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EGG MARKETING COSTS INFLUENCED BY SIZE OF FARM SHIPMENTS[1]

F. D. ROLLINS, P. C. CLAYTON, R. E. CRAY

Size of farm flocks supplying eggs to assembling and grading plants is one of the factors influencing marketing costs. Until recent times, most of these flocks were of similar size. For example, in 1950 over 75 percent of the chickens on farms were in flocks of less than 400 birds. By 1954 only 55 percent of birds were in flocks of less than 400 birds. This trend toward larger flocks has continued since 1954. Today, central egg assembly and grading plants must handle eggs from flocks varying between several hundred birds and as many as ten to fifteen thousand.

When most of the eggs came from the small farm flocks, plants paid all producers the same price for eggs of a similar quality. But, today with the much wider variation in flock size, producers should be paid price differentials which reflect the costs of marketing eggs from various size flocks. There is a direct relationship between the size of the flock which supply eggs to an egg assembly and grading plant and the costs of marketing.

The cost involved in collecting eggs from one producer with 10,000 birds would be much less than the cost involved in collecting eggs from 40 different farms with 250 birds each. In purchasing eggs from the producer on the graded basis, it is necessary in the grading to make a tally of the eggs of different quality and size grades. Time involved in taking the stop and start count on a shipment of eggs from one flock of 10,000 birds will be much less than the time required for 40 different producers with 250 birds each. Larger flocks would also facilitate handling in the plant and in the cooler. The costs involved in making out the settlement reports for one producer of 10,000 birds would be much less than the costs of 40 different producers with 250 birds each.

[1]Department of Poultry Science and Department of Agricultural Economics and Rural Sociology.

This study was designed to determine the relationship between weekly volume of eggs sold by individual producers and:

(1) The costs of assembling the product.
(2) The costs of grading the product.
(3) The costs of computing the settlement reports.

PROCURING EGGS BY FARM ROUTES OF CENTRAL ASSEMBLING AND GRADING PLANTS

Data were collected on the operations of the farm procurement routes of three assembling and grading plants in different areas of Ohio during four selected weeks (one each in June, September, December and March). The average number of stops per route of the plants cooperating in the study during these four selected weeks was 39, with a range of 28 to 57 stops per route (Table 1).

The average length of the egg routes was 185 miles with a range of from 142 to 266 miles, indicating that a large area had to be covered in order to assemble a small truck load of eggs. As shown in Table 1, a longer route did not mean a greater volume of eggs assembled. The average volume per stop by plants ranged from 2.1 to 4.3 cases for the routes, with an average of 2.8 for all plants studied. The concentration of poultry farms and the size of the flocks influenced the distance travelled and volume of eggs assembled. Table 1 also shows the effects of seasonality in egg production upon the operations of farm routes.

Chart 1 shows that a majority of the producers (51.7 percent) marketed less than two cases of eggs per week, but these shippers accounted for only 14 percent of the volume of eggs procured on the routes. Less than 17 percent of the stops had a volume over 5 cases, but accounted for 57 percent of the eggs assembled. Thirty-nine percent of the eggs came from stops of 10 cases and over.

Data was secured on the time required to perform each of the various activities involved in procuring eggs by farm routes. Increasing labor costs are making it necessary for management to know the time elements in the various facets of procuring eggs. One alternative to paying drivers an hourly wage is to pay the truck drivers a flat fee per case hauled. This system gives an incentive to the driver to increase the number of cases of eggs picked up and in turn may help reduce the costs of procuring eggs. According to these time studies (Chart 2) driving accounted for 61.6 percent of the total time spent on the farm routes.

