COSTS

of PROCUREMENT AND ASSEMBLY OF EGGS

in THREE MIDWESTERN STATES

MARKETING ECONOMICS DIVISION
ECONOMIC RESEARCH SERVICE
U. S. DEPARTMENT OF AGRICULTURE

ERS-92

PREFACE

This study was designed to analyze the procurement and assembly of Midwestern eggs and to find more efficient ways to perform these functions.

Procurement policies and assembly routes of 7 Midwestern firms were investigated during 1959 and 1960. Information was obtained on methods, costs, and performance. On the basis of these findings, recommendations are made for improvements in procurement and assembly of eggs suitable for several types of farming areas in the Midwest.

The author wishes to thank the egg producers, managers of central assembly plants, and others whose cooperation in furnishing data made this study possible.

This study is part of a broad research program conducted by the Economic Research Service to improve the marketing of poultry and eggs.

CONTENTS

Washington, D. C. October 1962

SUMMARY

Many Midwestern plants can realize savings of 15 to 45 percent in the cost of assembling eggs. These savings result from a realignment of routes, the use of set-in stations, the payment of price differentials based on volume picked up, and more attention to procurement and assembly problems. The plotting of routes on county maps showing mileage between farms and number of cases per stop is a simple but effective device to help management reorganize assembly routes.

A study of 20 pickup routes showed that only 5.4 percent of the volume came from 23 percent of the 838 farms included in the survey. Many of these farms produced eggs only as a minor sideline. For the most part these producers received the same price per dozen for their eggs as larger producers in spite of the higher pickup costs.

If assemblers make periodic studies of their pickup operations, they will be in a better position to make informed decisions. Assemblers should consider costs of moving the trucks, and of labor during travel and at each farm, in setting up price differentials to farmers based on size of pickup. Improvements possible through changes in assembling eggs are a higher percentage of Grade A eggs and lower office costs per unit in handling and keeping producer records.

Total assembly costs per case for 20 routes averaged 38.7 cents per case. The lowest total cost per case was 20 cents, the highest 59.4 cents. Labor cost per case averaged 20 cents with a low of 10.2 cents and a high of 30.9 cents. Truck costs averaged 18.6 cents per case with a low of 5.7 cents and a high of 36.2 cents. Total costs per mile including truck and driver averaged 22.5 cents with a low of 17.3 cents and a high of 37.1 cents.

Increasing egg volume near the plant in order to cut down transportation expense is difficult because farmers are engaged in other enterprises, some of which are more profitable than egg production. Some assemblers have overcome this difficulty through a program of education for farmers, showing them, through the use of dollar income data, that two or more successful and large scale enterprises can be operated side by side. A necessary part of this educational program is demonstrating the importance of strict quality control to insure satisfactory returns. Size of flock and strain of layer require special attention.

Discussions with many assemblers in the Midwest and elsewhere indicate a growing awareness on their part of the necessity for a steady flow of top quality eggs from the farm to the consumer's table. Efficient procurement and assembly practices are an important factor in maintaining an adequate supply of the kind of table eggs in demand by retailers.

COSTS OF PROCUREMENT AND ASSEMBLY OF EGGS

IN THREE MIDWESTERN STATES

By Robert M. Conlogue, Agricultural Economist
Marketing Economics Division
Economic Research Service

INTRODUCTION

Efficient procurement and assembly of eggs have become increasingly important in recent years due to intensified competition. Large savings already have been achieved in plant operations, and management is now willing to investigate areas such as assembly where unit costs have historically been small in relation to plant operational costs. This report measures present performance, indicating why improvements are necessary and suggesting how they may be accomplished.

Although the Midwest, traditionally an area of small sideline laying flocks, has made considerable progress recently in tightening up supply lines, it still lags behind many other areas. However, there are indications of increasing numbers of larger flocks, more emphasis on quality, and more compact production areas.

The latest State Farm Census for Iowa (1960) shows 335 farms with 1,600 layers or more compared with 241 such farms in 1959 and only 147 in 1958. 1/ The average number of layers on these farms in 1960 was 2,916. Additional information on the changing picture in egg production in Wisconsin, Minnesota, and Iowa is contained in tables 1 and 2. These tables show the number of farms selling eggs, the total number of farms of all types, the number of eggs sold for 1954 and 1959, and percentage changes from 1954 to 1959.

Information was obtained during 1959 and 1960 from 7 Midwestern firms engaged in egg assembly. This included descriptions of procurement practices and quality programs, and time and cost data for 20 farm pickup routes.

All 20 of these routes were traced on county maps, showing location of farms, distances between farms, and the number of cases picked up at each farm. New routes were then overlaid on the maps, after careful consideration of mileage between stops, volume per stop, and distance from the central assembly plant. Consideration was given to the use of set-in stations where producers on these routes and other routes of the same company were clustered around a town or city where a refrigerated holding space might be available. Changes were demonstrated that could result in savings ranging from 10 to 45 percent. These savings were possible mainly from reduced mileage and time.

Following these demonstrations, some of the companies completely revamped their assembly programs. Using this type of route analysis, they realigned routes, established set-in stations, and urged producers to deliver to plants and set-in stations. Other firms in the Midwest and elsewhere may wish to adapt this type of analysis to their own egg assembly operations.

1/ Iowa Crop and Livestock Reporting Service. Number and Size of Farms, Geographic Patterns in Iowa, State Farm Census Supplement Number One, Farm Counts. Iowa Dept. Agr., Des Moines, 38 p. June 1961. (U.S. Statis. Rptg. Serv. cooperating.)

Table 1.--All farms, farms selling eggs, and eggs sold from farms, Wisconsin, Minnesota, Iowa, and United States, 1954 and 1959

Item	1954	1959	Percentage change
	Farms	Farms	Percent
All farms:			
Wisconsin	153,558	131,215	-14.6
Minnesota	165,225	145,662	-11.8
Iowa	192,933	174,707	-9.4
United States	4,782,416	1/3,703,642	-22.6
Farms selling eggs:			
Wisconsin	77,303	51,998	-32.7
Minnesota	105,267	74,784	-29.0
Iowa	136,402	105,489	-22.7
United States	1,684,531	1/1,067,187	-36.6
	Dozens	Dozens	Percent
Eggs sold from farms:			
Wisconsin	97,922,198	99,355,565	+1.0
Minnesota	228,952,632	229,428,778	+0.2
Iowa	238,768,955	266,170,987	+11.1
United States	2,654,202,330	1/3,327,359,447	+25.4

Source: 1959 Census of Agriculture, Bureau of the Census.

