ABSTRACT OF THESIS

ANALYSIS OF WHOLESALE EGG MARKETING COSTS IN COLORADO

Submitted by

Robert Howard Adolph

In partial fulfillment of the requirements

for the Degree of Master of Science

Colorado

Agricultural and Mechanical College

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Abstract of Thesis

Robert Howard Adolph
808 South College
Fort Collins, Colorado

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Master of Science
Major in Economics

Title

Analysis of Wholesale Egg Marketing Costs in Colorado

Introduction

The importance of an analysis of egg marketing costs at the wholesale level is of particular merit in approaching the problem of improving egg marketing conditions in Colorado. It is necessary to survey the pattern of egg production in Colorado in order to proceed with an analysis of these costs since the location and concentration of production has a direct bearing on marketing costs at the wholesale level. The fact that eggs are a perishable product accentuates the necessity for following through with a detailed study of egg production pattern in Colorado.

Market agencies have been accused of reaping huge profits for services rendered largely because of the well known spread in prices received by farmers and prices paid at the retail level. However, the fact of the matter is that there is a wide range of profits and

losses among marketing agencies resulting largely from the variations in marketing costs.

The problem

To develop a methodology for determining the variations of costs of marketing eggs at the wholesale level.

Problem analysis.--1. What effect does the volume of egg production and average flock size have on the costs of marketing eggs?

2. How do the prices for eggs in Colorado compare with average regional and national prices paid?

3. What are the costs involved in the procurement, candling, and handling of eggs?

4. What is the effect of volume of business on the above costs of marketing eggs?

5. By what method may standards for obtaining costs of marketing be set up and how may these standards be used?

Delimitation.--This investigation has been limited to an analysis of costs of procurement, candling, and handling of eggs in Colorado and to the pattern of egg production in the state as it effects these costs.

Procedure

Data needed	Source	Technique
1. Statistics on egg production in Colorado.	Bureau of Agricultural Economics Statistics and Bureau of Census Reports.	Analyzing and interpretation of trends in production and of egg production areas.
2. Costs of procurement, candling and handling of eggs.	Interview of Egg Marketing Establishments.	Set up analysis of costs involved in egg marketing under present Colorado conditions.

Background

The poultry industry has made a tremendous advancement since the depression years of the 1930's. This has been brought about by the consumer who has become more aware of the egg as a wholesome nutritious food. At the same time many farmers found that poultry flocks could provide a good source of income to the home farm. With the increase in production and increase in demand of eggs taking place, market agencies found themselves confronted with the problem of handling more of this product. Breeding, proper housing and more efficient methods of

management have reduced costs of production. At the same time marketing agencies have had to keep pace with a growing industry by providing more efficient handling and storage methods which would give the consumer the high quality egg he desires.

Colorado has been slow in becoming as quality conscious as other states, since it does not produce eggs in sufficient quantities that it must look for out of state competitive consumer markets. However, Colorado producers and market men face active competition from quality eggs shipped in from adjacent states. This means that they must bring themselves into line with an integrated quality egg production and marketing program. This study will be confined to Colorado problems of production and marketing with an analysis of cost of marketing eggs within the state.

Methods and Materials

The pattern of egg production includes the extent of egg production, areas, location, and trends in egg production and flock sizes. This material was obtained from the United States Census reports. The Bureau of Agriculture Economics statistics do not give a breakdown of egg production within the state so for the most part both the U. S. Census of 1940 and 1945 were used. The Special Poultry Report of 1940 was of valuable assis-

tance in analyzing the production of eggs in the state. After the statistics were obtained definite areas of production according to geographical locations were shown to be evident within the state. With production areas outlined it was possible to make comparisons. Since the information available was limited to counties it was necessary to use county lines for splitting the state into the production areas selected. The areas chosen first were the river basins and although all of the land of these basins is not under irrigation, they were arbitrarily classified as irrigated areas. The next areas chosen were those where dryland farming is generally practiced. The remaining area was that area which is generally considered as a mountainous region.

A number of studies have been made on costs of marketing poultry products. However, the majority of these have been on marketing poultry with fewer reports being made on egg marketing costs. An investigation into average costs of marketing eggs was shown to be of little value inasmuch as there are a large number of variations in the organization of those engaged in the egg handling business. Because of this variation and the fact that a survey reporting averages would be of little value to the individual handler of eggs, it was felt that a standard for ascertaining egg marketing costs should be developed.

The procedure consisted of obtaining the labor rates commonly paid and of estimating normal costs that are incurred in the egg marketing business. These were obtained by informal interviews with persons engaged in the egg marketing business in Colorado. Tables and graphs were developed to show the wide variations that occur in costs and why such variations occur.

Findings of this Study

1. Poultry flocks were kept on 84.5 percent of all farms in 1945. These flocks produced 26,552,391 dozen eggs in 1944.

2. Seventy-eight percent of Colorado poultry production occurred in the South Platte River Basin, Eastern Colorado dryland area and Arkansas River Basin.

3. There was no evidence of specialized commercial egg production developing within certain areas of the state.

4. There was a general increase in production of 38 percent from 1939 to 1944 of which 26.5 percent came from an increase in flock size. The difference of 11.5 percent could be attributed to increased egg production per bird.

5. Average flock size of Colorado poultry flocks was 86 birds in 1945 compared to 68 in 1940. This small flock size was considered a basic reason for the production of poor quality eggs.

6. Dryland areas were considered as probably having more efficient production than irrigated areas based upon the fact that larger sized flocks and a larger production in proportion to the population was found in the dryland area.

7. Topography has a very important part in production and marketing of eggs. The high mountain ranges serve as a barrier to smooth year around marketing and split Colorado into definite areas.

8. Flocks having 200 or more birds numbered 4,163 in 1945 compared to 2,146 flocks in 1940. This number of flocks having over 200 birds was only 10.4 percent of all flocks compared to 4.1 percent in 1940.

9. Almost 2/3 of the years total production occurred during the six months period February through July.

10. Colorado definitely does not produce enough eggs for its own needs during all seasons of the year.

11. An expanded egg production program in Colorado would actually improve market conditions.

12. Average prices paid producers for eggs in Colorado for a seven year period 1940 to 1946 inclusive were computed at 2.6 cents less per dozen than the Mountain States average and 1.9 cents less than the United States average. This 2.6 cents per dozen would have meant

$690,000 more to the Colorado poultry industry during the 1944 production year if Colorado had received the same as the average Mountain States price paid for eggs.

13. The analysis of costs of marketing eggs did not attempt to determine the profits of egg marketing, but did try to show, under a given set of conditions, what the market agency could expect in the way of costs.

14. Volume of business was shown to be the greatest factor in determining variations in the costs of marketing eggs.

Implications

A more efficient egg marketing system in Colorado would encourage larger consumption of eggs where the consumer is assured of obtaining a quality product. Colorado production of eggs would be enlarged as a result of increased demand within the state. Improved quality production could open outlets outside of the state resulting in increased profitability of egg production.

An educational program demonstrating good management practices and profitability of larger flocks would help to even out the seasonal cycle of egg production.

The fact that Colorado producers received a lower price for their eggs than the average of the mountain states can be attributed to poor quality eggs being produced and an inefficient marketing system.

Suggestions for further study

The object of this study has been to present an analysis of the cost of egg marketing at the wholesale level in Colorado which would naturally develop suggestions for further study. Further study is suggested on these main topics. An analysis of the efficiency and profitability of various sized flocks on Colorado farms. The relative advantages of poultry flocks on dryland and irrigated farms. Means for improving the marketing of eggs in Mountain Valleys of Colorado. A study of available storage facilities in Colorado as a means for providing a year around supply of eggs from Colorado's egg production. An analysis of out of state market outlets available to Colorado market agencies. An analysis of the types of market agencies present in Colorado with special emphasis on the volume of eggs handled. Marketing cost at the retail level with emphasis on the costs of maintaining quality.

T H E S I S

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COLORADO AGRICULTURAL AND MECHANICAL COLLEGE

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY ROBERT HOWARD ADOLPH

ENTITLED ANALYSIS OF WHOLESALE EGG MARKETING COSTS IN COLORADO

BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

MAJORING IN ECONOMICS

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R T Burdick
In Charge of Thesis

APPROVED R T Burdick
Head of Department

Examination Satisfactory

Committee on Final Examination

J. B. Doyne — R T Burdick

J. H. Stone — Richard Creek

D. McDonaldson — Stanley W. Voelker

David A. Morgan
Dean of the Graduate School

Permission to publish this thesis or any part of it must be obtained from the Dean of the Graduate School.

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Chapter I

INTRODUCTION

The importance of an analysis of egg marketing costs at the wholesale level is of particular merit in approaching the problem of improving egg marketing conditions in Colorado. It is necessary to survey the pattern of egg production in Colorado in order to proceed with an analysis of these costs since the location and concentration of production has a direct bearing on marketing costs at the wholesale level. The fact that eggs are a perishable product accentuates the necessity for following through with a detailed study of egg production pattern in Colorado.

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Delimitation.--This investigation has been limited to an analysis of costs of procurement, candling, and handling eggs in Colorado and to the pattern of egg production in the state as it effects these costs.

Definition of terms.--This study will be concerned with the marketing of chicken eggs. In marketing channels the Colorado Egg Law requires that eggs be graded for interior quality by means of "candling" before retail sale (3:3), 1939. Accurate "candling" can best be done in a darkened room with some arrangement for passing the light from a lamp or an electric light bulb through the eggs to the observer. Each egg must be individually examined.

A "case" of eggs contains 360 individual or 30 dozen eggs. The container used for sale to the consumer is usually a "carton" containing 1 dozen eggs. Eggs may be cased in cartons of 30 dozen to the case depending on make of carton or by the use of flats and fillers which provides protection for each individual egg.

An egg is at the peak of its quality when first laid. After that time environmental conditions such as high temperature, low humidity, and rough handling all contribute to lowering the quality of the newly laid egg. Extended improper environmental conditions may cause deterioration to the extent that the egg becomes inedible. A newly laid egg is considered inedible when it contains some foreign material, such as a blood or meat spot over 1/8 of an inch square in size. The process known as "candling" is used to determine the quality and edibility of an unopened egg.

"Natural eggs" are differentiated from "processed eggs" by virtue of the fact that processed eggs have been dipped in some type of solution, usually oil, in order to slow down normal evaporation and gaseous exchange through the egg shell. The processing of eggs is generally practiced before putting eggs into storage.

Procedure

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efficient methods of management have reduced costs of production. At the same time marketing agencies have had to keep pace with a growing industry by providing more efficient handling and storage methods which would give the consumer the high quality egg which he desires.

In 1942 the Armed forces turned to the egg as a means of supplying some of the proteins and vitamins in the diet of several million men under arms. Research programs were accelerated and better handling methods were studied. Farmers were again urged to increase their flocks and the civilian, finding red meats not as plentiful, began competing for eggs and poultry meats. In 1945 egg production hit a new peak. Flocks that year laid more eggs per hen. Hatcheries produced a new peak in number of chicks hatched. Consumers consumed more eggs than in any year previous.

This background is given to show that the poultry industry has now taken a definite place in American agriculture. With it has come modern methods of production and handling of poultry products. With it also has come many new problems. The main problem or concern of every poultryman is whether the present high level of egg consumption is going to be maintained. During the war and at the present time the consumer has not been able to be "choosey" about the quality of the egg he has purchased. It is now up to the producer and all

those who perform marketing services to see that the consumer gets a quality product, else when other protein foods are more readily available he will turn to them and as a result, producer and all those handling this product will lose out.

Colorado has been slow in becoming as quality conscious as other states since it does not produce eggs in sufficient quantities that it must look for out of state competitive consumer markets. However, Colorado producers and market men face active competition from quality eggs shipped in from adjacent states. This means that they must bring themselves into line with an integrated quality egg production and marketing program. This study will be confined to Colorado problems of production and marketing with an analysis of cost of marketing eggs within the state. It is believed that a more efficient egg marketing system would encourage larger consumption of eggs where the consumer is assured of obtaining a quality product. Colorado production of eggs would be enlarged as a result of increased demand within the state. Improved quality production could open outlets outside of the state resulting in increased profitability of egg production.

Chapter II

REVIEW OF LITERATURE

The literature pertaining to problems in egg marketing is quite extensive. With the advent of World War II and high consumer demand for poultry products, poultry became increasingly important as an agricultural industry. In a fast developing industry conditions, which have been ignored previously have become real problems.

In order to study egg marketing problems in Colorado and means of overcoming these, it was deemed necessary to include personal interviews and correspondence to obtain the latest information on egg marketing and on problems confronting the industry as a whole. This helped to form a background for the evaluation of recent material which was reviewed.

The analyses of egg marketing problems in several other states have been reviewed to form a basis for improvement of marketing conditions. A thesis by Newman (13), 1939, pointed out that egg and poultry marketing in Minnesota was in a disorganized situation. From his findings he indicated that there was an apparent need for an effective and comprehensive

educational program with egg producers. He points out that at that time Minnesota ranked eighth among all states in numbers of chickens on hand. With this and a subsequent thesis study, Wyman (24), 1940, Minnesota was able to form a basis for an educational program for the production of high quality eggs in the state. W. H. Dankers (6:1), 1946, reports that 3.7 billion eggs were produced in 1944 compared to prewar year average of 1935-39 of 1.6 billion eggs. Iowa according to Cunningham (6:28), 1946, produces 10 percent of the nation's eggs, but when the eggs reach out of state markets they are at a price disadvantage because of higher quality eggs from other states.

The Hope-Flannagan bill with its emphasis on marketing has brought forth numerous proposed studies on egg marketing problems. As an example Kansas State College has initiated a project, July 1947, entitled "Marketing Kansas poultry products with particular reference to maintaining market egg quality".

The expanded consumer demand for eggs and the westward movement of population has changed production areas from surplus to deficient areas. Carl Frischknecht (7), 1947, showed that the poultry and egg marketing picture on the West Coast has changed radically in the last few years. Before the war, California, Oregon, Washington, Idaho and Utah were

surplus producing states which depended on eastern markets as outlets for most of their eggs.

He also goes on to state (7:21).

> Today the western part of the United States is a deficient area. It can supply only two-thirds of the eggs sold now in the Pacific Coast markets and, instead of shipping eggs to the East, it is importing them from the Middle West.

This is important to Colorado as it means that any excess production over its own needs now has a closer market.

The observations of Frischknecht are borne out by the fact that one of the larger dealers in eggs in Colorado buys all of his eggs in states east of Colorado and sells the majority to dealers on the West Coast.

Ray E. Cray at the 1948 Fact Finding Conference held by the Institute of American Poultry Industries (4:9), 1948, stated:

> All of us in the egg business must face the fact that there is a definite trend toward graded egg buying in the Middle West -- that leading farmers who follow good production and management practices and who do not have outlets for their eggs on a quality basis are tending to organize their own marketing associations.
>
> On the other hand, there are a good many other areas where farmers have little, if any, incentive to develop their own organizations because the existing marketing agencies are doing

a satisfactory job.

> The old system, with its long chain of handlers, is rapidly becoming obsolete. Obviously, the smaller number of marketing agencies involved, the fewer the mark ups which must be included in the marketing cost and the shorter the time it takes to move the eggs from the producer to the consumer.

Mr. Cray sums up his presentation with what we can consider as a warning to all private egg marketing agencies.

> Unless industry expands its graded buying programs and does a better marketing job, I'm sure we'll see more and more farmers doing the job themselves (4:27).

It was because of this interest in marketing that this thesis includes an analysis of costs of marketing eggs at the wholesale level.

Government and state experiment stations as well as large marketing concerns are all adding to general information to keep pace with the rapidly expanding poultry industry. Outstanding has been the work of E. M. Funk of the Missouri Agriculture Experiment station whose basic study (8), 1944, showed the effects of temperature and humidity on the keeping quality of shell eggs. He also reported on recent work concerning the washing of dirty eggs (9), 1948, which showed that this problem may be eventually solved.

Problems of blood and meat spots in chicken eggs and its importance in poultry flocks has been reported by Nalbandov and Card (12), 1947, of the University of Illinois.

Techniques in the successful processing of eggs are being constantly studied. J. N. Grant of Swift and Company at the 1948 Fact Finding Conference discussed with leaders in the poultry industry the importance of sanitation in the successful oil treating of eggs (11), 1948.

Dr. George F. Stewart, a leader in experimental work concerned with the production of egg products, discussed the future of dried eggs at the same conference listed above (16), 1948.

Clarence L. Gish (10), 1946, has shown that eggs produced in Louisiana are of comparable quality to those produced in other sections of the country. The main problem appears to be concerned with combating environmental conditions in the locality in which eggs are produced.

These few references have been given to show that the young poultry industry does have problems and that they are being attacked from all angles. It can be said that never before has a young industry had more enthusiasm and capable assistance given it than the poultry industry is getting in order to maintain a

foothold in the competitive agricultural field.

Canada has what is considered one of the most efficient egg marketing systems known. S. C. Barry, Poultry Products Inspection Service, Ottawa, Canada, in a letter dated July 14, 1947, to the writer, presented three basic factors in their egg marketing system:

1. All eggs must be graded according Canadian Standards with the grade name marked on the container.

2. Producers must be paid on a basis of grade for the eggs they deliver.

3. Eggs may be graded and marked according to Canadian Standards only in what we call registered egg grading stations.

Mr. Barry pointed out that the method of functioning of the registered egg grading stations were set forth in Sections 15 to 19 of their regulations (2:21).

Mr. Barry went on to say,

> There are two things which are of tremendous help in getting producers to improve the quality of their eggs. The first is the fact that they are paid on a basis of grade. The second is that these registered station operators are, we find, about the best educational medium you could possibly have and if they are on their toes they can do an awful lot of good in day to day contacts with their producers.

Previous work on egg marketing in Colorado

Egon P. Winter thesis, 1943, based his work "chiefly on informal interviews with members of the trade" (23:88). In his study he stated:

> The local egg marketing system does not function efficiently. The existing system at the local market which places no responsibility for the preservation of quality on the first seller (producer) and very little responsibility on the second seller (local buyer) can be remedied in either of two ways: (a) by enacting and enforcing regulations regarding refrigeration, storing facilities, packing material, etc., or (b) by creating inducements which will cause producers and local buyers to become interested in the preservation of quality. (23:80).

His work provided a background for this study in view of his analysis which shows an apparent lack of an efficient system of marketing of eggs in Colorado.

Summary and Implications

A complete review of poultry marketing literature would be so extensive that it would unduly burden the present manuscript. This review has been limited to that material which would show that an analysis of problems confronting producers and marketing agencies for improving the marketing of eggs in Colorado would be valuable. It is believed that much of the already completed work on egg marketing in this country

could be applied to improve egg marketing conditions in this state. A more efficient egg marketing system would encourage larger consumption of eggs where the consumer is assured of obtaining the quality of eggs purchased. Colorado production of eggs would be enlarged as a result of demand and increased profitability.

Chapter III

METHODS AND MATERIALS

A preliminary investigation showed that marketing conditions in Colorado were very poor. In order to approach the main problem of developing a methodology for determining the variations in costs of marketing eggs at the wholesale level, it was necessary to provide a background of the pattern of egg production in Colorado. This is followed by an analysis of some of the costs of marketing eggs on which the location and concentration of production in the state has a bearing.

PATTERN OF EGG PRODUCTION IN COLORADO

The pattern of egg production includes the extent of egg production, areas, location, and trends in egg production and flock sizes. This material was obtained from United States Census reports. The Bureau of Agriculture Economics statistics do not give a breakdown of egg production within the state so for the most part both the United States Census of 1940 (19) and 1945 (21) were used. The Special Poultry Report (20), 1940, was of valuable assistance in analyzing the production of eggs in the state. After the statistics were obtained definite areas of

production according to geographical locations were shown to be evident within the state. With production areas outlined it was possible to make comparisons. Since the information available was limited to counties it was necessary to use county lines for splitting the state into the production areas selected. The areas chosen first were the river basins and although all of the land of these basins is not under irrigation, they were arbitrarily classified as irrigated areas. The next areas chosen were those where dryland farming is generally practiced. The remaining area was that area which is generally considered as a mountainous region. The names given these areas are the common terms used for refering to them within the state. These are listed below and are outlined in Figure 1.

