.

A. Discussion of Ocean and Air Freight of Live Animals

The Transportation & Marketing Division, Agricultural Marketing Service, USDA, publishes a guide providing information on ocean carrier and air transportation for the export of livestock. The guide also provides a list of the freight forwarders that have experience in arranging livestock exports, including

inspection requirements and locations of export inspection facilities for livestock.

Ocean transport: A few ocean vessels are specifically designed and operated as transports for livestock. These vessels are all foreign flag vessels. Livestock vessels are chartered on a point- to-point basis. The capacity of these livestock vessels ranges from 900 to 6,000 head of cattle or 8,000- 85,000 head of sheep. The largest livestock ocean carriers necessitate dedicated loading and unloading facilities. The need for economical transport needs to be weighed against the ability of the country to receive such a large number of animals at one time and its capacity to ensure that the animals are provided adequate feed and land transport to their destination without undue mortality rates. In many cases, in developing countries suffering from food shortages, feed traditionally used for animal fodder is either unavailable due to drought, or is being consumed as food. Attention is also necessary to ensure the viability of the livestock while in-transit aboard ship.

Air transport: Aircraft may be more readily available for use in transporting lambs or other livestock. Air transport of livestock has the added benefit of shorter transit time and ability to reach landlocked destinations directly. These benefits, however, are reflected in the higher costs per head for transportation. Although air transport may be able to reach remote destinations, the country of destination may restrict imported livestock to specific landing sites where quarantine facilities are available or can be constructed. Truck transport to the final distribution point typically is necessary.

B. Cost Estimates for Selected Livestock and Transportation to Selected Countries

Livestock can be effectively transported by air to many destinations. However, there are only a few U.S. air carriers that regularly ship livestock worldwide. USDA would have to determine if a U.S. carrier was available to send food aid to a particular destination. In addition, a U.S. carrier would have to obtain the proper licenses for landing rights, pay landing fees and other costs associated with transport. Transportation by air is obviously faster and generally safer for the animals than ocean transport due to less time in transit. However, shipment by air necessarily limits the number of animals that can be shipped and the cost of shipment is generally much higher than by ocean vessel. Also, special animal pens are required to house the animals on the aircraft. This cost must be added to the quotes from the airlines and are listed as miscellaneous charges. Cost estimates in this report were based on a Chicago FOB price and using a 747 freight aircraft. Lower charges may be available depending on the airline, cargo, time of year and other factors.

Many more animals can be transported by ship than by air at a lower cost per animal. However, the cost of transportation of animals to a U.S. port may be higher than to an air facility and transit time can take several weeks or more depending on the destination. In addition, transportation by ship tends to be seasonal since rough fall and winter seas can be detrimental to the health of ship-bound livestock, particularly for trans-Atlantic voyages. Ships transporting cattle at capacity can carry from around 900 head or more depending on the ship. Ships transporting sheep were quoted at carrying from 8,000 to 85,000 head or more depending on the ship. Currently, all available livestock ocean vessels are foreign flag vessels.

Animal Health Issues: In addition to issues related to transportation, securing the proper animal health

documentation and services also contributes to the cost of shipping live animals for food aid. First, it would need to be determined if the Animal and Plant Health Inspection Service (APHIS), USDA, has an animal health protocol agreement with the recipient country. If not, APHIS could arrange to negotiate an agreement for the livestock commodities in the proposed recipient country. Additionally, under APHIS regulations, animals leaving the U.S. must have the proper veterinarian certificates and documents required by the recipient country. Under current practices, APHIS charges exporters user fees for veterinarian services for document preparation and an additional hourly fee to oversee the loading of the animals on the aircraft or ship. The cost of these services is scheduled to increase on October 1, 2002. In addition, a veterinarian or other animal attendant(s) is usually required to transit with a shipment of animals by air or sea. These costs would be added in addition to APHIS user fees. Animal health, feed, water and ventilation need to be ensured in-transit. For air transport, refueling stops, if required, need to be pre-arranged as there may be restrictions that would impact the heath certificates of the lambs. For example, refueling the aircraft in Europe may compromise a foot and mouth disease-free certificate of health.

Sheep/Lambs: The industry has estimated the typical cost of a breeder sheep/lamb, which is indicated in the table below, at $150 FOB. A purebred animal would cost approximately $300 FOB. Sheep/lambs could be transported by air or by ship.