Table 2.--Farms selling eggs as percentage of all farms, Wisconsin, Minnesota, Iowa, and United States, 1954 and 1959

State	1954	1959
	Percent	Percent
Wisconsin	50	40
Minnesota	64	51
Iowa	71	60
United States	35	29

1/ Preliminary.

Source: 1959 Census of Agriculture, Bureau of the Census.

ALTERNATIVE METHODS OF MOVING EGGS FROM THE FARM

The traditional system of assembling eggs from farms was to send trucks from a central assembly plant to farms once or twice a week. This system is still used in some areas but several studies have shown that the system may often be costly. Hence, many assemblers have switched to other methods. These include delivery of eggs to a central plant by producers, the use of set-in stations at country points, and a combination of these approaches.

Delivery of Eggs to Central Plants by Producers

In some areas, assemblers have dispensed with pickup trucks and all eggs are delivered to the central assembly plant by producers. In these areas, production is concentrated within easy driving distance of the central plant. Producers are paid an additional amount per dozen for delivering eggs to the plant. The amount depends on the savings, but may sometimes be as much as a cent per dozen eggs. Often producers can deliver their eggs on trips into town on other matters.

The assembler is able to pay a higher price for the eggs due to his savings on labor and truck expense. This means that competitors, still sending trucks some distance for the eggs, would be at a price disadvantage of 1 to 2 cents per dozen. This puts the local assembler in a better position to hold his producers and maintain a steady supply of eggs to his customers.

One of the indirect advantages of this plan is the closer working relationship between plant managers and producers. Producers whose eggs are consistently a low grade are invited to watch their eggs candled in order to be assured that they are being treated fairly. Discussions are held with these producers to determine reasons for the low grade-out. In most instances, these discussions reveal faulty management or handling practices which can be easily corrected. In other situations, disease problems may be suspected, and an expert on poultry diseases may be asked to suggest remedial action.

Set-in Stations

Another plan is for the assembler to locate several set-in stations (space in town or city buildings for holding eggs) outside a 10 to 15 mile area from the central plant. This is particularly feasible where production density is low. Some stations may be out as far as 150 to 200 miles or more, provided they are easily accessible to good highways. Producers in these areas deliver eggs to the set-in stations. These may be located in feed mills, dairies, or other types of businesses. While set-in stations are not new in the industry, many are being modernized with equipment to control temperature and humidity of holding rooms. Eggs are placed in these rooms upon delivery by producers.

The central assembly plant can thus use fewer but larger trucks. It sends these large refrigerated trucks, with load capacities up to 500 cases or more, over planned routes. Set-in stations are visited on scheduled days to pick up the eggs and deliver them to the central grading plant. Some companies plan pickups from set-in stations to begin in late afternoon and conclude during the night. Thus, the trucks will arrive at the central grading plant early in the morning. Eggs brought in one day can be candled, cartoned, and ready for shipment out the same day or the next day.

This type of program has worked satisfactorily and can be highly efficient. However, the central assembly plant should keep complete control over the set-in stations and supervise the producers who deliver eggs to them. Competent fieldmen are an invaluable aid in helping to maintain the quality program, but in some instances plant managers have put the burden of quality control on dealers operating the set-in stations for them. Here, the operator of the set-in station buys the eggs from the producer and sells to the central grading station. A system of discounts is used in paying dealers for eggs failing to meet a specified grade yield.

In some instances, eggs are picked up at the farm and brought to the set-in stations by pickup trucks. Here also, it is necessary for the central plant to maintain strict control over the pickup routes as well as the set-in stations.

A combination of delivery of eggs to central plants and set-in stations has also been used successfully. Farm pickup routes are thus abandoned, with set-in stations established in outlying areas and eggs delivered by producers to these stations or to the central plant.

Candling and Cartoning at the Farm

Direct marketing of eggs by producers is one of the oldest forms of marketing certain farm products. However, with the advent of large retail supermarkets, direct marketing declined. Recently, considerable interest has been evidenced in the renewal of this type of marketing, but under greatly changed conditions. As producers become larger and more specialized they are better able to control quality and to provide larger volumes. When these factors are combined with good local service and delivery to stores, there are many advantages for the retailer in a direct buying program.

There are also problems connected with such a program. The producer must be able to realize additional returns from performing these marketing functions sufficient to offset his additional costs and to return to him at least as much as from the same resources devoted to expanding production. Moreover, the producer must be able to furnish supplies of the quantity and quality required by the buyer at all times.

In the Midwest, this system has been tried with producers with laying flocks of 3,000 to 10,000 hens. When well managed, these flocks can produce eggs yielding consistently well over 90 percent grade A. The eggs can be delivered to retail stores with little loss in quality, and the buyer is able to pay substantial premiums for the eggs because of their high quality and because of the savings in assembling and hauling. In some instances, where this type of marketing was expanded too rapidly, producers with smaller flocks of poorer quality were brought into the program. This meant larger numbers of suppliers to supervise and sometimes greater variability in quality. Eventually some of the programs deteriorated because of the increased volume of poor quality eggs being delivered to the stores.

While there are successful programs operating in the Midwest that involve farm candling and cartoning, this method is not as widely used there as in some other regions. In part, this is because production is more scattered and many flocks are not large enough to provide for modern equipment and to provide an incentive for good management.

Importance of Quality to all Methods of Egg Assembly

Many variations in egg quality programs are found in the Midwest. High quality at minimum cost is one of the major goals of the egg industry everywhere. To attain this goal, an efficient and well-managed program is necessary.

Some of the newer quality programs are working out as planned. However, others have bogged down because of lack of "know-how," poor enforcement, low prices, the desire for volume at the expense of other considerations, or the persistence in moving eggs through older marketing channels. These defects tend to perpetuate practices which result in poor quality eggs.