TABLE 1.—Farm Egg Procurement Route Statistics of Three Central Egg and Grading Plants in Ohio During Four Selected Weeks in 1957-58

	Plant A					Plant B					Plant C					All Plants
	June	Sept.	Dec.	Mar.	Ave.	June	Sept.	Dec.	Mar.	Ave.	June	Sept.	Dec.	Mar.	Ave.	Ave.
Average Number																
Routes per Plant—	30	32	31	32	30.5	29	29	29	29	29	15	14	14	13	14	24.5
Stops per Route—	29.7	28.8	31.1	28	29.4	56.7	54.3	51.9	47.7	52.7	38.8	38.7	31.8	32.4	35.4	39.2
Miles per Route—	144.8	144.2	142.5	147.6	144.8	188.9	192.2	187.8	187.2	189.1	215.5	225.7	224.9	222	222	185.3
Cases per Route—	99.2	112.7	134.5	106.3	113.2	129.2	129.3	156.4	101.8	129.2	84.3	90.7	91	86	88	110.1
Hours per Route—	7.4	7.8	8	7.7	7.8	12.3	12.3	12.3	12.3	12.3	13.4	13.7	12.2	12.7	12.8	11
Cases per Stop—	3.3	3.9	4.3	3.8	3.9	2.3	2.4	3	2.1	2.5	2.2	2.3	2.9	2.7	2.5	2.8
Cases per Mile—	.68	.78	.94	.72	.78	.68	.67	.83	.54	.68	.39	.40	.41	39	.40	.59
Cases per Hour—	13.4	14.1	16.7	13.9	14.5	10.5	10.6	12.8	8.3	10.5	6.3	7	7.4	6.8	6.9	10

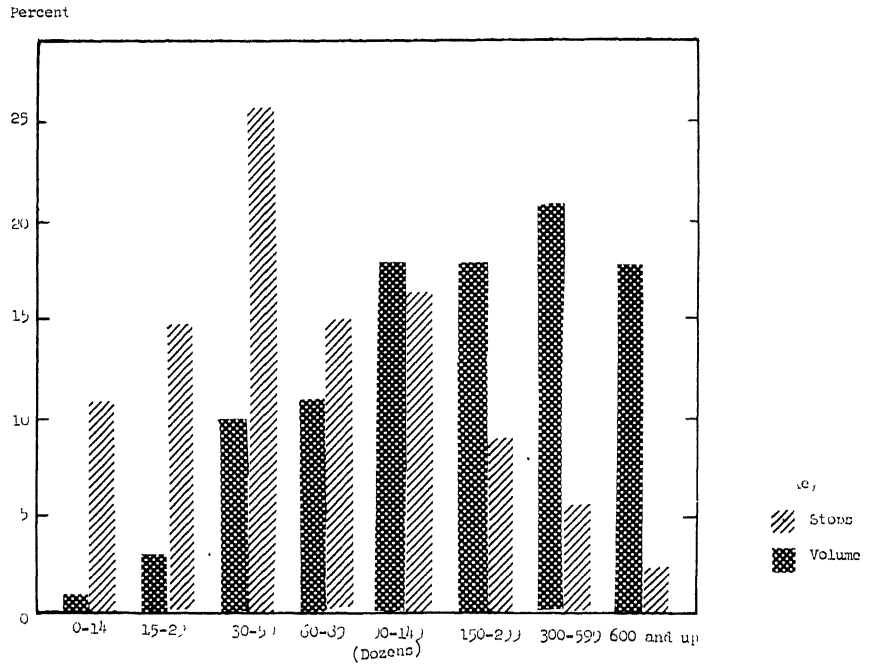

Chart 1.—Percent of Stops and Volume by Size of Shipments.

Two other minor points that management might look at are: (1) The driver spends 2.8 percent of his time packing eggs for the producers. This might be remedied by reminding the producer of the cost of the driver's time used for packing eggs and by asking them to have their eggs ready on time. (2) The management might look for ways of reducing the time spent in shifting the load. About 2.4 percent of the driver's time is spent in shifting loads. This could partially be eliminated by revising the system of loading their trucks.

It took 17.7 percent of the driver's time in procuring[2] eggs, (Chart 2). Some time was spent at stops where no eggs were picked up and this time was spent in conversation about egg prices, market conditions and other factors related to business.