Air transport - A typical 747 aircraft could carry up to 1,152 head of sheep/lambs weighing an estimated 100-150 pounds per animal. Cost estimates listed in the table below were based on Chicago FOB prices. There would need to be adequate space, sufficient fodder and quarantine facilities in or near the recipient airport. It is assumed that the recipient country can distribute the animals efficiently once they reach the destination port.

Ocean transport - Ships vary in size and can accommodate a much larger number of animals. One shipping company has ships that can accommodate between 3,290 and 48,260 head. There are even larger ships; however, the recipient country would need to be able to effectively distribute such a large number of animals at one time. A larger number of sheep/lambs (8,000-85,000) technically could be landed in Pakistan by ship from a port on the U.S. West Coast (e.g., Portland) and transported overland to Afghanistan, but that would be impractical given the current turmoil in the region. Ships departing from the East Coast (e.g. New York) would incur the additional cost of passage through the Suez Canal Zone. Any shipment to Pakistan would require the permission of the Pakistan government and the use of their port and quarantine facilities as well as transportation services to Afghanistan. The U.S. has exported dairy cows and cattle semen to Pakistan in the past. The U.S. currently does not have a comprehensive animal health protocol negotiated with Afghanistan. A protocol could be developed in consultation with APHIS, but this might take considerable time to accomplish.

Cost comparison to wheat: A cost construction and comparison to the volume of wheat that could be provided for a cost similar to that of live animals is presented, as was provided the perishable commodities section of this report.

Table 2: Air Freight Cost Estimates via 747 Aircraft for Non-Purebred Livestock

Commodity/ Country	U.S. Port	Port of Destination	FOB Cost To Port 1/	Air Freight	Misc. Cost 2/	C& F Landed 3/	Wheat 4/ Equivalent
U.S Sheep/Lambs 1,152 sheep/lambs @ $150/hd							
Guatemala	Chicago	Guatemala City	$172,800 1152 head	$150,000	$32,000	$354,800	1,503
Afghanistan	Chicago	Kabul	$172,800 1152 head	$250,000	$32,000	$454,800	1,960
Vietnam	Chicago	Ho Chi Minh	$172,800 1152 head	$220,000	$32,000	$424,800	1,880
U.S. Cattle 150 cattle @$1,100/hd							
Guatemala	Chicago	Guatemala City	$165,000 150 head	$150,000	$21,000	$336,000	1,424
Afghanistan	Chicago	Kabul	$165,000 150 head	$250,000	$21,000	$436,000	1,879
Vietnam	Chicago	Ho Chi Minh	$165,000 150 head	$220,000	$21,000	$406,000	1,796

Note: 1/ This estimate assumes an $1100 FOB cost per non-purebred animal for cattle.

2/Miscellaneous charges reflect the cost of the disposable animal pens and APHIS user fees for animal loading.

3/ Represents the total value of one air shipment of the live animals delivered to the recipient country including the cost of the animals, freight and miscellaneous handling costs.

4/ Wheat equivalent is the quantity in metric tons of U.S. No. 2, Hard Red Winter Wheat that could be shipped in bulk on a U.S. flag carrier to the destination country for a cost similar to the livestock.

Table 3: Ocean Freight Cost Estimates for Non-Purebred Livestock

Commodity/ Country	U.S. Port	Port of Destination	FOB Cost to Port 1/	Ocean Freight 2/	Misc. Cost 3/	C& F Landed	Transit Times	Wheat Equiv. 4/
U.S. Sheep/Lambs 3,290 head @ $150/hd								
Guatemala	Tampa	Puerto Barrios	$493,500 3290 head	$76,000	$2,300	$571,800	3-days	2,423
Afghanistan	Philadelphia	Karachi, Pakistan	$493,500 3290 head	$480,000	$2,300	$975,800	30 days	4,203
Vietnam	Portland	Ho Chi Minh	$493,500 3290 head	$354,000	$2,300	$849,800	24 days	3,760
U.S. Cattle 1,293 head @ $1,200								
Guatemala	Houston	Puerto Barrios	$1,551,600 1293 head	$115,000	$2,300	$1,668,900	4 days	7.072
Afghanistan	Philadelphia	Karachi, Pakistan	$1,551,600 1293 head	$585,000	$2,300	$2,138,900	29 days	9,154
Vietnam	Seattle	Ho Chi Minh	$1,551,600 1293 head	$515,000	$2,300	$2,068,900	28 days	9,219

Note: 1/ This estimate assumes a $1200 FOB per non-purebred animal price for cattle.