1. South Platte River Basin including its tributaries.
2. Eastern Colorado Dryland Area.
3. Arkansas River Basin.
4. Southeastern Colorado Dryland.
5. Western Slope or Colorado River Basin.
6. San Luis Valley.
7. Western Colorado Mountain Area.
8. San Juan Basin.

For obtaining consumer demands of eggs in Colorado, it was necessary to use the United States

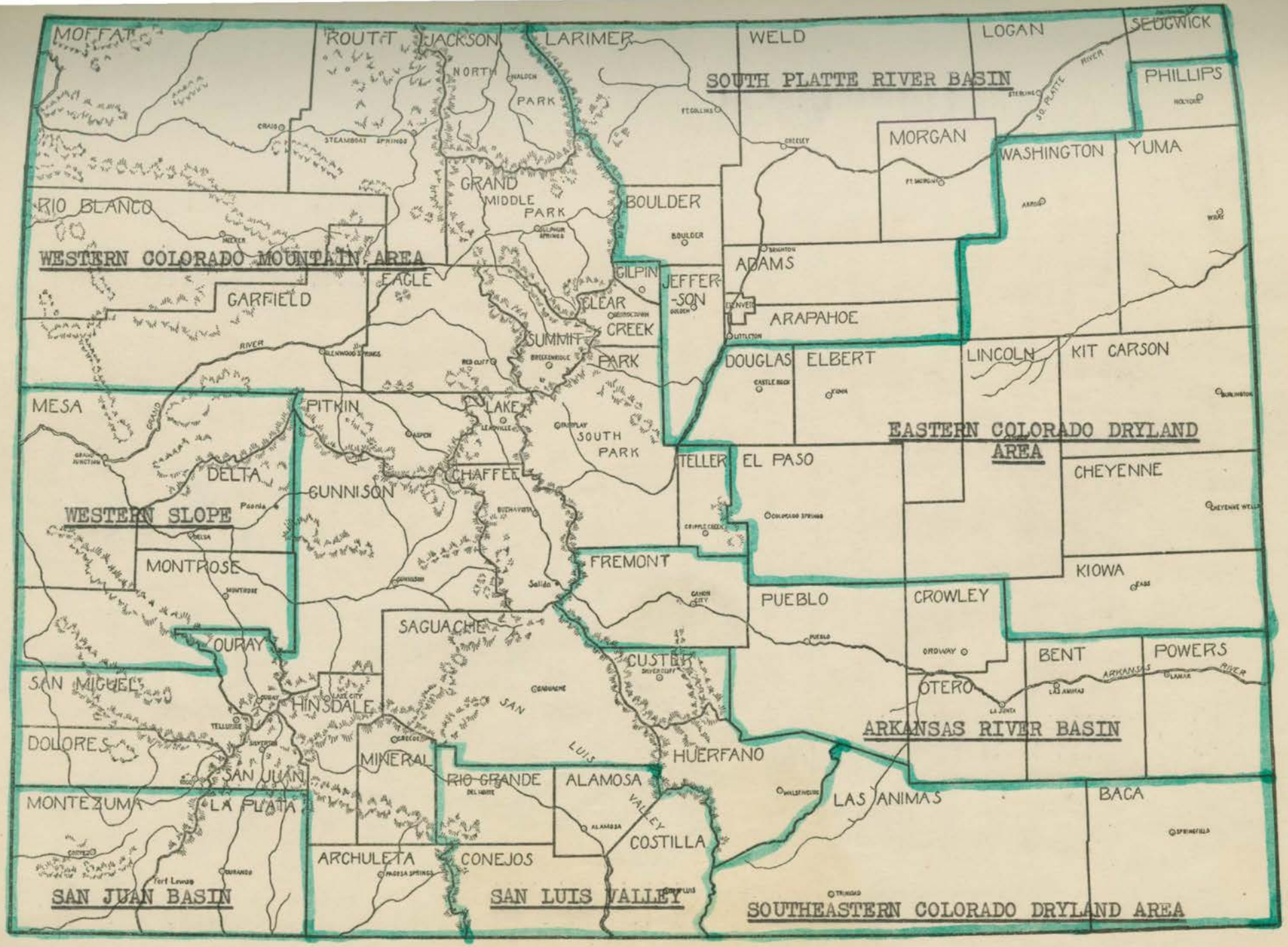

Fig. 1.--Map of Colorado outlining production areas.

average annual per capita consumption (14) applied to the Colorado (15), 1940, census report of population. This analysis was used to determine those areas where egg production was greater than computed consumer's demand. Another problem concerning production and consumer demand is that of seasonal egg production. For this data from the Bureau of Agricultural Economics (18:12-13) was used. It was found that seasonal production is important because even in areas where production was greater than consumer needs there are times of the year when production does not meet consumer needs of the area.

In order to provide a measure of marketing conditions, the average prices paid Colorado producers were compared with the average prices paid in the Mountain states and in the United States. Average prices were obtained from the Bureau of Agriculture Economics data (1), 1940-46.

ANALYSIS OF COSTS OF MARKETING EGGS

A number of studies have been made on costs of marketing poultry products. However, the majority of these have been on marketing poultry with fewer reports being made on egg marketing costs. An investigation into average costs of marketing eggs was shown to be of little value in as much as there are a large number of variations in the organization of those engaged in the

egg handling business. Because of this variation and the fact that a survey reporting averages would be of little value to the individual handler of eggs, it was felt that a standard for ascertaining egg marketing costs should be developed.

The procedure consisted of obtaining the labor rates commonly paid and of estimating normal costs that are incurred in the egg marketing business. These were obtained by informal interviews with persons engaged in the egg marketing business in Colorado. Tables and graphs were developed to show the wide variations that occur in costs and why such variations occur.

The costs of marketing eggs which were considered have been centered around three phases. The first consists of an analysis of the costs incurred in procurement of eggs including transportation and labor costs. The second phase was concerned with costs of handling eggs for candling, grading, and cartoning making them ready for consumer use. The third phase included costs of office expenses and also contains charts indicating costs from losses of inedible eggs (consisting of eggs which do not meet up to standards of either AA, A, B, or C grades) and checks (eggs which either have an internal shell crack or have been cracked in handling), where the market agencies buy on a current receipt basis.

Summary

The major problem of analyzing wholesale egg marketing costs was developed from the standpoint of the pattern of egg production since location and concentration of production has a direct bearing on marketing costs of this perishable product. This was followed by an analysis of costs of marketing eggs at the wholesale level.

Chapter IV

ANALYSIS OF DATA

In order to understand the problems facing wholesale egg marketing agencies, it is necessary to determine the pattern of egg production in Colorado. This is followed by an analysis of wholesale costs of marketing eggs.

PATTERN OF EGG PRODUCTION IN COLORADO

Materials concerned with the extent of egg production, areas and locations, and egg production trends were analyzed. Sizes of flocks in various parts of the state were compared to the type of farming carried on in those areas. Consumer population demands were compared to total production and cycles of egg production on the basis of average United States annual per capita consumption. To complete this phase average prices paid for eggs in Colorado were compared with the Mountain States region and the United States.

This pattern of egg production may be analyzed in six different parts.

Egg production in Colorado by counties and producing areas

The main consideration was to determine how many eggs were produced in Colorado and the location of this production.

According to United States Census of Agriculture (21:70), 1945, farmers reported a production of 26,552,391 dozen eggs in 1944. Of 47,618 farms reporting 84.5 percent of this number or 40,070 farmers reported having poultry on farm. The United States Census was used as it provided the only complete breakdown worked out for Colorado (21:143-55) for 1940 and 1945. In order to bring this large figure down to terms used in marketing channels this amount was converted to the equivalent of 885,797 cases. To further simplify this number in order to make comparisons the amount of a rail carload of eggs was used. A "carload" consists of 400 cases. The 26,552,391 dozen, would then be equivalent to 2,214 rail carloads. Table 1 shows egg production by counties in the order of importance and the percent of state production for these counties (21:143-45) in 1944.

Figure 2 shows diagrammatically the location of the egg production in Colorado. It should be noted that high producing areas are more or less concentrated in the Northeastern and Eastern part of the state.

The totals for the counties in the different production areas were computed in order to make

Table 1.--EGG PRODUCING COUNTIES IN ORDER OF IMPORTANCE - 1945 CENSUS

COUNTY	Dozens Produced in 1944	Equivalent Rail Carloads	Percent of State Production
1. Weld	2,612,589	218	9.8
2. Yuma	1,286,515	107	4.8
3. Boulder	1,275,895	106	4.8
4. Larimer	1,274,749	106	4.8
5. Logan	1,262,444	105	4.8
6. Jefferson	1,244,608	104	4.7
*Total - 6 Counties	8,916,710	743	33.6
7. Washington	1,164,961	97	4.4
8. Prowers	1,131,896	94	4.3
9. El Paso	1,021,707	85	3.8
10. Morgan	927,436	77	3.5
11. Mesa	903,544	75	3.4
12. Adams	852,819	71	3.2
*Total - 6 Counties	6,002,363	500	22.6
Sub-Total - 12 Counties	14,919,073	1,243	56.2

*Percent and total rail carloads computed from total dozens produced.

Table 1.--Continued.

COUNTY	Dozens Produced in 1944	Equivalent Rail Carloads	Percent of State Production
13. Arapahoe	762,252	64	2.9
14. Delta	692,707	58	2.6
15. Phillips	653,972	54	2.5
16. Kit Carson	653,358	54	2.5
17. Elbert	638,842	53	2.4
18. Montrose	581,805	49	2.2
*Total - 6 Counties	3,982,936	332	15.0
Sub-Total - 18 Counties	18,902,009	1,575	71.2
19. Otero	569,773	47	2.1
20. Bent	496,155	41	1.9
21. Pueblo	491,511	41	1.9
22. Lincoln	465,257	39	1.8
23. Fremont	386,188	32	1.5
24. Baca	374,184	31	1.4
25. Sedgwick	350,473	29	1.3
26. Rio Grande	345,281	29	1.3
27. La Plata	341,320	28	1.3
*Total - 9 Counties	3,820,142	318	14.4
Sub-Total - 27 Counties	22,722,151	1,894	85.6

*Percent and total rail carloads computed from total dozens produced.

Table 1.--Continued.

COUNTY	Dozens Produced in 1944	Equivalent Rail Carloads	Percent of State Production
28. Cheyenne	285,920	24	1.1
29. Garfield	268,397	22	1.0
30. Montezuma	264,935	22	1.0
31. Kiowa	243,238	20	1.0
32. Las Animas	238,899	20	.9
33. Crowley	229,249	19	.9
34. Routt	216,935	18	.8
35. Moffat	208,528	17	.8
36. Conejos	205,548	17	.8
37. Alamosa	195,607	16	.7
38. Douglas	164,797	14	.6
39. Huerfano	160,481	13	.6
40. Denver	147,227	12	.6
*Total - 13 Counties	2,829,071	236	10.7
Sub-Total - 40 Counties	25,551,222	2,130	96.3
*Total Remaining 13 Counties	1,001,169	84	3.7
TOTAL STATE	26,552,391	2,214	100.0

*Percent and total rail carloads computed from total dozens produced.

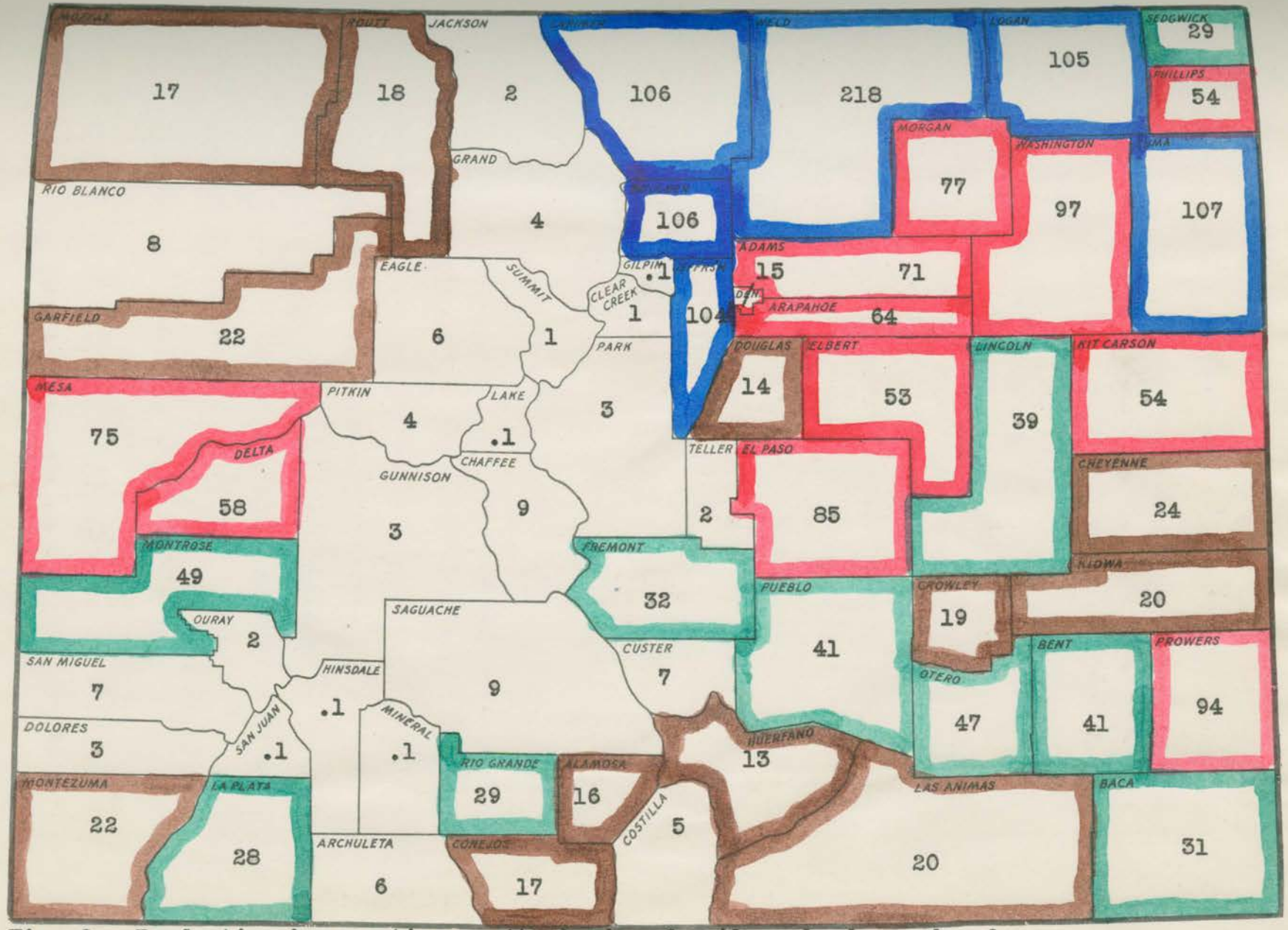

Fig. 2.--Production by counties on the basis of rail carloads produced.

over 100 | 50 to 99 | 25 to 49 | 10 to 24 | less than 10

comparisons. Table 2 shows the computed percent of the states total production of the areas selected.

Table 2.--PERCENT OF STATE'S TOTAL PRODUCTION BY GEOGRAPHICAL AREAS 1944

GEOGRAPHICAL AREAS	Percent
1. South Platte River Basin including its tributaries	40
2. Eastern Colorado dryland area	25
3. Arkansas River Basin	13
4. Southeastern Colorado dryland area	2
5. Western Slope or Colorado River Basin	8
6. San Luis Valley	3
7. Western Colorado mountain area	7
8. San Juan Basin	2
	100

Figure 3 shows diagrammatically these areas of production and the percent of the state's total production computed from 1944 Census production (21:143-55). It should be noted that the three top leading areas produced 78 percent of the state's egg production. These three sections are adjoining and are located in the north-eastern and eastern part of Colorado.

Egg production trends in Colorado

Farmers reported an increase in production from

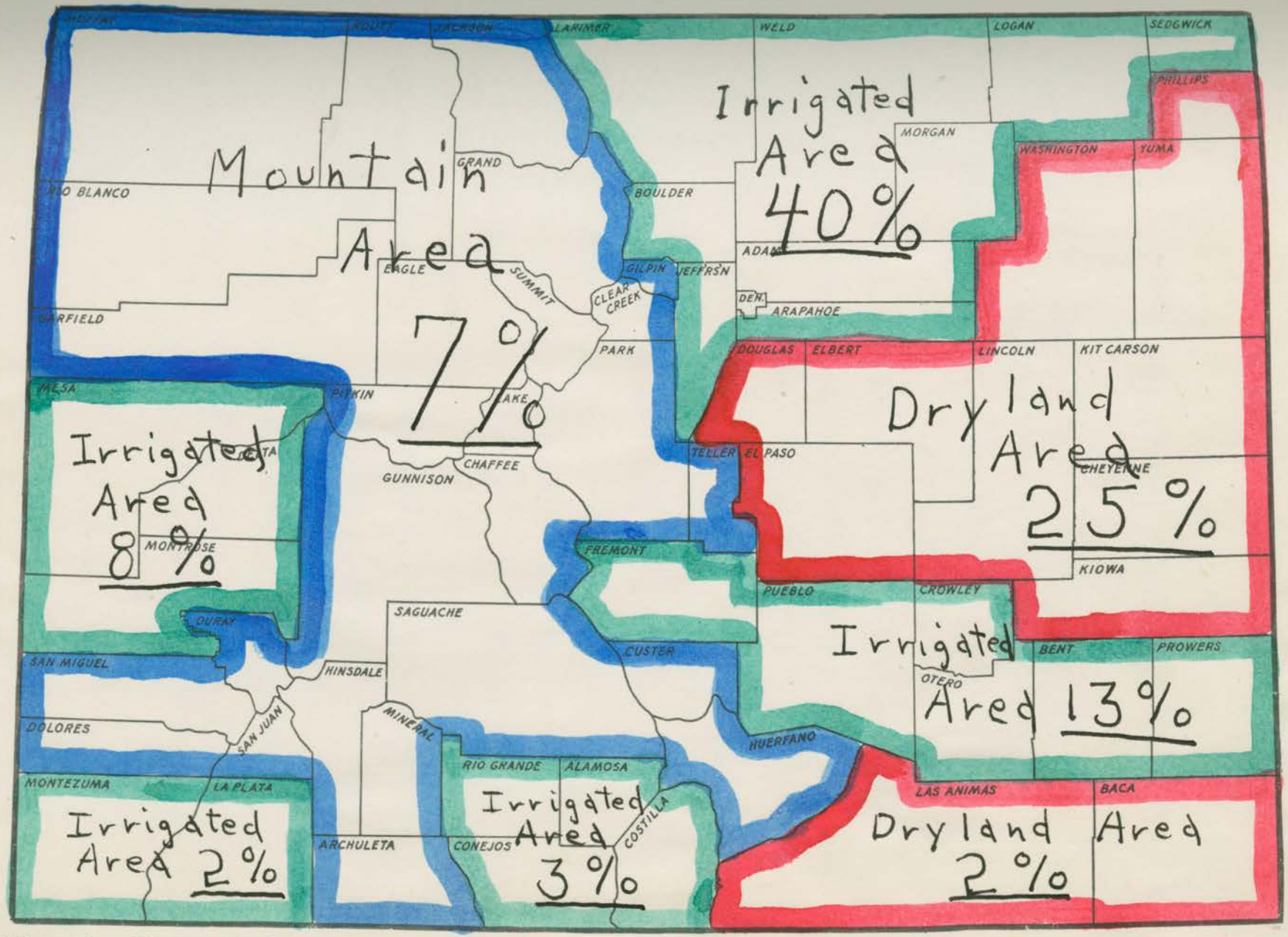

Fig. 3.--Percent of total state egg production by production areas.

