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The Cost of Producing Eggs and the Egg Feed Ratio in Utah 1929-'46

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THE COST OF PRODUCING EGGS

AND THE EGG FEED RATIO IN UTAH 1929-'46

By

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INTRODUCTION

Commercial egg production in Utah has developed largely since 1920. Prior to that time most farms had some chickens but the eggs were either used at home or consumed on the local markets. What few commercial poultry farms there were also supplied local markets. It has been estimated that the total egg production in the state was just about equal to the consumption within the state. 1/ Soon after 1920 however, egg production on a commercial basis began and thereafter expanded rapidly for a time.

Egg production increased from 142 million eggs in 1924 to 341 million in 1931. During the depression years, and until 1944, production remained below the 1931 level. The improved price relationship in the recent war period encouraged greater production. In 1945, Utah reached an all time high in producing 438 million eggs. This represents an increase of 208 percent from 1924 to 1945.

Income from the sale of eggs during the same period increased 464 percent or from $2,127,000 to $12,000,000. The percent of the total cash farm income, for the state, from eggs increased from 4 percent in 1924 to 10 percent in 1946.

In 1945, Utah ranked thirty-seventh in the nation in total egg production. At that time, the income from Utah's eggs was .8 of one percent of the total national egg income. Even though Utah's egg industry is small, compared to the national egg income, it still is important in the economy

1/ Thomas, W. P. and Marion Clawson, Economic factors affecting poultry production in Utah, Utah Agri. Exp. Sta. Bulletin 244, November 1933.

of the state (for additional comparisons see Appendix, table 1).

Utah has a definitely established egg industry which has occupied and in all probability will continue to occupy an important place in the agricultural economy of the state.

OBJECTIVE

The primary purpose of this study is to determine the average cost of producing eggs and the egg-feed ratio on commercial farms in Utah for each year since 1929. In addition, the trends and variation in the factors influencing total costs will be analyzed, as will the net returns from commercial egg production. The intent is to make the study representative of the entire industry of the state rather than for any particular geographic section.

SOURCE OF DATA AND METHOD OF PROCEDURE

The basic information for this study has been derived largely from secondary sources. Most important are two economic studies of the poultry industry in Utah that have been made by the Utah Agricultural Experiment Station. The first of these covered the period 1929-1931. The published report 2/ contains the detailed itemized money costs of producing eggs, and also the physical quantities of each kind of feed consumed per hen, hours of man labor required per hen, number of eggs produced per hen and the percent mortality of the laying flocks for each year. These data have been used almost entirely in this study for the years 1929, 1930, and 1931. In addition, it has served as a bench mark in determining the cost for the following years.

The second of the economic studies covered the year 1946 and resulted in detailed and itemized costs for that year similar to the previous study. 3/

2/ Ibid

3/ Unpublished data, Dept. of Agri. Econ., Utah Agri. Exp. Sta.

The 1946 costs and returns as reported herein were obtained from that study. The data obtained from the 1946 study also formed a second bench mark in determining the costs for the years 1932 to 1945. An important consideration in the 1946 study was an attempt to discover and measure any changes that may have occurred since 1931 in the amount of labor required per hen, physical quantities of feed fed per hen, composition of the poultry ration, percent mortality of the laying flock, egg production per hen and any other changes in physical costs that may have an economic effect on egg production in Utah.

These two studies, one at the beginning, the other at the end of the period, provide the major framework of reference for calculating the costs for the intervening years. The physical data, such as amount of feed fed per hen, death losses, egg production per hen, and the labor requirements, were assumed not to fluctuate widely from year to year. It has been recognized, however, that these factors do not all remain constant but that some, such as feed requirements and egg production per hen respond to changes in price relationships. The prices applied to the physical data varied from year to year. Some costs such as building costs, medicines, etc., were not subject to physical measurements. In ascertaining these costs for the years between the studies, the costs, as revealed by the studies, were used as guides and adjusted on the basis of changes in the price level of such items.

Data pertaining to the years 1932 to 1945 were obtained from several sources, the most important of which was the reports of the Bureau of Agricultural Economics. These reports include prices of feed, eggs, and chickens sold, death losses, inventory values of hens, wage rates, and the composition of the poultry ration. Most of these were available for every year of the study. The Poultry Department of the College provided some

information on death losses, feed consumption, and production per hen for a number of years. This information was assembled from the "Utah Poultry Record-Keeping Projects" conducted by the Extension Service throughout the state from 1932 to 1941. Data on egg and feed prices were obtained from the records of the Utah Poultry and Farmers' Cooperative and from the Draper Egg Producers Association.

The costs for the years 1932 to 1945 inclusive were derived from a synthesis of all data available from whatever source including the projection of the 1929-1931 data forward and the 1946 data backward. Studies made in other states have also been used where possible as checks on the consistency of the data developed for this study.

In the assembly of these cost data the average or most prevalent size and method of organization and of management practices has been assumed. The average commercial flock would range from 1000 to 1500 hens. The data were all developed on a per hen basis and then converted to a dozen eggs basis by dividing by the dozens of eggs produced per hen. Both bases are used throughout the report.

Further and more detailed references will be made to sources of data and to methods of calculation in the various sections of the report.

COST OF PRODUCING EGGS

Inasmuch as the price for which eggs sell varies but little among producers, the differences in costs of production account for the major variations in profits. Total costs per dozen eggs vary greatly. This results from the variation in the amount of physical inputs, the prices paid for inputs and the number of eggs produced per hen. Within limits, these factors which determine costs can be controlled by the poultry operator. This section presents the detailed costs for the average poultrymen in Utah for the period 1929 to 1946. Included in costs are all the items

necessary for the production of eggs. For purposes of presentation they are grouped into five divisions, namely: feeds, labor, flock replacements, overhead, and miscellaneous. The data are given both on a hen and per dozen basis and also where possible in physical units as well as the money cost. Data for each of these divisions of costs follows.

Feed Costs

While the physical quantity of feed fed per hen remains much more consistent than money costs, it varies considerably among producers each year and the average also changes from year to year. The variations are no doubt associated with price relationships, level of egg production per hen, feeding practices and the amount wasted and consumed or destroyed by rodents. The amount fed thus represents the total physical quantity of feed acquired for consumption by the laying flock rather than the amount actually consumed.

Pounds of feed fed per hen: According to the report of Thomas and Clawson, in 1929 hens were fed an average of 76 pounds of feed each, exclusive of grits and special medicinal feeds (table 1). The 1946 study shows the poultrymen were feeding an average of 91 pounds or an increase of 20 percent. The Thomas and Clawson study lists the consumption per hen for 1930 and 1931 at 80 and 79 pounds respectively. The data from 1929 to 1931 indicates an upward trend in the amount of feed fed per hen. The 1946 study definitely suggests this trend continued upward after 1931.

The pounds of feed fed per hen for the intervening years was determined by interpolating between the 1929-1931 and the 1946 amounts fed but adjusted according to the number of eggs produced per hen as reported by the Bureau of Agricultural Economics and other sources.

The relatively high feed requirements for the recent years are corroborated by studies made in New York and Montana. Darrah, 4/ in a study for

4/ Darrah, L. B., Factors affecting incomes on commercial poultry farms 1940-1941, 1943C, Cornell Agri. Exp. Sta. Bulletin 803, November 1943.

Table 1. Pounds of selected feeds fed per hen, 1929-1946

Year	Total feed	Mash	Total scratch	Wheat	Corn	Barley	Oats
	pounds	pounds	pounds	pounds	pounds	pounds	pounds
1929	76	36.6	39.5	25.7	10.0	3.2	.6
1930	80	42.4	37.6	23.9	8.9	4.0	.8
1931	79	39.6	39.4	28.8	7.7	2.7	.2
1932	81	40.6	40.5	26.7	7.3	5.7	.8
1933	82	41.8	40.2	27.1	6.6	5.7	.8
1934	82	41.8	40.2	27.1	6.6	5.7	.8
1935	84	43.7	40.3	27.7	5.9	5.9	.8
1936	83	43.2	39.8	27.4	5.8	5.8	.8
1937	85	45.0	40.0	28.0	5.1	6.0	.9
1938	85	45.0	40.0	28.0	5.1	6.0	.9
1939	82	44.3	37.7	27.1	4.9	4.9	.8
1940	83	44.8	38.2	27.4	5.0	5.0	.8
1941	85	46.8	38.2	28.0	4.2	5.1	.9
1942	86	47.3	38.7	28.4	4.3	5.1	.9
1943	86	47.3	38.7	28.4	4.3	5.1	.9
1944	88	49.3	38.7	29.0	3.5	5.3	.9
1945	89	49.8	39.2	29.4	3.6	5.3	.9
1946	91	51.0	40.0	29.7	4.2	5.0	.8
Average	83.7	44.5	39.2	27.6	5.7	5.1	.8

1940-1941 in New York State reports feed fed per hen for light breed layers as 95 pounds per year with an average egg production of 168 eggs. In a report of a continuous record-keeping project on poultry farms since the early twenties, Halcrow 5/ from Montana State College of Agriculture states, "The farm flock which returns the highest labor income per hen is the flock in which the laying stock is fed an average of 90 to 100 pounds of feed per hen annually."

These studies indicate a higher amount of feed is being fed per hen at present than was indicated by earlier studies.

The amount of feed fed per hen from 1932 to 1940 as assumed varied from 81 to 85 pounds, but since 1940 has been above 85 pounds every year. During the war and postwar years, price relationships have been relatively favorable for egg production and poultrymen have no doubt tried to increase production by more liberal feeding.

The physical quantities of feed fed includes all feed that is chargeable to the laying hen. It includes the amount destroyed by rodents and the amount otherwise wasted in storage and feeding. The assumption of this study is that hens should be charged for all feed acquired for their use whether the hen consumes it or not.

Composition of the poultry ration: The average composition of the ration was 53 percent mash and 47 percent scratch (table 2). There has been a definite increase in the percentage of the total feed that was mash and a proportionate decrease in the scratch. These changes have not been abrupt, but have been gradual over the entier period of the study. The percent that was mash has increased from 48 percent in 1929 to 56 percent in 1946. The trend is toward more mash in the ration.

5/ Halcrow, G. H. and H. Cushman, Guides in poultry profits in Montana, Montana State College Agri. Exp. Sta. Bulletin 443, March 1947.

Table 2. Composition of the poultry ration by weight, 1929-1946

Year	Total feed	Mash	Total scratch	Wheat	Corn	Barley	Oats
	percent	percent	percent	percent	percent	percent	percent
1929	100	48	52	34	13	4	1
1930	100	53	47	30	11	5	1
1931	100	50	50	36	10	3.5	.5
1932	100	50	50	33	9	7	1
1933	100	51	49	33	8	7	1
1934	100	51	49	33	8	7	1
1935	100	52	48	33	7	7	1
1936	100	52	48	33	7	7	1
1937	100	53	47	33	6	7	1
1938	100	53	47	33	6	7	1
1939	100	54	46	33	6	6	1
1940	100	54	46	33	6	6	1
1941	100	55	45	33	5	6	1
1942	100	55	45	33	5	6	1
1943	100	55	45	33	5	6	1
1944	100	56	44	33	4	6	1
1945	100	56	44	33	4	6	1
1946	100	56	44	33	4	6	1
Average	100	53	47	33	7	6	1

The composition of the ration in 1929-1931 as reported in the Thomas and Clawson study was mash 48 percent, wheat 33 percent, corn 11 percent, barley 4 percent, and oats 1 percent of the total. The composition of the ration in 1946 was 56 percent mash, 33 percent wheat, 4 percent corn, 6 percent barley, and 1 percent oats. The Bureau of Agricultural Economics listed the composition of the poultry ration in 1943 as 51 percent mash, 6 percent commercial scratch, 33 percent wheat, 2 percent corn, 2 percent oats, and 6 percent barley. The composition of the ration as suggested by the poultry department staff for the period was essentially the same as that listed above.