Better egg quality also facilitates reduced plant costs. In a previous study, it was found that savings of 6 cents per dozen were possible under certain conditions. 2/ The three principal sources of the savings are: Elimination of one candling operation, reduction in costs of transportation and of egg replacements when undergrade eggs are kept out of shipments, and elimination of the overhead and general expenses of one marketing firm. The third source of savings listed is available only if sales are made directly to retailers or retail warehouses. Realization of the savings requires the development of a quality egg program, in which 90 percent or more of the eggs bought by the assembler are grade A or better the year around, and the establishment of dependable marketing channels for such eggs.

While emphasis in this report is placed on the planning and execution of efficient low cost procurement and assembly programs which fit the particular conditions in the Midwest, good production practices are essential to the success of such programs. Much has been written on what constitutes a good production program. This involves such factors as breed or strain of layer, culling and replacement practices, type of laying house, waterers, ventilation, litter, type of nests, feeding program, medicinal care, number of times to pick up eggs daily, and maintaining the proper temperature and humidity in the cooling room. Information on recommended practices can be obtained from agricultural colleges and other sources and will not be elaborated on here.

However, even the best recommendations are worthless unless carried out. The services of one or more well trained fieldmen may be needed and, for diseases, a close working relationship with an agricultural college or independent laboratory. In the case of the small operator who cannot afford a fieldman, the manager, with the aid of his pickup drivers, may carry out a creditable educational program provided he can get outside help on problems with which he is unfamiliar.

PRESENT COSTS AND PRACTICES ON EGG ASSEMBLY ROUTES

Assembly Costs

The average cost per case, for assembling eggs on 20 routes during the first quarter of 1960 was 38.7 cents. Labor costs accounted for 20 cents per case and truck costs for the remaining 18.7 cents per case (table 3).

The ranges on both labor and truck costs were very wide. For labor the low cost was 10.2 cents per case, the high 30.9 cents. For truck costs the low was 5.7 cents per case, the high 36.2 cents.

2/ Conlogue, R. M. Candling and Cartoning Eggs at Country Plants. U.S. Dept. Agr., Mktg. Res. Rpt. 366. Dec. 1959.

Table 3.--Labor and truck costs per case and per mile, 20 egg assembly routes in Minnesota, Wisconsin, and Iowa, January 1960

Route	Costs per case of eggs			Total cost per mile
	Labor	Truck	Total	
	Cents	Cents	Cents	Cents
Low cost routes:				
1	10.20	9.75	19.95	1/
2	11.91	9.35	21.26	24.12
3	14.33	13.30	27.63	22.04
4	15.61	13.15	28.76	23.20
5	17.07	12.55	29.62	25.03
Average, 5 routes	13.82	11.62	25.44	23.60
Medium cost routes:				
6	27.00	5.70	32.70	37.07
7	16.30	17.29	33.59	19.72
8	21.90	12.30	34.20	18.47
9	13.34	21.39	34.73	17.26
10	17.42	18.93	36.35	20.33
11	21.90	15.30	37.20	25.17
12	19.63	21.89	41.52	20.12
13	17.62	24.22	41.84	18.31
14	30.90	12.00	42.90	31.49
15	19.75	25.75	45.50	18.76
Average, 10 routes	20.57	17.48	38.05	22.67
High cost routes:				
16	24.13	23.23	47.36	21.59
17	28.52	22.82	51.34	23.90
18	27.26	25.37	52.63	22.08
19	22.57	32.25	54.82	21.78
20	23.15	36.20	59.35	17.38
Average, 5 routes	25.13	27.97	53.10	21.35
Average, 20 routes	20.02	18.64	38.66	22.52

1/ Not available.

On a per mile basis, the average cost of operating 19 trucks (data not available for one), was 22.5 cents. A breakdown between labor and truck costs per mile was not available for all trucks since some companies grouped the costs for several trucks together. For those from which information was available, the average labor cost per mile was about 12.3 cents and the average truck cost was 10.2 cents per mile. The total cost per mile including labor and truck costs ranged from a low of 17.3 cents to a high of 37.1 cents. The next high was 31.5 cents per mile. Both of these highs were due to a high labor cost. Eliminating these two, the high was 25.2 cents per mile.

Variations in total costs per mile were due mostly to labor costs. The determination of labor costs is complicated by the fact that some drivers work on a commission basis and others work by the hour or week. For those drivers working on commission, the per mile labor cost was derived from total mileage covered and total commissions paid.

Factors Affecting Costs per Case

The six routes with the lowest labor cost per case had the highest number of cases per stop. Five of them also had the largest number of cases per mile, and all six had the largest number of cases per hour. Thus, number of cases per stop, per mile, and per hour are important factors in lowering the labor cost per case.

Averages of routes with the five lowest total costs per case showed labor costs per case averaging 13.8 cents with 4.2 cases per stop, 0.8 cases per mile, and 15.0 cases per hour. Averages for the five highest total costs per case were 25.1 cents with 1.9 cases per stop, 0.4 cases per mile, and 8.6 cases per hour. The greater number of cases per stop reduces the average time and mileage per case and the greater number of cases per hour meant less time per case at and between stops.

Table 4 shows mileage, time, stops, and size of pickups for each of 20 routes, and all 20 routes combined for an average day in mid-January, 1960. There were 838 stops on these combined routes on which 62,964 dozen eggs were picked up. The average pickup was about 75 dozen, or 2.5 cases. There were 193 stops, 23 percent of the total, where less than one case, an average of about 17.6 dozen, was picked up. There were 645 stops where one or more cases were picked up, totaling 59,570 dozen, or slightly over 3 cases per stop. On the basis of an average cost of 22.5 cents per mile and an average of approximately 2.75 miles between stops, the cost for picking up 3,394 dozen from the less-than-one-case stops was $118.46 or 3.5 cents per dozen. Cost of picking up 59,570 dozen from 645 stops was $395.89, or 0.66 cent per dozen.

A closer examination of individual route data points out a few of the more costly operations. For example, 48 stops were made on route 18, of which 19, or 40 percent, were for less than one case. On this route, 19 stops were made to pick up 232 dozen eggs. This amounted to 12.2 dozen, or less than 0.5 case, per stop. On the other 29 stops, 2,217 dozen were picked up, averaging 76.4 dozen, or 2.5 cases per stop. On route 20, 61 stops were made of which 23, or 38 percent, were for less than one case. On this route, 23 stops were made to pick up 399 dozen. This averaged 17.3 dozen, slightly over 0.5 case per stop. On the other 38 stops, 2,012 dozen were picked up, nearly 2 cases or an average of 52.9 dozen, per stop.