19,250,929 dozen in 1939 to 26,552,391 dozen in 1944 (21:143), 1946, which was an increase of 38 percent. The state data was analyzed to determine whether the increase was general or whether it was a result of large increases in certain areas or counties. The number of farmers reporting in the 1940 census was 38,787 and in 1945, 38,497 which is less than a 1 percent decrease. The computed increase of 38 percent then was not a result of an increase in number of flock owners, but rather an increase in either in size of flocks or an increase in egg production per bird, or both.

The egg producing areas in percent of total production are listed in Table 3. Both census years were used in order to determine any significant changes taking place in production areas in Colorado. Figure 4 shows Table 3 diagrammatically. This analysis indicates that even though there was an increase of 38 percent of eggs produced in Colorado from 1939 to 1944, it was a general increase rather than a localized increase. This is based on the fact that there was no significant differences noted in the percent of states total production of the different areas for the two production years of 1939 and 1944 reported by the 1940 and 1945 Census.

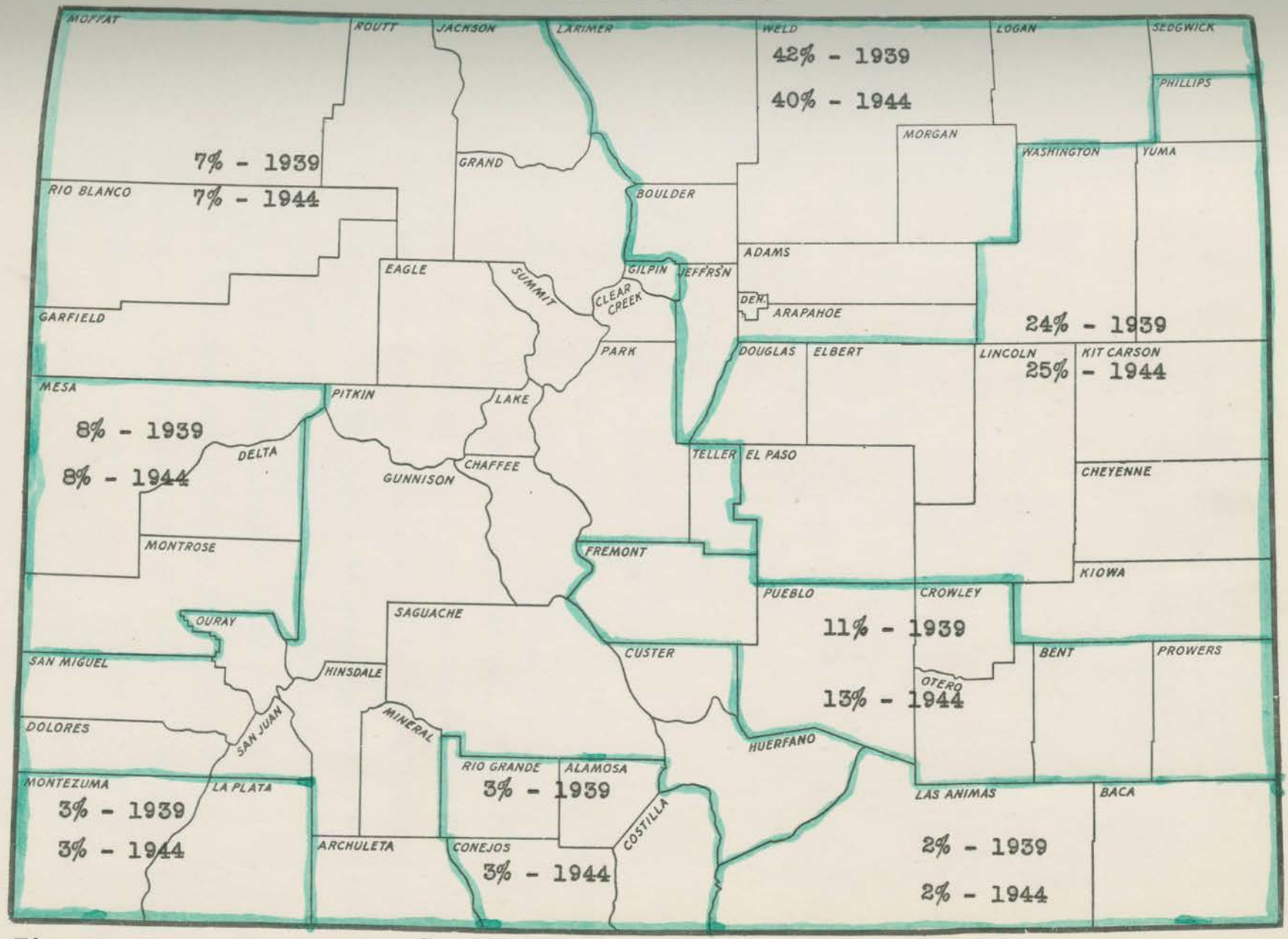

Fig. 4.--Egg production changes by Areas 1939 and 1944

Table 3.--COMPARISON OF TOTAL PERCENTS OF EGG PRODUCTION FOR 1940 AND 1945 CENSUS REPORTS

AREA	Percent of Colorado Egg Production	
	1939	1944
1. South Platte River Basin	42	40
2. Eastern Colorado Dryland	24	25
3. Arkansas River Basin	11	13
4. Southeastern Dryland	2	2
5. San Luis Valley	2	3
6. San Juan Basin	1	2
7. Western Slope or Colorado River Basin	8	8
8. Western Colorado Mountain Area	7	7
	100	100

Figure 5 goes into more detail and shows the actual percent comparison of the 1944 production to that of 1939. A study of Figure 5 shows only two counties with less production in 1944 and five counties with production double that of 1939. With the exception of Prowers County, the five counties which doubled in production, rank in the bottom third of egg producing counties. These are not significant because three or four more flock owners in these small production counties would be sufficient to double the counties production. The

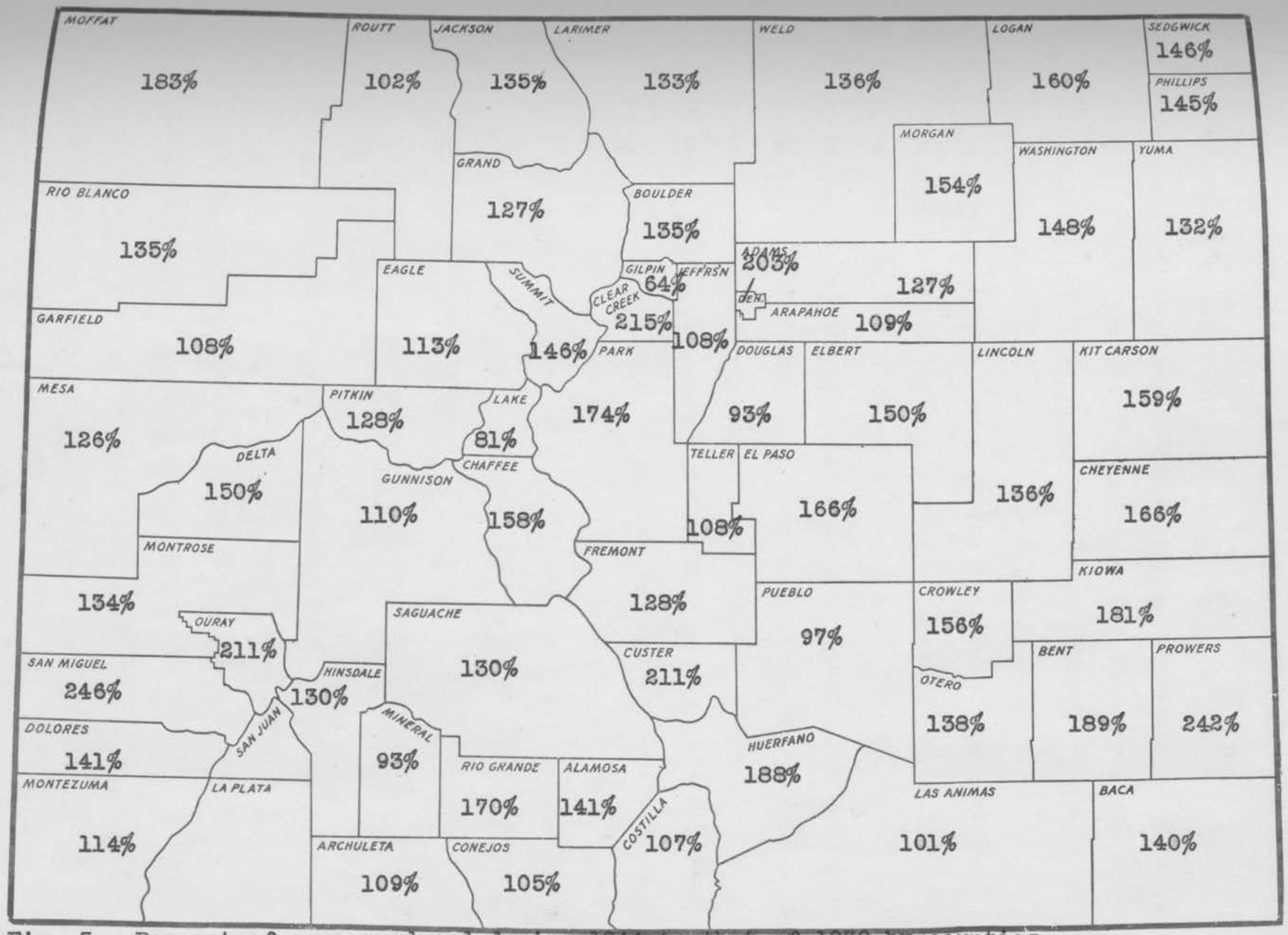

Fig. 5.--Percent of eggs produced during 1944 to that of 1939 by counties. Total percentage increase for state 138 percent.

increased production noted in Prowers County can be attributed to the rehabilitation of that section of the state which was just recovering from the drouth years of the 1930's. This increase was accelerated by favorable weather conditions of the last few years.

Floyd K. Reed of the Bureau of Agriculture Economics, Denver, in a personal interview reported that census reports for Pueblo County were incomplete and it should be considered that this county actually had an increase in production. Farmers in Lake County which is in the mountainous region reported only 284 birds (21:108) in 1945 compared to 331 birds in 1940 so any percentage decrease in production could not be considered as significant. With the exceptions as analyzed, it was considered that for the most part the state production of 138 percent over 1939 for 1944 was fairly consistent throughout the state.

Average flock sizes in Colorado by production areas and Counties

The average flock size of Colorado poultry flocks has an important bearing on this study. The average flock size was computed from the number of flocks and the total birds reported in counties and producing areas (21:143-55) for 1940 and 1945. With an analysis of the computed data it is possible to note a

definite correlation of flock size to that of high producing areas. Table 4 shows the computed average flock size for the production areas. Figure 6 diagrammatically shows the data obtained for Table 4.

Table 4.--AVERAGE FLOCK SIZE OF PRODUCTION AREAS

AREA	Percent Production in 1944	Average Flock Size
Eastern Colorado Dryland	25	113.1
South Platte River Basin	40	103.3
Arkansas River Basin	13	86.5
South Eastern Dryland	2	65.5
San Juan Basin	2	57.7
San Luis Valley	3	57.5
Western Slope or Colorado River Basin	8	55.2
Western Mountain Area	7	51.8

By referring to the computed average flock size in the individual counties it is possible to see where more efficient egg production is taking place and probably more profitable egg production. Figure 7 shows the computed average flock size by counties. This demonstrates that where flock sizes are larger, heavier production is also taking place. Table 5 lists the 12 leading counties in average flock size. Of the 10 lead-

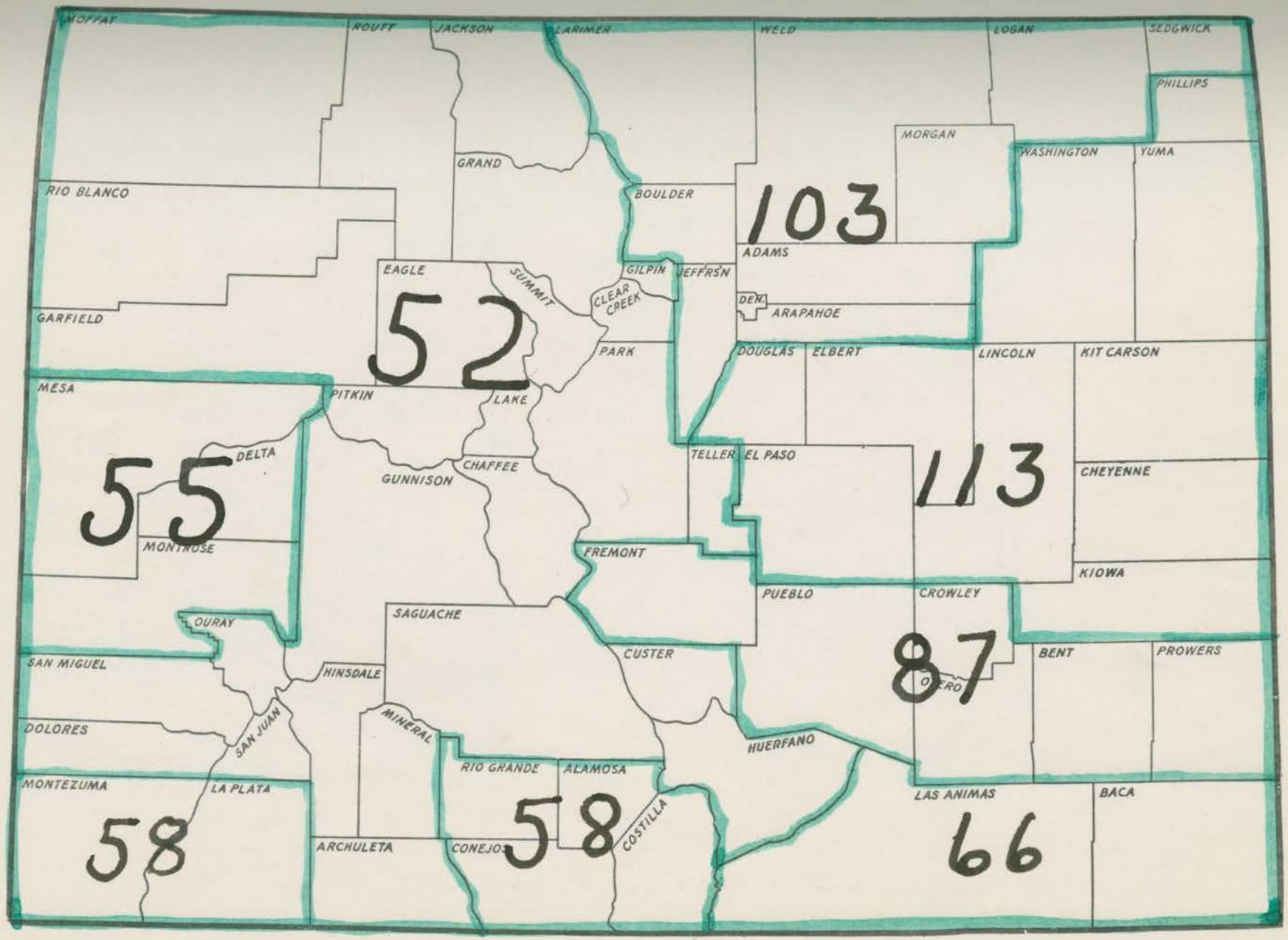

Fig. 6.--Average flock size by production Areas 1945

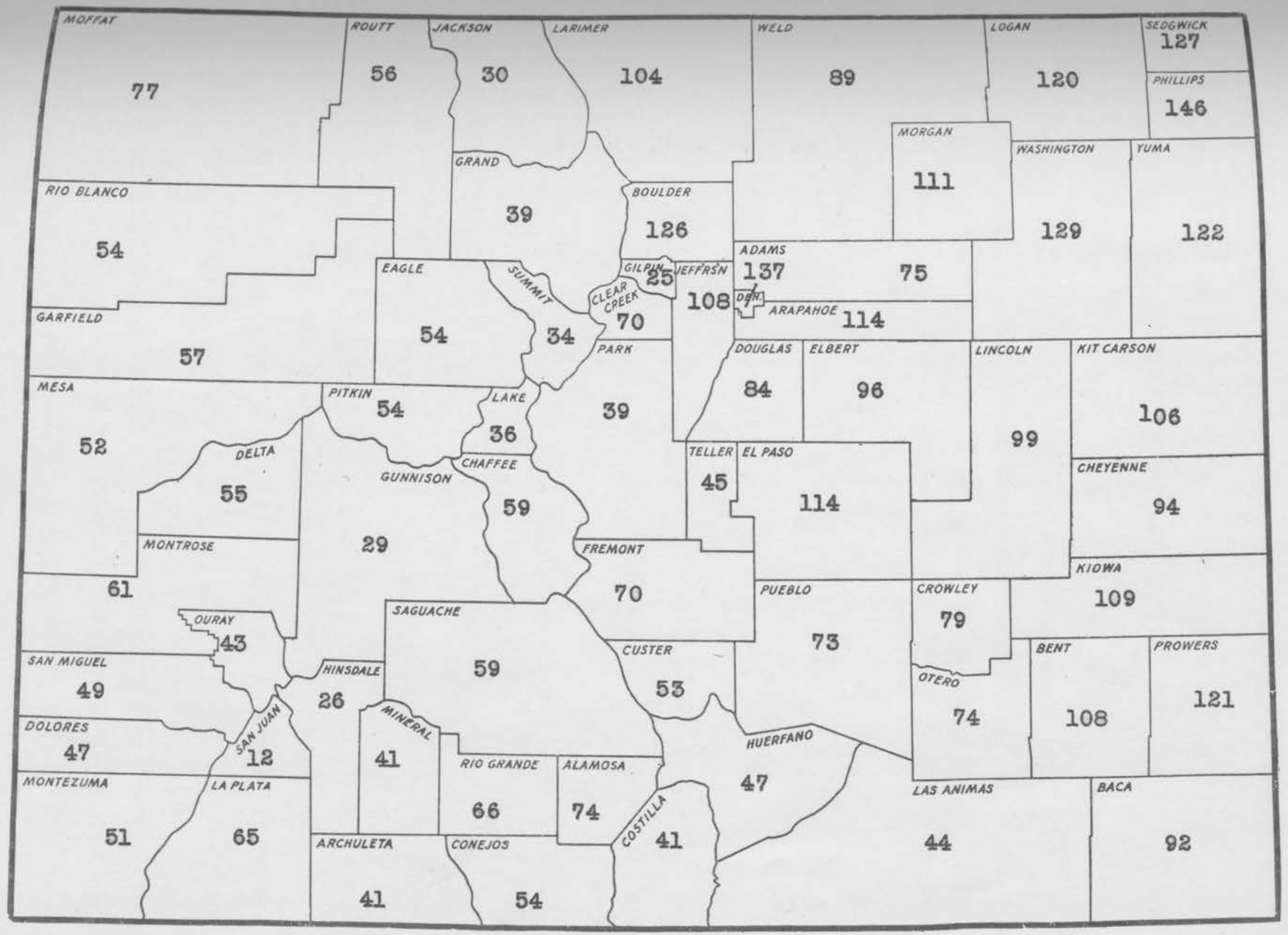

Fig. 7.--Average flock by counties 1945
Average flock size for State 86

ing counties in flock size it should be noted that all of them, except Prowers County are located in the two highest producing areas.

Table 5.--12 LEADING COUNTIES IN AVERAGE FLOCK SIZE

	COUNTY	Average Flock Size January 1945
1.	Phillips	147
2.	Denver	137
3.	Washington	129
4.	Sedgwick	127
5.	Boulder	126
6.	Yuma	122
7.	Prowers	121
8.	Logan	120
9.	El Paso	114
10.	Arapahoe	114
11.	Morgan	111
12.	Kiowa	109

Higher producing areas were found to have more than twice as many birds per flock as the lower producing areas.