In arriving at the composition of the rations for the years 1932 to 1945, suggestions of the staff members of the poultry department and the reports of the Bureau of Agricultural Economics which began January 1, 1944 were used to modify the interpolations between the data obtained from the 1929-1931 and the 1946 studies.

Wheat is the major scratch feed. This study shows that it has consistently averaged about 33 percent of the total ration. Corn, barley, and oats are minor feeds, comprising an 18 year average of 7, 6, and 1 percent respectively of the total feed consumed. There has been a definite decline in the use of corn, and a slight increase in the use of barley. The use of oats has remained constant and relatively unimportant. No doubt there has been some variation in the use of scratch grains arising from price variations but the total effect on the costs per dozen eggs would be relatively small.

The component parts of mash have fluctuated according to the relationship of feed grain prices. The important item so far as mash is concerned, is the protein content which has usually remained from 18 to 20 percent for

laying mash. In the war period, the percent protein dropped as low as 16 percent but the usual mash for this study was of higher protein content.

The average feed fed was 6.4 pounds per dozen eggs produced for the eighteen-year period. The most unfavorable period for feed fed was the depression years from 1932 to 1934 when the average consumption was 6.73 pounds per dozen eggs.

Prices of various feeds: The prices of the various feeds that were used in this study in determining the feed costs are intended to represent the prices paid by commercial poultrymen at the various feed plants or stores. Inasmuch as the Salt Lake and Utah County area contains the greatest concentrations of commercial flocks, the prices paid for feed is heavily weighted by prices in this area.

The prices of the 1929-1931 study are those prices paid by commercial poultrymen at that time. The data in the 1946 study lists the average prices paid by egg producers at this time. Data on feed prices for the whole period were obtained from the records of the Utah Poultry and Farmers' Cooperative. Feed price quotations were assembled from the records of the Draper Egg Producers Association since 1936. Additional supplemental information was obtained from the Bureau of Agricultural Economics feed quotations for Utah of all scratch grains for the entire period of the study and for laying mash since 1936. These actual price quotations provide an excellent basis for obtaining representative prices paid by Utah poultrymen for feeds. Inasmuch as the Utah Poultry and Farmers' Cooperative and the Draper Egg Producers Association handle over 65 percent of the egg business in the state, the final prices were heavily weighted by their quotations. Prices for the entire period have been built around this body of information. Due allowance has been made for the value of sacks. The prices as listed are net feed prices to the poultrymen at the plants.

The prices of poultry feed follow the general price level very closely. In every case, the lowest prices were in 1932 (table 3). The prices remained low during the early thirties and in 1938, 1939, and 1940. Since the war, prices of poultry feed increased very rapidly reaching a peak in 1946.

Cost of feed: The cost of feeding a hen depends upon the general level of feed prices, the total amount of feed fed, and the composition of the ration.

Feed costs per hen increased from $1.67 in 1929 to $3.21 in 1946 (table 4). The average cost per hen for the 18 years was $1.70 with a fluctuation from $1.01 in 1932 to $3.21 in 1946. In 12 of the 18 years the cost was less than the average. However, in about half of the years the cost was within a range of 25 cents on either side of the average. The cost of mash fod averaged 57 percent of the total cost of feed, and ranged from 51 to 60 percent of the feed value per hen per year.

Feed costs per dozen eggs increased from 11.6 cents per dozen in 1929-1931 to 23.5 cents in 1946, an increase of 103 percent. The eighteen-year average feed cost was 13 cents per dozen. The lowest cost was 8.7 cents per dozen in 1933. For the years 1931, 1932, 1938, and 1939, feed costs per dozen were less than 10 cents. Beginning with the recent war period and continuing through 1946 costs increased rapidly, reaching the highest cost of all, 23.5 cents per dozen (table 5).

If the above increases in cost per dozen are compared with increases in the costs per hen, a slight difference will be observed. This is because of the differences in the number of eggs produced per hen each year.

Table 3. Average prices paid by Utah poultrymen for one hundred pounds of selected poultry feeds, 1929-1946

Year	Mash	Wheat	Corn	Barley	Oats
	dollars	dollars	dollars	dollars	dollars
1929	2.38	1.69	2.21	1.63	1.95
1930	2.16	1.37	1.92	1.31	1.53
1931	1.65	.93	1.51	1.02	1.21
1932	1.46	.83	1.28	.91	1.16
1933	1.55	1.15	1.41	1.13	1.36
1934	1.61	1.46	1.55	1.34	1.59
1935	1.85	1.47	2.02	1.41	1.70
1936	1.82	1.67	1.93	1.47	1.29
1937	2.14	1.91	2.26	1.67	1.68
1938	1.89	1.26	1.45	1.10	1.25
1939	1.64	1.15	1.40	.99	1.24
1940	1.86	1.48	1.60	1.32	1.25
1941	1.97	1.45	1.72	1.42	1.42
1942	2.51	1.78	2.05	1.76	2.14
1943	2.50	1.93	2.42	2.18	2.43
1944	2.91	2.36	2.66	2.46	2.72
1945	3.00	2.67	2.71	2.34	2.65
1946	3.65	3.19	3.82	2.85	3.11
Average	2.12	1.65	2.00	1.57	1.76

Table 4. Cost of feeds fed per hen, 1929-1946

Year	Total feeds	Mash	Total scratch	Wheat	Corn	Barley	Oats	Misc. feed
	dollars	dollars	dollars	dollars	dollars	dollars	dollars	dollars
1929	1.67	.87	.73	.46	.22	.06		.07
1930	1.63	.94	.65	.40	.18	.06		.05
1931	1.25	.72	.50	.34	.13	.03		.03
1932	1.01	.59	.37	.22	.09	.05	.01	.05
1933	1.17	.65	.47	.31	.09	.06	.01	.05
1934	1.30	.67	.58	.40	.10	.07	.01	.05
1935	1.48	.81	.62	.41	.12	.08	.01	.05
1936	1.51	.79	.67	.46	.11	.09	.01	.05
1937	1.78	.96	.77	.53	.12	.10	.02	.05
1938	1.27	.72	.50	.35	.07	.07	.01	.05
1939	1.22	.73	.44	.31	.07	.05	.01	.05
1940	1.45	.83	.56	.40	.08	.07	.01	.06
1941	1.55	.92	.56	.41	.07	.07	.01	.07
1942	1.98	1.19	.71	.51	.09	.09	.02	.08
1943	2.05	1.18	.78	.55	.10	.11	.02	.09
1944	2.44	1.43	.91	.67	.09	.13	.02	.10
1945	2.61	1.49	1.02	.78	.10	.12	.02	.10
1946	3.21	1.86	1.25	.93	.16	.14	.02	.10
Avg.	1.70	.96	.67	.47	.11	.08	.01	.07

Table 5. Value of poultry ration required to produce one dozen eggs, 1929-1946

Year	Total	Mash	Scratch	Miscellaneous feed
	dollars	dollars	dollars	dollars
1929	.132	.069	.058	.005
1930	.119	.068	.047	.004
1931	.097	.056	.039	.002
1932	.087	.051	.032	.004
1933	.096	.053	.039	.004
1934	.103	.053	.046	.004
1935	.112	.061	.047	.004
1936	.116	.061	.051	.004
1937	.133	.072	.058	.003
1938	.095	.054	.037	.004
1939	.097	.058	.035	.004
1940	.112	.064	.043	.005
1941	.117	.070	.042	.005
1942	.148	.089	.053	.006
1943	.155	.089	.059	.007
1944	.176	.103	.066	.007
1945	.192	.110	.075	.007
1946	.235	.136	.092	.007
Average	.129	.073	.051	.005

Cost of Labor

The cost of labor was the second most important item in the cost of producing eggs. It amounted to an average of 16.8 percent of the total costs during the 18 years of the study.

From the 1929-1931 and 1946 studies, the average labor requirement was ascertained to be 1.5 man hours per hen. Unpaid family labor, operators labor, and hired labor were all included. This time includes the time of doing all the tasks directly associated with the care of the laying flock and the production of eggs and also the marketing of eggs up to the time they left the possession of the producer. Where child labor was used, it was converted to man equivalents and is included.

The cost of labor, as reported in the 1929-1931 study and the 1946 study was accepted as the basis for determining labor costs. Inasmuch as these two studies indicated there was no apparent change in the labor requirements, 1.5 hours per hen was accepted as the labor requirement for the years between 1931 and 1946. The prevailing hourly wage rate for adult labor for each year was applied to this constant to obtain the labor cost.

The prevailing hourly wage rate for each year was determined by listing the average annual farm labor wage rates compiled for Utah by the Bureau of Agricultural Economics (Appendix table 2). These rates were compared with the results of wage rate hearings held by the Extension Service in the state since 1942, and with wage rates reported in farm enterprise cost studies conducted by the Department of Agricultural Economics for various years since 1929. The Bureau of Agricultural Economics average annual wage rate per day, without board, was assumed to be most representative of the class of labor being performed. This daily rate was divided by a nine-hour day to determine the hourly wage rate. The hourly wage rate thus computed was checked with data from the other sources of information and were found to be very consistent with the reports in the studies conducted at various times during this period of years.

According to the 1929-1931 study the cost of labor amounted to 18.1 percent of the total expenses per hen as compared to 17.3 percent in 1946. The cost of labor dropped to as low as 30 cents per hen in 1933. From 1941 to 1946 labor costs increased rapidly and by 1946 were the highest for the study at $.94 per hen. In comparing the cost of labor year by year, there is an extremely wide variation, but when reduced to a percent of the total expenses, the ratio of cost of labor to total expense is relatively constant.

When the expense of labor was expressed as a cost per dozen eggs, the average for the study was $.041 per dozen with a fluctuation from $.025 in 1933 to $.069 in 1946.

Flock Depreciation

The third major item of total expenses is flock depreciation. For the 18 years covered by this study it amounted to 15.6 percent of the total average expense per hen.

Depreciation arises from three sources: 1. that which results from death loss of hens, 2. that which arises from selling cull hens for lower prices than their inventory value, and 3. the decline in value of hens kept over.

In order to ascertain the depreciation for each year the following procedure was adopted:

Depreciation per hen was computed on a year basis. Inasmuch as it is customary for egg producers to add pullets to the laying flock in the fall of each year, the year for calculating depreciation per hen was set from one September to the following September.