The Role of Good Management

Close observation of farm pickup routes indicates a lack of knowledge on the part of management in some firms as to how the routes are set up and operated. Some plant managers tend to stress volume regardless of how that volume is built up and maintained. Much of the responsibility of this part of the program has been delegated to drivers of the trucks used for picking up eggs. Over a period of years, some producers have dropped out and others have been added, without much thought being given to mileage or size pickup.

Many farm pickup routes show little evidence of planning. Route mileages may be excessive and routes may overlap. For example, on one route, the distance

Table 4.--Mileage, time, number of stops, and quantity per trip of eggs from farms, 20 pickup routes in Minnesota, Wisconsin, and Iowa, January 1960

	Route 1		Route 2		Route 3		Route 4		Route 5		Route 6	
	Miles		Miles		Miles		Miles		Miles		Miles	
Distance:												
To 1st stop	4		7		62		46		13		13	
From last stop	2		1		62		23		--		22	
On route	61		135		137		158		128		58	
Total miles	67		143		261		227		141		93	
	Hours		Hours		Hours		Hours		Hours		Hours	
Time on route	5		9 1/2		12		11 1/2		10		6 1/2	
Average time to load and unload at plant	1/2		1 1/4		1 1/4		1 1/4		1		3/4	
	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops
Number of stops, by size of pickup:												
4 cases or more	3	10.0	9	18.0	19	43.2	7	14.9	8	16.3	7	25.9
3 cases or more	6	20.0	15	30.0	25	56.8	11	23.4	11	22.4	13	48.1
2 cases or more	15	50.0	22	44.0	30	68.2	21	44.7	23	46.9	20	74.1
1 case or more	24	80.0	38	76.0	38	86.4	39	83.0	43	87.8	24	88.9
All pickups	30	100.0	50	100.0	44	100.0	47	100.0	49	100.0	27	100.0
	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs
Quantity per trip, by size of pickup:												
4 cases or more	720	36.9	2,981	61.2	4,778	76.4	3,446	62.6	1,556	43.5	1,072	44.9
3 cases or more	990	50.8	3,581	73.5	5,359	85.7	3,935	71.5	1,874	52.4	1,665	69.8
2 cases or more	1,500	76.9	4,040	82.9	5,723	91.5	4,636	84.3	2,584	72.2	1,954	81.9
1 case or more	1,829	93.8	4,653	95.5	6,133	98.1	5,359	97.4	3,470	97.0	2,343	98.2
All pickups	1,950	100.0	4,873	100.0	6,252	100.0	5,501	100.0	3,578	100.0	2,387	100.0

	Route 7		Route 8		Route 9		Route 10		Route 11		Route 12	
	Miles		Miles		Miles		Miles		Miles		Miles	
Distance:												
To 1st stop	69		7		47		25		10		48	
From last stop	61		10		31		16		8		63	
On route	193		84		125		115		62		135	
Total miles	323		101		203		156		80		246	
	Hours		Hours		Hours		Hours		Hours		Hours	
Time on route	13		6 1/2		8		9		7 1/2		11 1/2	
Average time to load and unload at plant	1 1/4		1/2		3/4		3/4		3/4		1	
	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops
Number of stops, by size of pickup:												
4 cases or more	8	29.6	3	11.1	2	6.9	5	10.2	3	7.0	6	10.9
3 cases or more	10	37.0	3	11.1	6	20.7	7	14.3	10	23.3	11	20.0
2 cases or more	16	59.3	12	44.4	12	41.4	15	30.6	26	60.5	21	38.2
1 case or more	24	88.9	23	85.2	22	75.9	34	69.4	32	74.4	42	76.4
All pickups	27	100.0	27	100.0	29	100.0	49	100.0	43	100.0	55	100.0
	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs
Quantity per trip, by size of pickup:												
4 cases or more	4,871	81.9	480	36.4	1,672	55.3	885	33.7	390	15.7	1,191	33.3
3 cases or more	5,165	86.8	480	36.4	2,088	69.0	1,075	41.0	1,020	41.0	1,714	47.9
2 cases or more	5,546	93.2	960	72.7	2,395	79.2	1,532	58.4	1,980	79.5	2,471	69.0
1 case or more	5,912	99.3	1,224	92.7	2,882	95.3	2,303	87.7	2,346	94.2	3,284	91.7
All pickups	5,951	100.0	1,320	100.0	3,024	100.0	2,625	100.0	2,490	100.0	3,580	100.0

Table 4.--(Continued)

	Route 13		Route 14		Route 15		Route 16		Route 17	
	Miles		Miles		Miles		Miles		Miles	
Distance:										
To 1st stop	44		11		48		49		51	
From last stop	25		9		31		16		25	
On route	128		62		117		111		83	
Total miles	197		82		196		176		159	
	Hours		Hours		Hours		Hours		Hours	
Time on route	9		7		9 1/2		9 1/2		8 1/2	
Average time to load and unload at plant	3/4		3/4		1		1		3/4	
	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops
Number of stops, by size of pickup:										
4 cases or more	3	6.2	1	2.4	5	13.5	3	6.5	6	17.1
3 cases or more	7	14.6	5	11.9	9	24.3	6	13.0	8	22.9
2 cases or more	18	37.5	19	45.2	18	48.6	15	32.6	14	40.0
1 case or more	37	77.1	35	83.3	28	75.7	33	71.7	25	71.4
All pickups	48	100.0	42	100.0	37	100.0	46	100.0	35	100.0
	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs
Quantity per trip, by size of pickup:										
4 cases or more	527	20.3	120	5.4	819	33.8	426	17.6	963	43.4
3 cases or more	924	35.7	500	22.6	1,257	51.8	733	30.4	1,155	52.0
2 cases or more	1,696	65.5	1,500	67.8	1,864	76.9	1,371	56.8	1,573	70.9
1 case or more	2,433	93.9	2,135	96.6	2,266	93.4	2,154	89.2	2,027	91.3
All pickups	2,591	100.0	2,211	100.0	2,425	100.0	2,414	100.0	2,220	100.0

