Perishables Distribution In The 1970's

Containerized Handling in Future Delivery of Perishables

Food 70's

Describes present methods of delivery utilizing unitized handling and evaluates future developments

F. S. Macomber
Senior V. P. Transportation
A. T. Kearney & Co., Inc.

INTRODUCTION

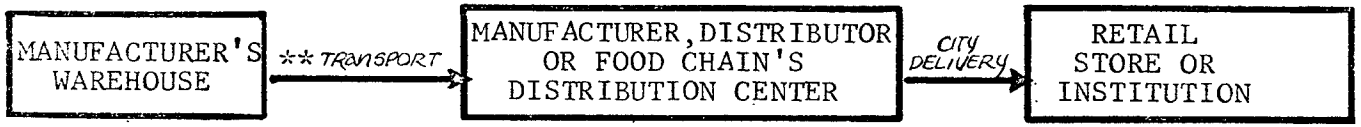
In reviewing the present distribution system for perishables and relating it to the container era, it appears important initially to make a distinction between the ISO standard containers, 8' x 8' x 20' and 8' x 8' x 40' and smaller containers which might be used inside the vehicle to unitize shipments. In the context of the title of this presentation, I intend to deal with both classes of containers as well as cargo cages and other unitizing devices because I believe there is as much potential benefit for the smaller sizes as from the large.

PRESENT DISTRIBUTION SYSTEM FOR PERISHABLE FOODS

Although there are hundreds of possible combinations in the flow of perishable items from the manufacturer to the ultimate retail store, the most common pattern is illustrated in Exhibit I. This shows the various steps and handlings involved in moving frozen foods and produce from origin to destination. In spite of the great improvements in warehouse design and materials handling operations in recent years, there still seems to be considerable room for improvement as we survey the present fairly complex distribution system and note the number of individual case handlings. In many cases there are good and valid reasons why case handling must take place. For example, in some product lines it may not be possible to get up to truck weight limits in palletized unit loads. Careful hand stacking is often required. However, there are also many places where our experience indicates that containerization and unitization can be made to work if the company involved has the patience to continue testing and experimenting until the proper combination is found. We will discuss specific suggestions along these lines in a later portion of this presentation.

EXHIBIT I

FLOW CHART OF TYPICAL PERISHABLE FOOD DISTRIBUTION



A) Order pick
B) Load reefer car or truck-
1. palletized or slip sheet
2. case by case

A) Unload with fork lift (or by hand to pallets)
B) Stack in reefer room
C) Order pick by store
D) Load-
1. by hand
2. palletized
3. unitized
4. insulated 50cu.ft. containers*

A) Unload-
1. by hand
2. palletized
3. unitized
4. insulated 50cu.ft. containers*

DISADVANTAGES OF PRESENT SYSTEM

a) Requires as many as 6 case handlings
b) All products move through distribution center
c) Relatively high inventory required
d) Spoilage rate can be high due to elasped time

*Most of these move to store in regular dry grocery vans
**LTL may be handled in transit at break bulk terminal

FUTURE CONCEPT OF BYPASSING DISTRIBUTION WAREHOUSES

In looking towards the future it is often a valuable discipline to attempt to project the ideal situation in streamlined distribution system and then back away from this to something that represents a compromise between the present and the often unattainable ideal.

An example of a possible future distribution system for produce is illustrated in Exhibit II. For illustration we have used produce distribution to stores in a Chicago food chain. Daily requirements for each store are relayed as a computer printout to a modern produce terminal in California. These are order picked directly into unitizing devices of approximately 25 cubic feet; a particular store might take anywhere from 6 to 20 of these unit loads. These are mechanically loaded by fork lift into an ISO reefer container which is part of a pool that moves back and forth to the Midwest. The container may have from three to eight store drops and of course would be loaded for stores that are in the same section of the city.

The container would then be moved by straddle carrier from its position by the door of the produce terminal and placed directly on a piggyback car nearby in the same terminal. The string of cars which would finally evolve from such activity would be attached to one of the existing daily high speed piggy-back trains and moved to Chicago in less than 40 hours.

