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AGRICULTURAL EXPERIMENT STATION of The Alabama Polytechnic Institute, Auburn, Ala.

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COMPARISON of WEIGHT LOSSES and DEFECTS in EARLY IRISH POTATOES SHIPPED by VAN and OPEN TRUCK, and VALUE of WATER CHLORINATION in PREVENTING DECAY¹

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Nearly half of the early Irish potatoes shipped from Baldwin County, Alabama, during the 1950 season were transported by trucks usually without refrigeration and frequently by open-bodied trucks.

The open truck is preferred by some shippers in the area because they believe that less decay develops in open-truck shipment than in vans. The load is more likely to be refused by the receiver if there is a small amount of decay than if the potatoes are somewhat damaged en route by "burning" through excessive drying.

A series of tests was made of shipments from Baldwin County, Alabama, to Chicago, Illinois, during the 1950 season to determine (1) whether more decay develops in vans than in open trucks, and (2) whether rain en route adversely affects the keeping quality of potatoes shipped by open truck.

The potatoes produced in this area are washed but are not dried before being packed in 100-pound burlap bags. The main variety grown is Red Bliss, while Sebago makes up the bulk of the remainder of the crop.

Three shipping tests involving seven trucks containing test lots were sent from Summerdale, Alabama, to Chicago, Illinois, between May 8 and 15, 1950.

When actual loading began, two samples of approximately 25 pounds each were collected, properly marked for identification, and set aside for examination to determine the conditions of potatoes when loaded at the shipping point. While these samples were being collected, several bags were labeled so that they could be positively identified as "test bags." These test bags were weighed at the terminal market to determine weight loss in transit and were examined to determine how well the potatoes withstood shipment. The test bags were placed in four positions in each truck. These positions were in the top and bottom layers of the front

stack (stack 1), and in the top and middle layers about half way back in the truck (stack 5 or 6). The bags were laid flat and lengthwise in the trucks. It was not always possible to place a test bag in the bottom layer, stack 1 position.

Ryan recording thermometers were placed in five of the trucks in the middle layer of stack 5 or 6 (about center of the load). Also, a hygrothermograph capable of recording temperature and relative humidity for 30 hours was attached to the outside of one of the trucks in the second and third tests. Since trucks are ordinarily en route about 30 to 36 hours between Summerdale and Chicago, the records from these instruments covered most of the transit period. In addition to these records, some of the truck drivers supplied additional notes on rainfall or other incidents en route.

Two 25-pound samples were taken from each test bag upon its recovery at the terminal market. One sample was used to record the condition of potatoes upon arrival. The second sample was held for a period of 7 days and then examined. This 7-day period was assumed to be

¹ The research on which this report is based was financed in part by funds provided by the Research and Marketing Act of 1946.

This study was done as part of the Southern Regional Project on "Spoilage in Marketing Early Irish Potatoes." The Department of Agricultural Economics, Alabama Agricultural Experiment Station, and the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S.D.A., had joint responsibility for this project.

² L. J. Kushman, Associate Physiologist, B.P.I.S. A.E., had a major part in carrying out the project and contributed much to this report. G. B. Ramsey and M. A. Smith, Pathologists, B.P.I.S.A.E., had charge of inspecting test lots and making reports on the condition of potatoes at Chicago. The author assumes responsibility for all statements made in this report.

representative of time lapse between unloading at terminal markets and final sale of potatoes in retail stores.

DESCRIPTION OF THE TRUCKS USED

The van used in the first and third test was equipped with the usual type bunker and bunker openings. These openings, about 14 by 16 inches in size, were aligned so that air was not obstructed or diverted in moving into the van. There was a grilled vent at the bottom of the bunker on the inside bunker wall. This was 6 inches high and extended completely across the van. In the back of the van, there were two vents of about the same size and height from the floor as the front vents. This van had 1½ to 2 inches of insulation in the walls and ceiling, and had shallow slatted floor racks that provided about 1½ inches of air space between the floor and the racks. It was equipped with a blower that was in operation during the time the load was in the van; all vents were left open.

The van used in the second test had insulation and floor racks similar to the van just described. In addition, it was equipped with a refrigeration unit.³ All vents were closed while in transit and the thermostat was set at 55° F.