A flock of 1000 hens at the beginning of each year was assumed. This flock was assumed to consist of 60 percent pullets and 40 percent hens for every year. This means that each year, layers died or were culled down to

a point where the carry-over was 40 percent of the beginning number. The percent death loss for each year based on the number on hand January 1, as reported by the Bureau of Agricultural Economics for Utah, was applied to the beginning inventory numbers. The number of deaths thus obtained were distributed throughout the year. The basis for this distribution was arrived at by carefully analyzing selected records where known death loss had been recorded for the whole year. The difference between the number which were calculated to have died and 60 percent of beginning inventory numbers were assumed to have been culled and sold or eaten during the year. Those culled were distributed through the year in a manner similar to the distribution of the death losses.

In order to determine the cost of depreciation, values were assigned to all the layers on hand at the beginning of the year, end of year values were placed on the layers held over, and a value for cull hens at time of sale (table 6). Inasmuch as the beginning inventory number of hens was heavily weighted by pullets, and also because pullets are normally worth more at the time they are added to the flock than they are after they have laid for a fourth of the year when egg prices are usually highest, the value per layer at beginning inventory was placed 20 percent above the average inventory value as reported by the Bureau of Agricultural Economics for Utah.

The end of the year value of the layers held over was placed at the average inventory value as reported by the Bureau of Agricultural Economics for Utah.

Cull hens were assumed to weigh 3½ pounds each. The value assigned cull hens was the yearly average price per pound paid for chickens as reported each year by the Bureau of Agricultural Economics times the estimated weight of 3½ pounds (Appendix table 3).

Table 6. Data used in calculating depreciation per hen, 1929-1946

Year	Beginning inventory value of layers	Value of culled hens 1/	Closing inventory value of layers 2/	Percent death loss of layers 3/	Percent of layers culled	Percent of layers carried over	Depreciation per hen 4/
	dollars	dollars	dollars	percent	percent	percent	dollars
1929	.97	.63	.81	17	43	40	.53
1930	1.04	.57	.87	21	39	40	.79
1931	.84	.44	.70	22	38	40	.62
1932	.64	.37	.58	20	40	40	.36
1933	.55	.31	.46	20	40	40	.31
1934	.53	.32	.44	18	42	40	.28
1935	.56	.43	.47	20	40	40	.26
1936	.86	.45	.72	20	40	40	.50
1937	.79	.44	.68	19	41	40	.45
1938	.73	.43	.61	20	40	40	.40
1939	.82	.42	.68	21	39	40	.50
1940	.76	.38	.63	18	42	40	.45
1941	.76	.48	.63	20	40	40	.41
1942	.94	.58	.78	20	40	40	.51
1943	1.12	.63	.93	22	38	40	.56
1944	1.32	.82	1.10	20	40	40	.71
1945	1.32	.93	1.10	20	40	40	.65
1946	1.39	.98	1.16	20	40	40	.68
Avg.	.89	.54	.74	20	40	40	.50

1/ Average B.A.E. price for meat chickens times 3½ pounds.
2/ Inventory value of chickens on hand January 1, B.A.E.
3/ Percent death loss of number of hand January 1, B.A.E.
4/ 1929-30-31 depreciation values are taken from Thomas and Clawson study.

Depreciation for the assumed flock was calculated by subtracting from the beginning inventory value, the value of cull hens and the value of hens hens held over at the end of the year. Depreciation per hen was the quotient resulting from dividing the average number of hens into the depreciation per flock.

The average number of hens was computed by setting up 13 monthly inventories. These inventories were totaled and divided by 13 to give the average number of hens during the year. The average number of hens was 775 for the eighteen year assumed average. Inasmuch as the assumed flock was always reduced to 400 hens by the thirteenth inventory, there was not too much fluctuation from this average number of hens (Appendix table 4).

This method of determining depreciation is recognized as being rough, however the depreciation expense obtained in the 1946 study and the cost arrived at by the above method are identical at $.68 per hen. The depreciation per hen in the 1929-31 Thomas and Clawson report was about $.10 higher than obtained by this method. This could be the result of the rapidly declining prices during those three years. The depreciation per hen for 1929, 1930, and 1931 as reported in this study is the depreciation as reported in the Thomas and Clawson study. The depreciation per hen for the years 1932 to 1945 inclusive is the depreciation calculated by the above method.

Flock depreciation followed the general price level with the lowest cost per hen during the depression years of 1932 to 1935. From 1942 to 1946 there was a definite decrease in the proportion that depreciation was of the total cost. During these five years it dropped to an average of 14 percent of the total cost. This relatively low flock cost can be accounted for by the comparatively high cost of feed and labor and the

relatively high value of cull hens. This high value of cull hens resulted primarily from the rationing of other meats while chickens were not rationed and also from the relatively high purchasing power of the consuming public.

Overhead Costs

Overhead costs include taxes, interest and insurance on the enterprise investment and depreciation and repairs of buildings and equipment. Inasmuch as overhead charges are largely based on investment, before they could be computed, it was necessary to determine the average investment each year.

The investment in land, buildings and equipment was determined by using the 1929-31 values as one base period and the 1946 values for another base. Inasmuch as the respondents for the 1946 study had given 1940 values for land, buildings and equipment so that highly inflated war values would not distort the true picture of investment, the 1929-31 and the 1940 values were connected by applying the Bureau of Agricultural Economics yearly index of Utahs land values. The 1940 values were applied to all the succeeding years.

The investment in poultry buildings increased from $1.55 to $1.80 per hen or 16 percent from 1929 to 1946 (Table 7). This increase was due largely to the improvements in buildings. The improvement was mainly in better water facilities, feed hoppers, egg nests, etc. The increased value of buildings by reason of more built-in equipment was partially offset by lower investment in equipment.

The investment per hen in land decreased from $.41 to $.17 from 1929 to 1946. This decrease can be accounted for largely by a change in management practices which has resulted in the use of less land for

Table 7. Investment per hen, 1929-1946

Year	Land	Poultry buildings	Equipment	Chickens	Feed and supplies	Total
	dollars	dollars	dollars	dollars	dollars	dollars
1929	.41	1.55	.17	.84	.15	3.12
1930	.24	1.35	.13	.91	.19	2.82
1931	.22	1.41	.12	.81	.18	2.74
1932	.24	1.40	.12	.64	.12	2.52
1933	.15	1.40	.09	.55	.14	2.33
1934	.15	1.45	.09	.53	.15	2.37
1935	.16	1.50	.09	.56	.17	2.48
1936	.16	1.50	.09	.86	.17	2.78
1937	.16	1.60	.09	.79	.20	2.84
1938	.16	1.60	.09	.73	.14	2.72
1939	.17	1.65	.10	.82	.14	2.88
1940	.17	1.75	.10	.76	.17	2.95
1941	.17	1.75	.10	.76	.17	2.95
1942	.17	1.80	.10	.94	.22	3.23
1943	.17	1.80	.10	1.12	.23	3.42
1944	.17	1.80	.10	1.32	.27	3.66
1945	.17	1.80	.10	1.32	.28	3.67
1946	.17	1.80	.10	1.29	.34	3.70
Average	.19	1.61	.11	.86	.19	2.96

a given size flock.

The value of hens used for this purpose was the value as used for the beginning inventory value in computing flock depreciation.

The investment in feeds and supplies was computed by assuming the same quantity of feed and supplies on hand each year. The variations in prices from year to year accounts for the difference in the total investment which varied from $.12 in 1932 to $.34 in 1946.

The total investment per hen was $3.12 in 1929 and declined to $2.33 in 1933 and then increased to $3.23 in 1942 and the highest point of all $3.70 in 1946. The 1946 value is an increase of 29 percent over the 1929-31 average investment per hen. The item causing the major fluctuation in the total investment per hen was the value of the hen which fluctuated from $.53 in 1934 to $1.29 in 1946. Proportionally the fluctuation in feeds was even greater but the absolute variation was much less. The range in values of land, buildings and equipment was not great.

The average investment per hen for the 18 years of the study was $2.96. The greatest part of this investment was in buildings which represent 55 percent of the total. Other items as listed in the order of their importance are chickens 29 percent, land 6 percent, feed and supplies 6 percent and equipment 4 percent of the total.

The amount of overhead charges were determined as follows:

Taxes:- The 1929-31 and the 1946 studies both indicated that taxes amounted to $.04 per hen. This amount was used for every year.

Interest:- Interest was charged on the total investment at the rate of 5 percent per annum.

Cost of buildings and equipment:- A comparison of the depreciation and repair on buildings and equipment for 1929-31 and 1946 show an increase of $.02 in the cost per hen per year. Inasmuch as in each period the

cost amounted to approximately 5 percent of the value of buildings and equipment, such a rate was applied for every year. This rate has also been verified in other studies.

Total Overhead Costs:- The summation of the charges made for interest, taxes, depreciation and repairs of buildings and equipment was the total overhead costs. The average cost of overhead for the 18 years of the study was $.28 with a fluctuation from $.24 in the depression period to $.32 in 1944, 1945 and 1946. Overhead charges have followed the general price level from $.31 in 1931 to $.24 in 1932 where they remained until 1935. In 1935 overhead charges began to increase and they have risen steadily to 1946 when they are $.32 or 3 percent above the 1929 costs (Table 8).

Miscellaneous Costs

Miscellaneous expenses amounted to an average of 5.9 percent of the total expenses per hen for the 18 years of the study. These expenses include all expenses not included under feed, labor, flock depreciation, and overhead costs. Included are such items as litter, lights, hauling eggs, auto and truck expense, telephone, veterinary assistance, medicine and disinfectants, fillers and flats, etc.

The miscellaneous expenses as reported in the 1929-31 study and the 1946 study were used as the basis for determining the miscellaneous expenses from 1929-31 to 1946, these items were left relatively constant. The cost of litter was adjusted to make it conform with the general price level inasmuch as it is ordinarily a by-product of agricultural production.

The greatest change and most important factor in the latter years was that of other miscellaneous expenses. These costs remained essentially

Table 8. Overhead costs per hen, 1929-1946

Year	Interest on investment	Taxes	Cost of bldgs. and equip. 1/	Total
	cents	cents	cents	cents
1929-31	16	4	8	28
1932	13	4	8	25
1933	12	4	8	24
1934	12	4	8	24
1935	12	4	8	24
1936	14	4	8	26
1937	14	4	8	26
1938	14	4	8	26
1939	14	4	9	27
1940	15	4	9	28
1941	15	4	9	28
1942	16	4	10	30
1943	17	4	10	31
1944	18	4	10	32
1945	18	4	10	32
1946	18	4	10	32

1/ Includes insurance, repairs, and depreciation on buildings and equipment at 5 percent of value.

constant until 1940. At that time some of the egg marketing agencies began to charge for fillers and flats. This item cost $.06 per hen in the 1946 study. The organizations charging for fillers and flats were marketing about 50 percent of the commercial eggs in the state, therefore this charge was applied from the time they began to charge the producers for them. Veterinary expense, medicines and other items for disease and insect control have also increased since 1940. These trends have been checked with members of the Poultry Department staff and also field men of poultry marketing organizations.