Flock size distribution of Colorado poultry flocks

Egg marketing starts with the producer. Proper care and handling of eggs is time consuming and the

larger producer is able to more economically produce and market eggs of high quality. Therefore, the facts concerning flock size of Colorado poultry flocks are important. Table 6 presents the number and percent distribution according to size of flocks of 1940 and 1945. The two census figures were used to show comparison and to present trends. The material concerning chickens on farms by flock size distribution for Colorado 1945 census has not been printed. However, Ray Hurley, Chief, Agriculture Division, Bureau of the Census, Washington D. C., has made available a complete analysis of chickens on farms for 1945 with comparisons of 1940, 1935 and 1930 for this manuscript. The report which concerns 1945 census material by flock size is at the present time unpublished data and has been included in this manuscript (Appendix A to F) in its complete form.

The results of an analysis of flock size in Colorado presents a very discouraging picture. Of the total 39,963 farms reporting chickens on farms, 26,622 farms had less than 100 birds which is equivalent to 66.6 percent. Even though these results showed considerable improvement over the 1940 census figures of 80.3 percent of farmers having less than 100 birds, it still means that 2 out of every 3 poultry farmers are producing eggs under the most uneconomical conditions

Table 6.--NUMBER AND PERCENT DISTRIBUTION ACCORDING TO SIZE OF FLOCKS 1940 AND 1945

Number of birds per flock	Number of Flocks		Percent of total number of flocks		Percentage change between 1940 and 1945
	1945	1940	1945	1940	
400 and over	659	424	1.6	1.0	/ 55.4
200-399	3,504	1,722	8.8	4.1	/103.5
100-199	9,178	6,154	23.0	14.6	/ 49.1
50-99	10,140	11,484	25.4	27.2	- 11.7
Less than 50	16,482	22,438	41.2	53.1	- 26.5
TOTAL	39,963	42,222	100.0	100.0	- 5.5

from the standpoint of efficient marketing. Poultry specialists generally agree that it requires at least a minimum unit of 200 birds, preferably 400 birds, to economically produce high quality eggs. Considering the 200 bird flock as the minimum it would mean that 9 out of 10 farms having poultry cannot economically produce high quality eggs.

A further analysis indicates that the picture is not entirely dark. Whereas, in 1940, 4.1 percent of farmers reporting poultry had more than 200 birds this number has more than doubled in a 5 year period to 10.4 percent. The total percent of eggs produced by flocks numbering over 200 has increased from 30.3 percent to 38.3 percent according to the special report obtained from Bureau of the Census (Appendix A to F).

Average flock size for 1940 was computed at 68 and 1945 average flock size at 86. This means a 26.5 percent increase in flock size occurred during the 5 year period. As noted previously the number of flock owners reporting did not change materially, but an increase of 38 percent in production occurred. With 26.5 percent increase in flock size it may be indicated that average egg production per bird increased about 11.5 percent which is normal in view of the national trend towards higher egg production per bird.

Percent distribution of flocks numbering 200 or

more could not be determined from the 1945 census reports. The breakdown was possible, however, for the 1940 census (20:101-13). Figure 8 shows by production areas for 1940 the percentage distribution of flocks numbering 200 or over. This analysis shows that of the 2,136 flocks numbering 200 or over, 89 percent were located in the 3 high production areas which produced 78 percent of the states total production in 1944.

Populations and their effect on marketing problems

Egg production according to population was found to have an important bearing on egg marketing problems in Colorado. The 1940 census (15:8) shows Colorado population at 1,123,292. On the basis of the national average consumption rate of 1944, 1945 and 1946 of 375 (14) eggs per person per year, Colorado would need 1,168,228 cases of eggs per year. In 1944, which was a peak production year, Colorado farmers reported according to United States Census, a production of only 885,080 cases of eggs. From this figure 40,000 cases were subtracted to allow for 14,400,000 eggs used for hatching which is approximately the number needed to produce the 7,838,000 chicks produced in Colorado (17), 1945. This leaves production for consumers at 845,080 cases or 72 percent of the computed egg consumer needs.

In order for Colorado poultry producers in

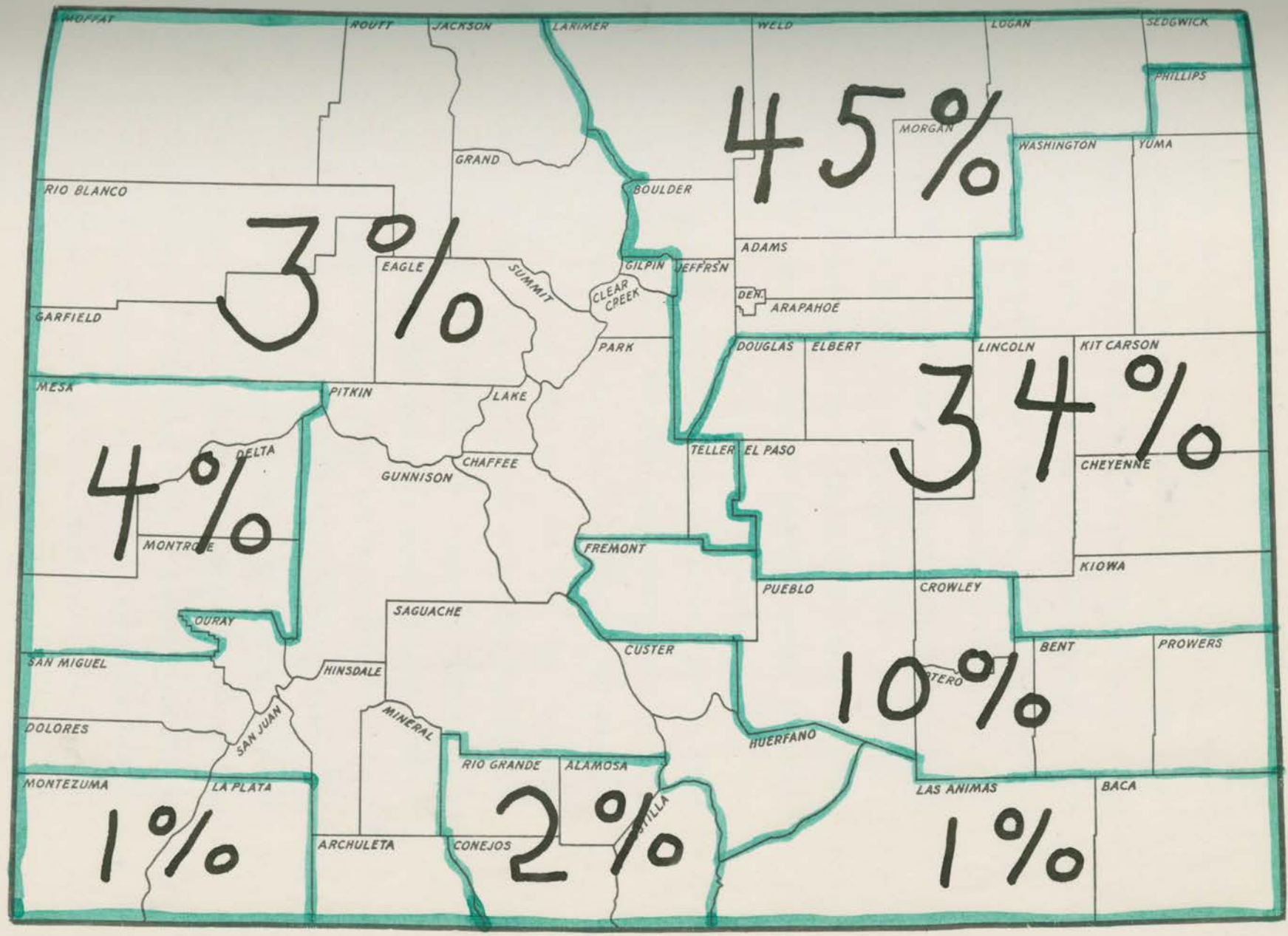

Fig. 8.--Percent distribution of flocks numbering 200 or more birds 1940.

1944 to produce enough eggs for Colorado's own demand they would have had to increase their production 39 percent. It was also considered that Colorado has a heavy tourist trade which actually brings up this demand for eggs an additional amount.

In order to get a true picture, it was necessary to include a study of the production cycle within the state. Table 7 shows this cycle by months. It was noted that February through July are periods of above the average percent and the other six months are below. This means that in March, April, May and June, 46.4 percent of the year's total production occurs while at the low cycle of production September, October, November and December, only 23.0% of the eggs are produced. It is readily borne out that our main problem from the standpoint of marketing is the seasonal production of a perishable product. There are months in which marketing agencies must maintain business establishments with only 1/2 to 1/3 the volume of fresh eggs which could be handled at times of peak volume.

In spite of these apparent deficiencies as noted from Census reports Colorado is not necessarily a deficient production state. Census data is not always complete. Bureau of Agriculture Economics estimates production at 43.8 million dozen for 1944, a larger

Table 7.--MONTHLY PERCENT DISTRIBUTION OF EGG PRODUCTION IN COLORADO, 1945 (BASED ON BUREAU OF AGRICULTURE ECONOMICS FIGURES 1945)

Month	Percent of Annual production	Percent over or short of 8.3 average
Jan.	6.6	- 2.1
Feb.	8.4	+ 0.1
Mar.	11.9	+ 3.6
April	12.3	+ 4.0
May	12.1	+ 3.8
June	10.3	+ 2.0
July	8.9	+ 0.6
Aug.	7.5	- 0.8
Sept.	6.4	- 1.9
Oct.	5.5	- 2.8
Nov.	4.6	- 3.7
Dec.	5.3	- 3.0
Feb. through July	63.9	+13.9
Aug. through Jan.	36.1	-13.9

egg production than shown by the 1945 census. The Bureau of Agriculture Economics data would indicate that Colorado (1:22:41) in 1944 produced a few more eggs than needed according to national average consumption figures. Surplus or deficient production must be considered by months or seasons not on a yearly basis. Table 8 shows the percent population, percent of total eggs produced and the per capita production by areas. Figure 9 shows diagrammatically the material presented in Table 8. It was necessary to consider Denver as a separate area as Denver has 29 percent of the states population.

Study of Table 8 and Figure 9 indicated that here again the same two top areas which had higher production and larger flocks were also excess production areas. However, both of these areas are close to the separated deficient area of Denver which means that if Denver County was included in the South Platte River Basin area, this area would show up as only producing 217.7 eggs per capita making that area a deficient area.

Further study of the production consumption demand relationship was made and the results are indicated in Figure 10. This shows the percent which each individual county produces in comparison to the computed average consumption of 375 eggs per person. Table 9 shows the eight leading counties producing eggs

Table 8.--COMPARISON OF PERCENT POPULATION TO PERCENT PRODUCTION AND PER CAPITA PRODUCTION OF EGGS BY PRODUCTION AREAS - 1940 CENSUS POPULATION 1944 PRODUCTION YEAR

AREA	Percent of State Population	Percent of Eggs Produced	Eggs Produced Per Capita
1. Eastern Colorado Dryland Area	10	25	740.9
2. South Platte River Basin*	23	39	472.5
3. Western Slope or Colorado River Basin	6	8	388.1
4. Arkansas River Basin	12	13	296.8
5. San Juan Basin	2	2	245.5
6. San Luis Valley	4	3	227.2
7. Mountain Area	11	7	198.6
8. South East Dryland	3	2	105.2
9. Denver*	29	1	9.9

*Denver included as a separate area as it contains 29 percent of the states population.

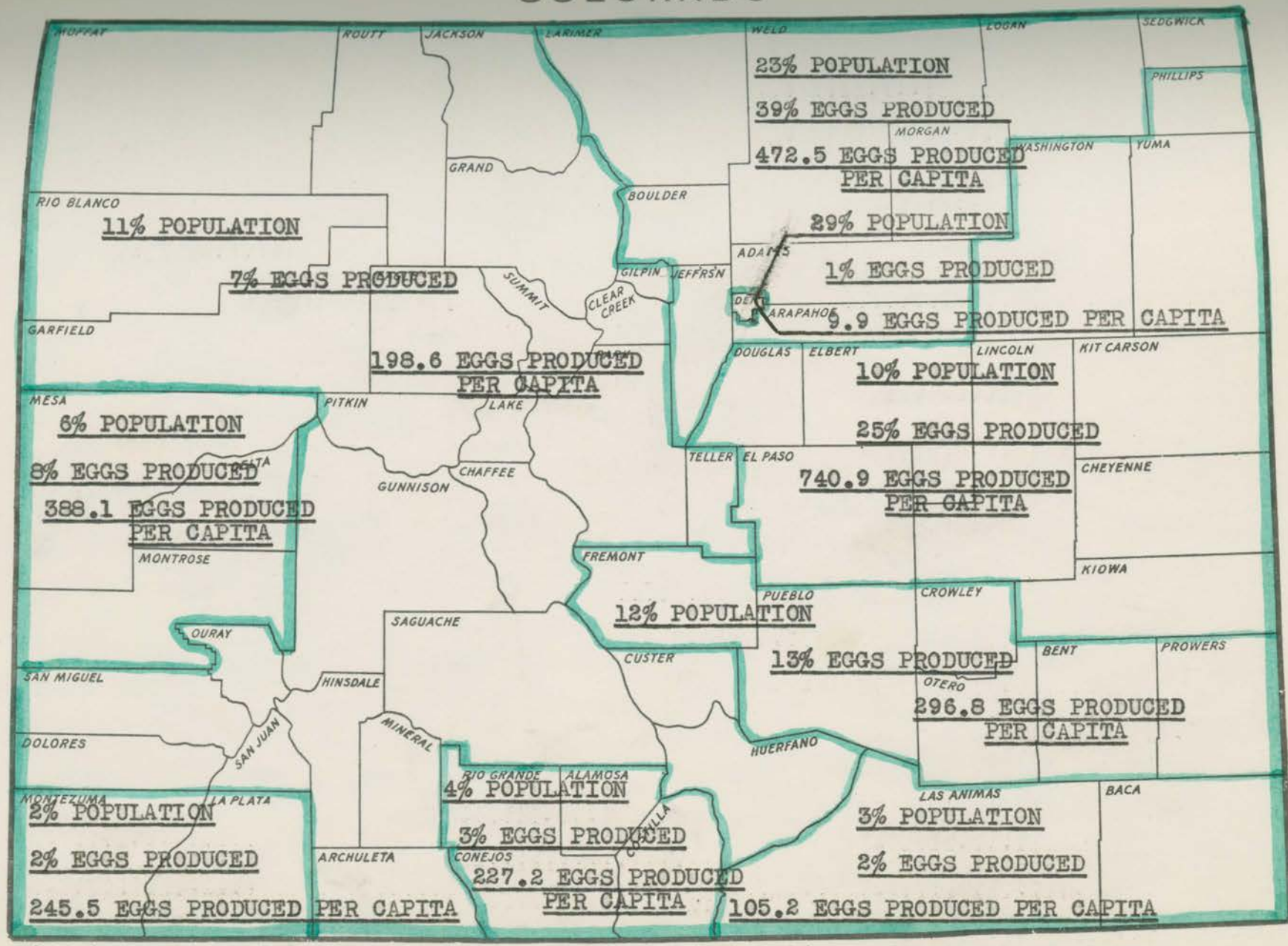

Fig. 9.--Eggs produced per capita compared with population and percent of States production.

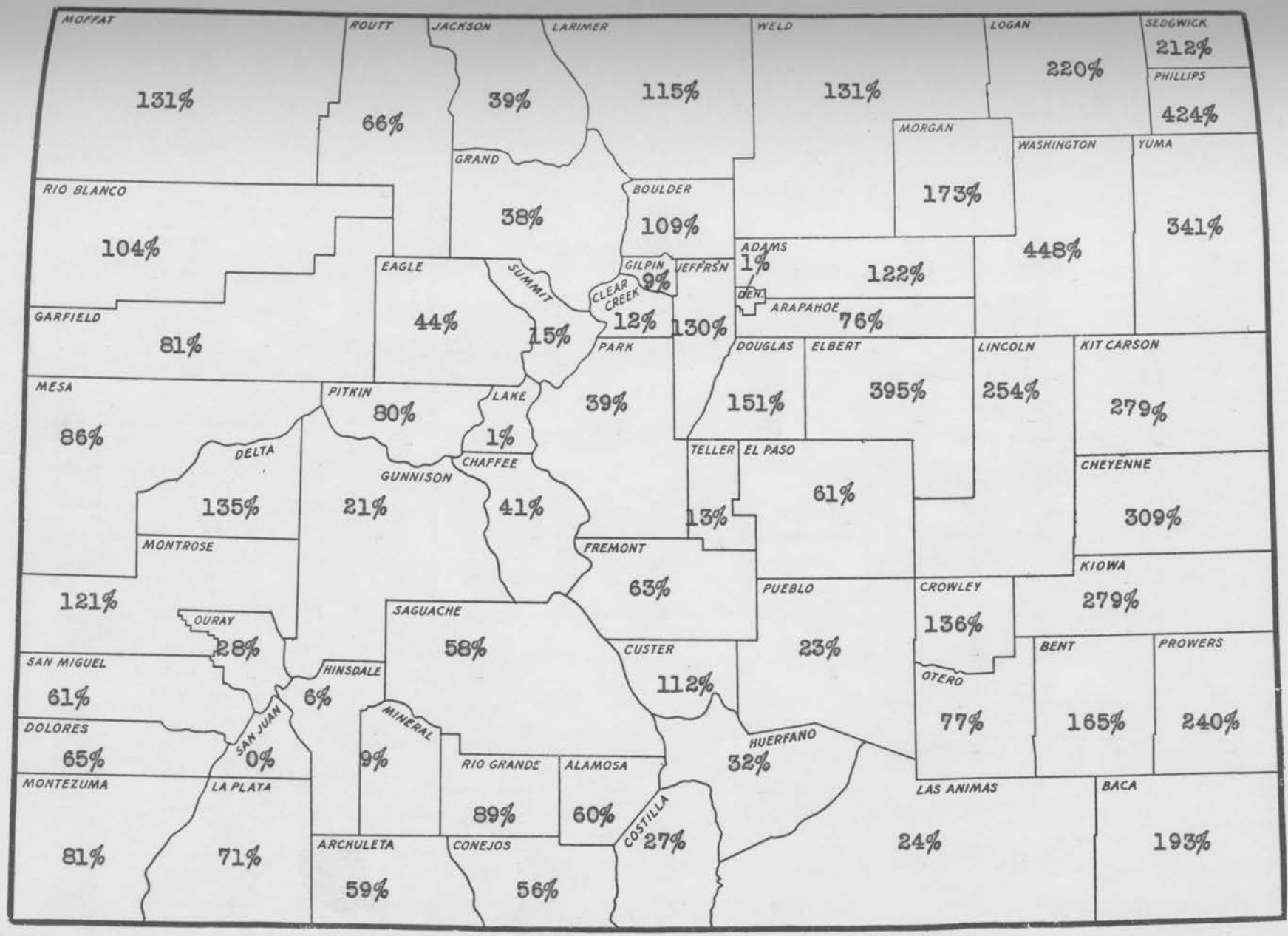

Fig. 10.--Percentage of counties own computed demand to that of production within the county 1944 production year.

beyond computed consumer needs. This shows that the top eight leading counties are all in the Eastern Colorado Dryland Area.

Table 9.--LEADING COUNTIES IN PRODUCTION BASED ON COMPUTED CONSUMER NEEDS

COUNTY	1945 Census Production in Cases of Eggs Over County Population Needs	Production to Computed Consumer Needs
1. Washington	30,163	448%
2. Phillips	16,653	424%
3. Elbert	15,617	375%
4. Yuma	30,298	341%
5. Cheyenne	6,448	309%
6. Kit Carson	13,967	279%
7. Kiowa	5,203	279%
8. Lincoln	9,392	254%

The total number of cases in the excess production counties over computed needs was found to be 260,609 dozen which if marketed in Denver only would make up for 79 percent of Denver's computed needs. Figure 11 shows the number of cases short or over the computed consumer needs for the individual counties.

