FOOD PROTECTION DURING DISTRIBUTION[1]

PAUL SCHENCK
Refrigerated Transporter
1602 Harold Street, Houston, Texas 77006

ABSTRACT

In-plant inspectors in federally-inspected meat plants are satisfactorily inspecting trucks that distribute meat and meat products In other food plants, inspections are more random and could be improved. Some truckers claim bias and lack of consistency in the acceptable degree of cleanliness. Refrigerated trucks on the road today are better than they have ever been before, and there are more of them. However, not all trucks meet the minimum standards of temperature protection and cleanliness. Food sanitarians can do a better job of checking trucks for their ability to safely transport perishable cargo, which would result in less claims damage and loss to both carrier and shipper.

As far as I can determine, sanitarians are not inspecting trucks. Outside of the USDA meat inspectors in plants shipping interstate, practically no one inspects trucks. Quality control inspectors do not inspect the trucks. Sanitarians do not inspect trucks. No one representing the shipper's interest sees the inside of a refrigerated truck, other than the dock hands and foreman.

This is what the truck lines tell us, and we asked quite a few of them. Many of these trucks haul more meat than anything else, so they do get inspected quite frequently at meat plants. State and city inspectors also get into the act on meat shipments.

But I still see meat being shipped in open trucks, pickups, compact vans, station wagons, trunks of automobiles, etc. And what about the foods other than meat—dairy foods, produce such as lettuce, frozen foods, fish and other seafoods, tree fruits, and berries? I don't say that these foods need to be as closely regulated as meat and poultry now are, but from a quality control standpoint within a company, vehicles that transport and distribute foods could be more closely inspected at the loading dock to prevent food spoilage and eventual damage claims.

NEED TO CHECK TRANSPORTERS

There is a real need for food sanitarians or quality control people to check on their food transporters, both for cleanliness and for proper temperature control. Some outstanding examples might point up why.

Take New York, for example. I have always regarded New York City as having the most stringent food manufacturing codes. And it may be true. Everything is regulated, controlled, and prohibited in New York City. But that's as far as it goes. Nothing is enforced, at least as far as refrigerated trucks are concerned.

New York State may have the poorest refrigerated trucks in the nation. I remember visiting one of the larger refrigerated carriers in the state, and photographing his truck loading operation. The truck bodies were ancient, and they were in a terrible state of repair. When the last carton was crammed into the truck, the door was swung around, almost closed. Dock hands did not even attempt to close it all the way, for they had been unable to get it closed for some weeks. Instead, a wire was hanging on the door locking bar so they could wire the door in an almost-closed position, with a 2 or 3-inches gap left open. Sure, the refrigeration unit was turned on, and it would do some good refrigerating the cartons at the front of the truck. But the whole effect would be like driving in humid Houston with the windows down and the air conditioner on in our 100 F, 100% humidity weather.

While New York State may have the poorest refrigerated trucks in the nation, it is at least better than New York City. In the city, they don't even bother with a refrigerated truck. Instead, they use open pickups and light compacts of the Econoline variety to transport their meat. If you would visit the alleys behind many of those fancy restaurants, you would see their meat and perishable foods being delivered in dry freight vans, pickups, and compact vans. Some go as far as using an insulated van. But it probably does not have a refrigeration unit. Just an insulated van.

Veteran truck watchers, the men who spend more time looking at trucks than at girls, just don't see refrigerated trucks on New York City streets. I have been puzzled over this for many years, and several years ago I did some investigating to find out why. I found that there are regulations. City health department inspectors could reject incoming milk deliveries at a retail store if the temperature were over 50 F, and there are comparable meat handling regulations. Refrigeration is generally not required, but temperature control of the product is required, although hard to enforce.

Generally speaking, the enforcement divisions I talked to just didn't care or didn't know enough or

[1]Presented at the 59th Annual Meeting of the International Association of Milk, Food, and Environmental Sanitarians, Milwaukee, Wisconsin, August 21-24, 1972.

didn't have enough inspectors to do a job. The feeling was that the sun never shines in New York anyway, so there is no need to protect foods from heat damage during shipment.

I don't mean to pick on New York City. It is just the most outstanding example, being the largest city with probably the weakest enforcement. But the same thing happens in cities throughout the United States. I know that it happens in my city, Houston. A driver in Minneapolis, for example, told me he didn't care whether the refrigeration unit on his milk delivery truck worked or not. All he wanted was a unit to make some noise like it was running while he was unloading at some of the more quality-conscious supermarkets.