The average miscellaneous expense for the 18 years was $.195 with a fluctuation from $.14 in the depression period of 1932-1934 to $.28 in 1946 (Table 9).

Total Gross Expense

Total gross expense is the summation of the total cost of feed, labor, flock replacement, overhead and miscellaneous expenses. These include all the costs of producing eggs.

The total expenses per hen increased from $3.35 in 1929 to $5.43 in 1946 (Table 10). Even though total expenses fluctuated and followed the general price level, the overall trend has been toward increased costs. This trend is largely accounted for by the increased amount of feed fed per hen, though there was also some increase in miscellaneous expenses. However if all expenses were adjusted for changes in the general price level most of the increase would be eliminated.

While the average expense was $3.21 for the 18 years, there were 11 years when the cost was less than average. The years from 1941 to 1946 had an average expense of $4.48 which heavily weights the average. Expenses decreased rapidly with the declining price level from 1929 to 1933. From 1933 to 1937 there was a gradual rise in the total expenses

Table 9. Miscellaneous costs per hen, 1929-1946

Year	Litter	Light	Hauling eggs	Auto charge per lay. hen	All other	Total misc.
	cents	cents	cents	cents	cents	cents
1929	4	1	2	6	3	16
1930	5	1	2	5	3	16
1931	5	1	2	5	3	16
1932	3	1	2	5	3	14
1933	3	1	2	5	3	14
1934	3	1	2	5	3	14
1935	4	1	2	5	3	15
1936	4	1	2	5	3	15
1937	5	1	2	5	3	16
1938	5	1	2	5	3	16
1939	5	1	2	5	4	17
1940	6	2	2	5	6	21
1941	6	2	2	5	11	26
1942	6	2	2	5	11	26
1943	6	2	2	5	12	27
1944	6	2	2	5	12	27
1945	6	2	2	5	12	27
1946	6	2	2	5	13	28

Table 10. Total expenses per hen, 1929-1946

Year	Feed	Labor	Flock replacement	Overhead	Miscellaneous	Total costs
	dollars	dollars	dollars	dollars	dollars	dollars
1929	1.67	.68	.53	.31	.16	3.35
1930	1.63	.60	.79	.27	.16	3.45
1931	1.25	.46	.62	.26	.16	2.75
1932	1.01	.33	.36	.25	.14	2.09
1933	1.17	.30	.31	.24	.14	2.16
1934	1.30	.33	.28	.24	.14	2.29
1935	1.48	.36	.26	.24	.15	2.49
1936	1.51	.39	.50	.26	.15	2.81
1937	1.78	.46	.45	.26	.16	3.11
1938	1.27	.43	.40	.26	.16	2.52
1939	1.22	.42	.50	.27	.17	2.58
1940	1.45	.43	.45	.28	.21	2.82
1941	1.55	.50	.41	.28	.26	3.00
1942	1.98	.62	.51	.30	.26	3.67
1943	2.05	.76	.56	.31	.27	3.95
1944	2.44	.86	.71	.32	.27	4.60
1945	2.61	.90	.65	.32	.27	4.75
1946	3.21	.94	.68	.32	.28	5.43
Avg.	1.70	.54	.50	.28	.19	3.21

followed by a pronounced drop in 1938. This drop was due primarily to the business recession. Total costs at that time were $2.52. Since 1938 costs have steadily increased. By 1946 total expenses reached an all time high of $5.43 per hen. From 1938 to 1946 there was an increase of 115 percent in total expenses.

A breakdown of the average costs per hen shows feed costs amounting to an average of $1.70 or 53 percent, labor $.54 or 16.8 percent, flock replacement $.50 or 15.6 percent, overhead $.28 or 8.7 percent and miscellaneous $.19 or 5.9 percent of the total.

There was considerable variation in the percentage increase of individual expense items. From 1929 to 1946 feed costs increased 92 percent, labor 38 percent, flock replacement 28 percent, miscellaneous 75 percent and overhead only 3 percent. When this variation is considered as part of the total expenses, the proportional variation is reduced considerably. While this particular grouping of costs shows a considerable increase over the base period of 1929-31, the percentage increase in relation to total expense has maintained a close relationship from one year to the next (Figure 1).

Total expenses per dozen were obtained by dividing the total expenses per hen by the number of dozen eggs produced per hen. The average expense per dozen was $.244 for the eighteen years of the study. Expenses per dozen fluctuated from a low of $.177 in 1933 to $.398 in 1946. The analysis of individual items of total expenses are essentially the same as on a per hen basis. Some slight variation exists from year to year because of the difference in the total number of eggs produced.

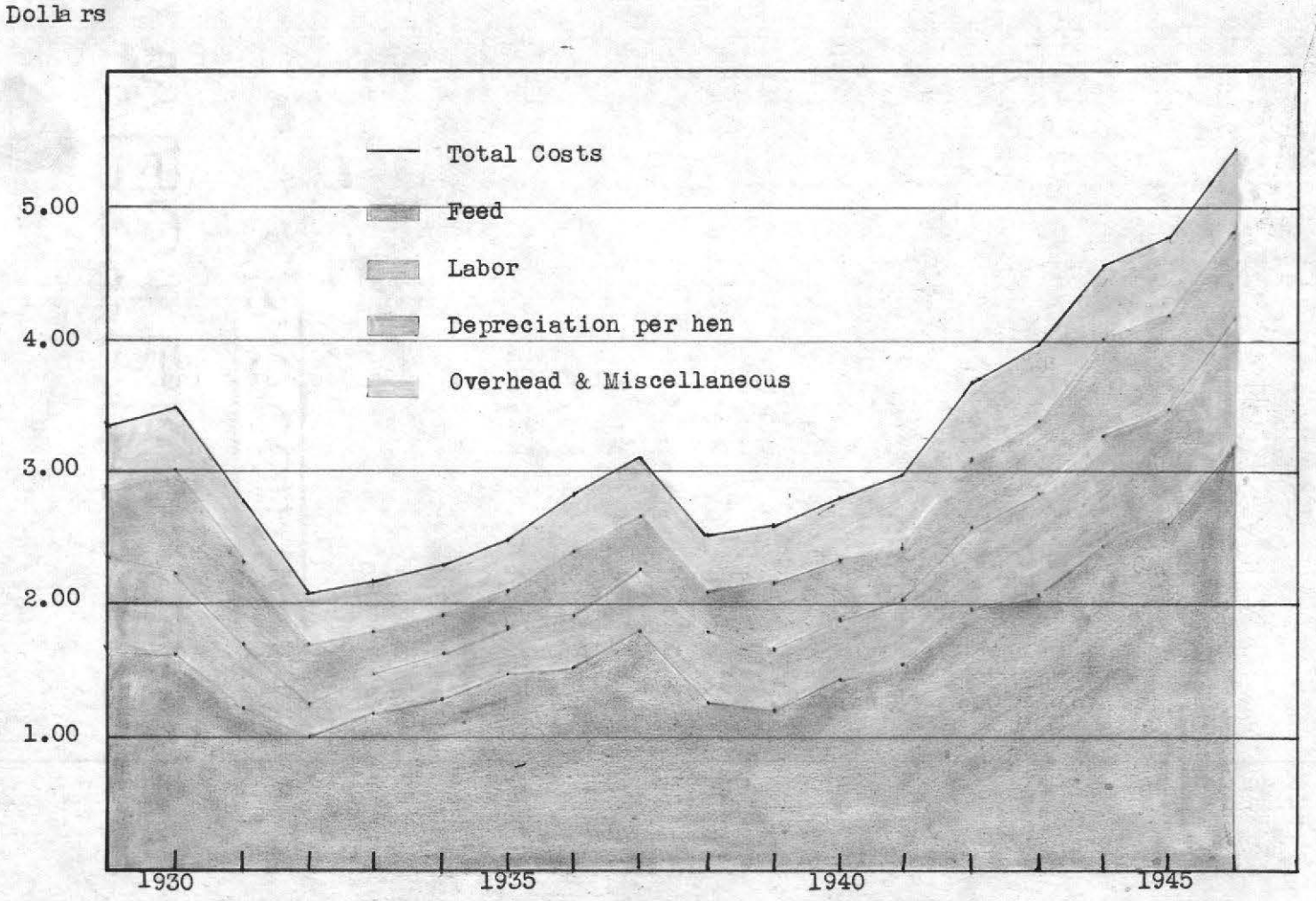

FIGURE 1. TOTAL EXPENSES PER HEN, UTAH, 1929-1946

RECEIPTS

Receipts per hen are determined by three factors: 1. The number of eggs produced, 2. the price received per dozen eggs, and 3. miscellaneous receipts.

Production per hen

Production per hen was computed on the basis of the average number of hens on hand during the year. Egg production per hen was determined by using the data on production per hen from the 1929-31 and the 1946 studies, date compiled by the Bureau of Agricultural Economics and the Poultry Department records of commercial flocks throughout the state.

The production per hen as reported by the Thomas and Clawson study in 1929-31 was used as the production for those years. The production as reported in the 1946 study was accepted for 1946. The production per hen for the average number of layers during the year, as reported by the Bureau of Agricultural Economics, from 1940 to 1945 inclusive have been used as the production per hen for those years.

The egg production per hen for the years 1932 to 1939 inclusive was determined by multiplying the production per hen based on the number of hens on hand January 1 of each year, as reported by the Bureau of Agricultural Economics, by an index of 120. For the year 1932 this was modified somewhat in order to make it conform to the trend of production as indicated by the Poultry Department records.

The index of 120 was determined as follows: The average production, as reported by Thomas and Clawson in the 1929-31 report and the 1946 study, was based on production per hen for the average number of hens on hand during the year. One series of egg production per hen from 1940 to 1945, as reported by the Bureau of Agricultural Economics, was also based on the average number of hens. The Bureau of Agricultural Economics has

reported a second series on production per hen based on the number of hens on hand January 1 for each year of this study. A comparison of the average number of eggs produced per hen based on the beginning inventory number of hens with the number of eggs produced per hen based on the average number of hens during the year gives a ratio for the 1929-31 period of 120.2, and for the 1940-46 period 120.4. Therefore inasmuch as the ratios were practically identical, they were applied to the Bureau of Agricultural Economics number of eggs produced per hen based on the number of hens on hand January 1 for the years 1932 to 1939 to convert this series to production per hen based on the average number of hens.

The average production per hen was 157 eggs, or 13.08 dozen for the 18 years of the study (Table 11). There was a variation from a low of 140 eggs in 1932 to a high of 166 eggs in 1944.

Receipts for eggs

The average price received per dozen eggs by the producers was obtained from three sources; namely, 1. Average prices paid each year by the Utah Poultry Producers Association, 2. Average prices paid by Draper Egg Producers Association each year since their organization in 1933, and 3. Average prices received by the producers for eggs each year as reported by the Bureau of Agricultural Economics. These three series of prices were very nearly the same for every year, and also very close to the average prices reported in the 1929-31 and 1946 studies.

The average price received per dozen eggs fluctuated from $.16 in 1932 to $.43 in 1946 (Table 11). Receipts per hen fluctuated from $1.87 in 1932 to $5.87 in 1946. The 18 year average gross receipts were 26.6 cents per dozen or $3.48 per hen.