Average prices paid for eggs in Colorado compared to mountain states and United States average prices paid

A study of prices received by producers for

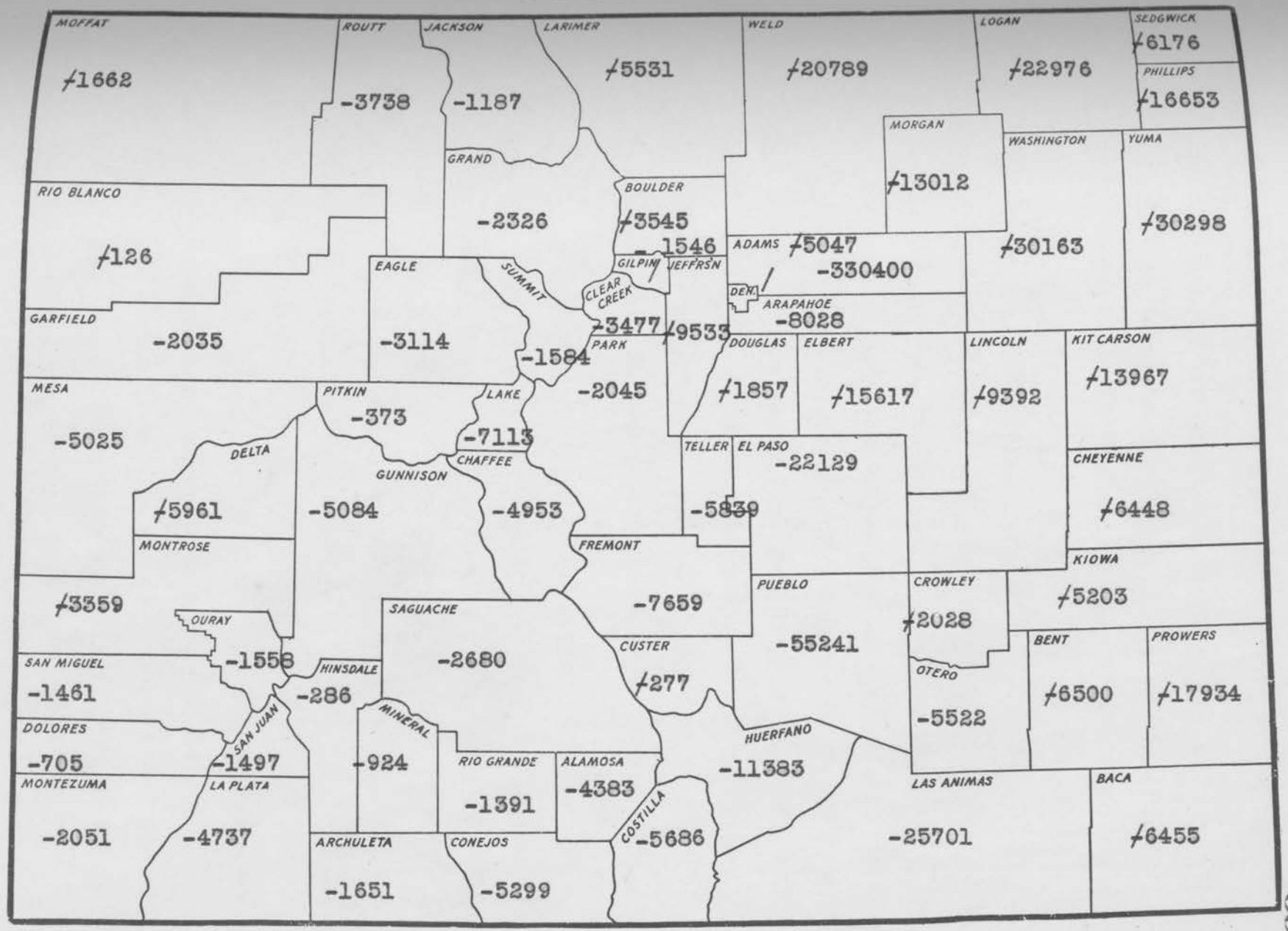

Fig. 11.--Number of cases over or short over the computed needs by counties 1944 production 1940 census.

eggs in Colorado was necessary to determine whether producers were receiving the same prices for their eggs as the average of the Mountain States Region and the United States average. Average prices paid obtained from Bureau of Agriculture Economics (1), 1940-1946, indicated Colorado producers were receiving 2.6 cents less per dozen than the Mountain States average and 1.9 cents less than the United States average. Table 10 gives the average price paid for eggs as of the 15th of each month for the years 1940 to 1946 with a seven year computed average. The average computed price for the Mountain States included New Mexico, Arizona, Utah, Wyoming, Idaho, Montana, Nevada and Colorado.

ANALYSIS OF COSTS OF MARKETING EGGS

The problem concerned in this phase is one of methodology. The primary purpose is centered around developing a means for analyzing the costs of marketing eggs. Average costs are deemed to be of little or no value. Furthermore an attempt to attain an average cost analysis would be inaccurate because of the limited number of concerns whose officials would be willing to supply the necessary material in accurate form. A number of studies have been made on costs of marketing poultry, but very little information has been made available concerning egg marketing costs. This has

Table 10.--AVERAGE PRICES RECEIVED BY PRODUCERS FOR EGGS AS OF THE 15TH OF THE MONTH 1940 THROUGH 1946 WITH COMPUTED AVERAGE FOR THE 7 YEARS

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ave.
						1940							
Colorado	18.1	20.0	12.9	12.6	12.7	12.8	12.9	14.8	17.5	22.1	25.3	27.1	16.9
Mountain	18.3	18.4	14.7	13.7	13.9	14.4	15.5	17.8	20.4	25.1	27.5	28.7	19.0
U. S.	18.3	20.2	15.4	15.0	15.1	14.4	16.4	17.2	21.1	23.7	26.2	26.8	19.2
						1941							
Colorado	18.9	14.5	14.0	17.7	17.8	20.8	22.9	24.0	26.9	29.9	35.5	31.8	22.9
Mountain	21.7	16.8	15.4	18.0	19.7	22.4	24.6	25.9	30.0	33.4	36.5	33.8	24.9
U. S.	19.7	16.8	16.4	19.7	20.1	23.2	25.6	26.8	30.3	31.8	35.5	34.1	25.0
						1942							
Colorado	29.1	24.3	23.6	23.1	23.7	24.3	26.1	29.1	31.8	34.9	36.5	38.3	28.7
Mountain	30.9	27.1	24.9	24.8	25.2	25.7	27.4	30.2	33.4	37.6	40.7	41.7	30.8
U. S.	31.3	27.5	25.8	25.6	26.5	27.4	29.5	32.2	34.7	37.4	38.9	39.7	30.5
						1943							
Colorado	37.2	31.0	30.5	31.2	31.6	32.5	33.1	35.4	37.6	41.3	43.1	43.1	35.6
Mountain	40.3	34.4	32.8	32.9	33.0	33.4	34.7	37.6	40.5	44.8	49.3	47.8	38.5
U. S.	39.0	34.2	34.0	33.7	34.2	35.2	36.3	38.8	41.6	45.2	47.1	44.9	38.7

Table 10.--Continued.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ave.
1944													
Colorado	31.9	30.7	30.2	25.8	26.7	26.7	29.7	31.0	33.0	37.3	41.9	45.8	32.6
Mountain	37.0	33.0	30.8	26.6	26.9	27.6	29.6	31.8	33.8	38.8	45.5	48.3	34.1
U. S.	34.6	31.9	30.1	27.1	27.2	28.1	31.2	33.0	35.5	38.8	43.4	44.5	33.7
1945													
Colorado	38.9	33.0	31.3	31.6	32.7	34.7	36.6	39.7	40.0	40.0	45.9	47.4	37.7
Mountain	44.3	36.1	33.0	33.0	33.0	35.3	38.6	40.8	42.9	46.0	49.8	51.3	40.3
U. S.	41.0	35.8	33.1	33.0	33.7	35.8	37.9	40.8	39.6	42.6	47.1	48.2	39.1
1946													
Colorado	39.6	29.9	30.5	28.8	30.6	30.6	35.6	36.3	41.2	49.0	50.0	49.0	37.6
Mountain	44.3	35.2	33.6	31.4	32.3	33.0	38.4	42.0	41.7	54.5	67.1	55.9	42.5
U. S.	41.1	32.6	32.1	31.3	32.8	33.5	37.1	39.1	44.5	51.5	47.8	47.0	39.2
7 YEAR AVERAGE													
Colorado	30.5	26.2	24.7	24.4	25.1	26.1	28.1	30.0	32.6	36.4	39.7	40.4	30.3
Mountain	33.8	28.7	26.5	25.8	26.3	27.4	29.8	32.3	34.7	40.0	45.2	43.9	32.9
U. S.	32.1	28.4	26.7	26.5	27.1	28.2	30.6	32.6	35.3	38.7	40.9	40.7	32.2

been due principally to the many differences in organization of those engaged in the egg marketing business. This manuscript is concerned with analyzing costs to enable further study on egg marketing costs. A basis for comparing egg marketing costs should be developed as a first criteria in attempting to aid in improving the egg marketing conditions in Colorado. This basis or standard would help make it possible to emphasize the problems of the individual market agency.

The costs of marketing eggs center around three phases. The first consists of an analysis of the costs incurred in the procurement of eggs including transportation costs. The second phase is concerned with costs of handling eggs for candling, grading and cartoning making them ready for consumer use. The third phase includes costs of office expenses and loss costs from inedible eggs and checks which occur when the market agency buys on a current receipt basis.

Costs incurred in the procurement of eggs.

Costs of procurement particularly where the farm pick up service is practiced were analyzed. Personal interviews show that 95 cents an hour was the common wage paid for this type of work in 1948. Mileage costs were found to vary widely, hence for the purpose of analyzing costs three different scales of seven, ten

and fifteen cents per mile was set up. Table 11 was computed for 7 cents per mile. Figure 12 shows how this table plots out on a semi log graph. The semi log gives a percentage relationship which can be compared directly for various price or cost levels. This means that a 1 cent difference in the 10 cent cost area would show up the same as a 1 dollar difference in the 10 dollar cost area. Tables 12 and 13 show the same computations where costs per mile are 10 and 15 cents respectively while Figures 13 and 14 are plotted curves of Tables 12 and 13 respectively. The introduction of the term "case-miles" should further be explained as being the product of the number of cases hauled in an 8 hour period and the number of miles traveled. Although the tables were primarily prepared for the use on a farm procurement route using a 1-1/2 ton truck with a capacity load of 100 cases, they may be used in any egg transportation costs that involves 8 hours labor at 95 cents per hour and where the load does not exceed 100 cases, and the rates per mile are as given.

To show how these graphs may be used an example of an agency which obtains their eggs by the farm pickup route is presented. This agency figures its truck cost per mile at 10 cents so Figure 13 will be used. The route is 120 miles from which the driver

Table 11.--PROCUREMENT COSTS PER CASE IN CENTS BASIS 8 HOURS LABOR AT $.95 PER HOUR AND TRUCKING COSTS AT $.07 PER MILE

NUMBER CASES PROCURED	LENGTH OF ROUTE IN MILES								
	20	40	60	80	100	120	140	160	180
10	90.0	104.0	118.0	132.0	146.0	160.0	174.0	188.0	202.0
20	45.0	52.0	59.0	66.0	73.0	80.0	87.0	94.0	101.0
30	30.0	34.7	39.3	44.0	48.7	53.3	58.0	62.7	67.3
40	22.5	26.0	29.5	33.0	36.5	40.0	43.5	47.0	50.5
50	18.0	20.8	23.6	26.4	29.2	32.0	34.8	37.6	40.4
60	15.0	17.3	19.7	22.0	24.3	26.7	29.0	31.3	33.7
70	12.9	14.9	16.8	18.9	20.8	22.8	24.9	26.8	28.9
80	11.3	13.0	14.7	16.5	18.2	20.0	21.8	23.5	25.3
90	10.0	11.6	13.1	14.7	16.2	17.8	19.3	20.9	22.4
100	9.0	10.4	11.8	13.2	14.6	16.0	17.4	18.8	20.2

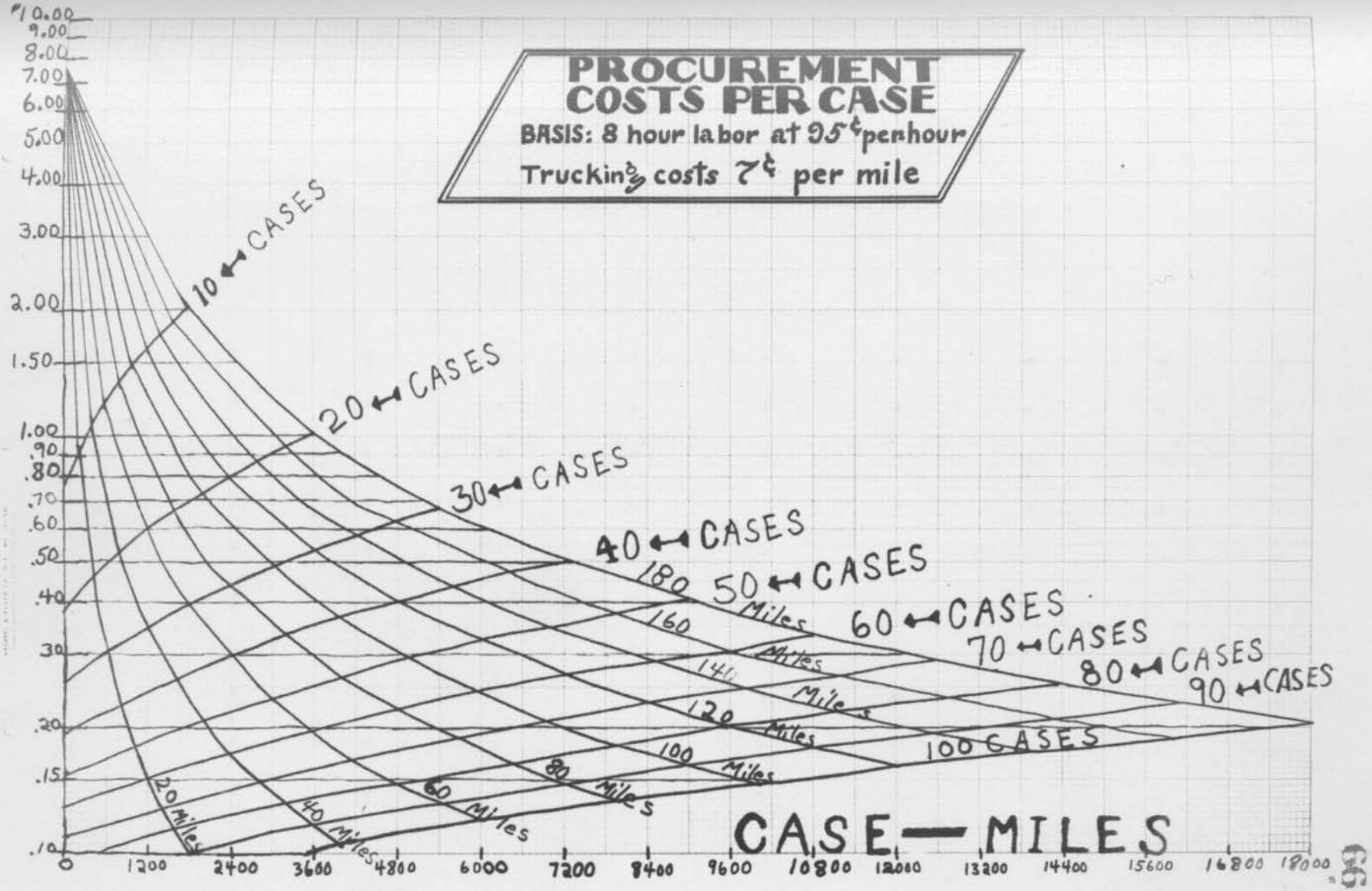
PROCUREMENT COSTS PER CASE
BASIS: 8 hour labor at 95¢ per hour
Trucking costs 7¢ per mile
$10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.50
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.15
.10
10 CASES
20 CASES
30 CASES
40 CASES
50 CASES
60 CASES
70 CASES
80 CASES
90 CASES
100 CASES
180 Miles
160 Miles
140 Miles
120 Miles
100 Miles
80 Miles
60 Miles
40 Miles
20 Miles
0
1200
2400
3600
4800
6000
7200
8400
9600
10800
12000
13200
14400
15600
16800
18000
CASE — MILES

Fig. 12.

Table 12.--PROCUREMENT COSTS PER CASE IN CENTS BASIS: 8 HOURS LABOR AT $.95 PER HOUR AND TRUCKING COSTS AT $.10 PER MILE

NUMBER CASES PROCURED	LENGTH OF ROUTE IN MILES								
	20	40	60	80	100	120	140	160	180
10	96.0	116.0	136.0	156.0	176.0	196.0	216.0	236.0	256.0
20	48.0	58.0	68.0	78.0	88.0	98.0	108.0	118.0	128.0
30	32.0	38.7	45.3	52.0	58.7	65.3	72.0	78.7	85.3
40	24.0	29.0	34.0	39.0	44.0	49.0	54.0	59.0	64.0
50	19.2	23.2	27.2	31.2	35.2	39.2	43.2	47.2	49.2
60	16.0	19.3	22.7	26.0	29.3	32.7	36.0	39.3	42.7
70	13.7	16.6	19.4	22.3	25.1	28.0	30.8	33.7	36.6
80	12.0	14.5	17.0	19.5	22.0	24.5	27.0	29.5	32.0
90	10.7	12.9	15.1	17.3	19.6	21.8	24.0	26.2	28.5
100	9.6	11.6	13.6	15.6	17.6	19.6	21.6	23.6	25.6

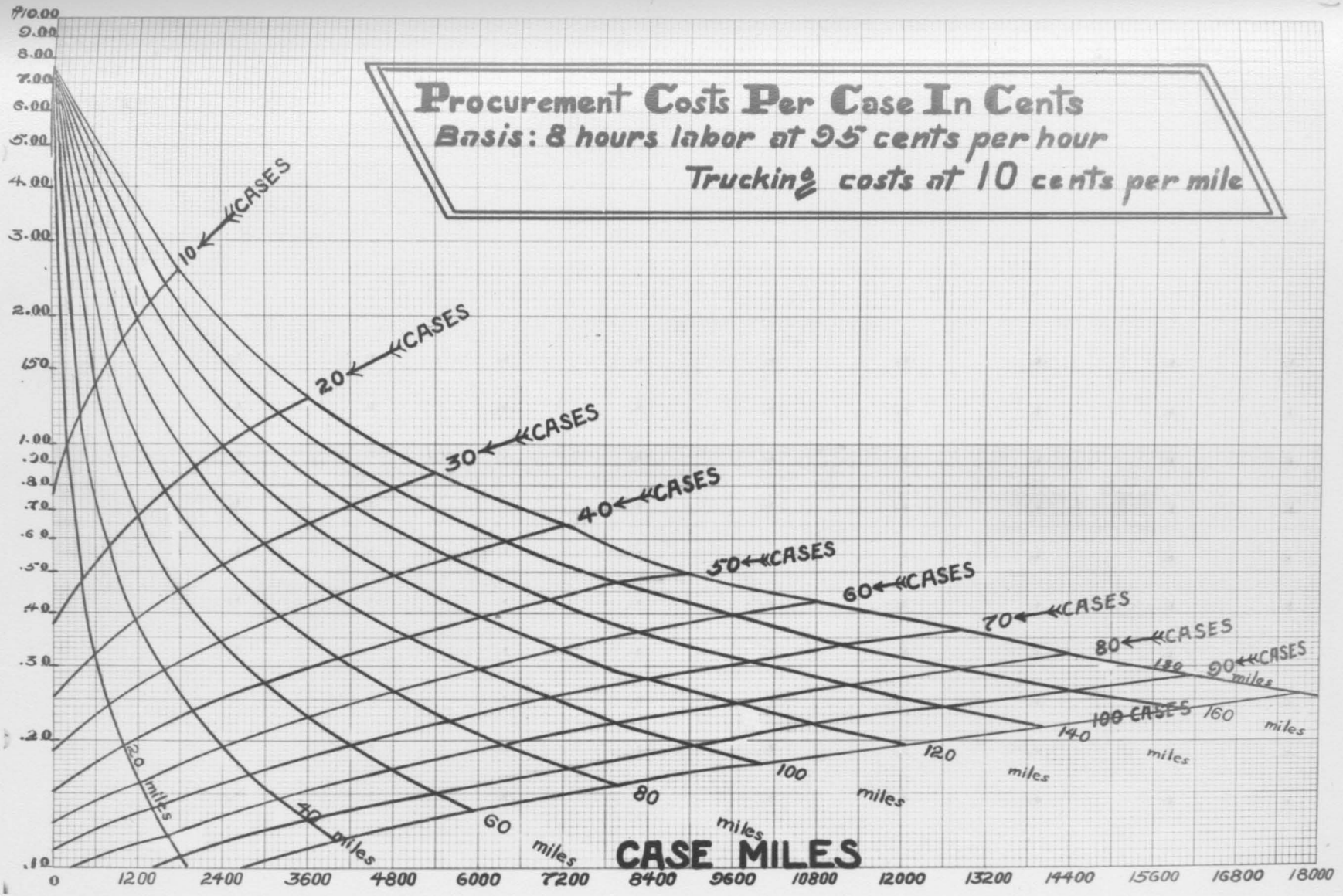
Procurement Costs Per Case In Cents
Basis: 8 hours labor at 95 cents per hour
Trucking costs at 10 cents per mile
$10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.50
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
10 CASES
20 CASES
30 CASES
40 CASES
50 CASES
60 CASES
70 CASES
80 CASES
90 CASES
100 CASES
20 miles
40 miles
60 miles
80 miles
100 miles
120 miles
140 miles
160 miles
180 miles
0
1200
2400
3600
4800
6000
7200
8400
9600
10800
12000
13200
14400
15600
16800
18000
CASE MILES

Fig. 13.

