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A Study of Certain Economic Factors Involved in the Organization and Management of Poultry Farms in Utah

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A STUDY OF CERTAIN ECONOMIC FACTORS INVOLVED IN THE ORGANIZATION AND MANAGEMENT OF POULTRY FARMS IN UTAH

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Introduction

In the organization and management of poultry farming many problems arise which call for a solution. Among such problems are the following: The amount of floor space per hen which will prove the most economical, the value of electric lights in poultry houses, amount of labor which can be profitably invested in a poultry flock, and the amount of feed which can be economically fed to poultry.

There are many influences which determine poultry profits that cannot be controlled directly, but the factors mentioned here are largely within the control of the poultryman. He should, therefore, direct them as far as possible so as to increase his net returns.

Each hen should be provided with floor space necessary for most efficient production. The poultryman, however, does not know the amount of space that will bring the greatest returns. If the net income from each hen is just as high with two square feet of floor space per hen as where each hen has six square feet, then it is not economical to have six square feet of floor space per hen. If this is the case, it would be advisable for the poultryman to increase the size of his flock so as to obtain the fullest returns from his investment in poultry houses and equipment.

A poultry farmer should know if there are any advantages derived from the use of electric lights. If it is an advantage to use lights, the poultryman desires to know how many hours they should be used each day. If, through the use of lights, production is increased to such an extent that gross returns more than pay for wiring, cost of electricity, and other incidental expenses, lights will prove a profitable investment.

A poultryman must give time and labor to his flock in feeding, cleaning coops and gathering eggs. When this work has been efficiently done, extra time and labor is not likely to increase profits. The poultry farmer wants to know the point where increased labor fails to increase profits. This same principle applies to the amount of feed given to poultry. Up to a certain point production may be increased as the amount of feed is increased, but before this point is reached, the extra eggs may not pay for the additional feed costs. The poultry farmer should know the limits of poultry feeding which will prove profitable.

Whether or not the poultryman solves these problems determines to a considerable degree his success or failure.

This study is an attempt to point out the relationship existing between several of these factors which pertain to the organization, management, and profitableness of a poultry farm.

Source of Data

The data used in this study were obtained from 319 records of representative commercial poultry flocks in Utah. The records were taken between 1928-1931 from the following counties: Cache, Box Elder, Weber, Morgan, Summit, Davis, Utah, Salt Lake, San Pete, Juab, and Sevier. Of the 319 records, 119 were for the year 1929, 100 for the year 1930, and 100 for the year 1931. The survey method was used in obtaining these records. The records were collected as part of a study of the poultry industry in Utah in which the Utah State Experiment Station and Bureau of Agricultural Economics, U.S.D.A., cooperated. Utah Experiment Station Bulletin No. 244, "Economic Factors Affecting Poultry Production and Marketing in Utah" by W. Preston Thomas and Marion Clawson, has been published by the Experiment Station. This study is a further analysis of data contained in the records not previously covered by the bulletin mentioned.

Purpose of Study

The purpose of this study is to analyze the effect of certain poultry practices upon egg production, and to show how changes in different production and marketing practices affect costs and returns to poultrymen.

The Length of Time Poultrymen Have Been in the Poultry Business in Relation to Various Measures of Poultry Efficiency

It is generally thought that long experience in any given field promotes efficiency in that field. If this were true, one would expect poultrymen who had been in the business longest to be the most efficient. That is, they would have larger flocks, higher egg production per hen, less death loss, and a larger percentage of their eggs would be graded as extras. Furthermore, they would be expected to have a larger net income from each hen.

In order to study the relationship of these factors, the poultry farms were divided into four groups on the basis of the number of hens kept. Each size group was then subdivided on the basis of the number of years the poultryman had been in the poultry business. The size of flock groups were set up in order to eliminate the effect that the size of flock has on the efficiency of the poultryman. For example, in the Utah Experiment Station Bulletin, "Economic Factors Affecting Poultry Production and Marketing in Utah", previously mentioned, it was shown that a farm with 500 or less hens requires on the average 2.2 hours of man labor per hen while a farm with more than 1500 hens requires on the average only 1.2 hours of man labor per hen. This difference of one hour of labor per hen has a tremendous influence on the profitableness of the poultry farm.