2/ The estimates assume a fully loaded vessel. Larger and smaller vessels are available depending on need. The example for sheep/lambs is the smallest vessel available from this company. Lower charges may be available depending on the shipping company, type of animals, and other factors.

3/ Miscellaneous expenses reflect estimated APHIS user fees for documentation and two staff veterinarians to load a ship for an 8-hour period. The fees could increase if animal loading exceeds 8 hours. The cost of animal feed for the voyage is not included in the shipping

company charges and would need to be calculated and added depending on the ship used.
4/ Wheat equivalent is the quantity in metric tons of U.S. No. 2, Hard Red Winter Wheat that could be shipped in bulk on a U.S. flag carrier to the destination country for a cost similar to the livestock.

VIII. CONCLUSIONS

A. *Perishables*: Most developing countries that would be recipients of food aid have limited available infrastructure to handle, store and distribute perishable commodities in a manner that would be consistent with product handling in developed countries. A food aid agreement for a perishable commodity, as for any other agricultural commodity, would require a Bellmon Determination and an UMR. The Bellmon Determination would assess the available infrastructure in the recipient country to ensure that the product could be handled, stored and distributed in a manner to prevent unreasonable spoilage. The UMR would ensure that food aid sales or donations would not unduly disrupt the recipient country's agricultural commodity prices and normal patterns of commercial trade. Perishable commodities, as food aid, would be better shipped by refrigerated shipping container, rather than by break bulk refrigerated vessel, as smaller quantities can be delivered over a longer period. Reasonable quantities of perishable commodities would be less likely to present challenges to the limits of a food aid recipient country's cold chain infrastructure.

B. *Livestock*: The logistics of ensuring the health and viability of the animals are paramount. A food aid agreement for live animals would require a Bellmon Determination and an UMR. The Bellmon Determination would assess the available infrastructure in the recipient country to ensure that the animals could be handled in a manner to prevent unreasonable mortality. The UMR would ensure that food aid sales or donations would not unduly disrupt normal patterns of commercial trade. Considerable attention needs to be given to the assessment of available fodder for livestock in the recipient country. In many cases, countries needing food aid would not have ideal conditions for providing animal fodder on a long-term basis. The provision of livestock as food aid to any country should be reconsidered if fodder must also be provided as food aid to keep the animals alive. Providing lambs to Afghanistan by ocean transport, although feasible, is not considered viable due to complicated logistics of obtaining clearances of the animals through neighboring countries and truck transport for the large number of lambs that would be involved in an ocean vessel shipment. Providing lambs to Afghanistan by air transport is considered more feasible because of less complicated logistics in arranging a point-to-point shipment of lambs and the more manageable size of a shipment.

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Port Infrastructure for Refrigerated Containers in Food Aid Recipient Countries

AFRICA/INDIAN OCEAN

Country/Port	Berths with Container Access	Direct Call Liner Service/ No. of Shiplines Calling	No. Reefer Points
Algeria			
Algiers	2 general cargo/container berths 10 berths (ro-ro)	10	none indicated
Oran	1 general cargo berth (for geared vessels)	8	none indicated
Angola			
Lobito	2 general cargo berths	5	none indicated
Benin			
Cotonou	1 berth	24	none indicated
Burkina Faso	landlocked		
Burundi	landlocked		
Cameroon			
Douala	1 berth	16	90 electric
Cape Verde Islands			
Porto Grande, Mindelo	no information		
Sao Vicente	no information		
Praia	no information		
Central African Rep.	landlocked		
Congo, (Democratic)			
Matadi	2 berths	14	none indicated
Congo, (Republic)			
Pointe Noire	general cargo berth for geared vessels	12	none indicated
Cote D'Ivoire			
Abidjan	1 container quay/1 berth (ro-ro)	32	4 electric
Djibouti	1 stern-ramp berth (ro-ro) 2 container berths	8	24 electric
Egypt			
Alexandria	3 berths	17	300 electric
Alexandria Container Handling Co.	2 container berths	12	300 electric
Damietta	4 berths	7	376 electric
Dekheila	1 berth (ro-ro)	none	none indicated
Abbas Quay	1 container berth/1 berth (ro-ro)	9	360 electric
Inland Clearance Depots	none	none	50 electric
Eritrea			
Assab	7 general cargo	6	none indicated
Ethiopia	landlocked		
Equatorial Guinea	no information		
Gambia			
Banjul	4 berths (ro-ro berths/geared vessels)	9	12 electric
Ghana			
Tema	3 berths (multipurpose)	14	280 electric
Guinea			
Conakry	2 general cargo berths	12	60 electric
Kenya			
Mombasa	3 container berths	23	72 electric
Lesotho	landlocked		
Liberia			
Monrovia	4 general berths	19	none indicated
Libya			
Benghazi	7 general cargo berths	13	none indicated
Tripoli	3 berths	15	none indicated
Madagascar	1 berth	5	none indicated
Mali	landlocked		
Malawi	landlocked		
Mauritania			
Nouadhibou	1 general cargo berths	4	none indicated