Table 11. Number, price, and value of eggs produced per hen, 1929-1946

Year	Number of eggs per hen	Number of dozen per hen	Price per dozen	Value per hen
	number	number	cents	dollars
1929	152	12.67	30	3.77
1930	165	13.75	29	3.99
1931	154	12.83	20	2.53
1932	140	11.67	16	1.87
1933	146	12.17	16	1.95
1934	151	12.58	18	2.26
1935	159	13.25	24	3.18
1936	156	13.00	22	2.86
1937	160	13.33	22	2.93
1938	160	13.33	23	3.07
1939	151	12.58	20	2.52
1940	155	12.92	19	2.45
1941	159	13.25	25	3.31
1942	161	13.42	33	4.43
1943	159	13.25	40	5.30
1944	166	13.83	37	5.12
1945	163	13.58	42	5.70
1946	164	13.64	43	5.87
Average	157	13.1	26.6	3.50

Receipts as shown in this study are the net receipts to the producer for eggs delivered at the plant.

Miscellaneous receipts

Of minor importance in the receipts per hen is the value of the litter and manure. This value represents only 1 percent of the total receipts per hen. Miscellaneous receipts are accounted for as an offset against gross costs in computing net cost of producing eggs and net returns.

NET COST OF PRODUCING EGGS

The average net cost of producing eggs was determined by subtracting miscellaneous receipts from gross costs. Gross costs included all charges for feed, labor, flock replacement, overhead, and miscellaneous expenses. Miscellaneous receipts is a credit for the value of the litter and manure produced. Inasmuch as gross costs result in the production of values in addition to eggs andsince the costs are joint and cannot be divided and also since the other values are very small, the values produced other than eggs are subtracted from the gross costs in order to obtain the cost of producing the eggs.

The average net cost of producing eggs for the eighteen years of the study was $.242 per dozen eggs. There were 11 years when the cost was less than average. The years from 1941 to 1946 had an average cost of $.326 per dozen eggs, which heavily weights the average. Expenses decreased rapidly with the declining price level from 1929 to 1933. From 1933 to 1937 there was a gradual rise in the net cost from $.176 per dozen to $.231. In 1938 there was a pronounced drop in costs to $.186 per dozen which was due primarily to the business recession. Since 1938 costs have

steadily increased. By 1946 the total cost of producing eggs reached an all time high of $.394 per dozen (Table 12).

A breakdown of the average cost of producing a dozen eggs for the 18 years of the study shows feed at $.129 or 53 percent, labor $.041 or 16.8 percent, flock replacement $.038 or 15.6 percent, overhead $.021 or 8.6 percent and miscellaneous $.015 or 6 percent of the gross cost of producing a dozen eggs (Table 13). This makes a total gross cost of $.244 which must have an offset of $.002 deducted for miscellaneous receipts to give a net cost of producing eggs $.242 per dozen. There is a slight variation in these percentage figures as compared to the per hen expenses because of the variation in egg production from year to year.

NET RETURNS

The net returns per hen are the returns after all expenses, including the value of the operators time and unpaid family labor are subtracted from total receipts. In determining net returns for the study, two steps were taken: 1. Miscellaneous receipts were subtracted from gross costs. The residual represents net cost of producing eggs. 2. Net costs were then deducted from receipts from eggs. The remainder is net returns or profit, or loss per hen. This calculation gives credit to the hen for the miscellaneous value she produces as well as the value of the eggs she produced (Table 14) (Figure 2).

An analysis of the net returns for egg production indicates there was much more profit per hen when feed and labor costs were high. This study consistently shows profits above average during the years when feed prices were high, with the exception of 1937. Every year when labor cost in excess of $.50 per hen, there was also a profit. In 7 of the 10 years when labor

Table 12. Net costs of producing eggs per dozen, 1929-1946

Year	Gross costs	Miscellaneous receipts	Net costs	Percent of 18-year average
	dollars	dollars	dollars	percent
1929	.264		.264	109
1930	.251		.251	104
1931	.214		.214	89
1932	.179	.002	.177	73
1933	.178	.002	.176	73
1934	.182	.002	.180	74
1935	.188	.002	.186	77
1936	.216	.002	.214	89
1937	.233	.002	.231	96
1938	.189	.003	.186	77
1939	.205	.003	.202	84
1940	.218	.003	.215	89
1941	.226	.003	.223	92
1942	.274	.004	.270	112
1943	.298	.004	.294	122
1944	.333	.004	.329	136
1945	.350	.004	.346	143
1946	.398	.004	.394	163
Average	.244	.002	.242	100

Table 13. Gross expenses of producing a dozen eggs, each year, 1929-46

Year	Feed	Labor	Flock replacement	Overhead	Miscellaneous	Total costs
	dollars	dollars	dollars	dollars	dollars	dollars
1929	.132	.064	.042	.024	.012	.264
1930	.119	.044	.057	.020	.011	.251
1931	.097	.036	.048	.020	.013	.214
1932	.087	.028	.031	.022	.012	.179
1933	.096	.025	.026	.020	.011	.178
1934	.103	.026	.023	.019	.011	.182
1935	.112	.027	.020	.018	.011	.188
1936	.116	.030	.039	.020	.011	.216
1937	.133	.034	.034	.020	.012	.253
1938	.095	.032	.030	.020	.012	.189
1939	.097	.033	.040	.021	.014	.205
1940	.112	.033	.035	.022	.016	.218
1941	.117	.038	.031	.021	.019	.226
1942	.148	.046	.038	.022	.020	.274
1943	.155	.057	.042	.024	.020	.298
1944	.177	.062	.051	.023	.020	.333
1945	.192	.066	.048	.024	.020	.350
1946	.235	.069	.050	.025	.021	.398
Avg.	.129	.041	.038	.021	.015	.244

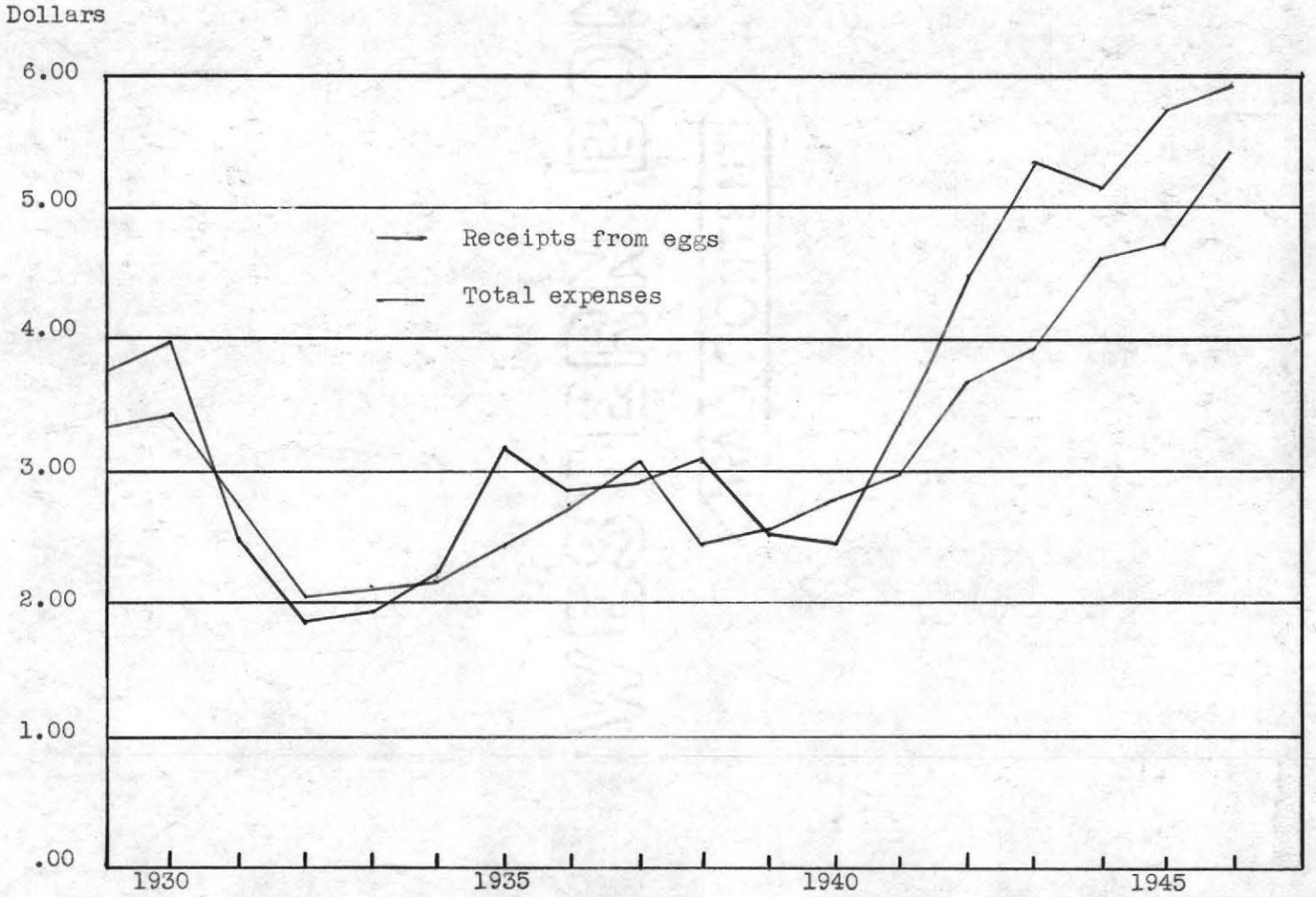

FIGURE 2. RECEIPTS FROM EGGS AND EXPENSES PER HEN PER YEAR, UTAH, 1929-1946

costs were less then $.50 per hen there were no profits.

The 18 year average net income was $.325 per hen and the range was from a loss of $.33 in 1940 to a profit of $1.40 in 1943. In the early 1930's and in 1939 and 1940 it was difficult to make any profit. The profits per hen have definitely been associated with rising agricultural prices. During the first twelve years, 1929-40, prices were either declining or were at a low level. In seven of these years there was a definite loss from egg production. Losses occurred in 1931, 1932, 1933, 1934, 1937, 1939 and 1940. In 1938 a substantial profit was made, but only because there was a drop of $.59 a hundredweight in feed costs and an increase of $.03 per dozen in the price of eggs. As the general level of prices was lower in 1938 than in 1937, the higher prices for eggs may be assumed to have resulted from the smaller supply of eggs which in turn resulted from the heavy losses sustained by poultrymen in 1937. In 1940 the poultrymen experienced their most unprofitable year of the study. From 1941 to 1946 the rising price level no doubt influenced the profits made from egg production. During this period, the costs of feed were comparatively cheap when compared to the returns for eggs. At this time feed prices tended to lag behind the general price increases for eggs. The prices paid for eggs were more in line with the general price level.

The policy to "Hold the line on costs" during the war period had a definite bearing on feed costs. The increased prices received for cull hens was a factor very much in favor of the egg producer. The general conditions at this time were extremely favorable for the producers of eggs.