The results show that there was a tendency for those who had been in the business for the greatest length of time to have the largest flocks (Table 1). In the two groups having the smallest flocks there were more

farms with less than 4 years experience as poultrymen than there were with more than 4 years experience. In the two groups with largest flocks the opposite condition prevailed. Furthermore, within each size group, with but one exception, the average number of hens was largest for the poultrymen who had had the most experience. This general relationship is further shown in the summary of farms operated by poultrymen who had had less than three years experience compared with those who had had more than six years experience in the poultry business (Table 3).

Table 1. Number of years poultrymen have been engaged in the poultry business in relation to various measures of poultry efficiency, 257 Utah poultry farms, 1929-1931.

Item	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Experience of Poultrymen							
	Most	Least	Most	Least	Most	Least	Most	Least
No. of Records	38	48	41	46	26	20	21	17
Avg. Exp. (Years)	7.02	2.31	11.10	3.20	8.58	3.30	6.00	2.71
Avg. No. of Hens	390	335	722	677	1,209	1,254	2,747	2,632
% Death Loss Hens	21.2	18.3	18.1	17.9	17.8	23.3	21.1	22.7
% in Extra G. Eggs	32.3	37.3	42.4	42.6	46.0	51.0	52.1	46.1
Net Income Per Hen	$-.151	$-.220	$.005	$.135	$.201	$.422	$.431	$.422

Practically no relationship was shown between per cent death loss of hens and experience of the producer (Tables 1 and 2). Poultrymen with the least experience on farms with 400 or less and 751 or more hens had the highest mortality rate among their flocks. On farms with 451 to 750 hens poultrymen with the most experience had the highest death loss (Table 2). These results are so conflicting that no conclusive answer as to the relationship of experience of producers to percentage death loss of hens can be given.

The relationship of experience to percentage of eggs in extra grade were not conclusive enough to warrant any definite answer as to the affect of experience on percentage of extras. It is significant, however, that the percentage of extras increase in succession from about 38 per cent to 48

per cent as the size of flocks increase (Table 3).

Table 2. The relationship of several measures of poultry efficiency for farms where poultrymen have had three or less years experience in comparison to farms where they have had six or more years experience, 180 Utah poultry farms, 1929-1931.

Item	Flocks of 450 Hens or Less		451-750 Hen Flocks		Flocks of 751 or More Hens	
	Years of Experience of Poultrymen					
	6 or More	3 or Less	6 or More	3 or Less	6 or More	3 or Less
No. of Records	14	42	24	22	46	32
Avg. Experience (Years)	10.14	2.29	9.67	2.59	8.52	2.41
Avg. No. of Hens	377	320	598	564	1,472	1,819
Egg Production Per Hen	156	159	156	170	150	160
% Death Loss (Hens)	15.9	18.7	18.9	14.2	17.7	23.0
% in Extra G. (Eggs)	38.7	38.0	40.8	40.4	46.5	47.7

In regard to the production of eggs per hen the tendency was for the group with the least experience as poultrymen to have the highest production. For every size group the average production per hen for the three years, 1929-1931, was highest for the group of least experience (Table 3). The difference varied from three eggs for the smallest size group to 8 eggs in the group with over 1500 hens. Although the difference was not large, the general relationship held, with but one exception, for every group for all three years. This one exception was in the small size group in which the poultrymen with more than four years poultry experience had an average production of 165 eggs per hen while those with less than four years experience had a production of only 158 eggs per hen. The same general relationship was shown for each of the three size groups divided into those poultrymen with more than six and less than three years experience (Table 2). For the groups of farms with 451-750 hens there was a variation of as many as 14 eggs in favor of poultrymen with the least poultry experience.

Table 3. Number of years poultrymen have been engaged in the poultry business in relation to egg production per hen, 257 Utah poultry farms, 1929-1931.

Years	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Experience of Poultrymen							
	Most	Least	Most	Least	Most	Least	Most	Least
	Number of Eggs Per Hen							
1929	155	160	152	163	144	159	148	155
1930	165	158	160	166	161	168	158	175
1931	150	163	144	147	149	153	155	157
Three Year Average	157	160	152	159	151	160	154	162
Avg. Experience (Yrs.)	7.02	2.31	11.10	3.20	8.38	3.30	6.00	2.71

Three possible reasons may be given for the high egg production of poultrymen with the least experience, attention to job, new and better coops, and freedom from disease among hens.