Port Infrastructure for Refrigerated Containers in Food Aid Recipient Countries

AFRICA/INDIAN OCEAN

Country/Port	Berths with Container Access	Direct Call Liner Service/ No.of Shiplines Calling	No.Reefer Points
Morocco			
Casablanca	3 berths (ro-ro)(east terminal)	25	151 electric
	2 berths (Tarik Terminal)	36	43 electric
Tangier	3 general cargo berths	6	none indicated
Mozambique			
Beira	1 berth	9	none indicated
Muputo International Port Services	inland container freight station		20 electric
Maputo Container Terminal	1 berth	2	68 electric
Nacala	1 berth	8	26 electric
Nambia			
Walvis Bay	3 berths	9	238 electric
Niger	landlocked		
Nigeria			
Lagos (Nigerain Ports PLC)	see specific terminal sites below	23	none indicated
Old Apapa Quays	20 berths	see above Lagos	none indicated
Third Apapa Wharf Extension	6 container berths/1 (multipurpose & ro-ro)	see above Lagos	none indicated
Tin Can Island	8 general cargo berths/ro-ro berths	see above Lagos	none indicated
Calabar	4 general cargo berths	3	none indicated
Onne	1 container berths/1 ro-ro berth	3	none indicated
Port Harcourt	8 berths	8	none indicated
Warri	4 general cargo berths	6	none indicated
Rwanda	landlocked		
Senegal			
Dakar	South Harbour-15 container/ro-ro berths	18	120 electric
Sierra Leone			
Freetown	2 container berths	7	2 electric
Somalia			
Mogadishu	no information		
South Africa			
Cape Town	5 container berths	15	336 electric
Durban	2 container berths/ 6 deep water berths	11	456 electric
East London	1 ro-ro berths/13 general cargo berths	5	42 electric
Port Elizabeth	2 container berths	10	72 electric
Inland Clearance Depots-CapeTown	none, 2 inland clearance depots	none	120 & 48 electric
Inland Clearance Depots-Duban	none, 1 inland clearance depot	none	30 electric
Inland Clearance Depots-Port Elizabeth	none, 1 inland clearance depot	none	5 electric
Sudan			
Port Sudan	2 container berths	8	none indicated
Swaziland	landlocked		
Tanzania			
Dar-Es-Salaam	3 container berths	6	60 electric
Tanga	1 berth (multipurpose)	5	none indicated
Togo			
Lome	2 container berths/quarter-ramp ro-ro berths	22	none indicated
Tunisia			
Rades	2 general cargo berths	none	none indicated
Tunis	3 ro-ro berths/7general cargo berths	22	20 electric
Uganda	landlocked		
Zambia	landlocked		
Zimbabwe	landlocked		
FAR & MIDDLE EAST/ASIA			
Afghanistan	landlocked		