Table 13.--PROCUREMENT COSTS PER CASE IN CENTS BASIS: 8 HOURS LABOR AT $.95 PER HOUR AND TRUCKING COSTS AT $.15 PER MILE

NUMBER CASES PROCURED	LENGTH OF ROUTE IN MILES								
	20	40	60	80	100	120	140	160	180
10	106.0	136.0	166.0	196.0	226.0	256.0	286.0	316.0	346.0
20	53.0	68.0	83.0	98.0	113.0	128.0	143.0	158.0	173.0
30	35.3	45.3	55.3	65.3	75.3	85.3	95.3	105.3	115.3
40	26.5	34.0	41.5	49.0	56.5	64.0	71.5	79.0	86.5
50	22.2	28.2	33.2	39.2	45.2	51.2	57.2	63.2	69.2
60	17.6	22.7	27.7	32.7	37.7	42.7	47.7	52.7	57.7
70	15.1	19.4	23.7	28.0	32.3	36.8	40.9	45.1	49.4
80	13.3	17.0	20.8	24.5	28.3	32.0	35.8	39.5	43.3
90	11.8	15.1	18.4	21.8	25.1	28.4	31.8	35.1	38.4
100	10.6	13.6	16.6	19.6	22.6	25.6	28.6	31.6	34.6

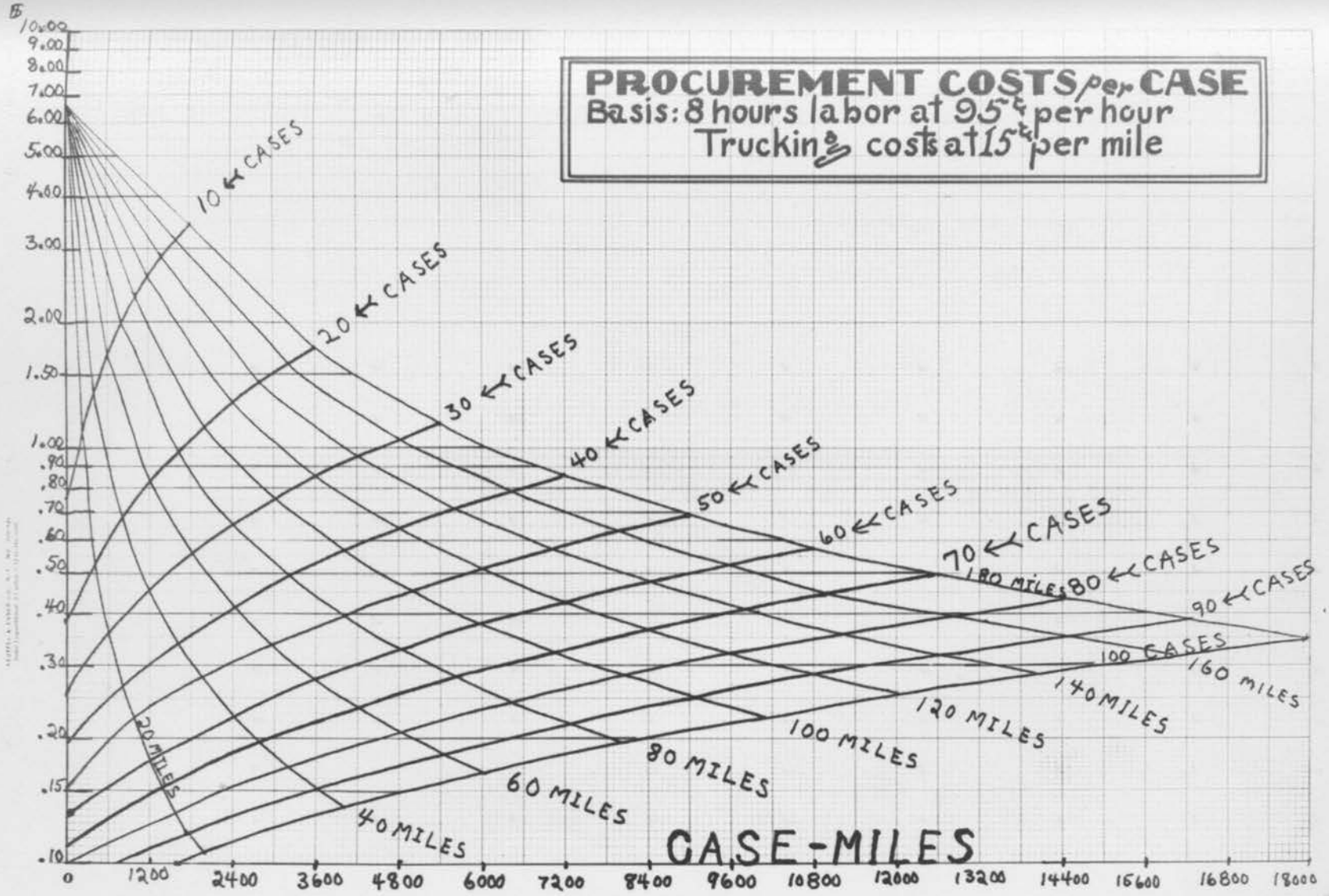
PROCUREMENT COSTS per CASE
Basis: 8 hours labor at 95¢ per hour
Trucking costs at 15¢ per mile
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.50
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.15
.10
10 CASES
20 CASES
30 CASES
40 CASES
50 CASES
60 CASES
70 CASES
80 CASES
90 CASES
100 CASES
20 MILES
40 MILES
60 MILES
80 MILES
100 MILES
120 MILES
140 MILES
160 MILES
180 MILES
CASE-MILES
0
1200
2400
3600
4800
6000
7200
8400
9600
10800
12000
13200
14400
15600
16800
18000

Fig. 14.

obtains an average of 60 cases of eggs per trip. He wants to know his present costs and whether an additional 40 miles to pick up 30 more cases would increase or decrease his procurement cost per case. Figure 13 shows his present cost at 33 cents per case. The added miles would make his route 160 miles with a total of 90 cases obtained. Figure 13 now shows his cost to be 26 cents per case. An actual lowering of cost of 7 cents per case would result where the additional eggs were obtained.

Costs of handling eggs for candling and packaging

This phase analyzes costs of labor, equipment, and buildings necessary to candle, grade, and carton eggs ready for resale to retailer or consumer.

It was found that a variation occurred in costs for the basic unit warehouse of 1,000 square feet with a definite difference in costs within the Denver Area and for areas outside of Denver. The same was found to be true of labor costs. The costs as they were determined are presented in Table 14 for the Denver Area and Table 15 for the state excluding the Denver Area. One point not considered in labor costs was a two weeks vacation with pay which when figured would add 4 percent to labor costs.

With the basis for costs of handling eggs

Table 14.--DENVER AREA COSTS PER 1,000 SQ. FT. FLOOR SPACE

ITEM	Per Year 250 Days	Per Month 20.83 Days	Per Day 8 Hours
Rent	$1,032.00	$ 86.00	$4.13
Equipment Interest @ 6% $1,200.00	72.00	8.00	.38
Equipment* Depreciation 5% to 10% $1,200.00	60.00 to 120.00	5.00 to 10.00	.24 to .48
Repairs* $50.00 to $100.00	50.00 to 100.00	4.17 to 8.33	.20 to .40
TOTAL FIXED COSTS	$1,214.00 to 1,324.00	$103.17 to 112.33	$4.95 to 5.39
Dock Workers @ $1.00 an hour	$2,000.00	$166.67	$8.00
Bench or Warehousemen @ $.95 per hour	1,900.00	158.33	7.60
Candler @ $.87.5 an hour	1,750.00	145.81	7.00

*The maximum figure was used in calculating costs.

Table 15.--OUTSIDE DENVER AREA COSTS PER 1,000 SQ. FT. FLOOR SPACE

ITEM	Per Year 250 Days	Per Month 20.83 Days	Per Day 8 Hours
Rent	$ 900.00	$ 75.00	$3.60
Equipment Interest @ 6% $1,200.00	72.00	8.00	.38
Equipment* Depreciation 5% to 10% $1,200.00	60.00 to 120.00	5.00 to 10.00	.24 to .48
Repairs* $50.00 to $100.00	50.00 to 100.00	4.17 to 8.33	.20 to .40
TOTAL FIXED COSTS*	$1,082.00 to 1,192.00	$ 92.17 to 101.33	$4.42 to 4.86
Dock Workers @ $.90 per hour	$1,800.00	$150.00	$7.20
Bench or Warehousemen @ 75 cents per hour	1,500.00	125.00	6.00
Candler @ $.80 per hour	1,600.00	133.33	6.40

*The maximum figure was used in calculating costs.

determined it was necessary to set up a scale of employment which is presented in Table 16. This table was then used as a basis for computing costs per case for candling and cartoning eggs. Table 17 presents this computation for the area outside Denver and Table 18 presents the same for Denver Area.

The remaining computation necessary to complete the costs per case was the fixed plant costs which is presented in Table 19.

The aim in this method of analyzing candling and packaging costs was to provide material for a graphic picture of these costs and to show the effects of variation in plant operation. Figure 15 shows per case costs of handling eggs for candling and packaging eggs under Colorado conditions excluding Denver Area which is presented in Figure 16. Costs of cases and cartons have been omitted. Investigation showed that new cases can be obtained for 45 cents each and that new flats and fillers for each case cost 30 cents. Cartons for individual dozen eggs cost in the neighborhood of 2 cents each or 60 cents per case. However, in market channels eggs are not always sold the same way. Therefore, the type of business pursued by the marketing agency would determine the cost of cases and or cartons. Therefore, this cost should be kept separate, inasmuch

Table 16.--SCALE OF EMPLOYMENT (DAY BASIS)

IN OR OUT-SIDE DENVER AREA	DOCK WORKER		BENCH WORKER OR WARE-HOUSEMEN		CANDLER		TOTAL EMPLOYEES		FIXED COST PER DAY	TOTAL COST	RANGE OF CASES HANDLED
	No.	Cost	No.	Cost	No.	Cost	No.	Cost			
In	1	$8.00			1	$ 7.00	2	$15.00	$5.39	$20.39	10 - 34
Out	1	7.20			1	6.40	2	13.60	4.86	18.46	10 - 34
In	1	8.00			2	14.00	3	22.00	5.39	27.39	24 - 48
Out	1	7.20			2	12.80	3	20.00	4.86	24.86	24 - 48
In	1	8.00			3	21.00	4	29.00	5.39	34.39	49 - 72
Out	1	7.20			3	19.20	4	26.40	4.86	31.26	49 - 72
In	1	8.00	1	$ 7.60	3	21.00	5	36.60	5.39	41.99	49 - 72
Out	1	7.20	1	6.00	3	19.20	5	32.40	4.86	37.26	49 - 72
In	1	8.00	1	7.60	4	28.00	6	43.60	5.39	48.99	73 - 96
Out	1	7.20	1	6.00	4	25.60	6	38.80	4.86	43.66	73 - 96
In	1	8.00	1	7.60	5	35.00	7	50.60	5.39	55.99	97 - 120
Out	1	7.20	1	6.00	5	32.00	7	45.20	4.86	50.06	97 - 120
In	1	8.00	1	7.60	6	42.00	8	57.60	5.39	62.99	121 - 144
Out	1	7.20	1	6.00	6	38.40	8	51.60	4.86	56.46	121 - 144

Table 16.--Continued.

IN OR OUT-SIDE DENVER AREA	DOCK WORKER		BENCH WORKER OR WARE-HOUSEMEN		CANDLER		TOTAL EMPLOYEES		FIXED COST PER DAY	TOTAL COST	RANGE OF CASES HANDLED
	No.	Cost	No.	Cost	No.	Cost	No.	Cost			
In	1	$8.00	2	$15.20	6	$42.00	9	$65.20	$5.39	$70.59	121 - 144
Out	1	7.20	2	12.00	6	38.40	9	57.60	4.86	62.46	121 - 144
In	1	8.00	2	15.20	7	49.00	10	72.20	5.39	77.59	145 - 168
Out	1	7.20	2	12.00	7	44.80	10	64.00	4.86	68.86	145 - 168
In	1	8.00	2	15.20	8	56.00	11	79.20	5.39	84.59	169 - 192
Out	1	7.20	2	12.00	8	57.20	11	70.40	4.86	75.26	169 - 192

Table 17.--COSTS PER CASE FOR CANDLING AND CARTONING EGGS UNDER COLORADO CONDITIONS EXCLUDING DENVER AREA*

One Dockworker and One Candler
Based on Per Day Cost of $18.46 for Labor and Fixed Costs

Number of Cases Per Day	15	20	25	30	35	40	45	50	55
Costs Per Case in Cents	123.0	92.0	73.8	61.5	52.7	46.2	41.0	37.0	33.6

One Dockworker and Two Candlers
Based on Per Day Cost of $24.86 for Labor and Fixed Costs

Number of Cases Per Day	30	35	40	45	50	55	60	65	70
Costs Per Case in Cents	83.0	71.0	62.0	55.0	49.7	45.0	41.4	38.2	35.5

One Dockworker and Three Candlers
Based on Per Day Cost of $31.26 for Labor and Fixed Costs

Number of Cases Per Day	50	55	60	65	70	75	80	85	90
Costs Per Case in Cents	62.5	56.8	52.0	48.1	44.7	41.7	39.0	36.6	34.7

One Dockworker, One Warehouseman and Three Candlers
Based on Per Day Cost of $37.26 for Labor and Fixed Costs

Number of Cases Per Day	50	55	60	65	70	75	80	85	90
Costs Per Case in Cents	74.5	67.7	62.1	57.3	53.2	49.7	46.6	43.8	41.4

One Dockworker, One Warehouseman and Four Candlers
Based on Per Day Cost of $43.66 for Labor and Fixed Costs

Number of Cases Per Day	75	80	85	90	95	100	105	110	115
Costs Per Case in Cents	58.2	54.6	51.4	48.5	46.0	43.7	41.6	39.7	38.0

Table 17.--Continued.

One Dockworker, One Warehouseman and Five Candlers
Based on Per Day Cost of $50.06 for Labor and Fixed Costs

Number of Cases Per Day	100	105	110	115	120	125	130	135	140
Costs Per Case in Cents	50.0	47.6	45.5	43.5	41.7	40.0	38.5	37.1	35.7

One Dockworker, One Warehouseman and Six Candlers
Based on Per Day Cost of $56.46 for Labor and Fixed Costs

Number of Cases Per Day	105	110	115	120	125	130	135	140	145
Costs Per Case in Cents	53.8	51.3	49.1	47.1	45.2	43.4	41.8	40.3	38.9

One Dockworker, Two Warehousemen and Six Candlers
Based on Per Day Cost of $62.46 for Labor and Fixed Costs

Number of Cases Per Day	105	110	115	120	125	130	135	140	145
Costs Per Case in Cents	59.5	56.8	54.3	52.0	50.0	48.0	46.3	44.6	43.1

One Dockworker, Two Warehousemen and Seven Candlers
Based on Per Day Cost of $68.86 for Labor and Fixed Costs

Number of Cases Per Day	135	140	145	150	155	160	165	170	175
Costs Per Case in Cents	51.0	49.2	47.5	46.0	44.4	43.0	41.7	40.5	39.3

One Dockworker, Two Warehousemen and Eight Candlers
Based on Per Day Cost of $75.26 for Labor and Fixed Costs

Number of Cases Per Day	160	165	170	175	180	185	190	195	200
Costs Per Case in Cents	47.0	45.6	44.5	43.0	41.8	40.7	39.6	38.6	37.6

*Excluding Costs of Cases and Cartons

Table 18.--COSTS PER CASE IN CENTS FOR CANDLING AND CARTONING EGGS IN THE DENVER AREA*

One Dockworker and One Candler
Based on Per Day Costs of $20.39 for Labor and Fixed Costs

Number of Cases Per Day	15	20	25	30	35	40	45	50	55
Costs Per Case in Cents	136.0	102.0	82.0	68.0	58.3	51.0	45.3	40.8	37.0

One Dockworker and Two Candlers
Based on Per Day Costs of $27.39 for Labor and Fixed Costs

Number of Cases Per Day	30	35	40	45	50	55	60	65	70
Costs Per Case in Cents	91.0	78.0	68.0	61.0	55.0	50.0	45.6	42.0	39.0

One Dockworker and Three Candlers
Based on Per Day Costs of $34.39 for Labor and Fixed Costs

Number of Cases Per Day	50	55	60	65	70	75	80	85	90
Costs Per Case in Cents	68.8	62.5	57.0	53.0	49.0	46.0	43.0	40.5	38.2

One Dockworker, One Warehouseman and Three Candlers
Based on Per Day Cost of $41.99 for Labor and Fixed Costs

Number of Cases Per Day	50	55	60	65	70	75	80	85	90
Costs Per Case in Cents	84.0	76.3	70.0	64.6	60.0	56.0	52.5	49.4	46.7

One Dockworker, One Warehouseman and Four Candlers
Based on Per Day Cost of $48.99 for Labor and Fixed Costs

Number of Cases Per Day	75	80	85	90	95	100	105	110	115
Costs Per Case in Cents	65.3	61.2	58.0	54.0	51.5	49.0	46.0	44.5	42.6

Table 18.--Continued.