The noise of the unit has the opposite effect on some drivers. I inquired of a Mexican refrigerated carrier why he restricted his loads to frozen strawberries. He explained quite candidly that he did not have quite as much control over drivers in his country as we do here in the States. The driver is out there driving all by himself on lonely roads throughout the night. Noise of the refrigeration unit behind the cab gets to bothering him. So he turns off the refrigeration unit engine to get rid of the noise. For most of the 600 miles between the strawberry-producing regions around Irapuato to the border at Laredo, the truck is traveling without refrigeration other than that contained in the load itself. Frozen stawberries can stand that kind of abuse without it being detected, but fresh strawberries can't. Therefore, the frozen load is safer from a damage claim standpoint.

Decisions are a Factor in Competition

I think that you, as inspectors, have to appreciate that your decisions may be a competitive factor in the trucking of perishables. For example, right now in New York City, the reason we don't see many refrigerated trucks on the streets is that, competitively, most firms feel they can't afford the extra expense of insulated trucks and refrigeration units. Their competitors are not required to carry this extra expense, so why should they? Professional truck people tell us they can't sell, rent, or lease a decent refrigerated truck in New York City. The buyers don't want them. They're too expensive.

In cities where there is a fair amount of enforcement of food handling codes, the industry does some self-policing to this extent: A carrier who is doing a good job with clean equipment at the right temperature may be undercut in rates by another carrier with poor equipment or very little temperature control. The carrier with good equipment is going to encourage the Meat Inspection Division or local inspectors to check the carrier with poor equipment and so try to put him out of business—or at least force him to acquire better equipment and face the same costs. So the important thing in these regulations, aside from the primary purpose of protecting the wholesome quality of the food, is to make the regulations uniform and apply equally to everyone. This means enforcement should apply to the small truck operator as well as to the large one.

Inspectors also figure in the economic competitiveness of shipper versus carrier versus receiver. Not all truckers feel that inspectors have been fair in their judgments. Specifically, they state that it is almost impossible to get a written report from the receiving inspector telling why merchandise is rejected. And they say inspectors are not consistent—the same truck that was OK for loading last week will be rejected this week. They claim that inspectors tend to favor either the shipper or the receiver. When a load is rejected by the receiver, carriers question whether the real reason might not be that the market is down, or that the receiver may want to file a claim to help pay for the freight. For this reason, they have had to rely on independent inspectors to get a fair and unbiased report.

Claims are just another cost of doing business, and carriers know that if they are to be profitable, they must closely scrutinize the claims ratio. The better operated companies do this by using good equipment and keeping it well maintained so that it doesn't break down on the road. Even with good, reliable drivers who check the cargo temperature every few hours, though, they will still face a claim at destination for reasons beyond the control of the carrier. These reasons may range from too-warm cargo loaded at the shipper's dock to actual acts of God.

That is the reason for a little perishable claims manual entitled *"Perishable Claims: The Problem and the Cure."* It was written by a refrigerated carrier executive who had the benefit of many carriers' experience. It discusses the legal aspects of claims, citing court cases and prior decisions that affect claims payment. It also discusses how to prevent claims in the first place by proper cleaning of equipment, proper loading and unloading, and care of the perishable cargo while in transit. It includes frozen food handling codes adopted by industry as well as proper temperatures for several foods. I suggest that anyone involved with inspecting incoming or outgoing shipments might better understand the entire picture, including the economic benefits to his company, by having this 117-page book as a reference. It is published by the Common Carrier Conference-Irregular Route of the American Trucking

Associations, 1616 P Street NW, Washington, D. C. 20036.

For example, one of the useful items in this book is a two-page discussion of sour round in fresh meat. Many a carrier has paid claims for loss of quality because of "sour round, bone sour, or bone taint." However, the authority cited here shows how sour round can be caused by an excited animal with an increased level of propionate in peripheral blood and the carcass is not rapidly chilled after slaughter. In other words, the sour round can be caused at the packing plant rather than by any temperature conditions in transit. In the same manner, dark-cutting beef may be traced to ante-mortem stress. The author suggests that carriers consult a biological testing laboratory before paying claims on sour round. If the condition is caused by fatty acids, the carrier has no responsibility for the condition since it was set up before he took delivery on the meat.

CONCERNS OF INSPECTORS

Inspectors of transportation equipment, should be primarily concerned with the ability of the trailer or truck to get the perishable cargo to the destination without physical damage, bacterial damage, odor damage, and heat damage (or freeze damage). The best temperature for hauling much of the fresh produce like lettuce is as close to 32 F as possible without freezing. Several degrees lower and the lettuce will be ruined—carriers who get caught with their temperatures down become long-distance garbage haulers.