The open trucks were entirely open across the front and top. The solid sides were about 3 or 4 feet high and the rear was closed with a solid tail gate. Open trucks were equipped with tarpaulins and the drivers were usually instructed to use the tarpaulins only when it was apparent that they would be traveling through rain for any length of time.

DESCRIPTION OF INDIVIDUAL SHIPMENTS

Conventional Van vs. Open Truck

The first test consisted of a conventional-type ventilated van and an open truck. Potatoes carried in these trucks were dug from the same field in the morning, and graded and loaded at the same time in the afternoon. Test bags for both the van and open truck were filled with potatoes taken from the same field load and were of the Red Bliss variety. The van carried 310 bags stacked flat and lengthwise of the truck, while the open truck carried 300 bags stacked similarly. A Ryan recording thermometer was placed near the center of each load. Both trucks left the shipping point late in the afternoon of May 9, the van leaving 1 hour and 15 minutes ahead of the open truck.

Weather forecasts indicated that these trucks would very likely encounter rain during a con-

siderable portion of the trip, and it was hoped that the trucks of this test could be used to help establish whether rain en route favored decay in potatoes carried on open trucks. However, this did not materialize since the trucks were in rain for only a short while early in the transit period.

Both trucks arrived at Chicago on May 11. The potatoes in the van were described as being in very good condition, with slight feathering, skin generally fairly well set, and moderate bruising and slight discoloration. The decay present followed injuries. Inspection of the potatoes in the open truck indicated that some tubers were getting flabby. The sample taken from the open truck and examined a week later showed rather severe browning and withering. The inspection report showed that decay followed injuries, and that the potatoes transported in the open truck were not in as good condition as were those transported in the van.⁴

Loss in weight between the shipping point and destination was approximately 3 per cent more for the potatoes shipped by open truck, Table 1.

The location of the test bags in the van made little difference in the percentage of weight loss en route. On the open truck, the test bags on the top lost 6 per cent in weight en route, while the test bag in the center of the load lost only 3 per cent.

The quality of potatoes in each of these loads was good, and the potatoes were moved to market in a minimum of time. Soft rot⁵ and browning⁶ were the only defects recorded.

Although the data in Table 1 indicate a small amount of decay in both loads upon arrival, there was slightly more in the potatoes hauled by the van. Browning was more severe in the potatoes hauled by the open truck.

³ This van was equipped with a Thermo-King refrigeration unit having a capacity of approximately 15,000 BTU/hr. at 70° F.

⁴ Descriptions of the condition of potatoes upon arrival at the terminal market are those of representatives of the B.P.I.S.A.E. who recovered the test bags.

⁵ Bacterial soft rot developing in injuries constituted all of the decay in this test.

⁶ Browning is the superficial discoloration of skinned areas of the potatoes.

TABLE 1. COMPARISON of WEIGHT LOSS and DEFECTS in SAMPLES of POTATOES SHIPPED by CONVENTIONAL VAN and by OPEN TRUCK from SUMMERDALE, ALABAMA, to CHICAGO, ILLINOIS, MAY 9, 1950

| LOCATION IN LOAD | LOSS IN WEIGHT EN ROUTE | PERCENTAGE OF POTATOES AFFECTED BY: | | | |
|-------------------------|-------------------------|-------------------------------------|-----------------|-----------------|-----------------|
| | | DECAY | | BROWNING | |
| | | 1ST IN-SPECTION | 2ND IN-SPECTION | 1ST IN-SPECTION | 2ND IN-SPECTION |
| | <i>Per cent</i> | <i>Per cent</i> | <i>Per cent</i> | <i>Per cent</i> | <i>Per cent</i> |
| CONVENTIONAL VAN | | | | | |
| Top front | 2 | 1.6 | 2.0 | --- | 12.8 |
| Bottom front | 2 | .8 | 6.0 | --- | 10.4 |
| Top center | 2 | 4.0 | 4.0 | --- | 1.2 |
| Middle center | 2 | 1.2 | 5.2 | --- | 8.0 |
| OPEN TRUCK | | | | | |
| Top front | 6 | .0 | 2.0 | 12.0 | 44.0 |
| Bottom front | 5 | 2.0 | 4.0 | 2.4 | 18.0 |
| Top center | 6 | .0 | 2.6 | 8.0 | 23.2 |
| Middle center | 3 | .8 | 4.0 | .0 | 10.0 |