	Route 18		Route 19		Route 20		Total 20 routes	
	Miles		Miles		Miles		Miles	
Distance:								
To 1st stop	39		46		59		698	
From last stop	40		18		55		518	
On route	116		118		160		2,286	
Total miles	195		182		274		3,502	
	Hours		Hours		Hours		Hours	
Time on route	9		8		11		181 1/2	
Average time to load and unload at plant	3/4		1		1		18	
	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops	Stops	Pct. of stops
Number of stops, by size of pickup:								
4 cases or more	5	10.4	4	9.1	2	3.3	109	13.0
3 cases or more	7	14.6	7	15.9	4	6.6	181	21.6
2 cases or more	11	22.9	22	50.0	10	16.4	360	43.0
1 case or more	29	60.4	37	84.1	38	62.3	645	77.0
All pickups	48	100.0	44	100.0	61	100.0	838	100.0
	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs	Doz. eggs	Pct. of eggs
Quantity per trip, by size of pickup:								
4 cases or more	898	36.7	673	24.8	317	13.1	28,785	45.7
3 cases or more	1,126	46.0	989	36.5	537	22.3	36,167	57.4
2 cases or more	1,412	57.7	1,988	73.3	965	40.0	47,690	75.7
1 case or more	2,217	90.5	2,588	95.4	2,012	83.5	59,570	94.6
All pickups	2,449	100.0	2,712	100.0	2,411	100.0	62,964	100.0

from the central plant to the first stop was over 60 miles and required about 1.5 hours of driving time. The distance and time from the last stop to the central plant was about the same. The driver traveled 132 miles during 9 hours to make 44 pickups from the first to the last stop. Forty percent of these pickups were for less than one case of eggs. Similar experiences were reported at other plants.

Many of these problems can be studied effectively by a systematic plotting of stops and routes on large county maps available from State highway departments. These should show the average pickup over a fairly long period of time for each stop and the mileage between stops. In this way routes could be rearranged to increase volume per mile, or other alternatives could be used. In fact, assemblers might find it profitable to make such studies periodically.

Another area of study for management is the method of payment to drivers of pickup trucks. Some companies pay drivers a straight weekly salary or by the hour. Others pay a minimum salary and a commission whichever is higher. Where a straight salary or a per hour wage is paid, there is a tendency on the part of some drivers to concentrate pickups in as small an area as possible, and the proportion of time spent in actual travel and pickup of eggs declines. This is probably recognized by many plant managers, who try to compensate for it by paying only the minimum wage. Drivers who receive commissions tend to be more alert and are constantly on the lookout for new producers in order to build up their volume. This method can be advantageous to management but it requires supervision in order to set up and maintain routes so that each driver has the same opportunity as the other drivers. Disparities can occur because of different densities of production. Unprofitable expansion of mileage and the addition of numerous small producers not only increases per unit costs of operating the truck but also adds greatly to recordkeeping for candlers and office help.

REDUCING COSTS OF ASSEMBLING EGGS

Substantial opportunities exist for reducing mileage, time, and costs of picking up eggs on farm routes. The major methods by which savings can be achieved are: Rearrangement of routes to eliminate duplication; delivery of eggs by nearby producers to central plants; establishment of set-in stations; and elimination of small lots of lower quality. This section of the report gives examples of the savings available from these changes, mainly as applied to 20 egg pickup routes studied.

Rearranging Routes to Eliminate Duplication of Travel

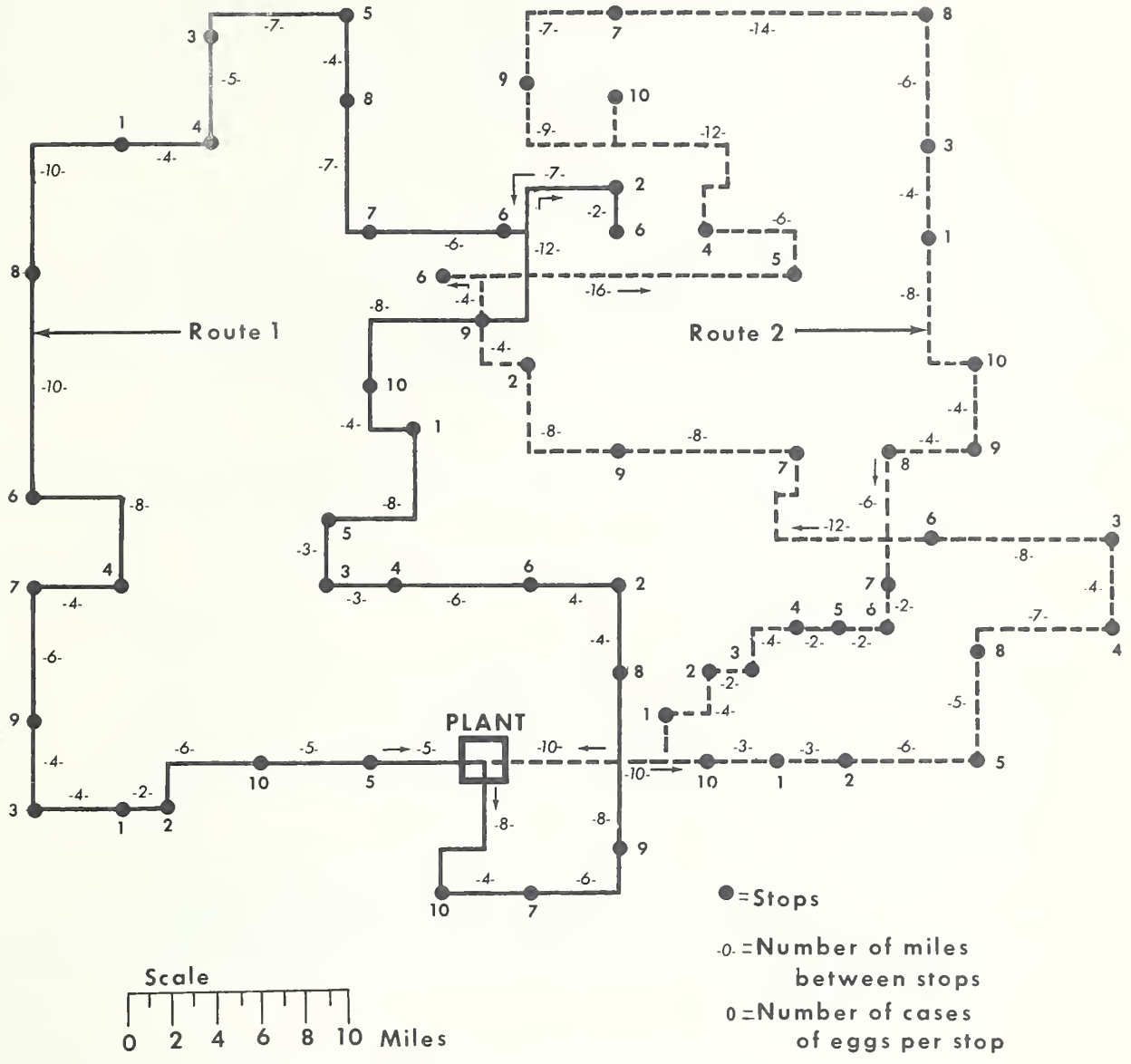
This process can be illustrated by means of a simplified hypothetical example.