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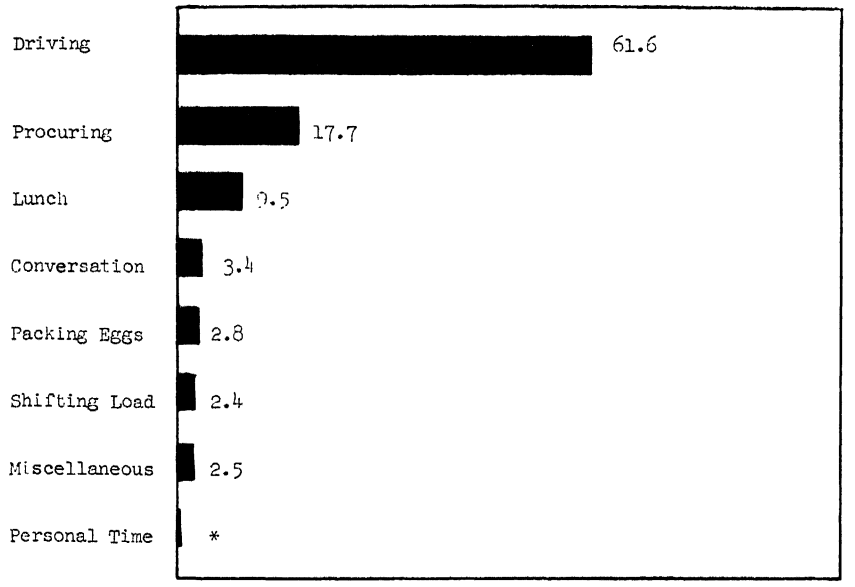
[2]The time spent carrying cases (empty) from the truck to the egg location and the time spent carrying full cases from the egg location to the truck and loading them. It does not include the time driving on and off the farm.

TABLE 2.—The Procurement* Time per Case for Various Size Shipments

Number Cases per Stop	Plant A	Plant B	Plant C	All Plants
		(Minutes per stop)		
None (1)	.5	2.3	2.03	1.91
		(Minutes per case)		
Less than 1	1.1	.90	1.1	1.3
1– 1.9	1.2	.86	1.23	1.0
2– 2.9	.92	1.04	.80	.96
3– 4.9	.77	.87	.56	.89
5– 9.9	.57	.80	.58	.65
10–19.9	.45	.99	.38	.59
20 and up	.29	.58	.54	.47

(1) Stops made at which no eggs procured but time was spent.

*The time spent carrying cases (empty) from the truck to the egg location and the time spent carrying full cases from the egg location to the truck and loading them. It does not include the time driving on and off the farm.



* Less than one tenth of one percent

Chart 2.—Distribution of Truck Driver's Time in Assembling Eggs from Ohio Farms (An Average of Selected Routes Operated by Three Central Egg Assembly and Grading Plants, 1957).

The total pick-up time per case was influenced by the number of cases in the shipment, the presence of doors, stairs, gates, etc., and the distance from the truck to the storage location. The method used by the truck driver such as a small hand cart or whether they carried one or two full cases at a time also influenced the time required per stop.

EGG ROUTE OPERATING COSTS

Operating costs of an egg route fall into two general categories—fixed costs and variable costs. Fixed costs are those which need to be charged irrespective of the volume of eggs hauled. They are the costs which would be incurred at a zero point, or if the trucks stood still and no eggs were procured. Such costs include depreciation on the trucks, interest charge on the investment, insurance of the truck and cargo, and miscellaneous costs such as license fees, registration, etc. Variable costs are costs which in the aggregate vary with output, or any costs added as a result of any increase above the zero point. Variable costs include such factors as wages, gasoline, oil, repairs, tires, etc.

Fixed costs for the 15 trucks studied ranged from $4.14 to $9.54 per day per truck. The average for all trucks was $6.75. Table 3 shows the average costs by plants and the average of all trucks operated by each of the three plants. The size of the truck, the original cost and the age of the truck influenced the fixed costs.

All plants studied depreciated[3] their trucks at 25 percent per year for a period of 4 years. Also, the bodies were depreciated at the same rate and no further depreciation is allowed after the four years even though they may be in use.

The depreciation on the trucks and bodies ranged from $801.45 to $1,592.21 per truck per year with an average of $1,030.19 per year for all trucks.