Port Infrastructure for Refrigerated Containers in Food Aid Recipient Countries

AFRICA/INDIAN OCEAN

Country/Port	Berths with Container Access	Direct Call Liner Service/ No. of Shiplines Calling	No.Reefer Points
Bangladesh			
Chittagong	2 general cargo berths	15	90 electric
Bhutan	landlocked		
Brunei			
Muara	multipurpose berths	6	
FAR & MIDDLE EAST/ASIA			
Cambodia	(http://www.cambodia.gov.kh/)		
Sikanoukville Port	5 general cargo berths	3	none indicated
Phnom Pehn Port	2 general cargo berths (draft limitations)	none indicated	none indicated
China			
Chiwan	1 berth	1	96 electric
Dalian	4 container berths	9	872 electric
Fuzhou	11 berths	2	
Gaolan	2 multipurpose berths	1	
Hong Kong (terminal 3)	1 berth	3	378 electric
Hong Kong (terminal 8-east)	2 berths	4	696 electric
Hong Kong (terminal 1/2/5&8)	2 berths	35	2,454 electric
Hong Kong (terminal 4/6/7)	10 berths	26	1,368 electric
Huangpu	2 berths (ro-ro)	5	100 electric
Jiangmen	2 berths (multipurpose)	5	10 electric
Jiuzhou	7 berths (multipurpose)	1	8 electric
Lianyungang	2 berths	3	200 electric
Nanjing	1 berths	1	104 electric
Qingdao	8 berths	23	2,400 electric
Qinhuangdao		1	
San Shan	5 berths (multipurpose)	5	10 electric
Shanghai			
Shanghai Horbour Bureau	container berths (no #'s)	17	none indicated
Bao Shan terminal	container berths (no #'s)	none	351 electric
Jun Gong Lu terminal	container berths (no #'s)	none	270 electric
Zhang Hua Bang terminal	container berths (no #'s)	none	480 electric
Shantou Port Authority	2 berths	5	312 electric
Shekou	2 berths	13	192 electric
Tianjin	1 berths	14	382 electric
Xiamen	2 berths	none	256 electric
XICT Terminal	1 general cargo berths	4	240 electric
Yantai	1 berths	1	48 electric
Yantian	5 berths	26	1,170 electric
Zhangjiagang	1 berths	none	none indicated
Zhanjiang Harbour Container	2 berths	4	none indicated
East Timor			
Dili	1 general berth (ships must self unload)	none indicated	none indicated
Gaza Strip (Israel)			
Ashdod	2 multipurpose berths	8	588 electric
India			
Chenna	3 container berths	25	60 electric
Cochin	2 container berths	22	122 electric
Jawaharlal Nehru (JN terminal)	3 container berths	10	288 electric
Nhava Sheva International	2 container berths	10	588 electric
Kandla	1 container berths	4	none indicated
Kolkata	5 general cargo berths	30	144 electric
Haldia Container terminal	1 general cargo/container berth	none	12 electric

Port Infrastructure for Refrigerated Containers in Food Aid Recipient Countries

FAR & MIDDLE EAST/ASIA

Country/Port	Berths with Container Access	Direct Call Liner Service/ No. of Shiplines Calling	No. Reefer Points
Mumbai Port Trust	none	25	none indicated
Ballard Pier	2 container berths	none	none indicated
Indira Dock	5 berths	none	16 electric
Mundra	4 multipurpose/container berths	none	none indicated
New Mangalore	6 general cargo berths	3	none indicated
Pipavav	3 general cargo/container berths	2	none indicated
Tuticorin	general cargo berth	3	none indicated
PSA Sical terminals Ltd	2 container berths	11	84 electric
Visakhapatnam	1 general cargo berth	17	96 electric
Inland Clearance Depots	none	none	4 electric
Central Warehousing Corp	none	none	76 electric
Indonesia			
Belawan (Domestic)	1 berths	none	none indicated
Belawan (International)	1 berths	21	72 electric
Makassar	2 berths	none	36 electric
Tanjung Perak	1 quay	23	246 electric
Tanjung Priok	4 berths	26	288 electric
Jordan			
Aqaba	2 berths	16	none indicated
Korea, Democratic Peoples Rep.			
Nampo	general cargo berth		
Chongjin	container berth		
Laos	landlocked		
Lebanon			
Beirut	3 berths (ro-ro)	18	none indicated
Mongolia	landlocked		
Morocco			
Casablanca	1 berths (ro-ro)	25	151 electric
Tarik Terminal	4 berths (ro-ro)	36	43 electric
Tangier	1 berths (ro-ro)	6	none indicated
Nepal	landlocked		
Pakistan			
Karachi	2 berths (conventional)	13	none indicated
Karachi Intn'l Container Terminal	3 container berths	7	96 electric
Port Mohammad Bin Qasim	3 container berths	11	216 electric
Philippines			
Manila International Terminal	5 container berths	37	630 electric
Pier 10	5 berths	1	none indicated
Pier 12	5 berths	1	none indicated
Pier 14	14 berths	1	none indicated
Pier 16	4 berths	1	none indicated
Pier 2	4 berths	1	none indicated
Pier 4	5 berths	1	none indicated
Pier 6	5 berths	1	none indicated
Pier 8	5 berths	1	none indicated
CEBU	1 berth	9	49 electric
DAVAO	9 berths (multipurpose)	7	10 electric
ILOILO	1 container/berth (ro-ro)	4	36 electric
Zamboanga	2 berths (multipurpose)	5	none indicated
Sri Lanka			
Jaye Container (terminal)	6 container berths	20	564 electric
South Asia Gateway (terminal)	3 container berths	19	604 electric
Syria			