In inspecting equipment, realize that the manufacturers of trailers and truck bodies can easily determine the precise heat loss of their vehicles. Trailers have been tested accurately for heat loss for at least 12 years now, at the Budd Laboratories in Philadelphia, and at a similar facility at Miner Enterprises in Chicago. The only problem with these tests is that they are expensive—costing about $1,700 per test plus transportation costs to either of these cities. Now a new testing procedure developed by the Truck Trailer Manufacturers Association permits similar testing right in the trailer manufacturing plant or in the fleet garage. All that is required is an insulated test room big enough to test the trailer or truck body and about $3,000 worth of test equipment—mainly temperature recorders and heaters. The air leakage test which is done at the same time requires about $300 worth of test equipment.

Results of the test are stated as air leakage in terms of cubic feet per minute, and heat leakage in terms of BTU's per hour per °F difference between the ambient and the inside box temperature. A common standard is to consider the most extreme case —that is, of hauling frozen foods at 0 F on a 100-F summer day or a temperature difference of 100°. A well-insulated 40-ft. trailer as constructed today should test out at approximately 8,000 BTU's at 100° temperature difference, or 80 BTU's per degree temperature difference, or less.

As for air leakage, the USDA method that is performed at the Budd Laboratories in Philadelphia or the Miner Laboratories in Chicago tests air leakage of the van when it is pressurized to 0.1 inch water pressure, while the new TTMA in-plant test uses a pressure five times higher, at a 0.5-inch water column pressure. Therefore, the two tests aren't directly comparable. A test trailer that will leak 2 ft^3/min pressure. A trailer leaking 4 ft^3/min at 0.1 inch will at 0.1 inch pressure will leak 7 ft^3 min at a 0.5 inch pressure. A trailer leaking 4 ft^3 min at 0.1 inch will leak 11 ft^3/min at 0.5 inch. And a trailer leaking 5 ft^3/min at 0.1 inch will leak almost 15 ft^3/min at 0.5 inch. These are actual test values taken from three different trailers.

Some new trailers will carry these ratings on a plaque or plate that can be checked. The values are determined when the trailer is new. The heat gain through the walls will not change much during the life of a trailer, but the air leakage rates can change drastically when door seals are damaged or worn. Of course, the air leakage rate affects the heat leakage, since the incoming warm air must be cooled.

These rating figures are especially meaningful now that we also have a BTU rating figure for the refrigeration units. The manufacturers of refrigeration units have agreed on a standard method of rating the cooling capacity at two temperatures, 35 and 0 F. The largest units made by the major manufacturers generally have a rating of approximately 18,000 to 20,000 BTU's per hour at 0 F in a 100 F ambient.

You can see that the largest refrigeration units generally have a cooling capacity about double that required to make up for the heat loss in the trailer when hauling frozen foods on a hot summer day, and about four times that required to haul fresh meat or produce. But that extra reserve capacity is not to be considered as useful for cooling the cargo. It is designed only to cool the air temperature inside the trailer after loading, and to provide a reserve in the event of equipment wear. It will also cool the trailer after door openings for drop shipments. But it is not possible for this doubled refrigeration capacity to keep the cargo at 0 F when making 15

or 20 LTL deliveries in a day.

I state this because shippers sometimes expect the carrier to cool their warm meat, or because frozen food shipments are questioned when they arrive at a few degrees above 0 F because the truck had to make a dozen door openings at previous stops. A carrier is only expected to deliver cargo at the same temperature at which it is loaded. He cannot be expected to cool in transit. We know that many meat packers do get overcrowded in the cooler and will ship warm meat. For this reason, many carriers require their drivers to take product temperatures on the dock before shipment. If the shipper loads and seals the trailer, then the driver will have to reach through the rear vent door to insert a thermometer in the product. Many trailers also are equipped with recording thermometers to protect the carrier from damage claims.

Besides a well insulated van with tight fitting doors and a refrigeration unit large enough to maintain product temperature, the inspector should inspect for cleanliness of the interior considering the product to be hauled.

A Clean Truck

If the trailer is designed and built properly, it can be easily cleaned. This includes fiberglass-reinforced plastic walls and ceiling, stainless steel meat rails, and tightly welded floor. Whether using corrugated aluminum refrigerator flooring or steel or aluminum flat plate, the floor seams can be welded to prevent water, blood, and meat residue from seeping into the insulation. When floors or walls are of wood, trailers are not so easily cleaned, and these demand closer inspection for odors, meat drippings, maggots, and other unclean conditions.