The container would be transferred by gantry crane or van carrier to a chassis and would be moved to the various stores involved where the unit loads would be taken directly into the back room cooler at the store; thus, bypassing the regular distribution center.

Small stocks would probably have to be kept of all items, but these would be loaded into small insulated containers of 50 cubic feet or less and moved to the stores as part of the dry grocery distribution system. Thus, there would be a dual ordering pattern, the major volume coming through the regularly committed share of the direct container movement and the balance (created by deviation from the forecast sales) would be made up at a much smaller perishable warehouse facility attached directly to the dry grocery warehouse and shipping complex. Present container rail rates do not favor this system and there are other legal barriers at present. However, it does appear to have a sound economic basis for a future distribution program.

Since California is the source of such a large percentage of the produce, the concept of remote order picking for direct delivery applies better than it would to many other refrigerated products that come from different parts of the country and must be assembled at the distribution center for redistribution to the stores. However, the container concept can also be applied to movements of frozen food products which pass through the distribution center. In

EXHIBIT II

FUTURE CONCEPT OF BYPASSING DISTRIBUTION WAREHOUSE

A) Receive telex of designated mix of items from stores
B) Order pick and unitize (at same time)
C) Load unit loads into container in route sequence for destination city (3 to 8 store drops)

A) Container is transfered to chassis by gantry crane

A) Unload unitized produce & move into freezer

MAJOR BENEFITS

A) Only one case handling
B) Reduction in elasped time (more shelf life)
C) by pass warehouse at destination city (less inventory)

DISADVANTAGE

A) Commitment of container space
B) Must have alternate back up system

serving chains in a major city, a vendor source does not have to put together a large mixed carload of their product line for a particular chain distribution center. He can send a much smaller order quantity in 8' x 8' x 20' containers and then assemble a number of these containers to make a respectable load on the piggyback car (three to six containers). This reduces inventory by allowing more frequent replenishment with a smaller quantity at each replenishment. There still are many difficulties and legal barriers to fully use this concept. These are being battled out as the container inventory through the world increases and containerships are launched.

WAYS OF USING THE CONTAINER CONCEPT TODAY

Between the extremes previously described (present distribution pattern and idealized pattern) there appear to be a number of steps towards greater use of the container concept that can be used today in selected situations. Here are three that look promising:

1. Use insulated small containers in dry grocery vans in dry grocery vans in servicing outlying stores to avoid repetitive stops and extra driving. This is in use to some degree now.

2. Unitize produce and frozen foods as part of the order picking operation to avoid case handling at stores and provide orderly storage. Unit loads smaller than a typical pallet (three across the truck) seem to be indicated because of back room limitations.

3. For large stores, consider use of drop-off van sized reefer containers on legs that substitute for the freezer room and seal into a special door.

Each of these will be described in the following sections of this presentation.

SMALL INSULATED CONTAINERS IN DRY GROCERY DELIVERY

A number of small containers suitable to be loaded by fork lift or on their own wheels into highway trailers have been on the market for several years. Design refinement is still taking place with both the rigid containers and collapsible containers of one type or another.

The line of containers made by the Avco Corporation including the Uni-Reef System in restaurant distribution has been tested in a number of situations with apparent economic benefit.

The Firestone Tire and Rubber Company has been working on a unique type of collapsible container that has interesting features that should provide

additional benefits.

A relatively cheap styrofoam type of collapsible insulated container is in the early stages of development and is shown in the series of sketches Exhibits III, IV and V.

The assumption is made that the frozen foods or perishables, can be order picked and easily brought to the shipping dock where the dry groceries are being loaded. In many cases chains have different buildings from which they ship and it may not be practical to make the combination suggested.

A number of chains have found this concept to be workable particular with their outlying stores. The two tables which follow indicate the "before and after" picture of a Chicago grocery chain where we simulated the movement of perishables to the stores in the same vans as dry groceries using small insulated containers.