Since most labor on the poultry flock is performed by the operator and his family many poultrymen are more interested in the returns above all costs exclusive of labor than in the net returns as reported above. They think of this total as the returns for labor.

The return to labor was computed by adding the cost of labor to net returns. When this was done, the study reveals there was a return for labor every year. The amount fluctuated from $.11 per hen or $.07 per hour of man labor in 1933 to $2.16 per hen, or $1.44 per hour in 1943. The average return for labor was $.867 per hen, or $.58 per hour of labor for the 18 years of the study (Figure 3).

The average net return per dozen eggs for the 18 years of the study was $.024 per dozen. The greatest loss was sustained in 1940 when poultrymen lost $.025 per dozen, and the greatest profit was in 1943 when $.106 was made above all expenses (Table 15).

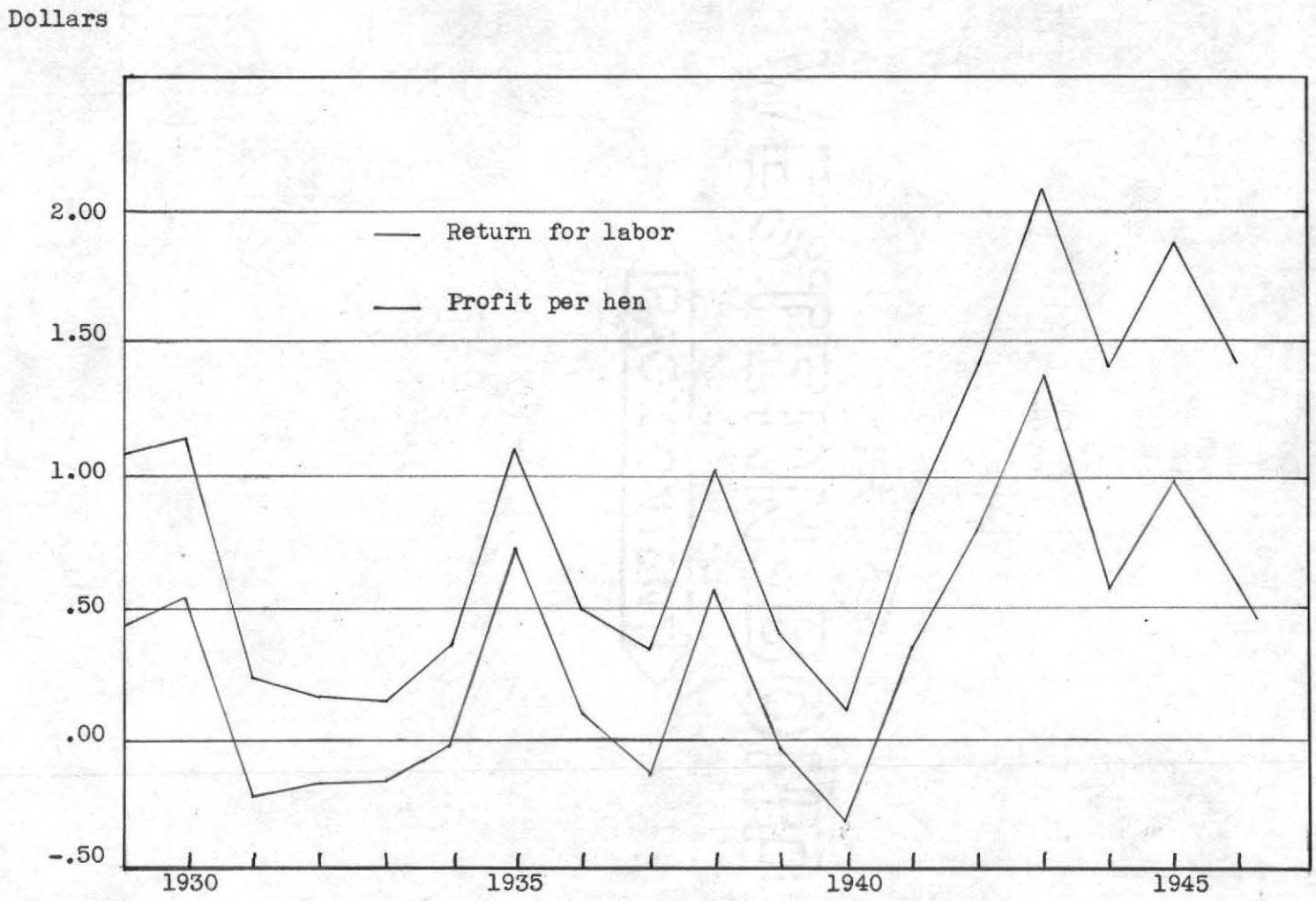

FIGURE 3. PROFIT AND RETURN FOR LABOR PER HEN PER YEAR, UTAH, 1929-1946

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Table 15. Receipts, costs, profit, and return for labor per dozen eggs 1929-1946

Year	Receipts from eggs	Net costs	Profit per dozen	Cost for labor	Return for labor
	dollars	dollars	dollars	dollars	dollars
1929	.297	.264	.033	.054	.087
1930	.290	.251	.039	.044	.083
1931	.197	.214	-.017	.036	.019
1932	.16	.177	-.017	.028	.011
1933	.16	.176	-.016	.025	.009
1934	.179	.180	-.001	.026	.025
1935	.24	.186	.054	.027	.081
1936	.22	.214	.006	.030	.036
1937	.22	.231	-.011	.034	.023
1938	.23	.186	.044	.032	.076
1939	.20	.202	-.002	.033	.032
1940	.19	.215	-.025	.033	.008
1941	.25	.223	.026	.038	.064
1942	.33	.270	.060	.046	.106
1943	.40	.294	.106	.057	.163
1944	.37	.329	.041	.062	.103
1945	.42	.346	.074	.066	.140
1946	.43	.394	.035	.069	.104

EGG-FEED RATIO

The profits made from egg production depend entirely on the ralationship between the costs of producing eggs and the receipts from egg production. This study indicates there have been years when the major items of cost have been so high in relation to receipts that the average producer made no profit. Undoubtedly there has been no year when the most efficient operators did not make a profit. There were other years when producers much less efficient than the average made a profit.

The egg-feed ratio is an expression of the relationship between the price paid producers for eggs, and the price paid by producers for poultry feed. Inasmuch as feed costs ordinarily represent more than half the cost of producing eggs and the receipts for eggs represent over 95 percent of the receipts per laying hen, and since the pounds of feed fed per hen and the average number of eggs produced per hen in the state, ordinarily do not fluctuate greatly, the egg-feed ratio is an excellent indicator of the relationship of costs to receipts.

The egg-feed ratio as used in this study has been expressed in two ways: First, the number of dozen eggs required to equal in value 100 pounds of the poultry ration. Second, the pounds of the poultry ration that would equal in value one dozen eggs. These two ratios are identical, the one is an expression in pounds of feed, and the other in number of eggs (Table 16).

The most frequently used method of presenting the egg-feed ratio is to show the pounds of a given ration that one dozen eggs will buy at the prevailing price. According to this measurement, the average egg-feed ratio for the 18 years of this study was 13.2 pounds. The most unfavorable relationship was in 1937 when one dozen eggs would only buy 10.6 pounds of the ration. The most favorable ratio was in 1943 when one dozen eggs would purchase 16.8

Table 16. Egg feed ratio, Utah, 1929-1946

Year	Value of poultry ration per 100 pounds 1/	Value of eggs per dozen	Egg feed ratio: Number of dozen eggs equal in value to 100 pounds feed	Egg feed ratio: Pounds of feed equal in value to one dozen eggs
	dollars	dollars	dozen	pounds
1929	2.10	30	7.00	14.3
1930	1.98	29	6.83	14.6
1931	1.54	20	7.70	13.0
1932	1.25	16	7.81	12.8
1933	1.43	16	8.94	11.2
1934	1.59	18	8.83	11.3
1935	1.76	24	7.33	13.6
1936	1.82	22	8.27	12.1
1937	2.09	22	9.50	10.5
1938	1.49	23	6.48	15.4
1939	1.49	20	7.45	13.4
1940	1.75	19	9.21	10.9
1941	1.82	25	7.28	13.7
1942	2.30	33	6.98	14.3
1943	2.38	40	5.95	16.8
1944	2.77	37	7.49	13.4
1945	2.93	42	6.98	14.3
1946	3.54	43	8.23	12.1
Average	2.00	26.6	7.52	13.2

1/ Average components of the poultry ration: 53 percent mash, 33 percent wheat, 7 percent barley, 6 percent corn, and 1 percent oats.

pounds of feed (figure 4). The average feed requirement per dozen eggs is 6.4 pounds of feed. Any difference between the feed requirements per dozen eggs and the egg-feed ratio is available to take care of all other expenses and profits. In 1943, there was the value of 10.4 pounds of feed available for other expenses and profits as compared to the value of 4.1 pounds in 1937.

In order to determine the association between the egg-feed ratio and profits, the egg-feed ratios for the 18 years of the study were arrayed from lowest to highest. This array was then divided into three equal groups according to their rank. Some selected factors which were related to profits or losses were then tabulated for each group. These data were then summated and divided by 6 to give an average for each group. The results were as follows:

Table 17. The relation of the yearly egg-feed ratios to selected factors 1929-1946

Item	Low Group	Medium Group	High Group	Average
Egg-feed ratio	11.8	13.3	15.0	13.2
Profits per hen	$-.02	$.20	$.79	$.32
Eggs produced per hen	155	155	160	157
Price of eggs per dozen	$.25	$.24	$.33	$.266
Price of feed per cwt.	$2.04	$1.77	$2.20	$2.00
Labor cost per hour	$.32	$.32	$.44	$.362
Depreciation per hen	$.45	$.49	$.57	$.50

The group with the lowest egg-feed ratio was also the lowest in each of these factors, except the price of feed. This grouping showed a net loss of $.02 per hen for those years. The years included in this group were