Suppose Company A has two pickup routes, in adjacent territories. Route 1 involves pickup of eggs on Tuesday, and Route 2 on Wednesday. These routes have grown up over a period of years, and the two drivers have acquired some additional producer-customers for the firm. The plant manager discovers, when plotting these routes on a map, that the two routes are not, in fact, in exclusive territories, but overlap each other to some extent.

Figure 1 shows the present routes and the locations of the producers. Note that the two routes overlap in the center of the diagram.

Route 1 before rearrangement involved 31 stops, 171 cases, and 186 miles of travel. Route 2 involved 30 stops, 165 cases, and 204 miles.

TWO HYPOTHETICAL EGG ASSEMBLY ROUTES BEFORE REARRANGEMENT



U. S. DEPARTMENT OF AGRICULTURE

NEG. ERS 1384-62(8) ECONOMIC RESEARCH SERVICE

Figure 1

The driver on Route 1 swapped two of his customers for two on Route 2. After the swap, Route 1 still has 31 stops and 171 cases, but only 180 miles of travel. Route 2 still involves 30 stops and 165 cases, but only 186 miles of travel (fig. 2).

Mileage saved totals 24 miles. If these routes are covered twice each week, annual mileage saved would total 2,496 miles. Man-hours saved, if travel between stops is at a rate of 40 miles per hour, would total 62.4 hours annually. While the changes made in these hypothetical routes and the savings which result are modest, they serve to illustrate the possibilities of this approach on a more extensive basis.

Delivery of Eggs by Producers to Central Grading Station or Set-in Stations

This type of assembly would be based on abandonment of farm pickup routes, the establishment of set-in stations in outlying areas and the delivery of eggs by nearby producers to the set-in stations or the central assembly plant. On 20 pickup routes, the pickup trucks traveled 3,502 miles and picked up 2,100 cases of eggs. The pickup cost per case was 38.66 cents. Estimated annual volume on these routes totalled 90,000 cases.

Towns or cities where set-in stations might be established were located on a map. Routes for the large trucks picking up at the set-in stations were traced on the map and the time on the routes estimated. This plan resulted in the following costs:

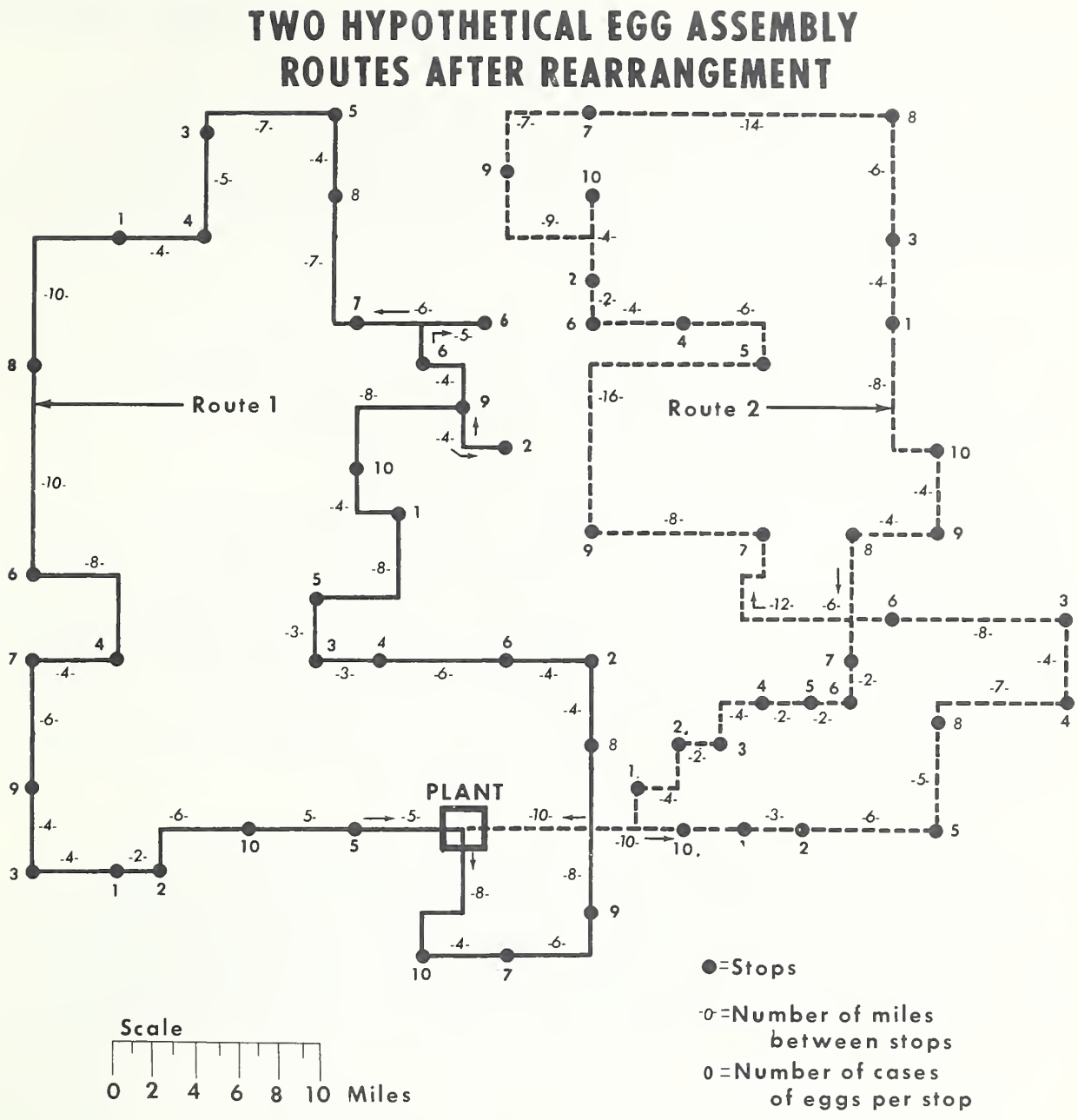
Trailer pickup from set-in stations	1,057 miles
Number of cases picked up	2,100 cases
Trailer truck cost at 14.40 cents per mile	$152.21
Labor cost at $2.25 per hour for drivers averaging 20 miles per hour including stops	118.91
Total cost	271.12
Cost per mile 271.12 ÷ 1057 =	25.65 cents
Cost per case 271.12 ÷ 2100 =	12.91 cents