COST SUMMARY

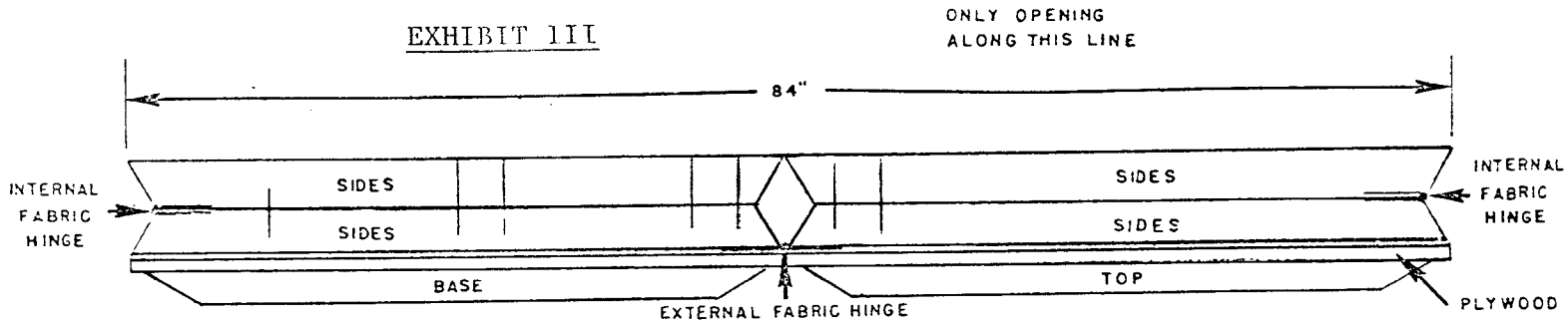
WAREHOUSE TO RETAIL STORE DISTRIBUTION

PRESENT METHOD

(SEPARATE SHIPMENTS OF GROCERIES, PRODUCE AND FROZEN FOODS

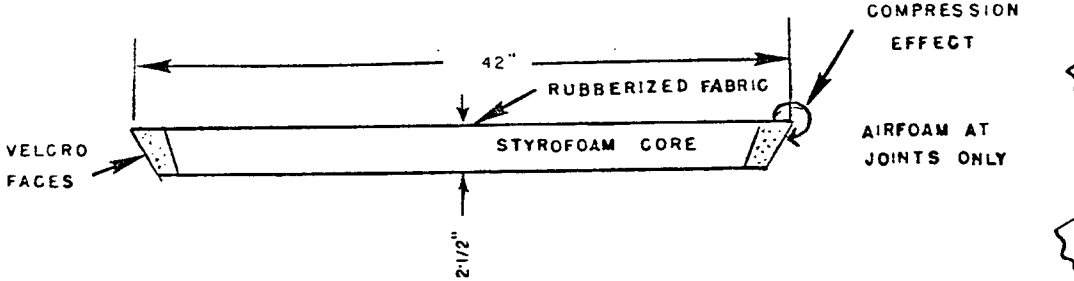
		Costs Per Week
Wages	S. T. 880 hours @ $3.75	$ 3,300
	O. T. 61 hours @ $5.625	343
Tractors	22 @ $40/week	880
	8,600 miles @ $ .15/mils	1,290
Dry Vans	18 @ $22.50/week	405
	4,405 miles @ $.05/mils	220
Refrigerated Vans	10 @ $35/week	350
	3 @ $40/week	120
	4,195 miles @ $.065/mile	273
Total		$ 7,181