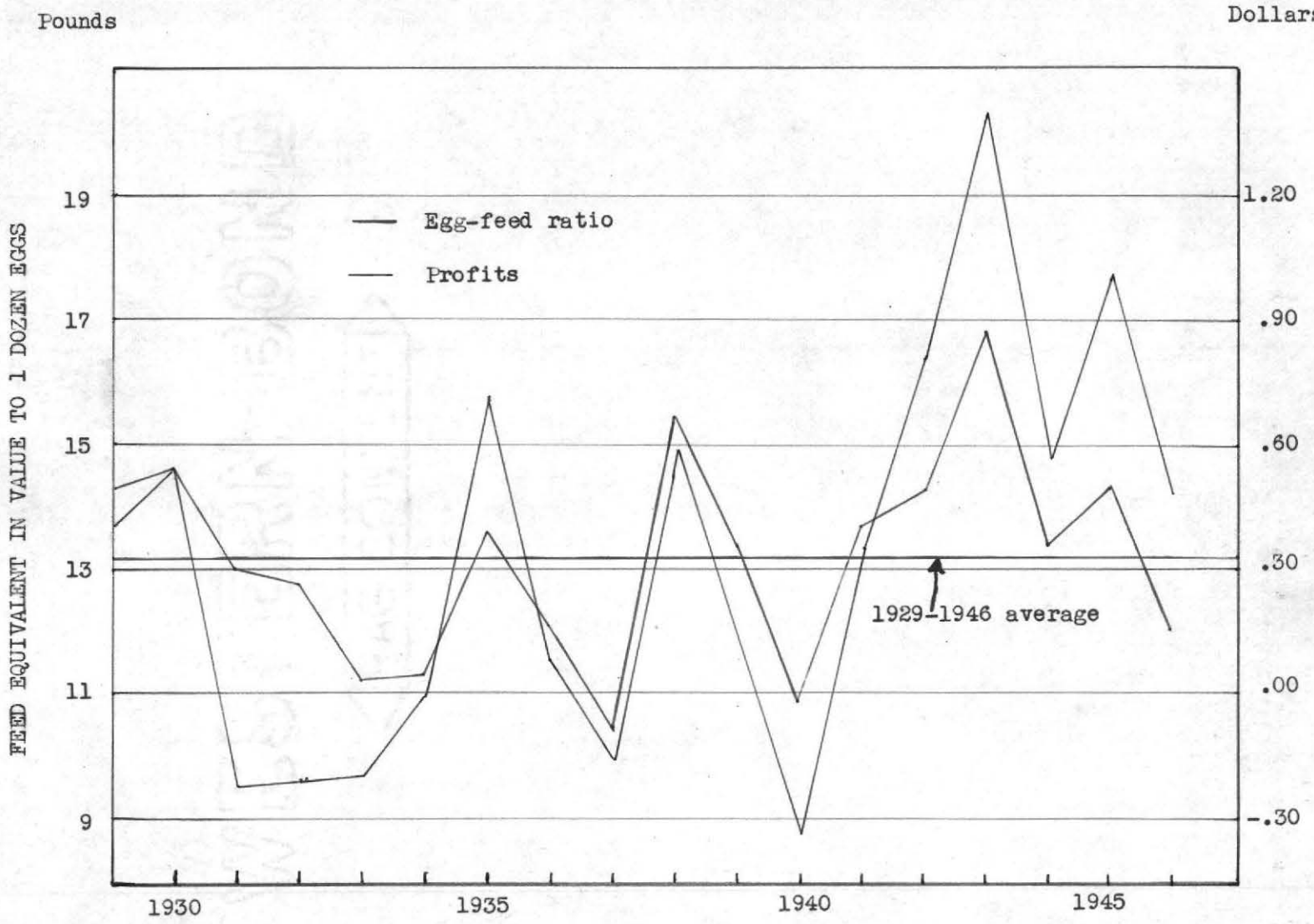

FIGURE 4. THE RELATIONSHIP OF THE EGG-FEED RATIO AND PROFITS PER HEN 1929-1946

in the depression period when the purchasing power of eggs was higher in proportion to costs than the other periods. The group with the highest egg-feed ratio had the highest average profit per hen at $.79, as well as the highest expenses for each factor. This would indicate that highest profits were made when the egg-feed ratio was highest which was when total costs of production were highest, which was of course when the price level was high. During the years when the egg-feed ratio was highest, the purchasing power of money profits was lowest, so the real profits may be decreased considerably when adjusted to the price level.

The egg-feed ratio is not to be interpreted as an infallible indicator of the profits to be had from egg production. However, over the 18-year period covered by this study, it was fairly reliable. There were 8 years when the egg-feed ratio was less than the average of 13.2. In six of these years there were losses from egg production. In the ten years in which the egg-feed ratio was more favorable than average, there was only one year in which there was a loss, and in that year, 1939, the ratio was only .2 of a pound above average. All the other years had substantial profits from egg production, ranging from $.08 to $1.40 per hen.

The chart (Figure 4) indicates there was a definite relationship between profits from eggs and the egg-feed ratio. During the depression period from 1931 to 1934 there were no profits from egg production, and during these four years, the egg-feed ratio was below average. There were profits made in 1937, and in this year the egg-feed ratio increased to above average. With the decline in the egg-feed ratio in 1936 and 1937, profits showed a corresponding precipitous drop. The low egg-feed ratio of 1940 coincided with the heaviest losses from egg production. From 1940 to 1943 there was a very rapidly rising increase in the profits made per hen, and at the same time the egg-feed ratio

rose rapidly. Since 1943, the profits and the egg-feed ratio have been on the downward trend.

There are definite limitations in the use of the egg-feed ratio. The cost of labor and flock depreciation and the production of eggs per hen and the level of feed costs may vary considerably with the same egg-feed ratio in different years. During the 18 years of the study, feed costs fluctuated from 40 percent of the total in 1931 to 59 percent in 1946. This indicates a wide variation in the relative importance of feed costs and an interpretation of egg-feed ratios based on these fluctuating prices could be misleading as to the prosperity of the egg producers in any given year.

The egg-feed ratio in 1929, 1945, and 1942 were all identical at 14.3 pounds. In each of these years there was profit made from egg production but there was $.58 greater profit per hen in 1945 than in 1929. In 1945 and 1942, when the cost of feed and the receipts from eggs were the highest, there was much more profit than in 1929.

In 1944 and 1939 the egg-feed ratio was identical at 13.4 pounds, but there was $.59 greater profit in 1944 than in 1939. This difference can largely be accounted for as follows: In 1944 labor costs were $.27 per hour more, depreciation per hen $.21 more, feed costs $1.28 more per hundredweight. To partially offset these increases, egg prices increased $.17 per dozen and there were 15 more eggs in 1944 than there were in 1939. The egg-feed ratio indicates the relationship between the value received for eggs and feed costs but does not indicate the other items listed above (Table 18).

In 1935 and 1941 there was only .1 of a pound difference in the egg-feed ratio; and the production per hen was identical. But there was $.37 more profit per hen in 1935. In 1935, the following items per hen were less than in 1941: Labor $.13, flock depreciation $.15, feed costs $.06, and the value of eggs $.13 per dozen. Still there was more profit in 1935 than in

Table 18. Relation of egg-feed ratio to selected factors, 1929-1948

Year	Egg feed ratio	Price of eggs	Price of feed per cwt.	Eggs per hen	Labor cost per hour	Depreciation per hen	Profit per hen	Wholesale price of all commodities, June 1/
	pounds	dollars	dollars	number	dollars	dollars	dollars	index
1937	10.5	.22	2.09	160	.31	.45	-.15	127
1940	10.9	.19	1.75	155	.29	.45	-.33	113
1933	11.2	.16	1.43	146	.20	.31	-.19	95
1934	11.3	.18	1.59	151	.22	.28	-.01	109
1946	12.1	.43	3.54	164	.63	.68	.48	165
1936	12.1	.22	1.82	156	.26	.50	.08	116
Avg.	11.3	.23	2.04	155	.32	.45	-.02	121
1932	12.8	.16	1.25	140	.22	.36	-.20	93
1931	13.0	.20	1.54	154	.31	.62	-.22	105
1944	13.4	.37	2.77	166	.57	.71	.57	162
1939	13.4	.20	1.49	151	.28	.50	-.02	110
1935	13.6	.24	1.76	159	.24	.26	.72	116
1941	13.7	.25	1.82	159	.33	.41	.35	127
Avg.	13.3	.24	1.77	155	.32	.48	.20	117
1929	14.3	.30	2.10	152	.45	.53	.42	139
1945	14.3	.42	2.93	163	.60	.65	1.00	155
1942	14.3	.33	2.30	161	.41	.51	.81	144
1930	14.6	.29	1.98	165	.40	.79	.54	127
1938	15.4	.23	1.49	160	.29	.40	.59	114
1943	16.8	.40	2.38	159	.51	.56	1.40	152
Avg.	15.0	.33	2.20	160	.44	.57	.79	139
18-year avg.	13.2	.266	2.00	157	.362	.50	.324	125

1/ Agricultural Outlook Charts, 1947, B.A.E. 1910-14 = 100.

1941 even though the egg-feed ratio in 1941 was the most favorable.

When prices were high, profits were made with less favorable egg-feed ratios than when the general price level was low. In relation to the average, the 1946 egg-feed ratio was unfavorable, still the egg producers made more than average profits. In 1931 and 1932, the egg-feed ratio was nearer the average and was more favorable than 1946 by .9 and .7 of a pound respectively, yet because of the low prices in these years, the profit per hen in 1946 was $.70 and $.68 more than in 1931 and 1932 respectively.

SUMMARY AND CONCLUSIONS

The basic information for this study was derived largely from secondary sources. Two studies made by the Department of Agricultural Economics, one at the beginning, the other at the end of the period, provide the major framework or reference for calculating the costs for the intervening years. The costs for the years 1929-1931 and 1946 are those data reported in the two studies. The data for the intervening years, 1932 to 1945 inclusive, were derived from a synthesis of all data available from whatever source including the projection of 1929-1931 data forward and the 1946 data backward. The physical data, such as amount of feed fed per hen, death losses, egg production per hen, and labor requirements, were assumed not to fluctuate widely from year to year. Prices applied to these data varied from year to year.

The difference in costs of producing eggs and the difference in the price of eggs account for the major variations in profits. The total costs vary because of the variation in the amount of physical inputs, the number of eggs produced per hen, but mostly because of the variation in the prices paid for the inputs.

The average amount of feed fed per hen was 83.7 pounds per year for the 18 years. It varied from 76 pounds in 1929 to 91 pounds in 1946. The trend

over the years has been to increase the amount of feed fed per hen. The average amount of feed fed per dozen eggs was 6.4 pounds and fluctuated from 5.6 pounds in 1930 to 7.0 pounds in 1932.

This study indicates the average composition of the poultry ration was 53 percent mash and 47 percent scratch. The percent mash, by weight, increased from 48 percent in 1929 to 59 percent in 1946. Scratch decreased from 52 percent in 1929 to 44 percent in 1946. The use of wheat in the scratch has remained comparatively constant at 33 percent of the total ration. There has been a definite decline in the use of corn, and an increase in the use of barley since 1929.

The prices of poultry feeds used throughout the report were the prices paid at the plant by the producer. The cost of the poultry ration increased from $1.07 in 1929 to $3.21 in 1946. The lowest cost per hen was $1.01 in 1932. The average feed cost per hen for the 18 years was $1.70 or 65 percent of the total average expense. The 18-year average feed cost was $.129 per dozen eggs with a fluctuation from $.097 per dozen in 1933 to $.235 in 1946.

In computing labor costs, the 1929 and the 1946 labor requirements which were the same, 1.6 man hours per hen per year, were used for each of the intervening years. The average cost of labor for the study was $.24 per hen or 10.3 percent of the total average expenses. The variation in cost of labor came about through the variation in rates per hour of labor. Labor costs fluctuated from $.20 per hen in 1933 to $.34 in 1946. The cost of labor per dozen eggs fluctuated from $.025 in 1933 to $.009 in 1946 and averaged $.041 for the 18 years.

The cost of flock depreciation per hen fluctuated from $.20 in 1933 to $.79 in 1932 and had an 18-year average cost of $.30 per hen.