One Dockworker, One Warehouseman and Five Candlers
Based on Per Day Cost of $55.99 for Labor and Fixed Costs

Number of Cases Per Day	100	105	110	115	120	125	130	135	140
Costs Per Case in Cents	56.0	53.3	51.0	49.0	47.0	45.0	43.0	41.5	40.0

One Dockworker, One Warehouseman and Six Candlers
Based on Per Day Cost of $62.99 for Labor and Fixed Costs

Number of Cases Per Day	105	110	115	120	125	130	135	140	145
Costs Per Case in Cents	60.0	57.3	54.8	52.5	50.4	48.5	46.7	45.0	43.4

One Dockworker, Two Warehousemen and Six Candlers
Based on Per Day Cost of $70.59 for Labor and Fixed Costs

Number of Cases Per Day	105	110	115	120	125	130	135	140	145
Costs Per Case in Cents	67.2	64.1	61.4	58.8	56.5	54.3	52.0	50.5	49.0

One Dockworker, Two Warehousemen and Seven Candlers
Based on Per Day Cost of $77.59 for Labor and Fixed Costs

Number of Cases Per Day	135	140	145	150	155	160	165	170	175
Costs Per Case in Cents	57.5	55.4	53.5	51.7	50.0	48.5	47.0	45.5	44.0

One Dockworker, Two Warehousemen and Eight Candlers
Based on Per Day Cost of $84.59 for Labor and Fixed Costs

Number of Cases Per Day	160	165	170	175	180	185	190	195	200
Costs Per Case in Cents	52.9	51.3	49.8	48.3	47.0	46.0	44.5	43.4	42.3

*Excluding Costs of Cases and Cartons

Table 19.--FIXED COSTS BY VOLUME HANDLED PER DAY.

TOTAL FIXED COSTS PER DAY AT $5.39 IN DENVER AREA

Number Cases	10	15	20	25	30	35	40
Cost per Case	.54	.36	.27	.22	.18	.155	.135
Number Cases	50	60	70	80	90	100	120
Cost per Case	.11	.09	.073	.067	.06	.054	.045
Number Cases	140	160	180	200	202	240	280
Cost per Case	.0385	.034	.03	.027	.027	.0225	.019

TOTAL FIXED COSTS PER DAY AT $4.86 OUTSIDE DENVER AREA

Number Cases	10	15	20	25	30	35	40
Cost per Case	.486	.324	.243	.194	.162	.139	.122
Number Cases	50	60	70	80	90	100	120
Cost per Case	.097	.081	.069	.061	.054	.049	.041
Number Cases	140	160	180	200	202	240	280
Cost per Case	.035	.030	.027	.024	.024	.020	.0174

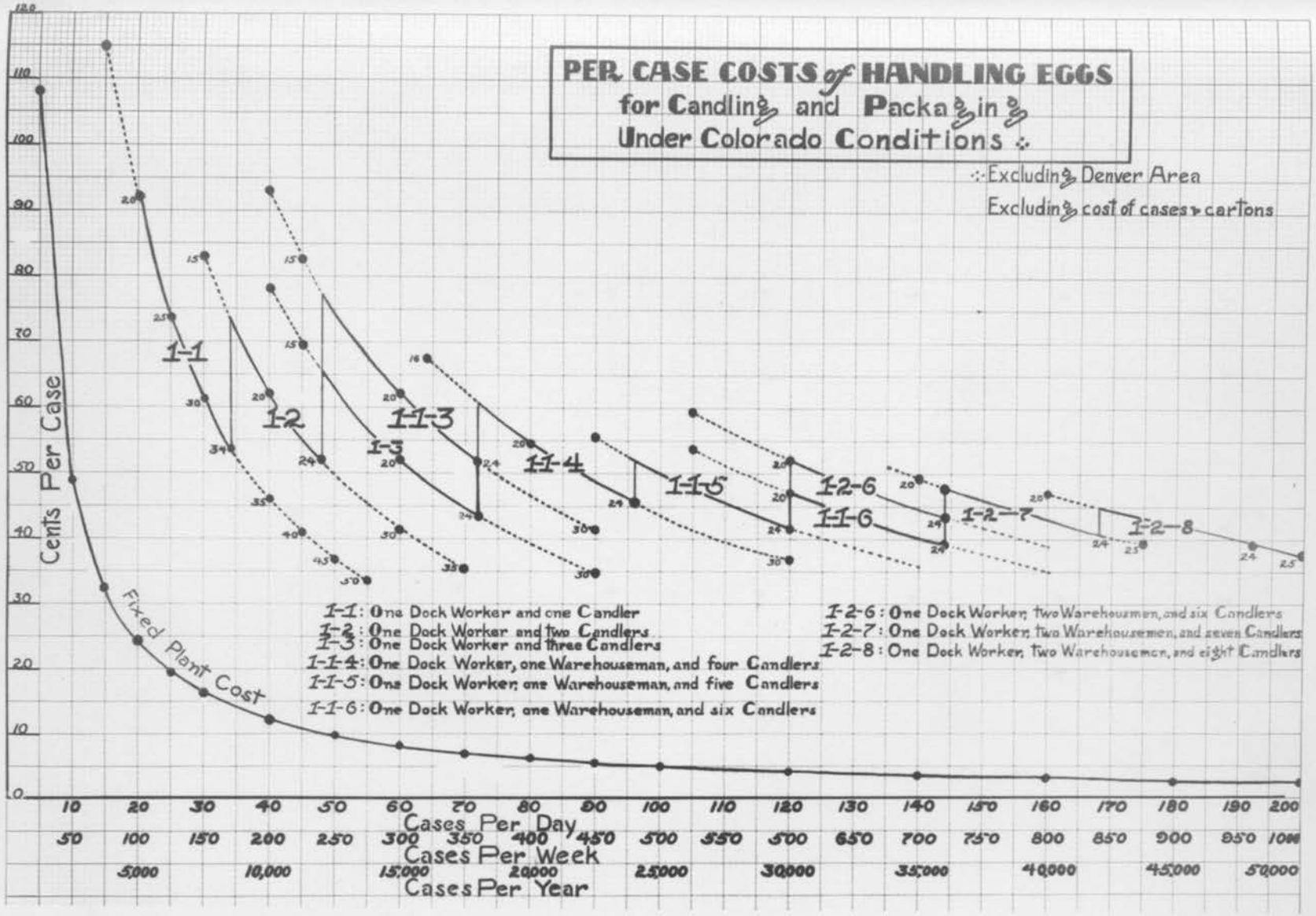
PER CASE COSTS of HANDLING EGGS
for Candling and Packaging
Under Colorado Conditions ∴
∴ Excluding Denver Area
Excluding cost of cases & cartons
Cents Per Case
Fixed Plant Cost
1-1
1-2
1-3
1-1-3
1-1-4
1-1-5
1-1-6
1-2-6
1-2-7
1-2-8
1-1: One Dock Worker and one Candler
1-2: One Dock Worker and two Candlers
1-3: One Dock Worker and three Candlers
1-1-4: One Dock Worker, one Warehouseman, and four Candlers
1-1-5: One Dock Worker, one Warehouseman, and five Candlers
1-1-6: One Dock Worker, one Warehouseman, and six Candlers
1-2-6: One Dock Worker, two Warehousemen, and six Candlers
1-2-7: One Dock Worker, two Warehousemen, and seven Candlers
1-2-8: One Dock Worker, two Warehousemen, and eight Candlers
Cases Per Day
Cases Per Week
Cases Per Year

Fig. 15.

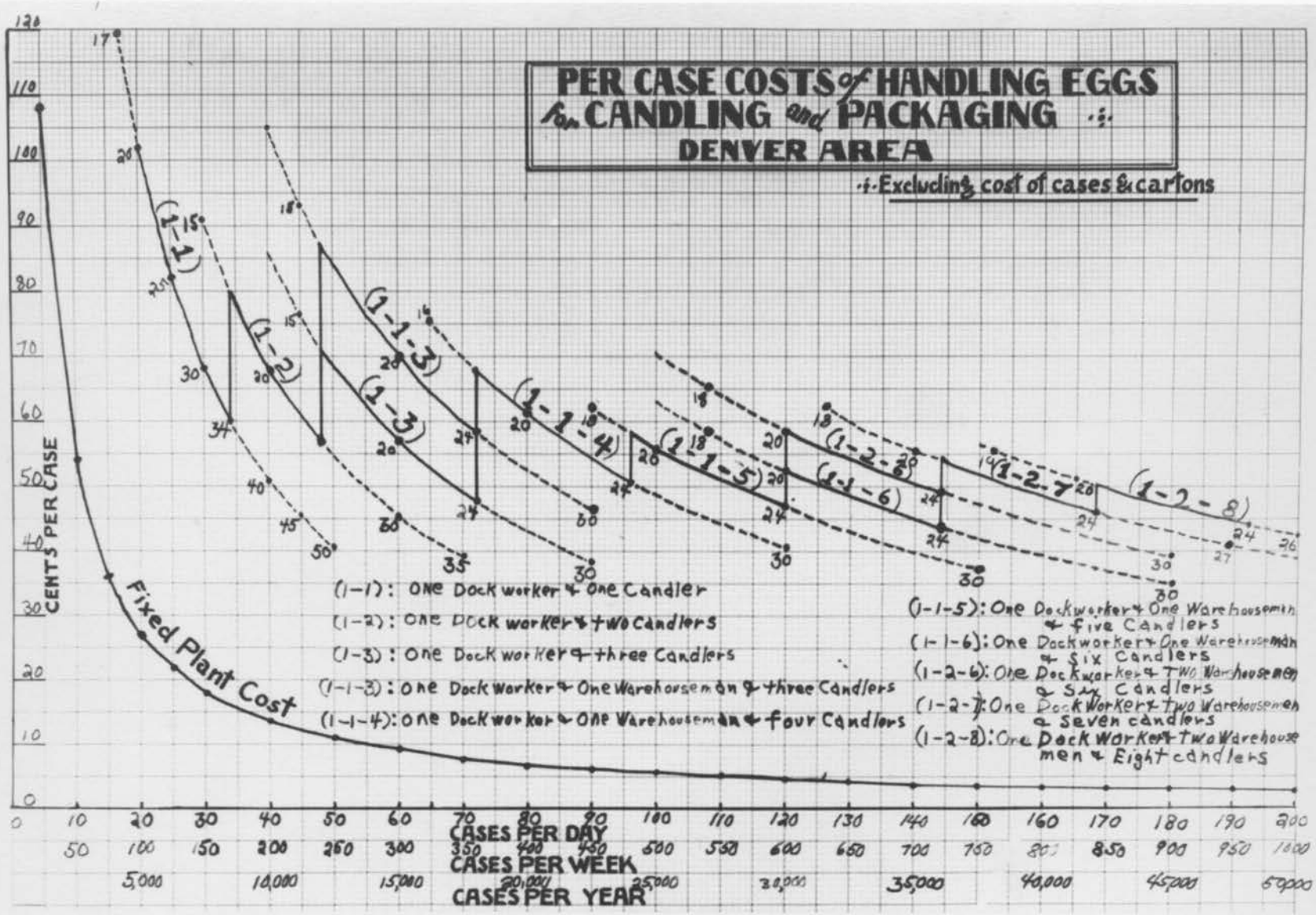
PER CASE COSTS of HANDLING EGGS for CANDLING and PACKAGING *
DENVER AREA
* Excluding cost of cases & cartons
CENTS PER CASE
Fixed Plant Cost
(1-1): One Dock worker & One Candler
(1-2): One Dock worker & two Candlers
(1-3): One Dock worker & three Candlers
(1-1-3): one Dock worker & One Warehouseman & three Candlers
(1-1-4): one Dock worker & One Warehouseman & four Candlers
(1-1-5): One Dockworker & One Warehouseman & five Candlers
(1-1-6): One Dockworker & One Warehouseman & Six Candlers
(1-2-6): One Dockworker & Two Warehousemen & Six Candlers
(1-2-7): One Dock Worker & Two Warehousemen & Seven candlers
(1-2-8): One Dock Worker & Two Warehousemen & Eight candlers
CASES PER DAY
CASES PER WEEK
CASES PER YEAR

Fig. 16.

as this cost would be consistently the same regardless of volume. Marketing agencies interviewed all apparently considered this item as a separate cost, hence case and filler costs have been considered separately.

To explain these graphs the example used previously will be continued.

The procurement cost for 60 cases of eggs obtained was 33 cents per case and an additional volume of 30 case decreased costs to 26 cents per case. It is assumed that the point of collection is in Denver so Figure 16 applies. At the volume of 60 cases per day the employment would either be 1 dockworker and 3 candlers or 1 dockworker, 1 warehouseman and 3 candlers. In the former the costs per case of handling for candling and packaging would be 57 cents while the latter would be 70 cents per case. On the assumption that the candlers at this point are not at full capacity the former will be used. If the additional 30 cases should be handled it would require 1 dockworker, 1 warehouseman and 4 candlers. Costs at this volume of 90 cases per day would be 54 cents per case. This actually shows a decrease of 3 cents per case cost even though 2 additional persons are employed. For the purposes of this example it is assumed that the agency is using new cases with 30 cartons to the case which would add $1.05 to the costs at either volume rate.

Miscellaneous costs

The third and final phase considered what may be determined as miscellaneous costs. No standard, of course, was possible. These costs have a very important bearing on the variations in costs of the different marketing agencies. From the standpoint of illustrating how these costs enter into the total costs per case an example of a minimum office expense has been considered. Table 20 shows the expenses considered while Table 21 shows these costs as they are effected by the volume of business of the establishment. This table also gives a comparison of costs per case where an additional clerk at the cost of $7.20 per day or 90 cents per hour has been added.

The method of analysis concerning office costs can be readily applied to any type of business organization. In any instance these costs should be determined by totaling the costs for a period of time and dividing these costs by the number of cases handled during that period of time. As an example, where a concern handles 500 cases of eggs during a week in which costs were found to be 100 dollars for the week, then "overhead" costs would be 20 cents per case. A further example could be given by following up the previous example in which costs of procurement at the 60 case

Table 20.--EXAMPLE OF OFFICE EXPENDITURES

	PER YEAR (250 DAYS)	PER MONTH (20.83 DAYS)	PER DAY (8 HOURS)
Manager	$ 3,600.00	$ 300.00	$ 14.40
Secretary	1,800.00	150.00	7.20
Office Equipment $500.00 @ 6% Interest	30.00	2.50	.12
Office Equipment Depreciation 10%	50.00	4.17	.20
Office Supplies	100.00	8.33	.40
License Fees	50.00	4.17	.20
TOTAL COSTS	$ 5,630.00	$ 569.17	$ 22.52

Table 21.--COSTS PER CASE OF OFFICE EXPENDITURES

Volume of Business Per Day In Cases	Cost Per Case @ $22.52 Per Day	Cost Per Case @ $29.72 Per Day
10	2.25	2.970
20	1.125	1.486
40	.562	.743
60	.375	.495
80	.281	.372
100	.225	.297
120	.188	.248
140	.161	.212
160	.141	.186
180	.125	.165
200	.113	.149
240	.094	.124
280	.080	.106

per day volume were 33 cents per case; handling costs for candling and packaging were 57 cents, and case and carton costs were $1.05. It is assumed that a minimum office expense as shown in Table 20 would apply. Table 21 shows the cost to be 37.5 cents per case at the 60 case volume. This would make the total costs per case considered so far as $2.325. The same type of computation at the 90 case volume would show a cost of $2.10 per case.

Generally it was found that two methods of purchasing eggs are used. The most common method in use was the purchase of eggs on a current receipt basis. The other method was where the producer is paid on a graded basis. In the former method there is a loss from inedible and cracked eggs which enters into marketing costs. In the latter method the marketing agency does not have this loss to consider. Naturally the producer who has not taken care of his eggs will want to sell on a current receipt basis while the larger producer who can more economically give proper care to produce high quality eggs will want to sell on a graded basis. The purchasing of eggs on a current receipt basis involves not only marketing costs for unsaleable eggs, but also a loss cost which will vary according to how the edible eggs grade out. No standards for these costs can be set up because in any instance this type of purchasing is

only a guessing game in which one producer is over paid at the expense of another producer. The market agency is depending on the general run of the egg quality and losses of unsaleable eggs in quoting prices. He expects to make a little money at quoted prices in order to cover the risk of buying a product the quality of which is unknown. Table 22 illustrates the per case cost at various price levels according to loss in eggs per case.

If current receipt buying was considered, a 10 percent loss incurred at the $9.00 per case cost as shown in Table 22 would add 90 cents to the cost per case. The market agency buying on a graded basis would not have this loss, hence could offer the producer 3 cents or 10 percent more per dozen as an added incentive for selling his eggs on a graded basis. The main value of the grade purchase which cannot be figured would be in promoting a business relationship in which the producer would become financially interested in maintaining egg quality.

Summary

It was indicated that the pattern of egg production in Colorado has an important bearing on the problems confronting producers and marketing agencies for improving the marketing of eggs. A few of the more important factors involved have been presented. It was shown that the larger percent of eggs are produced in

Table 22.--PER CASE COST IN CENTS AT VARIOUS PRICES PAID ACCORDING TO LOSS IN EGGS PER CASE

LOSS IN EGGS PER CASE	$5.40 PER CASE	$7.20 PER CASE	$9.00 PER CASE	$10.80 PER CASE	$12.60 PER CASE	$14.40 PER CASE	$16.20 PER CASE	$18.00 PER CASE	$19.80 PER CASE	PER-CENT LOSS
3	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	0.83
6	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	1.67
9	13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	49.5	2.50
12	18.0	24.0	30.0	36.0	42.0	48.0	54.0	60.0	66.0	3.33
15	22.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	4.17
18	27.0	36.0	45.0	54.0	63.0	72.0	81.0	90.0	99.0	5.00
21	31.5	42.0	52.5	63.0	73.5	84.0	94.5	105.0	115.5	5.83
24	36.0	48.0	60.0	72.0	84.0	96.0	108.0	120.0	132.0	6.66
27	40.5	54.0	67.5	81.0	94.5	108.0	121.5	135.0	148.5	7.50
30	45.0	60.0	75.0	90.0	105.0	120.0	135.0	150.0	165.0	8.33
33	49.5	66.0	82.5	99.0	115.5	132.0	148.5	165.0	181.5	9.17
36	54.0	72.0	90.0	108.0	126.0	144.0	162.0	180.0	198.0	10.00

Northeastern Colorado and that for the greater part of the year Colorado is a deficient production state. Prices paid Colorado producers for eggs during the 7 year period 1940-46 was 2.6 cents less than the average price per dozen paid in the Mountain States region. It was shown that larger flocks are maintained in the high production areas. The Eastern dryland proved to be the largest excess production area.

An analysis of costs of marketing eggs was developed. Tables and graphs were used to develop an analysis of costs. It is admitted that not all costs have been included. The presentation was developed to show more clearly the problem of costs that are involved in the marketing of eggs and the effect of variations in plant operation.

Chapter V

DISCUSSION

The results of this study reveal that the problems of egg marketing in Colorado are not only concerned with an apparent lack of an efficient marketing system as pointed out by Winter (23:88), in 1943, but they are also related to the problem of production.

In considering the extent of production of eggs in Colorado, it was determined that Colorado poultry flocks were kept on 84.5 percent of all farms in 1945 in Colorado. These flocks produced 26,552,391 dozen eggs in 1944 (21:64,70).

The locations of these poultry flocks were in greater concentration in definite areas within the state. Seventy-eight percent of Colorado poultry production occurred in the South Platte River Basin, Eastern Colorado Dryland Area and Arkansas River Basin. The trend of the location of egg production has not significantly changed prior to World War II and after. There was an increase in production of 38 percent from 1939 to 1944. However, this was noted as a general increase in production per bird and increase in flock size and could not be considered as a result of

specialized commercial poultry production developing within certain areas of the state. Even though an increase occurred in production there was not a significant change in numbers of flock owners during the two periods.

It was shown that average flock size was very small. Poultry is a very small sideline on the average farm. This was determined from the evidence that average number of birds per farm in the state in 1945 was only 86 birds. The proper handling of eggs in an enterprise which contributes a very small share to the total farm income indicates a basic reason for the production of poor quality eggs. Due to the comparatively small benefits which farms having small flocks would receive from the additional returns of producing a high quality product, it appears that increasing flock size is one of the major requirements for the improvement of marketing conditions. This can be accomplished by urging farmers either to increase their flocks to a large enough scale that they can economically produce high quality eggs or to reduce flocks size sufficiently for the farmers own needs, in which case improperly held eggs would not reach market channels. Further study demonstrating these points would aid in the promotion of this type of program.