EXHIBIT III



TOP & BASE COULD BE STRAPPED TO
SIDE PANEL SHELL IN COLLAPSED POSITION

DWG. NO. 4



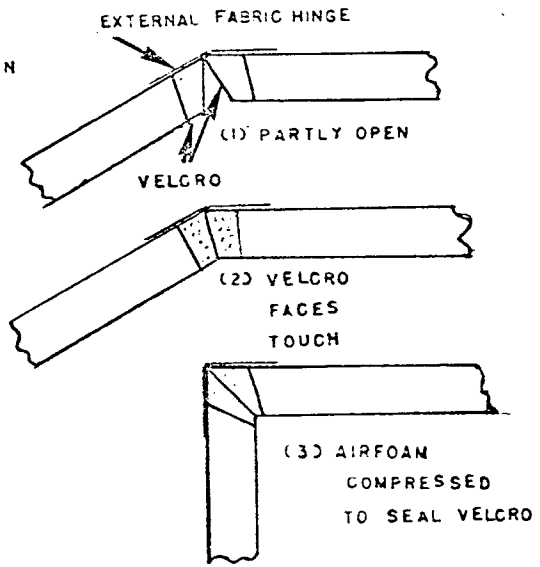
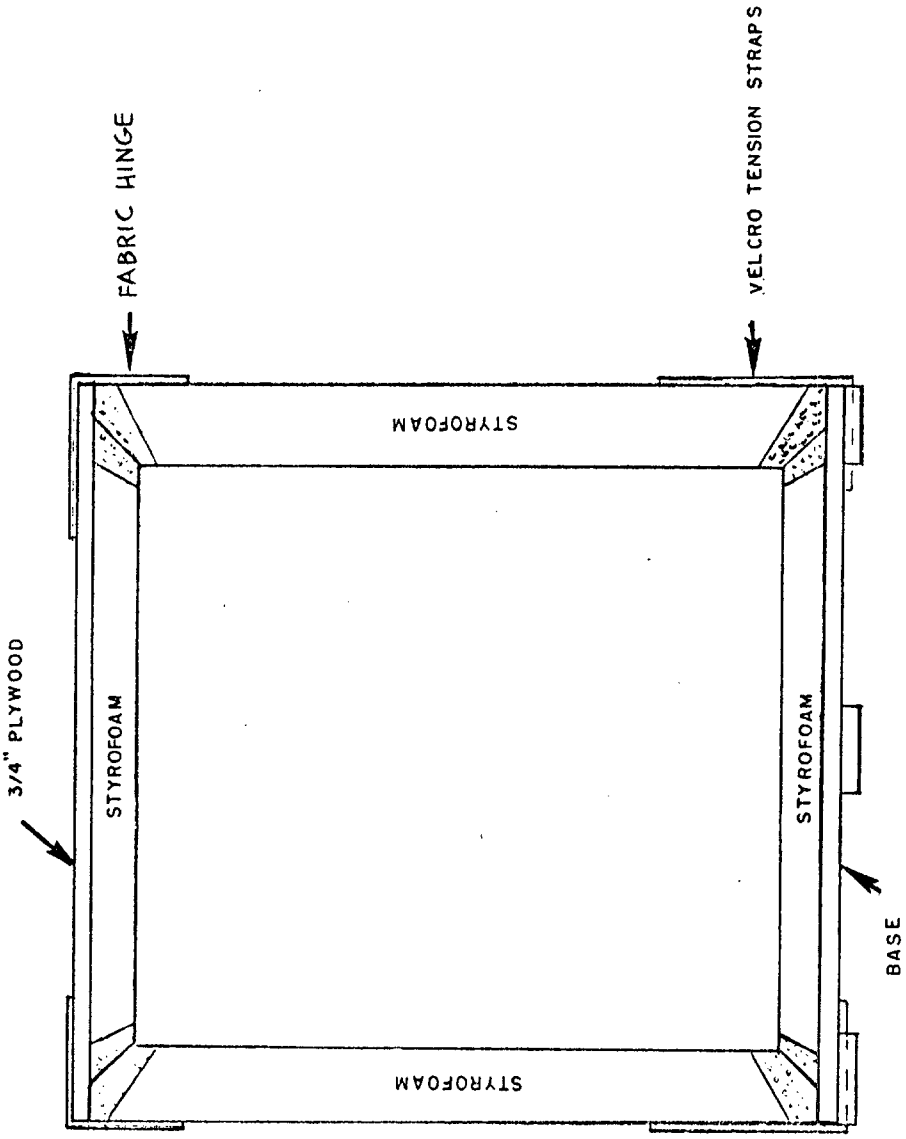