Refrigerated Van vs. Open Truck

The second test consisted of a refrigerated van and an open truck. Potatoes shipped in the refrigerated van were dug and graded on the day previous to shipment, and were held in the packing shed until they were loaded. Potatoes carried on the open truck were dug and graded the same day they were shipped. A comparison of the samples of potatoes going into the test bags for these two loads indicated that the potatoes on the open truck were in better condition than were those in the van, Table 2.

Loading of the refrigerated truck took place earlier in the afternoon than did loading of the open truck. The temperature at loading time was 82° F. for the van and 78° F. for the open truck.

The van carried 275 bags stacked solid, and shipping instructions called for setting the thermostat in the truck at 55° F. The open truck carried 240 bags stacked solid. A Ryan thermometer was placed near the center of each load.

The inspection report upon arrival at Chicago stated that potatoes in the van were in good condition, while those on the open truck were rather withered and brown with severe scald spots. Data for test bags from these two loads are given in Table 3.

Data in Table 3 show more decay in the potatoes transported by van, while potatoes transported by open truck were affected to a greater extent by scald and browning. All defects developed more rapidly in potatoes transported by open truck during the 1-week holding period after arrival at the terminal market.

TABLE 2. SCORED DEFECTS and PERCENTAGES of POTATOES AFFECTED in SAMPLES TAKEN from TEST LOTS SHIPPED by REFRIGERATED VAN and OPEN TRUCK from SUMMERDALE, ALABAMA, to CHICAGO, ILLINOIS, MAY 12, 1950

| TYPE OF TRUCK | SKINNING | MINOR CUTS & BRUISES | MAJOR CUTS & BRUISES | GRASS DAMAGE | SCALD | SOFT ROT | STICKY SCALD |
|----------------------------|-------------|----------------------|----------------------|--------------|-------------|-------------|--------------|
| | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> |
| Refrigerated van | 5-10 | 15.6 | 4.0 | .0 | 20.0 | 4.0 | 3.2 |
| Open truck | 5-10 | 13.2 | 1.7 | 2.6 | 6.0 | .0 | .0 |

Temperature recordings en route showed that potatoes in the open truck remained approximately 10° F. cooler than did those in the van, indicating that the refrigerating capacity of the truck-mounted unit was not equal to the cooling capacity of the open truck used in this test.

Conventional Van vs. Trucks with and without Tarpaulin

The third test consisted of a conventional van and two open trucks, one with the tarpaulin off for about two-thirds of the trip and the other with the tarpaulin on during the entire trip.

Potatoes carried in all three trucks were dug and graded on the day they were shipped. Test bags placed in the van were filled with potatoes from one field load, while those placed on both open trucks were filled from another field load. The examination of samples taken at the shipping point revealed that potatoes in the van had slightly higher percentages of cuts, bruises, and scald⁷ than did potatoes on the open trucks, Table 4. The van was loaded between 3:00 and 5:00 p.m. at a loading temperature of 80° F. The load consisted of 290 bags stacked solid. This van left the shipping point at 6:00 p.m.

Both open trucks were loaded between 6:00 and 9:30 p.m. Rain fell during the time these trucks were being loaded, and the temperature dropped from 76° F. to 73° F. The open truck that was to travel with the tarpaulin off as much

as possible was first to leave the shipping point, carrying a 320-bag load. The other open truck carried a 289-bag load. Both loads were stacked solid.

The van and the first open truck to leave the shipping point arrived at the terminal market in 2 days. The second open truck arrived late, and the load was resold. Test bags in this truck were recovered 4 days after the truck left the shipping point.

Upon initial inspection at the terminal market, potatoes in the van were reported as being firm. Those in the first open truck were somewhat withered and a little damp, whereas those in the second open truck arrived in very bad condition due to severe browning, sticky scald spots, and withering. The potatoes in this load were of little or no value. Results of an inspection of the potatoes in these three shipments are summarized in Table 5.