The difference between the old method cost of 38.66 cents per case and the new method cost of 12.91 cents is a saving of 25.75 cents. If 15 cents per case, or 0.5 cent per dozen, of this were paid to producers for bringing eggs into the set-in station or central assembly plant, increased annual returns to producers for 90,000 cases would amount to $13,500.

The remaining 10.75 cents per case or $9,675 per year would more than pay for the establishment and maintenance of the set-in stations, thus allowing an increased net return to the company. This could be used in modernization of the plant and equipment.

Eliminating Small Volume Stops

Study of the 20 egg pickup routes showed savings of $1,350 per year in labor costs resulted from the elimination of stops where the pickup was for less than one case of eggs. On these routes an estimated 90,000 cases of eggs are picked up over a period of one year.



U. S. DEPARTMENT OF AGRICULTURE

NEG. ERS 1385-62 (8) ECONOMIC RESEARCH SERVICE

Figure 2

Elimination of less-than-one-case stops would reduce the number of cases of eggs picked up by 4,730 or 5.3 percent of the 90,000 cases. It would reduce the 33,600 stops per year by 8,200, a decrease of 24.4 percent.

The saving of $1,350 was arrived at by using a combination of methods of payment to drivers including various commissions per case and wages per hour, with daily, weekly, or monthly total minimums on both. This averaged $2.25 per hour. Picking up only lots of eggs of one case or more, and excluding the less-than-one-case stops, would result in a saving of 600 hours of work. At $2.25 per hour, the saving on 600 hours would be $1,350.

The suggested elimination of small lots would be important to assemblers on a cost basis. For example, the labor cost at the farm while picking up the 90,000 cases was $5,540 or 6.2 cents per case. Labor costs at the farm for picking up 4,730 cases on the 8,200 less-than-one-case stops was $1,350 or 28.5 cents per case. Eliminating the 4,730 cases and their on-the-farm pickup costs leaves 85,270 cases with a pickup labor cost of $4,190, or 4.91 cents per case.

The preceding calculations reflect only savings on labor at the farm. Additional savings accrue from reduction in mileage. A retracing of the routes on maps after elimination of the less-than-one-case stops resulted in reduction in mileage from 147,485 miles to 139,672 miles. This amounts to 7,813 miles or 5.3 percent of the total mileage for all stops. At 10.2 cents per mile, the truck cost, not including labor, amounts to $797. Moreover, the savings in travel time at a speed of 25 miles per hour would equal 312 hours, or $702 annually. The total labor and truck cost, $797 plus $1,350 plus $702, is $2,849. Possible additional savings from eliminating unloading costs of about $65 and office costs, of about $235, would increase overall savings to $3,149. On a per case basis, costs averaged 66.6 cents per case for handling the 4,730 cases picked up on 8,200 stops for less-than-one-case losts, about twice as much per case as for the remaining volume.

Rerouting of Established Routes Plus Eliminating Less-Than-One-Case Stops

Rerouting of 15 established routes, plus eliminating less-than-one-case lots illustrated the possibility of further savings. New routes were drawn on maps on which producers' farms were located. The usual number of cases picked up at each farm per trip was also shown. A direct comparison of each new route with each old route was not possible because of the radical changes made in setting up the new routes.

However, the rerouting did result in lower per case costs and per mile costs. The number of routes was reduced from 15 to 12, the number of stops on one trip on all routes from 646 to 484, the number of miles from 2,686 to 2,465, the number of hours from 152 to 129, and the number of cases from 1,733 to 1,668. This amounts to reductions of 20 percent in number of routes, 25 percent in number of stops, 8 percent in number of miles, and 15 percent in number of hours, with only a 4 percent reduction in number of cases.

If truck costs are again valued at 10.2 cents per mile and labor costs at $2.25 per hour, total costs for one trip on each of the original 15 routes would be 35.5 cents per case, or 22.9 cents per mile. After rearrangement and elimination of small stops, costs on the 12 new routes would be 32.5 cents per case, or 22.0 cents per mile. The average number of cases per stop on the revised routes would be 3.4 cases. The average number of cases per mile would be two-thirds of a case, and the average time per case 4.6 minutes.

Paying Price Differentials Based on Size of Pickup

In this study, the average truck cost per mile including driver is shown to be 22.5 cents. The average distance between stops is shown to be approximately 2.75 miles (2,286 miles ÷ 838 stops). Using these and additional data (table 5), the average cost of pickup is shown to be 3.5 cents per dozen for less than 1 case, 1.5 cents per dozen for 1 but less than 2 cases, 1 cent per dozen for 2 but less than 3 cases, 0.6 cent per dozen for 3 but less than 4 cases and 0.25 cent per dozen for 4 or more cases. While these figures are only approximations, since average cost rates are used, they illustrate a method by which a differentiated pickup cost schedule can be devised.