All plants studied carried insurance on their trucks and cargoes. The insurance rates were based on such things as locality, age, value, condition, accident rate of the firm and number of trucks operated. The truck insurance premium for a year ranged from $73.19 to $400.11, with an average of $191.53 per truck. The cargo insurance had a range from $32.50 to $130.00, with an average of $77.74.

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[3]Depreciation accounting is a system of accounting which aims to distribute the cost of tangible capital assets over the estimated useful life of that asset. It is a process of allocation and not of valuation. Depreciation for the year is that portion of total allocated for that year. Depreciation in all the plants studied was figured on the straight-line method. This method of apportionment assumes that each time period benefits equally from availability of the asset.

TABLE 3.—Truck Procurement Costs for Egg Routes of Three Ohio Central Egg Assembling and Grading Plants

April 1957—March 1958

Average Cost	Plant A	Plant B	Plant C	Average All Plants
Daily Costs per Truck				
Fixed	6.03	7.41	7.38	6.75
Wages	20.28	20.15	22.72	20.72
Other Variable	9.00	14.41	9.69	10.91
Total	$35.31	$41.97	$39.79	$38.38
Cost per Mile				
Fixed	.04	.04	.03	.04
Wages	.14	.10	.10	.12
Other Vaiable	.06	.08	.04	.06
Total	$ .24	$ .22	$ .17	$ .22
Cost per Case				
Fixed	.05	.05	.08	.06
Wages	.18	.13	.26	.17
Other Variable	.08	.10	.11	.09
Total	$ .31	$ .28	$ .45	$ .32
Cost per Stop	$ 1.19	$ .80	$ 1.11	$ 1.00

In this study, an interest charge of 6 percent was made on the unamortized portion of the truck investment. The interest cost ranged from $56.30 to $344.30 per truck per year with an average of $161.29 per year.

Miscellaneous fixed costs per year included such things as licenses, registration and taxes. One plant in the study included an administrative overhead charge on the trucks to cover expenses in the office due to truck records, etc. The miscellaneous charges ranged from $66.61 to $202.41 per truck per year with an average for all trucks of $154.80 per year.

Daily variable costs including labor of all trucks studied ranged from $29.28 to $34.56 with an average of $31.63 (Table 3). Wages of the truck drivers were the largest portion of the variable costs and averaged 53.98 percent of the total variable costs. In all cases, only one man, the driver, was employed.

All plants, except one, paid the drivers an hourly wage. The one plant that differed, paid the drivers a flat fee per case handled. The

average hourly wage amounted to $2.03 per hour for all plants studied with a range from $1.46 to $2.70 per hour. Time and a half was paid drivers for over 40 hours except for the one plant that paid on a flat fee per case handled.

The average yearly expense per truck for gasoline amounted to $1,417.65 with a range from $994.10 to $2,024.62. Oil consumption costs per year ranged from $29.98 to $179.48 per year with an average cost for all trucks studied of $85.20 per year. Repair costs included the parts and materials plus labor charges to install them. Repair costs in general, barring accidents, usually increased with the age and use of the truck. The average yearly costs for repairs of all trucks in the study amounted to $1,126.32 with a range from $372.66 to $2,318.31 per truck per year. The cost of tire replacement is also included in the repair costs.

SYNTHETIC MODELS FOR ESTIMATING PROCUREMENT COSTS OF VARIOUS SIZED SHIPMENTS

By knowing the time requirements to do the various operations and the costs connected with these operations, it is possible to figure the procurement costs per case for various sized shipments. This information can be derived from a time study of the routes and from plant records such as the following data obtained from the three plants cooperating in the study:

1. The average time spent on driving from farm to farm was found to be 8 minutes and 17 seconds.

2. The amount of time spent on the farm procuring eggs varied with the size of the shipments. The average time per case for the various sized shipments was:

Number Cases Picked Up	Minutes per Case[4]
Less than 1 case	1.3
1 to 2 cases	1.0
2 to 3 cases	.96
3 to 5 cases	.89
5 to 10 cases	.65
10 to 20 cases	.59
20 and over cases	.47

[4]Time spent carrying cases (empty) from the truck to the egg location and the time spent carrying full cases from the egg location to the truck and loading them. (Does not include rearranging loads or the time to drive on and off the farm.)