The data indicate that loss in weight en route was greater for potatoes transported by open truck. The test bag in the center of the van load developed some decay, while the test bag in the top center position on the truck using the tarpaulin developed more. Part of this could have been due to the delay in recovering the test bags on this truck. A higher percentage of the

7 Scald spots may be described as sunken, discolored spots at skinned places on potatoes.

TABLE 3. COMPARISON of WEIGHT LOSS and DEFECTS in SAMPLES of POTATOES SHIPPED by REFRIGERATED VAN and by OPEN TRUCK from SUMMERDALE, ALABAMA, to CHICAGO, ILLINOIS, MAY 12, 1950

| LOCATION IN LOAD | LOSS IN WEIGHT EN ROUTE | PERCENTAGE OF POTATOES AFFECTED BY: | | | | | |
|-------------------------|-------------------------|-------------------------------------|---------------|---------------|---------------|---------------|---------------|
| | | DECAY | | SCALD | | BROWNING | |
| | | 1ST IN-SPECT. | 2ND IN-SPECT. | 1ST IN-SPECT. | 2ND IN-SPECT. | 1ST IN-SPECT. | 2ND IN-SPECT. |
| | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. |
| REFRIGERATED VAN | | | | | | | |
| Top front | 2 | 2.0 | 2.0 | 2.4 | 2.0 | 2.4 | 19.2 |
| Top center | 1 | .0 | 3.2 | .8 | .8 | 1.6 | 21.6 |
| Middle center | 2 | 4.8 | 6.0 | 4.0 | 4.4 | 2.0 | 32.8 |
| OPEN TRUCK | | | | | | | |
| Top front | 6 | .0 | 6.0 | 12.0 | 10.4 | 2.0 | 24.4 |
| Top center | 7 | .8 | 2.8 | 24.0 | 12.0 | 2.8 | 32.0 |
| Middle center | 4 | 1.2 | 5.6 | .0 | 5.2 | 8.0 | 43.2 |

TABLE 4. SCORED DEFECTS and PERCENTAGES of POTATOES AFFECTED in SAMPLES TAKEN from TEST LOTS SHIPPED by VAN and OPEN TRUCKS from SUMMERDALE, ALABAMA, to CHICAGO, ILLINOIS, MAY 15, 1950

| TYPE OF TRUCK | SKINNING | MINOR CUTS & BRUISES | MAJOR CUTS & BRUISES | GRASS DAM-AGE | DEEP PITTED SCAB | SCALD | SOFT ROT | STICKY SCALD | BROWN-ING |
|----------------------------|-------------|----------------------|----------------------|---------------|------------------|-------------|-------------|--------------|-------------|
| | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> |
| Conventional van | 15-20 | 17.7 | 3.0 | .0 | .0 | 13.8 | .0 | .0 | .0 |
| Open trucks | 5-10 | 11.0 | 1.0 | 1.0 | .0 | 11.5 | .0 | .0 | .0 |

TABLE 5. COMPARISON of WEIGHT LOSS and DEFECTS in SAMPLES of POTATOES SHIPPED by CONVENTIONAL VAN and by OPEN TRUCKS from SUMMERDALE, ALABAMA, to CHICAGO, ILLINOIS, MAY 15, 1950