EXHIBIT IV

CROSS SECTION SLICED VERTICALLY



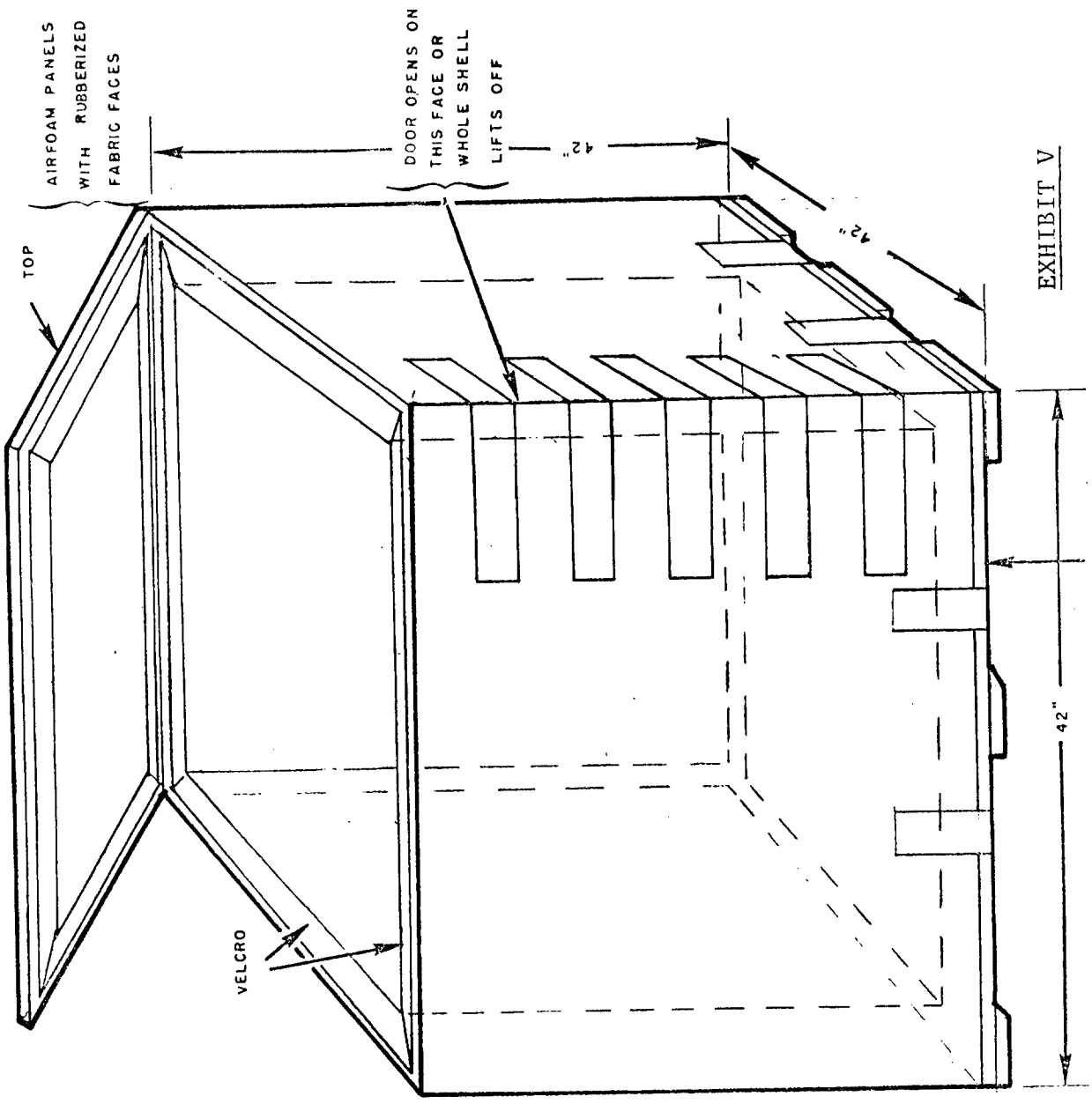

AIRFOAM PANELS
WITH RUBBERIZED
FABRIC FACES
DOOR OPENS ON
THIS FACE OR
WHOLE SHELL
LIFTS OFF
42"
42"
TOP
VELCRO
42"
3/4" PLYWOOD