Lattakia	3 general cargo berths	14	none indicated

FAR & MIDDLE EAST/ASIA

Country/Port	Berths with Container Access	Direct Call Liner Service/ No.of Shiplines Calling	No. Reefer Points
Vietnam			
Hai Phong	2 general cargo berths	25	none indicated
Chua Ve terminal	1 container terminal	no information found	none indicated
Ben Ngne	1 container terminal	no information found	60 electric
Saigon Port	13 berths	no information found	none indicated
Yemen			
Aden	2 berths	5	252 electric
Hodeidah	1 container/ro-ro berths	11	none indicated
CENTRAL AMERICA/CARIBBEAN/SOUTH AMERICA			
Belize			
Belize City Port Authority	1 general cargo/1 ro/ro berth	2	12
Bolivia	landlocked		
Colombia			
Barranquilla	6 berths	13	48 electric
Buenaventura	10 general cargo berths (ro-ro)	none	
Costa Rica			
Puerto Limon	1 container berth	7	80
Dominican Republic			
Boca Chica	1 quay	2	none indicated
Rio Hania	breakbulk/berths	21	none indicated
Rio Hania (west terminal)	2 berths	8	69 electric
Santo Domingo	general cargo berths (ro-ro)	1	
Ecuador			
Guayaquil	3 berths	5	1,125 electric
El Salvador			
Acajutla	2 berths	2	6 electric
Guatemala			
Santo Tomas De Castilla	1 berth	11	none indicated
Guyana	no information found		
Haiti			
Cap Haitien	1 general cargo berth	none	none indicated
Port-Au-Prince	1 berth	20	60 electric
Honduras			
Puerto Castilla	1 berth	none	190 electric
Puerto Cortes	2 berths (ro-ro)	9	120 electric
Jamaica			
Kingston	6 berths	11	462 electric
Kingston Wharves terminal	1 beths (multipurpose)	6	162 electric
Nicaragua			
Corinto	1 container berth	8	none indicated
Peru			
Callao	22 general cargo/container berths	11	30
Matarani	3 general cargo/container, 1 ro/ro berths	5	none indicated
Suriname	1 berths (ro-ro)	5	none indicated
EUROPE			
Armenia	landlocked		
Azerbaijan	landlocked (Caspian seaports)		
Georgia			
Poti	2 general cargo berths	not indicated	none indicated

Batumi	no information found	not indicated	none indicated
Kosovo			
Kyrgyzstan	landlocked		

EUROPE			
Country/Port	**Berths with Container Access**	**Direct Call Liner Service/ No. of Shiplines Calling**	**No. Reefer Points**
Moldova	landlocked		
Montenegro			
BAR	none	none indicated	40 electric
Container terminal	1 container berth	none indicated	48 electric
Russia			
Nakhodka	1 container berth	4	none indicated
St. Petersburg			
Sea Port of St. Petersburg, LTD		45	none indicated
Fist Container Terminal	3 container terminals	9	1,200 electric
Fourth Stevedoring Co.	1 ro/ro berth, 2 general cargo beths	not indicated	40 electric
Vladivostok	2 container terminals	2	none indicated
Vostochniy	2 container berth	5	169 electric
Serbia Croatia			
Rijeka	3 container berths	5	40 electric
Tajikistan	landlocked		
Turkmenistan	landlocked (Caspian seaports)		
Ukraine			
Ilyichevek	3 container/ro/ro berths	1	none indicated
Odessa	1 container berth, 1 container sternramp berth	7	24 electric
Uzbekistan	landlocked		