| TEST BAG NO. | LOCATION IN LOAD | LOSS IN WEIGHT EN ROUTE | PERCENTAGE OF POTATOES AFFECTED BY: | | | | | | |
|------------------------------------|-------------------------|-------------------------|-------------------------------------|---------------|---------------|---------------|---------------|---------------|--|
| | | | DECAY | | STICKY SCALD | | BROWNING | | |
| | | | 1ST IN-SPECT. | 2ND IN-SPECT. | 1ST IN-SPECT. | 2ND IN-SPECT. | 1ST IN-SPECT. | 2ND IN-SPECT. | |
| | | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | |
| CONVENTIONAL VAN | | | | | | | | | |
| 1 | Top front | 3 | .0 | 4.0 | 5.6 | 6.0 | 1.2 | 12.0 | |
| 2 | Top center | 2 | .0 | 4.8 | 4.0 | 8.0 | .8 | 8.0 | |
| 3 | Middle center | 5 | 1.2 | 10.4 | 2.0 | 10.4 | .0 | 9.2 | |
| OPEN TRUCK (no tarpaulin) | | | | | | | | | |
| 1 | Bottom front | 7 | .0 | 58.0 | 1.6 | 20.8 | 22.0 | 4.8 | |
| 2 | Top front | 9 | .0 | 44.0 | 12.0 | 48.8 | 64.0 | .0 | |
| 3 | Top center | 4 | .0 | 4.8 | 1.2 | 15.6 | 32.0 | 8.0 | |
| 4 | Middle center | 2 | .0 | 1.6 | .8 | 3.2 | .0 | 3.2 | |
| OPEN TRUCK (with tarpaulin) | | | | | | | | | |
| 1 | Bottom front | 9 | .0 | 20.0 | 4.0 | 32.8 | 25.6 | 10.0 | |
| 2 | Top front | 10 | .0 | 34.4 | 10.4 | 30.4 | 43.2 | 9.6 | |
| 3 | Top center | 12 | 4.0 | 45.2 | 6.0 | 35.2 | 82.0 | 12.8 | |
| 4 | Middle center | 6 | .0 | 4.4 | 20.0 | 26.0 | 42.0 | 15.2 | |

potatoes transported by open truck were affected by sticky scald and browning.

At the second inspection, potatoes shipped by van were mostly fairly firm to firm. The decay present mostly followed injuries. Potatoes in Test Bags 1 and 2 of the first open truck were very flabby, withered, sticky, and moldy. Potatoes in Bags 3 and 4 were fairly firm to firm, and in fair to good condition. In potatoes of the second open truck, much of the browning became decay.

SUMMARY

The volume of early Irish potatoes transported to market by motor vehicles from the Southeastern States has increased rapidly since 1946. Approximately 50 per cent of the 1950 Alabama crop was transported in this manner.

From areas where potatoes were washed and shipped without being dried, there was no available information as to the type of truck that should be used to insure getting potatoes

to distant markets in the best possible condition. By far the most important types of trucks now in use are open trucks that make limited use of tarpaulins and ventilated vans. To test the comparative merits of these trucks, a series of controlled shipments was made between Summerdale, Alabama, and Chicago, Illinois, during the 1950 season. The procedure was to select a truck of each type that would be en route to a market at the same time, place comparable test lots on

these trucks, and secure samples from these test lots to determine the extent to which certain defects developed. Also, to check the loss in weight, test bags were weighed when loaded and again upon arrival at the terminal market.

Temperatures and humidities taken in connection with these shipping tests were recorded. This record indicates that the temperature in the vans was quite similar and that the temperature

TABLE 6. AVERAGE CONDITION of POTATOES on ARRIVAL in CHICAGO and after HOLDING ONE WEEK in CHICAGO when SHIPPED from SUMMERDALE, ALABAMA, by VAN and OPEN TRUCK, MAY 1950

(A - Average condition of test bags by tests)

| TEST | TYPE OF TRUCK | CONDITION ON ARRIVAL | | | CONDITION AFTER 1 WEEK | | |
|------|-------------------------|----------------------|--------------------|-------------|------------------------|-------------|-------------|
| | | DECAY | SCALD SPOTS | BROWNING | DECAY | SCALD SPOTS | BROWNING |
| | | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> |
| 1 | Van | 2.0 | .4 | .0 | 4.3 | .0 | 8.1 |
| | Open truck | .7 | .3 | 5.6 | 3.1 | .0 | 23.8 |
| 2 | Van | 2.3 | 2.4 | 2.0 | 3.7 | 2.4 | 24.5 |
| | Open truck | .7 | 12.0 | 4.3 | 4.8 | 9.2 | 33.2 |
| 3 | Van | .4 | (3.3) ¹ | .7 | 6.4 | 8.1 | 9.7 |
| | Open truck ² | .0 | 3.9 | 29.2 | 27.1 | 22.4 | 4.0 |
| | Open truck ³ | 1.0 | 9.5 | 48.2 | 26.0 | 31.1 | 11.9 |