New poultrymen are generally enthusiastic over the possibilities in the poultry field, therefore, they may put more time and labor on their flocks, than poultrymen who have been in the business longest and whose interest may have lagged.

The influence of new and better coops and the amount of disease in the flocks would be reflected in the percentage death loss of hens. As has already been indicated, however, there was no relationship between years experience and the mortality rate of hens.

The fact that high production failed to bring in larger profits (Table 1) shows that extra care must have been given the flocks and the cost of this extra labor more than offset any advantage derived from increased production. It must be remembered, however, that other factors probably had a considerable influence in determining profits.

Amount of Floor Space Per Hen in Poultry Houses in Relation to a Number of Measures of Efficiency of the Poultry Business

Upon entering the poultry business poultrymen would like to know, as far as possible, the most desirable amount of floor space per hen where egg production will be at a maximum along with a low death loss and a high percentage of eggs in the extra grade.

In studying the relationship of the amount of floor space per hen to several measures of poultry efficiency, the records were first divided on the basis of the number of square feet of floor space per hen. Five different groups were set up with floor space ranging from 2.5 square feet per hen in the lowest group to 5.0 square feet or more per hen in the highest groups. Another division, based on the number of hens kept, was also made. Three different size groups were set up. The size groups were then divided into flocks with 3.1 or more to 3.0 or less square feet per hen.

The amount of floor space per hen had some influence on the percentage death loss (Tables 4 and 5). Poultry farms with the most floor space per hen, in general, had the lowest mortality rate. This fact was illustrated when the flocks were broken down into different size groups (Table 5). With no exceptions, flocks with the largest floor space had the lowest percentage death loss. The relationship was not so consistent in Table 4, but the general trend was still indicated. Although the figures show a trend, the differences between the percentages were not significant enough to justify any definite conclusion.

Table 4. The relationship of various amounts of floor space per hen to number of hens, egg production per hen, per cent death loss of hens, and percentage of extra grade eggs, 306 Utah poultry farms, 1929-1931.

Amount of floor space per hen in square feet.	No. of Farms	Avg. Space Per Hen	No. of Hens (Avg.)	Egg Production Per Hen	Death Loss	Extra Grade Eggs
	Number	Sq. Feet	Number	Number	Percent	Percent
2.5 ft. or less	40	2.06	1,201	153	20.7	41.1
2.6 - 3.3	105	2.91	1,048	160	21.0	41.8
3.4 - 4.1	77	3.72	1,034	156	17.8	43.0
4.2 - 4.9	32	4.50	890	153	17.5	44.5
5.0 or more	52	6.37	630	159	18.6	46.6

As the amount of floor space per hen increased, the percentage of extra grade eggs increased (Table 4). Although the variations between the groups were not very large it was significant that all percentages move in succession from 41.1 per cent in the lowest floor space group to 46.6 per cent in the highest group. This increased percentage may be due to the fact that a larger amount of floor space per hen makes it possible to keep cleaner coops and nests.

Table 5. The relationship of various amounts of floor space per hen to several measures of poultry efficiency, for different sized flocks, 212 Utah poultry farms, 1929-1930.

Item	Flocks of 500 Hens or Less		Flocks of 501 - 900 Hens		Flocks of 901 or More Hens	
	Floor Space Per Hen (Sq. Feet)					
	3.1 or More	3 or Less	3.1 or More	3 or Less	3.1 or More	3 or Less
Average floor space	4.84	2.54	4.56	2.55	4.31	2.54
Per cent death loss	19.3	19.7	17.8	18.0	17.5	21.8
Labor Costs	$.989	$.902	$.865	$.612	$.575	$.610
Feed Cost	$ 1.68	$ 1.57	$ 1.78	$ 1.62	$ 1.66	$ 1.60
Egg Production	159	161	162	155	158	160
Net Income per Hen	-.232	.076	.145	.348	.673	.498

Poultry farms with the most square feet of floor space had the highest feed costs (Table 5). The difference between feed costs in the floor space groups was very significant being as high as 16 cents per hen for flocks of 501 to 900 hens. In the smallest flocks, farms with the least floor space had feed costs of 11 cents per hen below farms with a larger amount of space. The difference in feed costs between floor space groups on the largest farms was only 6 cents per hen. These figures indicate quite definitely that the more floor space hens have, the higher will be the cost of feed.