EXHIBIT V

COST SUMMARY

WAREHOUSE TO RETAIL STORE DISTRIBUTION

PROPOSED METHOD

(CONSOLIDATION OF SHIPMENTS WHERE POSSIBLE)

		Costs Per Week
Wages	S. T. 800 hours @ $3.75	$ 3,000
	O. T. 80 hours @$5.625	450
Tractors	20 @ $40/week	800
	7,845 miles @ $ .15/mils	1,177
Dry Vans	18@ $22.50/week	405
	4,405 miles @ $.05/mile	220
Refrigerated	10-40° @ $35/week	350
	1 - 0° @ $40/week	40
	3,440 miles @ $.065/mile	224
Containers	72 @ $1.50/week	108
Total		$6,774
Savings by Proposed Method		$ 407
Per Cent Savings Total Distribution		5.7%
Savings on Frozen Food Distribution		43.0%

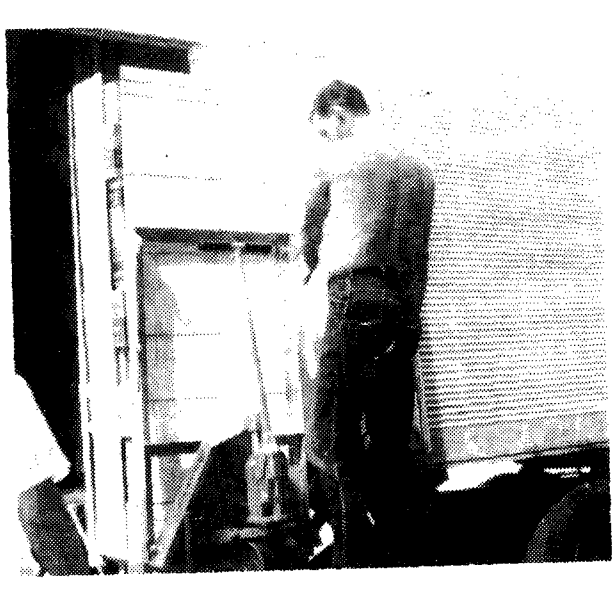
UNITIZED PRODUCE AND FROZEN FOODS AS PART OF THE ORDER PICKING OPERATION

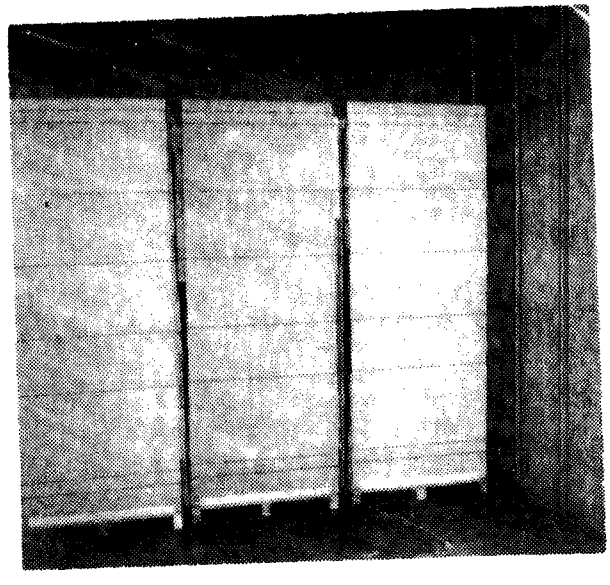
One of the labor intensive parts of the present distribution system is the typical hand stacking of cases of frozen foods in the vehicle and the case by case handling from the vehicle into the store freezer. We are convinced that some unitizing device whether it be a metal cage, a cargo binder (shown in Exhibit V I) or other device would provide a measurable improvement in the efficiency of this portion of the distribution system.