In comparing types of production areas, the

dryland areas can be considered as probably having more efficient production than the irrigated areas. This tentative conclusion was based upon two facts. Larger sized flocks per farm and larger production in proportion to the population was present in the dryland areas. This result probably has been brought about because of the very nature of feedstuff required by poultry in comparison with other livestock. The dryland farmer does not have as large a choice of livestock enterprises as the irrigation farmer. Milk production, sheep and cattle fattening and other enterprises are more common where a large supply of alfalfa hay and beet by-products are available. Chickens cannot utilize these bulky feeds as readily as other livestock. Grains, the principle feed required for chickens, are readily available in either type of farming, but relatively more plentiful on the dryland. However, further study on this would be necessary to justify definite conclusions.

Topography has a very important part in production and marketing of eggs. The high mountain ranges serve as a barrier to smooth year around marketing and split Colorado into definite areas. Because of transportation costs, any excess production in the San Juan Basin, San Luis Valley, Western Slope Area and Mountain Areas would naturally lower the price received in those areas to such an extent that production for shipping out

would be necessary and less profitable. In the sparsely populated areas where low consumer demand makes the marketing of eggs difficult, costs are naturally reflected in higher prices and lower consumption levels. The writer believes that basically this is the reason for such small flocks being present in the areas mentioned above.

The increase of 38 percent in Colorado production occuring between 1939 and 1944 was due to increase of average flock size from 68 in 1940 to 86 in 1945. This is a 26.5 percent increase in flock size which would mean the difference of 11.5 percent was due to increased egg production per bird which is normal in view of the national trend towards higher egg production per bird as a result of improved breeding and management practices. This increase in average flock size shows a desirable condition, especially since it was in the larger flocks. It was found that flocks containing 400 or more birds increased 55.4 percent (from 424 to 659) and flocks numbering 200 to 399 birds increased 103.5 percent (from 1,722 to 3,504). The number of flocks numbering over 200 birds, however, is still only 10.4 percent of all flocks in 1945. This compares to 4.1 percent in 1940.

The problem of seasonal production determined from monthly production data available from the

Bureau of Agriculture Economics (18:12-13) shows that production during the 6 month period from February through July was 63.9 percent of the years total compared to the remaining 6 months of only 36.1 percent. The small flock owners who are not able to properly care for their flocks obtain a heavy production through the spring and early summer months only. The larger, well managed, flocks will not show such a high degree of variation as their practices include means of obtaining more consistent year around production. An educational program demonstrating good management practices and the profitability of larger flocks would tend to even out the seasonal cycle of egg production.

The production of eggs in Colorado according to the United States Census for 1944 was deficient for Colorado consumer demands, on the basis of the United States average annual per capita consumption. However, it cannot be concluded that Colorado is a deficient production state because census data is not always complete. The Bureau of Agriculture Economics estimates for 1944 a larger egg production than shown by the 1945 census reports. The Bureau of Agriculture Economics data indicated that Colorado produced in 1944 more eggs than needed according to United States average annual per capita consumption.

Eggs are shipped out of the state during the

spring of the year due to a surplus production, which accentuates the deficient egg production of other seasons. This requires the shipping in of eggs during deficient production seasons. For this reason egg production data must be considered by months and seasons, and not on a yearly basis. Winter (23:32), 1943, points out that there is not sufficient storage space for carrying over the necessary number of eggs to supply Colorado during low seasonal production.

We have two advantages when we consider a program for expanded egg production in Colorado. Colorado definitely does not produce enough eggs for its own needs during all seasons of the year. Also according to Frischknecht (7), 1947, Colorado along with other Western states now has a market area in California which does not produce enough eggs for their own use. It can be assumed that an expanded egg production in Colorado would actually improve marketing conditions.

In Colorado, average prices paid producers for eggs in a seven year period 1940 to 1946 inclusive were computed at 2.6 cents less per dozen than the Mountain states average and 1.9 cents less than the United States average. In not a single month did the price paid for eggs in Colorado equal either the United States or Mountain states average for the same month. On the

basis of total production reported by farmers of 26,552,391 dozen (21:70) Colorado producers would have received about 700,000 dollars more if they had obtained the average price of the Mountain states average. This can definitely be considered as an indication of unsatisfactory conditions resulting from poorer quality eggs being produced together with an unsatisfactory marketing system.

As a first criteria for understanding the problems confronting egg marketing agencies an analysis was made of egg handling costs. An analysis of costs was considered to be of the most value to the individual market agency. This analysis did not attempt to determine the profits of egg marketing, but did try to show, under a given set of conditions, what the market agency could expect in the way of costs. Volume of business was shown to be the greatest factor in determining costs. Further study is needed to indicate the volume of business under which the many marketing agencies in Colorado operate. A study of this nature would provide a basis for determining whether the marketing agencies are operating at efficient volume levels.

Marketing costs were determined in three groups. The first cost involved was that of procurement. The second cost dealt with handling, candling and packaging.

The third group of costs, termed miscellaneous costs, were concerned with office expenses and losses from unsaleable eggs. There are other costs which were not considered, such as, storage and retailing costs which are important. A study of marketing costs at the retail level incorporating costs of maintaining quality of eggs would be valuable as a sequel to this study.

Suggestions for further study

The object of this study has been to present an analysis of wholesale costs of marketing eggs in Colorado which would naturally develop suggestions for further study. Further study is suggested on these main topics. An analysis of the efficiency and profitability of various sized flocks on Colorado farms. The relative advantages of poultry flocks on dryland and irrigated farms. Means for improving the marketing of eggs in Mountain Valleys of Colorado. A study of available storage facilities in Colorado as a means for providing a year around supply of eggs from Colorado's egg production. An analysis of out of state market outlets available to Colorado market agencies. An analysis of the types of market agencies present in Colorado with special emphasis on the volume of eggs handled. Marketing costs at the retail level with emphasis on the costs of maintaining quality.

Chapter VI

SUMMARY

An analysis of wholesale costs of marketing eggs was of particular merit in approaching the problem of improving the marketing of eggs in Colorado. It was necessary to survey the pattern of egg production in Colorado in order to proceed with an analysis of these costs. The location and concentration of production has a direct bearing on marketing at the wholesale level.

Colorado has been slow in becoming as quality conscious as other states since it does not produce eggs in sufficient quantities that must look for out of state competitive consumer markets. However, Colorado producers face active competition from quality eggs shipped in from adjacent states. This means Colorado producers and market agencies must bring themselves into line with an integrated quality egg production and marketing program.

Data used for determining the pattern of egg production in Colorado were obtained from reports of the United States Census Bureau and the United States Department of Agriculture. The costs of procurement, candling and handling of eggs were obtained by informal interviews with officials of egg marketing establishments.

The results of this study reveal the following:

1. Poultry flocks were kept on 84.5 percent of all farms in 1945. These flocks produced 26,552,391 dozen eggs in 1944 (21:64,70).

2. Seventy-eight percent of Colorado poultry production occurred in the South Platte River Basin, Eastern Colorado Dryland Area and Arkansas River Basin.

3. There was no evidence of specialized commercial egg production developing within certain areas of the state.

4. There was a general increase in production of 38 percent from 1939 to 1944 of which 26.5 percent came from an increase in flock size. The difference of 11.5 percent could be attributed to increased egg production per bird.

5. Average flock size of Colorado poultry flocks was 86 birds in 1945 compared to 68 in 1940. This small flock size was considered a basic reason for the production of poor quality eggs.

6. Dryland Areas were considered as probably having more efficient production than irrigated areas based upon the fact that larger sized flocks and a larger production in proportion to the population was present.

7. Topography has a very important part in production and marketing of eggs. The high mountain

ranges serve as a barrier to smooth year around marketing and split Colorado into definite areas.

8. Flocks having 200 or more birds numbered 4,163 in 1945 compared to 2,146 flocks in 1940. This number of flocks having over 200 birds was only 10.4 percent of all flocks compared to 4.1 percent in 1940.

9. Almost 2/3 of the years total production occurred during February through July.

10. An expanded egg production program in Colorado would actually improve market conditions.

11. Average prices paid producers for eggs in Colorado for a seven year period 1940 to 1946 inclusive were computed at 2.6 cents less per dozen than the Mountain States average and 1.9 cents less than the United States average. This 2.6 cents per dozen would have meant $690,000.00 more to the Colorado poultry industry during the 1944 production year if Colorado had received the same as the average Mountain States price paid for eggs. The lower price received was contributed to poor quality eggs produced and an inefficient marketing system.

12. The analysis of costs of marketing eggs showed, under a given set of conditions, what the market agency could expect in the way of costs.

13. Volume of business was shown to be the greatest factor in determing variations in the costs of marketing eggs.

APPENDIX

APPENDIX CONTENTS

APPENDIX A.--COLORADO STATISTICS BY FLOCK SIZE SUPPLIED BY BUREAU OF THE CENSUS

State and Number of Chickens On Hand	Farms reporting							
					Percent distribution			
	1945	1940	1935	1930	1945	1940	1935	1930
Colorado Total....	39,963	42,222	51,966	49,001	100.00	100.00	100.00	100.00
None.....	.....	.....	.....	.....	.....	.....	.....	.....
Under 50.....[1]..	16,482	22,438	29,048	23,030	41.2	53.1	55.9	47.0
Under 20...	4,056	10,993	14,338	(*)	10.1	26.0	27.6	(*)
20-49[2].....	12,426	11,455	14,710	(*)	31.1	27.1	28.3	(*)
50-99.....	10,140	11,484	13,580	14,168	25.4	27.2	26.1	28.9
100-199.....	9,178	6,154	6,913	8,715	23.0	14.6	13.3	17.8
100-149.....	6,437	(*)	(*)	(*)	16.1	(*)	(*)	(*)
150-199.....	2,741	(*)	(*)	(*)	6.9	(*)	(*)	(*)
200-399.....	3,504	1,722	1,835	2,453	8.8	4.1	3.5	5.0
200-299.....	2,601	(*)	(*)	(*)	6.5	(*)	(*)	(*)
300-399.....	903	(*)	(*)	(*)	2.3	(*)	(*)	(*)
400 and over.....	659	424	590	635	1.6	1.0	1.1	1.3

1. For 1940 and 1935, this group includes farms with under 25 chickens on hand.
2. For 1940 and 1935, this group includes farms with 25-49 chickens on hand.

APPENDIX B.--COLORADO CHICKENS ON HAND BY FLOCK SIZE

State and Number of Chickens On Hand	CHICKENS ON HAND			
	1945 (Jan.1)	1940 (Apr.1)	1935 (Jan.1)	1930 (Apr.1)
Colorado Total....	3,624,907	2,842,061	3,359,112	3,653,054
None.....	.....	.....	.....	.....
Under 50.....[1]	440,898	600,571	780,143	630,683
Under 20[1]...	53,710	184,172	245,547	(*)
20-49[2].....	387,188	416,399	534,596	(*)
50-99.....	646,890	749,641	863,490	927,644
100-199.....	1,156,864	762,397	846,612	1,084,980
100-149.....	721,573	(*)	(*)	(*)
150-199.....	435,291	(*)	(*)	(*)
200-399.....	846,014	422,131	443,812	597,323
200-299.....	564,481	(*)	(*)	(*)
300-399.....	281,533	(*)	(*)	(*)
400 and over.....	534,241	307,321	425,055	412,424

1. For 1940 and 1935, this group includes farms with under 25 chickens on hand.
2. For 1940 and 1935, this group includes farms with 25-49 chickens on hand.

APPENDIX C.--COLORADO NUMBER AND PERCENT DISTRIBUTION BY FLOCK SIZE

State and Number of Chickens On Hand	CHICKENS ON HAND — Percent Distribution			
	1945	1940	1935	1930
Colorado Total....	100.0	100.0	100.0	100.0
None.....	.....	.....	.....	.....
Under 50.....	12.2	21.1	23.2	17.3
Under 20[1]...	1.5	6.5	7.3	(*)
20-49[2].....	10.7	14.7	15.9	(*)
50-99.....	17.8	26.4	25.7	25.4
100-199.....	31.9	26.8	25.2	29.7
100-149.....	19.9	(*)	(*)	(*)
150-199.....	12.0	(*)	(*)	(*)
200-399.....	23.3	14.9	13.2	16.4
200-299.....	15.6	(*)	(*)	(*)
300.399.....	7.8	(*)	(*)	(*)
400 and over.....	14.7	10.8	12.7	11.3

1. For 1940 and 1935, this group includes farms with under 25 chickens on hand.
2. For 1940 and 1935, this group includes farms with 25-49 chickens on hand.

APPENDIX D.--CHICKEN EGGS PRODUCED IN DOZENS AND PERCENT DISTRIBUTION BY FLOCK SIZE

State and Number of Chickens On Hand	CHICKEN EGGS PRODUCED				
	Dozens			Percent Distribution	
	1944	1939	1934	1944	1939
Colorado					
Total....	27,241,656	19,250,929	20,928,068	100.0	100.0
None.....	257,830	163,504	129,514	0.9	0.8
Under 50.....	3,408,162	3,771,429	4,665,039	12.5	19.6
Under 20...	465,315	1,163,758	1,531,686	1.7	6.0
20-49.....	2,942,847	2,607,671	3,133,353	10.8	13.5
50-99.....	4,702,714	4,690,997	5,036,619	17.3	24.4
100-199.....	8,443,160	4,792,705	4,793,644	31.0	24.9
100-149.....	5,429,250	(*)	(*)	19.9	(*)
150-199.....	3,013,910	(*)	(*)	11.1	(*)
200-399.....	5,891,880	3,011,025	2,756,147	21.6	15.6
200-299.....	3,899,960	(*)	(*)	14.3	(*)
300-399.....	1,991,920	(*)	(*)	7.3	(*)
400 and over.....	4,537,910	2,821,269	3,547,105	16.7	14.7

APPENDIX E.--FARMS REPORTING CHICKEN EGGS PRODUCED AND CHICKENS RAISED BY FLOCK SIZE

State and Number of Chickens On Hand	CHICKEN EGGS PRODUCED — Farms Reporting			CHICKENS RAISED — Farms Reporting		
	1944	1939	1934	1944	1939	1934
Colorado Total....	38,105	38,786	49,336	38,113	37,218	44,192
None.....	444	421	447	446	506	499
Under 50.....	15,070	19,583	26,611	14,595	18,106	22,475
Under 20...	3,521	9,141	12,668	3,195	8,041	9,822
20-49.....	11,549	10,442	13,943	11,400	10,065	12,653
50-99.....	9,569	10,769	13,133	9,905	10,658	12,476
100-199.....	8,951	5,913	6,754	9,006	5,876	6,470
100-149.....	6,268	(*)	(*)	6,339	(*)	(*)
150-199.....	2,683	(*)	(*)	2,667	(*)	(*)
200-399.....	3,466	1,682	1,803	3,483	1,657	1,720
200-299.....	2,581	(*)	(*)	2,581	(*)	(*)
300-399.....	885	(*)	(*)	902	(*)	(*)
400 and over.....	605	418	588	658	415	552

APPENDIX F.--CHICKENS RAISED AND AVERAGE PER FARM REPORTING BY FLOCK SIZE

State and Number of Chickens On Hand	CHICKENS RAISED				
	Number			Average per Farm Reporting	
	1944	1939	1934	1944	1939
Colorado					
Total....	6,227,266	5,210,207	5,574,317	163	140
None.....	141,810	88,545	68,933	304	175
Under 50.....	951,835	1,275,103	1,408,669	65	70
Under 20...	111,335	427,157	462,898	35	53
20-49.....	840,500	847,946	945,771	74	84
50-99.....	1,173,075	1,451,903	1,481,690	118	136
100-199.....	1,920,242	1,293,740	1,262,010	213	220
100-149.....	1,228,289	(*)	(*)	194	(*)
150-199.....	691,953	(*)	(*)	259	(*)
200-399.....	1,168,064	631,495	642,790	335	381
200-299.....	861,244	(*)	(*)	334	(*)
300-399.....	306,820	(*)	(*)	340	(*)
400 and over.....	872,240	469,421	710,225	1,326	1,131

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Average prices received by farmers for farm products. Crops and Markets, vols.18-24, January 1941 - January 1947.
Table repeated each month.

2. Canada.Department of Agriculture. Regulations respecting the grading, marking, and packing of eggs.1940. Ottawa,Canada,Printer to the King,1945. 34p.

3. Colorado.Director of Markets. Regulations promulgated by the Colorado Director of Markets in connection with the enforcement of "An act in relation to poultry eggs". Denver, Colorado, 1939. 6p. folder.

4. Cray, Ray E. Why we buy eggs on grade. U. S. Egg and Poultry Magazine, 54: 7-9, 24-27, May 1948.

5. Cunningham, Glen. Iowa sets out to improve the quality of its eggs. U. S. Egg and Poultry Magazine, 52:28-29, January 1946.

6. Dankers, W. H. A survey of Minnesota egg and poultry processing and marketing. St. Paul, Minnesota, 1946. 12p. processed. (Minnesota.University. Agricultural Extension Division. Extension pamphlet 145.)

7. Frischknecht, Carl. Former surplus producing area now market for poultry and eggs. U. S. Egg and Poultry Magazine, 53:21-23, 35-36, November 1947.

8. Funk, E. M. Effects of temperature and humidity on the keeping quality of shell eggs. Columbia, Missouri, 1944. 27p. (Missouri.Agricultural Experiment Station. Research bulletin 382.)

9. Funk, E. M. Wash eggs the right way. U. S. Egg and Poultry Magazine, 54:10-11, 35-36, May 1948.

10. Gish, Clarence L. Storing of Louisiana eggs. Baton Rouge, Louisiana, Louisiana State Market Commission, 1946. 10 p. mimeographed.

11. Grant, J. N. The secret of oiling eggs successfully. U. S. Egg and Poultry Magazine, 54: 10-11, 32, 34, 36, 38, April 1948.

12. Nalbandov, A. V., and L. E. Card. The problem of blood and meat spots in chicken eggs: II. Its importance in poultry flocks and a study of the nutritional factors involved. Poultry Science, 26:400-409, July 1947.

13. Newman, W. A. Problems in marketing poultry and eggs in Minnesota. Master's thesis, 1939, University of Minnesota. 97 p. ms.

14. Poultry industry data, based on USDA figures. Hatchery Tribune, 21:20, January 1947.

15. Rand McNally and Company. Rand McNally pocket maps of Colorado, 1947 edition, Chicago, 1947. 32 p. 2 maps.

16. Stewart, George F. There's a future for good dried eggs. U. S. Egg and Poultry Magazine, 54: 17-19, 28, June 1948.

17. U. S. Bureau of Agricultural Economics. Hatchery production, December 1944. Washington, 1945. 3 p. mimeographed.

18. U. S. Bureau of Agricultural Economics. Monthly egg production, 1945-46. Washington, 1947. 13 p. mimeographed.

19. U. S. Bureau of the Census. Sixteenth census of the United States: 1940; Agriculture.Livestock and livestock products, Washington, U. S. Govt. Print, Off., 1942. 126 p.

20. U. S. Bureau of the Cnesus. Sixteenth census of the United States: 1940, Agriculture, Special poultry report. Washington, U. S. Govt. Print. Off., 1942. 739 p.

21. U. S. Bureau of the Census. United States census of agriculture: 1945, vol. I, part 29, Wyoming and Colorado-Statistics for counties. U. S. Govt. Print. Off., 1946. 216 p.

22. U. S. Department of Agriculture. Agricultural statistics, 1940-1946 Washington, Govt. Print. Off., 1940-1946. 7 v.

23. Winter, Egon P. An analysis of egg marketing in eastern Colorado with special emphasis on the local market. Mater's thesis, 1943. Colorado State College, Fort Collins, Colo. 117 p. ms.

24. Wyman, D. E., A study of county egg prices within Minnesota and in comparison with large Eastern markets. Master's thesis, 1940. University of Minnesota. 68 p. ms.