Labor costs had a tendency to be higher on farms with the most space (Table 5). This relationship, however, was not entirely consistent for within the group of more than 900 hens, flocks with the least space had the highest labor costs. This relationship was reversed on flocks of less than 900 hens. It was significant that the larger flocks had the lowest labor costs. In comparing flocks of 500 or less hens to those with 900 or more hens there was a difference of around 30 cents per hen for cost of labor in favor of the larger flocks.

Very little, or practically no relationship was shown between floor space and egg production per hen (Tables 4 and 5). The division based on the size of flock showed that farms of 501 to 900 hens had the highest production where the most space per hen was provided, while farms with less than 500 and more than 900 hens had the highest production where hens had the least floor space. The division of five different floor space groups (Table 4) showed no significant relationship between egg production and floor space per hen.

Table 6. The relation of various amounts of floor space per hen to net income per hen, 306 Utah poultry farms, 1929-1931.

Year	Average Square Feet of Floor Space Per Hen				
	2.5 or Less	2.6 - 3.3	3.4 - 4.1	4.2 - 4.9	5.0 or More
	Net Income Per Hen				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	$ .306	$ .345	$ .113	$ .133	$ .026
1930	.108	.498	.173	.551*	-.258**
1931	.021	-.232	-.296	-.538	-.748
Three Year Average	.145	.204	-.003	.051	-.327
Average space (Feet)	2.06	2.91	3.72	4.50	6.37

* Three records only.
** Two records only.

Higher labor and feed costs along with no indication of a higher egg production resulted in a minus income for farmers with the largest amount of floor space per hen (Table 6). On farms of 901 or more hens, flocks with the most space did have the highest net income, 67 cents per hen, compared to an average of 50 cents per hen on farms with less floor space (Table 5). For all the other groups farms with the least space were the most profitable. The most profitable amount of floor space was between 2 and 3 square feet per hen. Farms with an average floor space of 2.06 and 2.91 square feet per hen had an average net income per hen of 14.5 and 20.4 cents respectively, while farms with 5.0 or more square feet lost on the average 32.7 cents per hen (Table 6). These figures indicate that poultry farmers should keep their coops filled to capacity.

Use of Electric Lights in Poultry Houses in Relation to Various Measures of Efficiency of the Poultry Farm

The use of electric lights in poultry houses is becoming very common. Some poultrymen are going so far as to leave lights on from sunset to sunrise.

It is thought that by using lights, egg production will be greatly stimulated, thereby increasing the poultryman's profits. The installation and use of lights, however, entails considerable expense, therefore, a poultryman, before starting to use them, should weigh carefully the possible advantages to be obtained.

In studying this particular problem, the records were first divided into three groups. These groups were based on the number of months during the year in which lights were used. Each group was then subdivided on the basis of the number of hours per day that lights were used. In order to see the advantages derived from the use of lights, those farms where lights were used were in all cases compared to farms where lights were not used.

Table 7. The use of electric lights in poultry houses, for various amounts of time, in relation to egg production per hen, feed costs per hen, and percentage death loss of hens, 219 Utah poultry farms, 1929-1931.

Item	Months Lights Were Used					
	None Used	Less than 5 Months		5 Months		More than 5 Months	
	Hours Lights Were On					
	None Used	Less Than 2.5 hr	2.5 Hours &more	Less Than 2.5 hr	2.5 Hours &more	Less Than 2.5 hr	2.5 Hours & More
Average Months	0	4.06	3.94	5.00	5.00	5.78	5.93
Average Hours	0	1.89	2.92	2.06	2.94	2.00	2.92
Production Per Hen	159	157	154	151	156	157	166
Per cent death Loss	21.0	17.1	19.2	16.8	20.3	19.0	22.0
Feed Cost Per Hen	$ 1.48	$ 1.53	$1.63	$ 1.61	$1.54	$ 1.51	$ 1.50

On poultry farms where lights were left on the greatest number of hours during the day there was a slight tendency to have the highest percentage death loss of hens (Table 7). In comparing those farms where lights were

used less than five months with farms where they were used five months or more, there was little relationship between percentage death loss and use of lights. It is significant that with but one exception poultry farms where lights were not used had a higher percentage death loss than farms where lights were used (Table 7). The two extreme cases in the use of lights in this particular comparison have a percentage death loss of 21 and 22 per cent respectively. This was a higher percentage than was found in other groups. Within the range of this data no definite conclusion as to the influence of use of lights upon percentage death loss can be drawn.