Capital investment in the enterprise varied from $2.33 per hen in 1933 to $3.70 in 1946 and averaged $2.96 for the 18 years. The largest investment was in buildings with an average of $1.61, and in laying hens at $.89 per hen for the 18 years. The most variable item was the investment in the hen which increased from $.53 in 1934 to $1.29 in 1946.

These costs and some minor items were all needed to determine the net cost of producing eggs. To facilitate computation of the net cost of producing eggs, the value of miscellaneous receipts was subtracted from the gross cost of producing eggs. These miscellaneous receipts which fluctuated from $.002 in 1932 to $.004 per dozen eggs in 1946 came from the sale of manure and litter and were not receipts from egg production. The average net cost of producing a dozen eggs fluctuated from $.176 in 1933 to $.294 in 1946. The average cost of producing eggs for the 18 years was $.242 per dozen.

The average gross cost of producing eggs was $3.21 per hen per year for the 18 years. The cost per hen fluctuated from $2.09 in 1932 to $5.43 in 1946. A breakdown of the average cost per hen for the 18 years indicates feed was $1.70 or 53 percent, labor $.54 or 16.8 percent, flock replacement $.50 or 15.6 percent, overhead $.28 or 8.7 percent and miscellaneous expenses $.19 or 5.9 percent of the total. The average gross cost of producing a dozen eggs was $.244 per dozen for the 18 years. Costs per dozen fluctuated from a low of $.177 in 1933 to $.398 in 1946. A proportionate cost of the various items per dozen eggs for the 18 years shows feed cost $.129 or 53 percent, labor $.041 or 16.8 percent, flock replacement $.038 or 15.6 percent, overhead $.021 or 8.7 percent and miscellaneous costs $.015 or 5.9 percent of the gross cost.

The receipts as shown in this study are the net receipts to the producer for eggs delivered at the plant. The receipts per hen are determined

by the production per hen and the prices received for the eggs.

Production of eggs per hen fluctuated from 140 eggs in 1932 to 166 in 1944, the average for the 18 years was 157 eggs or 13.08 dozen. These production rates are based on the yearly average number of hens.

The average price received per dozen eggs fluctuated from $.16 in 1932 to $.43 in 1946. The average price of eggs was $.266 per dozen. These receipts are net to the producer for his eggs delivered at the plant.

The net return for the 18 years averaged $.024 per dozen eggs and fluctuated from a loss of $.025 per dozen in 1940 to a profit of $.106 in 1943. The net returns indicate that profits were highest when feed and labor costs were high. The profits per hen were above average every year when labor costs were in excess of $.50 per hen. In 7 out of 10 years when labor cost less than $.50 there were no profits. When feed prices were high, the same relationship was also observed. The profits per hen have been associated with rising agricultural prices.

Profits or net returns from egg production depend entirely on the relationship between the costs pf producing eggs and the receipts from egg production. There are various ways of measuring this relationship and of indicating the relative position of profits from the egg business at any given time; but because feed costs represent such a large part of the total cost of production, it is convenient to make use of a ratio between the price paid for eggs and the prices paid by the producers for poultry feed. This study indicates there is a definite relationship between profits from eggs and the egg-feed ratio. In 6 of the 8 years when the egg-feed ratio was less than the average of 13.2 pounds, there were losses from egg production. In 9 out of 10 years when the egg-feed ratio was above average, there were profits ranging from $.08 to $1.40 per hen from egg production.

When prices were high, greater profits were made with less favorable egg-feed ratios than when the general price level was low.

From a careful study of the cost of producing eggs and the egg-feed ratio for Utah, it may be concluded that with consistent effort and conservative managerial ability, there is definite opportunity in the egg business in the state.

APPENDIX

Table 1. Cash farm income by sources, Utah, 1924-1946 1/

Year	Total crops	Sheep	Beef cattle	Dairy	Eggs: Production	Eggs: Value	Eggs: Percent of total farm income	Total poultry	Total livestock and products	Total crops and livestock
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	million eggs	1,000 dollars	percent	1,000 dollars	1,000 dollars	1,000 dollars
1924	19,307	14,632	5,370	7,337	142	2,127	4.1	2,705	32,140	51,447
1925	25,433	15,219	4,684	7,723	157	3,007	5.1	3,696	33,071	58,504
1926	20,411	15,697	5,190	8,273	178	3,048	5.5	3,848	35,019	55,430
1927	19,944	14,620	5,246	9,499	197	3,250	5.9	4,206	35,613	55,532
1928	20,885	16,240	5,192	10,295	228	3,968	6.5	5,156	39,559	61,344
1929	19,181	14,456	7,440	12,137	269	5,573	8.9	7,883	43,533	62,714
1930	16,350	11,163	5,386	9,901	307	5,021	9.8	7,061	34,686	51,036
1931	11,246	7,530	3,719	7,727	341	4,189	11.3	5,953	25,859	37,103
1932	9,475	3,664	2,449	5,655	280	2,872	11.0	4,289	16,575	26,050
1933	9,855	6,710	2,447	5,381	255	2,610	9.1	3,769	18,854	28,709
1934	8,450	7,832	3,116	5,990	280	3,321	11.0	4,357	21,904	30,354
1935	10,318	7,294	3,192	6,690	269	4,523	13.1	5,759	24,127	34,445
1936	13,305	9,165	3,961	7,647	270	4,056	9.5	6,527	29,477	42,782
1937	13,882	12,628	4,942	8,498	320	5,029	10.2	7,286	35,500	49,382
1938	13,517	9,250	4,805	7,804	302	4,770	10.9	6,788	30,393	43,910
1939	12,207	10,078	5,618	8,203	256	3,668	8.2	6,563	32,416	44,623
1940	12,052	11,255	5,686	8,754	269	3,615	7.8	6,290	34,016	46,068
1941	16,192	13,851	7,614	11,455	280	5,021	8.3	8,648	43,981	60,173
1942	20,396	18,688	10,382	15,215	300	6,934	8.4	13,429	62,265	82,661
1943	28,984	19,711	9,462	18,349	322	9,366	9.2	17,430	72,463	101,447
1944	34,130	18,142	12,017	21,470	380	10,117	8.8	21,682	80,240	114,370
1945	35,275	18,319	12,988	21,242	438	11,639	9.7	27,626	85,701	120,976
1946	36,311	18,770 2/	13,508 2/	22,027	433	12,000 2/	9.7	28,646	87,644	123,955

1/ From reports of the Bureau of Agricultural Economics, U.S.D.A.
2/ Estimates based on 1945 ratio.

APPENDIX

Table 2. Miscellaneous data used in computing costs and values, Utah, 1929-1946

Year	Average value of all chickens 1/	Annual avg. price per lb. of chickens 1/	Percent death loss beginning inven. 1/	Index of value of ration per cwt. 2/	Index of land values 3/	Average wage rate per day 4/	Wage rate per hour 5/
	dollars	dollars	percent	index	index	dollars	dollars
1929	.81	18.1	17			2.49	.45
1930	.87	16.3	21	100	126	2.48	.40
1931	.70	12.6	22			2.12	.31
1932	.53	10.5	20	67	122	1.56	.22
1933	.46	8.8	20	76	83	1.37	.20
1934	.44	9.2	18	85	83	1.53	.22
1935	.47	12.2	20	94	84	1.76	.24
1936	.72	12.8	20	97	85	1.96	.26
1937	.66	12.5	19	112	87	2.13	.31
1938	.61	12.2	20	80	87	2.15	.29
1939	.68	12.1	21	80	89	2.14	.28
1940	.63	10.9	18	94	89	2.16	.29
1941	.63	13.6	20	97	89	2.51	.33
1942	.78	16.7	20	123	93	3.19	.41
1943	.93	23.8	22	127	100	3.82	.51
1944	1.10	23.4	20	148	112	4.33	.57
1945	1.10	26.5	20	157	121	4.62	.60
1946	1.16	23.4	20	189	127	5.14	.63

1/ Reports from Bureau of Agricultural Economics and Agricultural Statistics.
2/ 1929-31 = 100.
3/ 1912-14 = 100. Reports from Bureau of Agricultural Economics and Agricultural Statistics.
4/ From Farm Labor, Bureau of Agricultural Economics.
5/ Farm labor average wage rate per day divided by 9-hour day. 1929-31 values from Thomas and Clawson study.

APPENDIX

Table 8. Values used in the calculation of flock depreciation and depreciation per hen, 1929-1946 1/

Year	Beginning inventory	Cull hens	Hen carried over	Flock depreciation	Depreciation per hen 2/
	dollars	dollars	dollars	dollars	dollars
1929	970	271	324	375	.48
1930	1,040	222	348	470	.61
1931	840	167	280	393	.51
1932	640	148	212	280	.36
1933	550	124	184	242	.31
1934	530	134	176	220	.28
1935	560	172	188	200	.26
1936	860	180	288	392	.50
1937	790	180	264	346	.45
1938	730	172	244	314	.40
1939	820	164	272	384	.50
1940	760	160	252	348	.45
1941	760	192	252	316	.41
1942	940	232	312	396	.51
1943	1,120	316	372	433	.56
1944	1,320	328	440	552	.71
1945	1,320	372	440	508	.65
1946	1,390	392	464	534	.68

1/ Based on numbers of hens as given in Appendix Table 4 and prices as given in Table 4.

2/ Depreciation per hen = flock depreciation divided by average number of hens on hand during year.

APPENDIX

Table 4. Number of hens died, culled, and average number during the year each year, 1929-1946

Year	Beginning number	Deaths 1/	Culled 2/	Closing inventory	Average number
	number	number	number	number	number
1929	1,000	170	430	400	780
1930	1,000	210	390	400	770
1931	1,000	220	380	400	767
1932	1,000	200	400	400	777
1933	1,000	200	400	400	777
1934	1,000	180	420	400	781
1935	1,000	200	400	400	777
1936	1,000	200	400	400	777
1937	1,000	190	410	400	774
1938	1,000	200	400	400	777
1939	1,000	210	390	400	770
1940	1,000	180	420	400	781
1941	1,000	200	400	400	777
1942	1,000	200	400	400	777
1943	1,000	220	380	400	767
1944	1,000	200	400	400	777
1945	1,000	200	400	400	777
1946	1,000	200	400	400	777

1/ Percent death loss as reported by Bureau of Agricultural Economics crop reporting board and Agricultural Statistics, times beginning number.

2/ Hens culled equals the residual from 1,000 hens after subtracting death loss and number on hand for closing inventory.

APPENDIX

Table 5. Index of receipts, costs, and profits per dozen eggs each year, 1929-1946
(1929-1946 = 100)

Year	Receipts from eggs	Net cost of producing eggs	Profits from eggs	Egg feed ratio
1929	112	109	138	108
1930	109	104	164	111
1931	74	89	-71	99
1932	60	74	-76	97
1933	60	72	-63	85
1934	68	74	-4	86
1935	90	77	227	103
1936	83	89	25	92
1937	83	96	-46	80
1938	87	77	185	117
1939	75	84	-8	102
1940	71	89	-105	83
1941	94	92	109	104
1942	124	112	252	108
1943	150	122	445	127
1944	139	136	172	102
1945	158	143	310	103
1946	162	163	147	92