Some chains are equipped to do this with pallets; but pallets have a number of drawbacks as compared to devices designed specifically for this purpose that

EXHIBIT V I

CARGO BINDER





contain the merchandise and can be handled without the need for power equipment at the stores.

In the slide presentation which accompanied this discussion a pictorial record was reviewed of the various experimental installations of cages and cargo binders. The calculated reduction in labor cost proves that this approach is an improvement over the hand case handling. The investment in equipment was paid off in less than a year in some instances.

The difficulties experienced in some of these tests that have blocked progress toward the goal to changing to this system have related to several factors such as:

1. Insufficient back room space.
2. Difficult access to the back room because of curbs, stairways and other obstacles which made it difficult to roll a load into place.
3. Design problems in the unitizing device resulting in a cessation of tests pending stiffening and reinforcement of the maintenance-prone portions of the unit.

For the typical door and store limitations, a relatively small unit load of approximately 500 lbs. appears to be the most desirable target. Since the unit load would fit three across in a vehicle and would have base dimensions of approximately 28" x 24" with whatever height is required to bring the trailer load up to highway weight limitations.

This type of unit load can be handled in the store with a relatively inexpensive non-powered hydraulic jack designed to move the small unit load down a lift gate and into the store cooler or freezer.

This system is designed around a one-man unloading operation because no one is required to be in the store when the perishables are delivered by the driver, who, of course, requires no helper.

USE OF DROP-OFF VAN-SIZE REEFERS ON LEGS

The avoidance of the need for a freezer in the store back room area may represent enough savings in investment to justify the substitution of a reefer container which would be parked at a sealed door and become the back room. The chassis and wheels are not tied up while the container is at the store since it is supported by legs which drop down from the four corner posts. Obviously, if the frozen foods are loaded in the container for delivery to the store, the only unloading necessary would be for the residual frozen food from the last delivery which has not yet been used up. This would be held momentarily in the back room until the new load was substituted.

Unfortunately, we have not had an opportunity to make an economic comparison of this system. We have listed below some of the difficulties that might be encountered in making this scheme produce savings over more conventional systems:

1. A refrigerated container is a relatively expensive item. Most studies have shown that space in a trailer costs more than equivalent space in a warehouse.

2. To get reasonable payload and avoid damage in transit, the container would have to be filled like a truck body. This denies the store personal access to all of the items in the load and would require considerable rehandling and rearrangement with probably a need for a smaller freezer in the building to hold the excess stock; otherwise, the load would have to be assembled with an aisle down the center of the container.

It appears that this idea lends itself to a situation where an entirely new set of stores are put into a particular city. In practice chains usually have a combination of new and older stores and a change to this system would be relatively difficult to achieve. Nevertheless, the idea appears to be worth exploring.

Between these two extremes there are a number of ways to use the container concept today. Some of these may make economic sense in selected situations.

1. Use Insulated Pallet Sized Containers in Dry Grocery Vans in Servicing Outlying Stores to Avoid Repetitive Stops and Extra Driving.

2. Unitize produce and frozen foods as part of the order picking operation to avoid case handling at Stores & provide orderly storage. Unit loads smaller than a typical pallet (3 across the truck) seem to be indicated because of back room limitations.

3. For large stores, consider use of drop off van sized reefer containers on legs that substitute for the freezer room and seal into a special door.

SUMMARY

Containerization is undoubtedly going to have its impact on the movement of perishables in domestic service even as it has already had in ocean movement of perishables in containerships. Just how it will find its way into domestic service of this kind is harder to predict as compared to the smaller containers and unitizing devices where economic studies are easier to make and tests are less expensive to perform. We urge you to make such tests and also to continue to look for opportunities to use van-sized containers and break through some of the obstacles which are still hindering the normal development of the concept.

As in every other industry changes are difficult to achieve because of the innate resistance of people who are used to the "old" way. The pioneer, therefore, has to be able to endure a number of setbacks without giving up on the basic objective.