Table 8. Egg production per hen, per cent death loss of hens, net income per hen, and feed costs per hen on farms where no lights were used compared with the same factors on farms where lights were used 5 months or more and for 3 hours or more each day, 64 Utah poultry farms, 1929-1930.

	No Lights	*Lights on 5 months or more and 3 hours or more per day
Average Months	0	5.48
Average Hours	0	3.12
Production per Hen	163	168
Per cent Death Loss	20.0	22.5
Net Income Per Hen	$ .142	$ .190
Feed Cost Per Hen	$ 1.63	$ 1.70

* The cost of lighting for this group of flocks averaged 1.8 cents per hen.

Poultry farms where artificial lighting was used had slightly higher feed costs per hen than farms where no such lighting was used (Tables 7 and 8). Farms with no lighting had an average feed cost of $1.48 per hen for the three years, 1929-1931 while farms where lighting was used had feed costs ranging from $1.50 per hen up to $1.63 per hen, and in no case did they have feed costs as low as those farms where no lights were used (Table 7). This fact

was further illustrated in comparing two extreme cases such as in Table 8. For the two years, 1929-1930, there was a 7 cent additional feed cost for those who used lights in comparison to those who did not. All the figures indicate that farms where lighting was used had higher feed costs than farms where no lighting was used. The amount of time lights were used, however, had little influence on feed costs although there was a little tendency for farms where lights were used more than five months to have higher feed costs than farms where lights were used less than five months.

Poultrymen who used lights for the longest period of time had a tendency to have the highest egg production (Tables 7 and 8). The average egg production on farms with no lighting was 159 while farms where lights were used more than five months and 2.5 or more hours per day had an average production of 166 eggs (Table 7). There was no consistent relationship shown between egg production and use of lights by the intermediate groups. In general, the figures are not conclusive enough to show definitely that the use of lights increases egg production.

Table 9. The use of electric lights in poultry houses, for various lengths of time, in relation to net income per hen, 219 Utah poultry farms, 1929-1931.

Year	Used No Lights	Used lights less than five months: Less Than 2.5 hours	Used lights less than five months: 2.5 hrs. or more	Used Lights Five Months: Less than 2.5 hours	Used Lights Five Months: 2.5 hrs. or More	Used Lights More than five months: Less than 2.5 hours	Used Lights More than five months: 2.5 hrs. or more
	Number hours lights were used						
	Net Income Per Hen						
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1929	.199	.100	-.121	.108	.021	.055	.451
1930	.035	.130	.168	.067	.603	.216	.723
1931	-.251	-.232	-.413	-.680	-.357	-.361	-.282
Three Yr. Avg.	-.006	-.001	-.122	-.168	-.089	-.030	.297
Avg. Hours		1.89	2.92	2.06	2.94	2.00	2.92

There was little indication that the use of electric lights increases poultrymen's profits (Table 9). This should probably be expected in view of the fact that the use of lights increased feed costs while there was no material increase in egg production. Poultry farms where lights were used more than five months and 2.5 or more hours per day did have a net income of 30 cents per hen which was much higher than any other group. There must, however, have been some other factor influencing profits because in 1929 and 1930 the farms where lights were used more than five months and 2.5 or more hours per day had a high income compared to farms where lights were used the same number of months but fewer hours per day. So far as these figures go, no conclusive answer as to the benefits derived from the use of electric lights can be given.

The Relationship of Efficient Use of Man Labor to Profitableness of the Poultry Farm*

The cost of labor expended on a poultry farm makes up a considerable part of the total costs of egg production. Some poultrymen use a great deal of labor in caring for their flocks and have low incomes while other poultrymen spend a comparatively short amount of time and have high incomes. In the one case, the labor was inefficient, while in the other it was efficient. A poultryman's chances of success are largely dependent upon maintaining a high egg production and at the same time keeping labor costs to a minimum.