Sometimes foods get shipped by common carriers who normally haul only dry freight. There have been cases reported where foods such as lettuce were shipped in trailers that still had spilled agricultural chemicals on the floors—chemicals such as parathion, chlorodane, or DDT. This is an exception, and represents problems involved in trying to get by with someone other than a food carrier.

Generally speaking, meat trailers are steam cleaned just before picking up the load, and often cleaned again at the other end of the line after delivery. In this connection, there is a new phenomenon that is now puzzling carriers in regard to cleaning trailers. A microbiologist at the University of Georgia proposed a theory, substantiated by experiences of carriers, that loss of bloom or meat discoloration can be caused by oxides in the detergents used to sanitize the walls of the trailer. Experiments prove that oxides left on the walls produce abnormal amounts of oxygen under the blast of air from the refrigeration unit, which in turn causes the meat to lose its bloom. One carrier is successfully resisting a claim because the shipper insisted the trailer be cleaned at the shipper's washing facility, and loss of bloom resulted from the cleaning chemicals. More research is going on and perhaps we will have more complete answers later.

Another condition that can cause loss of bloom is changing the temperature setting of the refrigeration unit. If the unit has been set at, say 28 F, and the trailer temperature is stabilized at that temperature, then changing to 34 F will cause the unit to introduce heat to raise the air temperature to that level. The meat may then become discolored during this heat cycle.

These are fine points, but they represent the state of the art of refrigerated transport today. We have solved the major technology and cost hurdles, and are now perfecting the fine points.

Some Problems and Future Developments

Refrigerated transport has never been better than it is today. The equipment is available for handling cross-country or around the corner almost any size shipment from 5 to 40,000 lb. When I say the equipment is available, I mean that many carriers, both private and for-hire, are using it. But not all. There are still some who try to get by with sub-standard equipment or non-refrigerated trucks, and those are the ones we are trying to convert. You hold an economic arm lock on them when you turn down these non-refrigerated or substandard vehicles.

There are still problems to be solved. One has to do with LTL shipments. It is not always possible to get delivery of small shipments to out-of-the way places like Muleshoe, Texas, or Wheelwright, Kentucky. What's more, it is very difficult to maintain the air temperature inside the trailer when making a large number of drop shipments. But through the use of curtains, bulkheads, and large capacity units, the industry is doing a very acceptable job and improving all the time.

One of the newest developments is a trailer design that the Department of Agriculture has been working on for some years. This prototype van trailer was shown at Transpo 72 in Washington in June. It is unique in that it achieves much better air circulation throughout the van. Air distribution is the really critical point today—surrounding the load with a blanket of cool air, and for some products, pushing the air through the cargo. In the USDA van, this is achieved by increasing the air

pressure more than five times with bigger fans, and by blowing this high pressure air down the sidewalls so that it comes out at floor level before rising up and flowing back to the front.

The larger fans provide air at about 2.2 inches of static pressure at the unit, or 1½ inches by the time it is distributed at the bottom of the sidewall flues, compared to about 0.2 inches external static pressure in most refrigeration units in use today. The air flows down the length of the trailer in two ceiling ducts and is forced down the flues between the insulation and the interior liner. It comes out at floor level. The floor is laid crosswise instead of longitudinally so that the air can flow under the load and up through it to the return air duct also in the ceiling. This trailer is designed so that the loaders can't block air passages when they cram in those last few cartons. It also has ports for injection of cryogenic gases for pre-cooling or in case of emergency malfunction.

In discussing some of the problems with refrigerated transportation, I hope you don't get the mistaken impression that the industry is suffering today from any really serious difficulties. Far from it. The state of the art is very high today compared with a few years ago—like proceeding from the ice age to the mechanized age. In the past 10 years practically the entire fleet of trucks and trailers on the road has been converted from various soggy insulations to the present standard, which is foamed-in-place polyurethane insulation. This foam insulation has about twice the insulation efficiency of any previous material and it tends to seal the van against air leakage. It does not become waterlogged, settle, or freeze the way other insulations did in the past. This is probably the single most revolutionary development in refrigerated transport in recent years, and the fact that the industry converted to it almost from the beginning is evidence of the desire to provide the best possible food transport.

Generally speaking, you can obtain today the same conditions of sanitation, refrigeration, and product protection in transit as in plants. It just costs more to provide it on the road.