(B - Average condition of test bags by position)

| POSITION OF BAGS | TYPE OF TRUCK | CONDITION ON ARRIVAL | | | CONDITION AFTER 1 WEEK | | |
|-------------------------------|------------------|----------------------|--------------------|-------------|------------------------|-------------|-------------|
| | | DECAY | SCALD SPOTS | BROWNING | DECAY | SCALD SPOTS | BROWNING |
| | | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> | <i>Pct.</i> |
| Stack 1, bottom layer | Van ⁴ | ---- | ---- | ---- | ---- | ---- | ---- |
| | Open truck | .7 | 1.9 | 16.7 | 27.3 | 17.9 | 10.9 |
| Stack 1, top layer | Van | 1.2 | 2.6 | 1.2 | 2.6 | 2.6 | 14.6 |
| | Open truck | .0 | 8.9 | 30.6 | 21.6 | 22.4 | 19.5 |
| Stack 5 or 6, middle layer | Van | 2.4 | (2.0) ¹ | .6 | 7.2 | 4.9 | 16.6 |
| | Open truck | .5 | 5.2 | 16.5 | 3.9 | 8.6 | 17.9 |
| Stack 5 or 6, top layer | Van | 1.3 | 2.1 | .8 | 4.0 | 2.9 | 10.2 |
| | Open truck | 1.2 | 7.8 | 31.2 | 13.8 | 15.7 | 19.0 |

1/Estimated from other data.

2/Tarpaulin left off as much as possible.

3/Tarpaulin kept on for entire trip.

4/Insufficient data.

fell gradually in each case. The temperature of the potatoes in the open trucks fluctuated more with air temperature changes. However, it should be noted that although the temperature in the open trucks dropped readily with air temperature it warmed up but little as the air temperature rose. This may be due in part to the rather large moisture losses experienced by potatoes on open trucks. The differences recorded for commodity temperatures shipped by van or open truck would appear to be a reflection of a difference in evaporation as well as in ventilation.

Concerning the difference in weight loss between potatoes shipped by van and open truck, the data show that in each of the four positions in which test bags were placed they lost more weight on the open trucks than did comparable bags in the vans.

The top layer bags on the open trucks lost over three times as much weight as did top layer bags in the vans. Bags in the center of the loads on the open trucks lost only twice as much as did bags in this position in vans. In the van loads, the bags in stack 1 (top and bottom layers) lost a little more weight than did those farther back in the van because they were located immediately behind ventilators. On the open trucks, however, the bags in stack 1 and also the top layer bag in stack 5 or 6 lost nearly double the amount lost by the bags in the center of the load. This, of course, is related to greater air circulation. Leaving the tarpaulin on the load over the entire trip seemed to cause considerable air to be channeled through the load, thus increasing the weight loss in the middle of the load at stack 6. Removal of the tarpaulin for most of the trip allowed the air blast to be dissipated somewhat after hitting the bags in stack 1. This appears to be the only explanation of nearly equal weight losses in stack 1 but quite different losses in stack 6.

The scored defects found in samples on arrival and after holding 1 week under "room" conditions have been summarized in Table 6 as average conditions of test bags by tests (A), and by position in the trucks (B).

As expected from the weight loss records, test bags from the open trucks contained the greatest amounts of scald spots and browning. While this type of injury is not often conspicuous immediately after the period of desiccation, it is very obvious after being held 1 week following arrival at destination. By this time a large part of the scalded potatoes had developed decay and most of the scald spots were sticky. Browning and scald spots were most prevalent on potatoes from the open trucks of Test 3 and least noticeable in potatoes from the van of Test 1.

While potatoes on open trucks consistently lost more weight, they were affected to a greater degree by browning and scald spots, but they arrived in the terminal market with less decay than did potatoes in the vans. The smaller quantities of decay found in potatoes on the open trucks upon arrival were probably due to lower temperatures and greater drying en route. There was no obvious difference in the development of decay after holding 1 week, except for the development of large amounts of decay in the badly scalded potatoes from the open truck of Test 3, and more decay in potatoes from the middle layer of stacks 5 and 6 from the vans. This middle layer, stack 5 or 6 position, represents the bulk of the load, however, and makes it appear probable that more decay develops in van loads than in open trucks.