3. The amount of time spent for lunch and personal time averaged 46 minutes 38 seconds per route for all routes studied.

4. The amount of time spent in conversation, packing eggs and other miscellaneous activities averaged 2 minutes 21 seconds per stop for all routes studied.

5. The average distance between farm stops was found to be 3.98 miles per stop.

6. The average truck cost on a per mile basis was:

Variable costs per mile 6.2 cents
Fixed costs per mile 3.9 cents

7. The average wages of all drivers were $2.03 per hour.

This type of information could be used to compute differential payments to producers based on the costs of procuring various sized shipments. Since it costs less per case to assemble eggs from producers with large flocks than with small flocks, the larger producers would receive a "premium" based on lower costs.

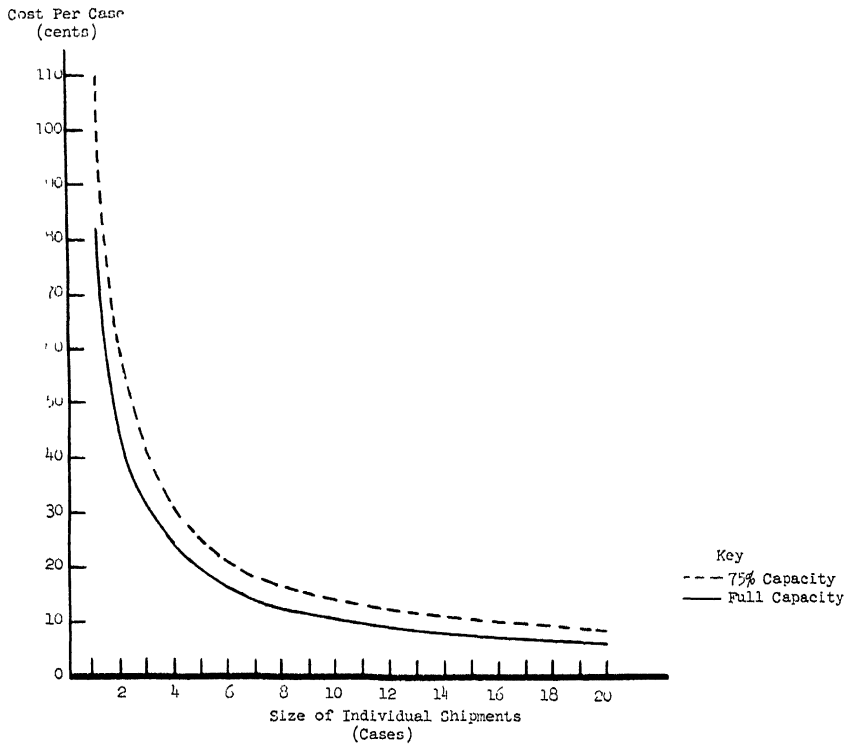

Chart 3.—The Relation of the Size of the Individual Shipments to the Procurement Costs per Case.

Chart 3 shows the cost per case for various sized shipments, using the above data, to procure a truck load of eggs from producers all with the same size shipment. For example, if the farm route truck had a capacity of 220 cases and using the above costs, time and mileage data, it would cost 82.4 cents per case to procure a truck load of eggs when only one case was picked up at each stop. If the driver picked up three cases at each stop, the procurement cost would be only 29.8 cents per case for a load of eggs.

A curve of this type could be used to establish price differentials for various size producers. For example, if it cost 82.4 cents per case to procure eggs from producers marketing only 1 case each week, and only 10 cents per case for a producer marketing 10 cases, the larger producer could be paid a "premium" of 72.4 cents per case of eggs—or just under 2.5 cents per dozen. This represents the savings from efficiencies on the egg route only. Individual plants should substitute their own figures in assessing their costs and computing the "premium payments".

Chart 3 also shows the effect on procurement costs per case for various size shipments when the truck is only used to 75 percent of full capacity (165 cases instead of 220 cases used in the above example). For example, the cost for one case shippers increased 27.6 cents per case and for the ten case shippers, the cost increased 4.0 cents per case when only 75 percent of the truck's capacity is used. Chart 3 also shows the importance of procuring eggs from producers with more than 5-6 cases per shipment. Costs drop rather sharply in the one to six case range.