Table 5.--Stops, quantity, mileage, and cost of pickup of eggs, 20 routes in Wisconsin, Minnesota, and Iowa, January 1960

Size of lot	Number of stops	Dozens picked up	Miles traveled	Total cost at 22.5 cents per mile	Cost per dozen (cents)
Less than 1 case	193	3,394	526.5	$118.46	3.5
1 case but less than 2	285	11,880	777.5	174.94	1.5
2 cases but less than 3	179	11,523	488.3	109.87	1.0
3 cases but less than 4	72	7,382	196.4	44.19	0.6
4 cases or more	109	28,785	297.3	66.89	0.23
Total	838	62,964	2,286.0	514.35	0.82

These figures show 46 percent of volume coming from producers with 4 or more cases of eggs. A more equitable payment program could be set up based upon the 0.23 cent per dozen cost of picking up their eggs. For example, discounts could be established based upon the top price paid to producers of 4 or more cases. Thus, producers with less than one case would be paid up to 3.5 cents per dozen less, those with 1 but less than 2 cases up to 1.5 cents per dozen less, those with 2 but less than 3 cases up to 1 cent per dozen less, and those with 3 cases but less than 4 cases up to 0.5 cent per dozen less. For example, if producers with 4 or more cases were paid 30 cents per dozen for large grade A eggs, the pay schedule might be as follows:

Paying Price, Large Grade A Eggs

	Cents
4 or more cases	30
3 but less than 4 cases	29.5
2 but less than 3 cases	29
1 case but less than 2	28.5
Less than 1 case	26.5

Other grades and sizes could be paid for accordingly.

There are other factors which increase the cost of handling less-than-one-case lots, such as the time spent by the driver at the farm, the records kept by the candler, and the office work in making out grading slips, checks, and other records. A record of time spent at the farm shows an average cost of about 10 cents per case for the initial stop and the first case or less. For 2 cases the cost per case is nearly halved. For 3 cases and above, with the methods used on the trips studied, the cost per case remains fairly constant. This cost plus the cost of record keeping by the candler and office work in making out tickets and checks is estimated to be about 0.5 cent per dozen for 1 case lots and less than 1 case lots and about 0.25 cent per dozen for 2 cases or more. Up to an extra 0.5 cent discount per dozen might be justified for 1 case lots and less, thus increasing the discount to 4 cents per dozen for less than one case and to 2 cents per dozen for 1 case but less than 2.

SELECTED REFERENCES

Anderson, R. H.
1956. The Organization and Structure of Egg Marketing in Utah. Utah Agr. Expt. Sta. Bul. 381, 24 p. Apr.

Bird, Kermit
1960. An Analysis of Egg Handling Costs and Efficiency. Okla. Agr. Expt. Sta. Bul. B-568, 50 p. Nov.

Clayton, P. C. and R. E. Cray
1956. Labor Efficiency in Egg Assembling and Grading Plants. Ohio Agr. Expt. Sta. Res. Bul. 773, 36 p. May.

Cray, R. E.
1952. The Efficiency and Cost of Collecting Eggs from Farms in Ohio. Ohio Agr. Expt. Sta. Res. Bul. 721, 19 p. June.

Gallimore, W. W. and Stemberger, A. P.
1960. Cost of Egg Marketing Services: Farm Versus Central Station. N. C. State Col., Dept. Agr. Econ., AE Inf. Ser. No. 74, 43 p. Mar.

Hansen, W. J. and Bressler, R. G.
1942. Efficiency of the Transportation of Eggs to Connecticut Cooperative Associations. Storrs (Conn.) Agr. Expt. Sta. Bul. 241, 35 p. Aug.

Judge, G. G. and Baker, R. L.
1952. Time and Cost Functions for Egg Routes. Poultry Science 31(4): 738 - 744. July.

Koudele, J. W.
1954. Procurement Costs of Eggs and Other Produce. Kans. Agr. Expt. Sta. Cir. 304, 27 p. Mar. (U.S. Dept. Agr. cooperating.)

Mortenson, W. P.
1959. A Study of Egg Handling Costs in Wisconsin. Wisc. Agr. Expt. Sta. A. E. 28. Jan.

Oyloe, Turner
1958. Marketing Policies and Practices of Country Egg Dealers in Eastern South Dakota. S. D. State Col., Dept. Agr. Econ., Brookings, S. D. Cir. 143, 23 p. June.

Ratcliffe, Harry E.
1959. Cost of Marketing Eggs and Labor Output of Selected Cooperatives. Part I. Northeast. U. S. Dept. Agr., Farmer Coop. Serv. Gen. Rpt. 59, 28 p. May.

_____
1960. Cost of Marketing Eggs and Labour Output of Selected Cooperatives. Part II. North Central States. U. S. Dept. Agr., Farmer Coop. Serv. Gen. Rpt. 72, 36 p. May.

_____
1960. Cost of Handling Eggs and Labor Output of Selected Cooperatives. Part III. Western States. U. S. Dept. Agr., Farmer Coop. Serv. Gen. Rpt. 75, 52 p. July.

_____
1961. Cost of Handling Eggs and Labor Output of Selected Cooperatives. Combined Report of Northeast, North Central and Western Areas. U. S. Dept. Agr., Farmer Coop. Serv. Gen. Rpt. 88, 52 p. Jan.

Rogers, G. B. and Woodworth, H. C.
1956. Distributing and Handling Grain-Feeds in New Hampshire. II. Problems in Retail Distribution. N. H. Agr. Expt. Sta. Bul. 427. July.

Rollins, F. D., Clayton, P. C. and Cray, R. E.
1960. Egg Marketing Costs Influenced by Size of Farm Shipment. Ohio Agr. Expt. Sta., Cir. 83. Feb.

Rothbauer, T. C., Wood, G. B. and Martin, J. H.
1952. Poultry and Egg Truck Routes in Indiana. Purdue Agr. Expt. Sta. Bul. 571. Jan.

Roy, Ewell P.
1957. Egg Marketing by Commercial Producers in the South. La. Agr. Expt. Sta., Baton Rouge, La., South. Coop. Ser. Bul. No. 50. June.

Growth Through Agricultural Progress