CONCLUSIONS

The data from this series of tests indicate that vans do not generally provide enough ventilation to have as low a temperature en route as do open trucks; open trucks, on the other hand, appear to provide too much ventilation. It may be desirable to use a cattle or similarly slatted truck to protect the front of the load against direct air blasts. If this is done, it may be desirable to open the load to a 5-3-2 stack, one similar to the method used in rail loads.

Shippers and receivers alike are more concerned over decay than over injury by desiccation. At present, bags loaded on open trucks are often a pound or two heavier than bags loaded in railroad cars because of the expected greater weight loss en route. Under present methods of handling, this loss is taken by the grower. He is paid on the basis of the number of bags graded out of his load whether the scales in the packing house are set for 100, 102, or 104 pounds.

DECCO TEST⁸

In an attempt to keep down bacterial soft rot, the most prevalent kind of decay that develops in shipment of early Irish potatoes, several ship-

⁸ Initially, a check on the Decco treatment of potatoes was not a part of the study in Alabama. However, when it was found that this could be done without hindrance to the proposed work and that shippers in the area were interested in the merits of the treatment, the tests described here were made.

pers tried the Decco process⁹ of water chlorination during the 1950 season. Since this process was previously tried in both Dade County, Florida, and in Currituck, North Carolina, and the tests in those areas were largely inconclusive, there was considerable interest among Alabama shippers as to the merits of the process. Accordingly, several tests were conducted with rail shipments from Alabama in 1950 to determine whether the Decco process aided in reducing the development of decay in transit. The cost of the process was about \$6 per carload of 300 100-pound bags.

Five cars containing Decco-treated and untreated potatoes were followed in 1950 from Foley, Alabama, to various destinations.

The Decco-treating process was tested by washing with pressure spray and brushes one-half of a field truck load of potatoes with treated water while the other half was washed with plain water. The application of the Decco material occurred only while the treated potatoes were being washed.

The treated and untreated bags of potatoes from the field truck load were placed in opposite

ends of a railroad car. Three test bags of each were labeled and placed in comparable positions, one in the top layer, one in the middle, and the other in the bottom layer of the 5-3-2 load. The cars were then filled with Decco-treated potatoes, and were sent to Montgomery, Alabama, with the vents open. At Montgomery, the cars were iced; some cars were re-iced once en route (Rule 240 or 258). No temperature or humidity records were taken for the Decco tests. The only objective was to determine whether the treatment reduced decay when it developed in the comparable untreated test bags in the car. Results of these tests are shown in Table 7.

The Decco process of water chlorination at the rate of about 80 to 90 p.p.m. of active chlorine did not reduce decay in transit when applied in the wash water of potatoes shipped from Foley, Alabama, during the 1950 season.

⁹ The Decco treatment as applied to potatoes is simply the addition of chlorine compounds to the water in which potatoes are washed. The concentration of active chlorine in the wash water is about 80 to 90 p.p.m., according to tests made by representatives of the company controlling the treatments.

TABLE 7. THE AVERAGE AMOUNT OF DECAY IN DECCO-TREATED and UNTREATED TEST BAGS in FIVE CARS SHIPPED from FOLEY, ALABAMA, MAY 1950

| NO. TEST BAGS | NO. DAYS EN ROUTE | DESTINATION | DECAY ON ARRIVAL | | DECAY AFTER HOLDING 1 WEEK | |
|---------------|-------------------|----------------------------|------------------|-----------------|----------------------------|-----------------|
| | | | CHECK | DECCO | CHECK | DECCO |
| | | | <i>Per cent</i> | <i>Per cent</i> | <i>Per cent</i> | <i>Per cent</i> |
| 3 | 7 | Chicago, Illinois | 0.7 | 1.1 | 2.6 | 2.5 |
| 3 | 4 | Chicago, Illinois | 1.8 | 1.8 | 2.8 | 1.6 |
| 3 | 3 | St. Louis, Missouri | .0 | .0 | ---- | ---- |
| 3 | 9 | Pittsburgh, Pennsylvania | .6 | .6 | ---- | ---- |
| 3 | 6 | Philadelphia, Pennsylvania | .0 | .0 ¹ | ---- | ---- |

¹Decco-treated material brighter than untreated material.