THE GRADING COSTS INFLUENCED BY SIZE OF FARM SHIPMENT

The cost of grading eggs decreases as the size of the individual shipments increase. If eggs are purchased on a graded basis, counts[5] must be made of each producer's eggs, regardless of the size of the shipment. There are more partially filled cases when the eggs come from small producers. This also increases handling and grading costs. Keeping each producer's eggs separate until they are graded may also increase costs.

With the following data, the cost of keeping a count of each producer's eggs can be demonstrated. These data were secured by time studies and analysis of the plant records of the cooperating plants:

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[5]Before starting to grade each producer's eggs, it is necessary to take a count of the number of eggs in each grade and size into which the eggs are segregated, and again after completing the job, so that by subtracting the "start count" from the "Stop count", it is possible to determine how many eggs the individual producer had in each grade.

1. The average time to candle[6] one case (30 dozen) of eggs was 9 minutes 51 seconds.

2. The average amount of time to make stop and start counts using automatic counters was 1 minute 8 seconds per shipment.

3. Average wage of all candlers cooperating in the study was $1.23 per hour.

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[6]Determining interior quality and placing eggs on a sizing machine.

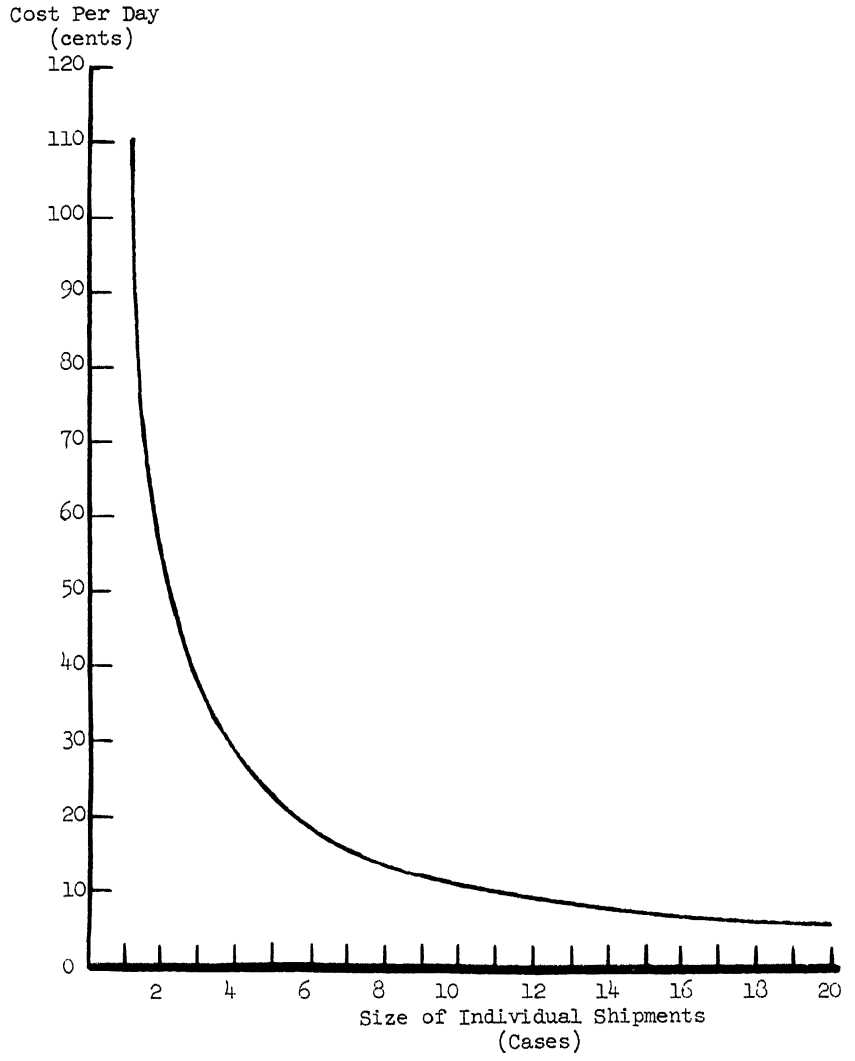

Chart 4.—The Relation of the Size of the Individual Shipment to the Cost per Day per Candler for Stop and Start Counts.

Chart 4 shows the cost per day per candler for stop and start counts for various sized shipments with the above data. As the size of shipments increases the cost per day for stop and start counts decreases. For example, cost per day for one case shipments is five times as much as the cost per day for five case shipments using the automatic stop and starts. With one case shipments, plants are paying $1.10 per day per candler for the stop and start counts. Handling the same number of cases but in five case shipments, the stop and start costs per day are 22 cents or one-fifth as much as the one case shipments. This is a daily savings to the plant of 88 cents per candler. A plant employing 10 candlers, 5 days a week for 50 weeks could decrease their costs of grading by over $2,000.00 per year.

In order for individual plants to figure their costs for stop and start counts, they would have to use figures from their own plants.

THE OFFICE COSTS INFLUENCED BY SIZE OF FARM SHIPMENTS

In order to determine the effect of size of shipment upon office costs, data on the time required to compute the payments for various sized shipments were secured. It was found that the time[7] required for performing the various operations connected with paying producers for their eggs increased as the size of the shipment increased but the time per case decreased. (Table 4).

Regardless of the size of the shipment, a check is usually issued to each producer every week. It costs the plants cooperating in the study 1.5 cents per check for printing and 1.3 cents per check for banking charges.

From the plant's records, it was found that the average wage of the secretarial employees was $1.25 per hour. By using the information in Table 4, the wage rate and check costs, it may be shown (Table 5) that these costs increase as the size of shipment increases, but the per case cost decreases.

Chart 5 shows the costs of computing settlement reports per case in relation to the size of shipment. For example, these costs amounted to 4.3 cents per case for 1 case shipments and 1.2 cents per case for 5 case shipments. A plant handling 100,000 cases annually would save over $3,000 per year handling 5 case shipments rather than one case shipments.

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[7]Time involved in transferring grading data to settlement reports, extending grade times price, writing checks, checking settlement reports, and sorting reports according to routes.

TABLE 4.—The Time* Required to Compute Settlement Reports, Amount of Time per Shipment and per Case for Various Sized Shipments

Size of Shipment	Time of Shipment	Time per Case
(cases)	(seconds)	(seconds)
1	43.0	43.0
3	69.9	23.2
5	88.1	17.6
10	109.0	10.0
20	130.8	6.5

*Time involved in transferring grading data to settlement reports, extending grade times price, writing the checks, checking settlement reports, and sorting reports according to routes.

SUMMARY AND CONCLUSIONS

A study of egg procurement routes at three plants showed that driving accounted for 61.6 percent of the total time spent on farm routes, whereas it took only 17.7 percent of the driver's time in procuring eggs. Drivers spent 2.8 percent of their time packing eggs for producers. This cost should be eliminated. Drivers also used 2.4 percent of their time in re-arranging loads, and this could partially be eliminated by revising the system of loading their trucks.

The average length of the route as 185 miles. A longer route did not mean a greater volume of eggs assembled. The concentration of poultry farms and the size of the flock influenced the distance travelled and the volume of eggs assembled. The average per stop was 2.81 cases and ranged from 2.14 to 4.33 cases per route. Fourteen percent of the volume of eggs procured on the routes came from 51.7 percent of the producers marketing less than 2 cases of eggs per shipment. Seventeen

TABLE 5.—The Costs of Computing Settlement Reports per Shipment and per Case for Various Sized Shipments

Size of Shipment	Cost per Shipment	Cost per Case
(cases)	(cents)	(cents)
1	4.3	4.3
3	5.3	1.8
5	5.9	1.2
10	6.6	0.7
20	7.4	0.4

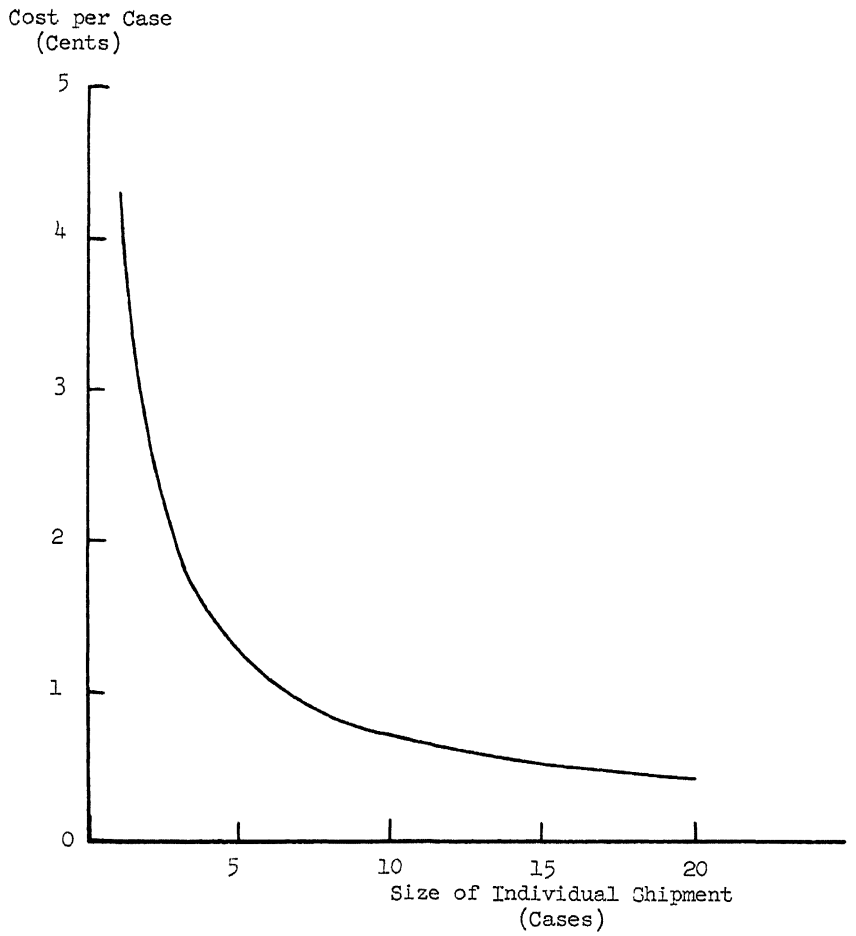

Chart 5.—The Relation of the Size of Individual Shipments to the per Case Costs of Computing Settlement Reports.

percent of the stops marketing over 5 cases per week accounted for 57 percent of the eggs assembled. Thirty-nine percent of the eggs came from producers marketing over 10 cases per week.

Average procurement cost per case for all plants was 32 cents. Procurement costs per case decreased as the size of the shipments increased. The truck cost in this study averaged 12 cents per mile. Fixed costs averaged $6.75 per day, and variable costs including labor averaged $31.63 per day per truck.

To procure a full truck load of eggs from producers with the same size shipments, the procurement cost for one case shippers was 82.4 cents per case, while for 10 case shippers, it was only 10 cents per case.

Grading costs per case decreased as the size of the shipment increased. The study showed that it cost five times as much per day for stop and start counts on one case shipments when compared with five case shipments. It cost the plants $1.10 per day for stop and start counts for the one case shippers, whereas the candlers can handle the same number of cases of eggs per day from five case shippers at a cost of only 22 cents per day for stop and start counts. This is a daily savings of 88 cents per day per candler.

The costs per case of computing settlement reports decreased as the size of the shipments increased. This was mainly due to the fact that check costs for printing and banking are the same for one case shippers as for the larger shippers.

Egg marketing costs of Central Egg and Assembly Plants decrease as the size of farm shipments increase. But, the amount it is decreased depends upon the size and location of producers shipping to the plants, and the handling procedures utilized within the plant. Producers could be paid price differentials based on marketing costs influenced by the size of shipments. But, each plant should use their own cost data in computing these differentials.

It may be necessary to pay the large producers a premium in order to increase volume, which in turn would reduce the per unit marketing costs of all size shippers.