In order to study the influence of labor upon the poultrymen's profits the farms were divided into five groups. These groups were based upon the average number of hours of labor per hen that the poultryman used on his flock during the year. As has already been indicated in the first part of this study, the size of flock has a tremendous influence on labor requirements. In almost all cases as the size of flock increased, the labor expended per

* In this study the efficient users of labor were considered to be those poultrymen who used the fewer number of hours in caring for their flocks.

hen decreased. In order to eliminate the effect of the size of flocks a division into four different flock sizes was made. Each of these size groups was then subdivided on the basis of the most and least efficient users of labor.

The amount of labor used on the flock had no influence on the percentage of eggs in the extra grade (Table 10). The average percentages for the five labor groups were very close, ranging between 42.3 and 45.8 per cent. It was significant that without exception the percentages in 1930 were lower than in either 1929 or 1931. In no case did either of the latter two years have a percentage below 40 while the highest percentage reached in 1930 was 38.6. The percentages for the year 1931 were in all cases slightly higher than in 1929. With no definite relationship shown it can be conclusively stated that the amount of labor used on a flock has no influence whatever, upon the percentage of eggs in the top grade.

Table 10. The amount of man labor used on poultry farms in relation to percentage of eggs in the extra grade, 319 Utah poultry farms, 1929-1931.

Year	Man Hours Per Hen				
	1.15 or Less	1.16-1.65	1.66-2.15	2.16-2.65	2.66 or More
	Percentage in Extra Grade				
	Per cent	Per cent	Per cent	Per cent	Per cent
1929	47.7	44.4	45.6	47.6	41.5
1930	38.6	37.8	34.1	33.3	34.7
1931	51.2	46.8	47.3	48.8	54.0
Three Year Average	45.8	43.0	42.3	43.2	43.4

If poultrymen who used the most labor had a higher percentage of extras it would likely be reflected in the average price they received for their eggs. The average price per dozen which they received, however, was 25.2

cents in comparison to 26 cents for poultrymen who were most efficient in the use of their labor. It was interesting to note how the average price received per dozen eggs decreased from about 30 cents per dozen in 1929 to about 20 cents per dozen in 1931.

Table 11. The amount of man labor used on poultry farms in relation to the average value received per dozen eggs, 319 Utah poultry farms, 1929-1931.

Year	Man Hours Per Hen				
	1.15 or Less	1.16-1.65	1.66-2.15	2.16-2.65	2.66 or More
	Average Value Received Per Dozen Eggs				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	.300	.290	.290	.294	.285
1930	.282	.282	.274	.275	.276
1931	.197	.192	.190	.192	.194
Three Year Average	.260	.255	.251	.254	.252

The production of eggs per hen tended to be highest on flocks where the most labor was used (Table 12). This relationship held with but one exception. Flocks of 501 to 1000 hens had the largest production where the fewest number of hours of labor per hen was used. In the group of 500 hens or less the egg production for the least efficient users of labor averaged 164 eggs per hen while producers who used less labor on their flock had a production of 155 eggs. This is a difference of 9 eggs per hen in favor of the least efficient users of labor. For flocks of from 1001 to 1500 hens the difference in production, in favor of flocks where the least efficient use of labor was made, ran as high as 18 eggs per hen.

Table 12. The efficient use of man labor on poultry flocks of different sizes in relation to egg production per hen, 319 Utah poultry farms, 1929-1931.

Year	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Efficiency in Use of Labor							
	Least	Most	Least	Most	Least	Most	Least	Most
	Egg Production Per Hen Per Year							
1929	167	149	151	165	159	137	155	155
1930	166	159	168	159	171	156	161	169
1931	158	158	148	149	163	144	163	150
Three Year Average	164	155	156	158	164	146	160	158

Increased costs due to the extra amount of labor used on their flocks more than offset any advantage derived from a higher egg production so that in the end poultrymen who used the most labor had a lower net income than poultrymen who used less labor or who were more efficient in the use of their labor (Table 13 and Figure 1). In the division of five different labor groups, those farms where the labor was used most efficiently had, on the average, a net income of 52 cents per hen while farms where labor was used less efficiently lost on the average 48 cents per hen. With but one exception this general relationship held for each of the three years. It was significant that farms in the highest labor groups, for all three years, had a large minus income.

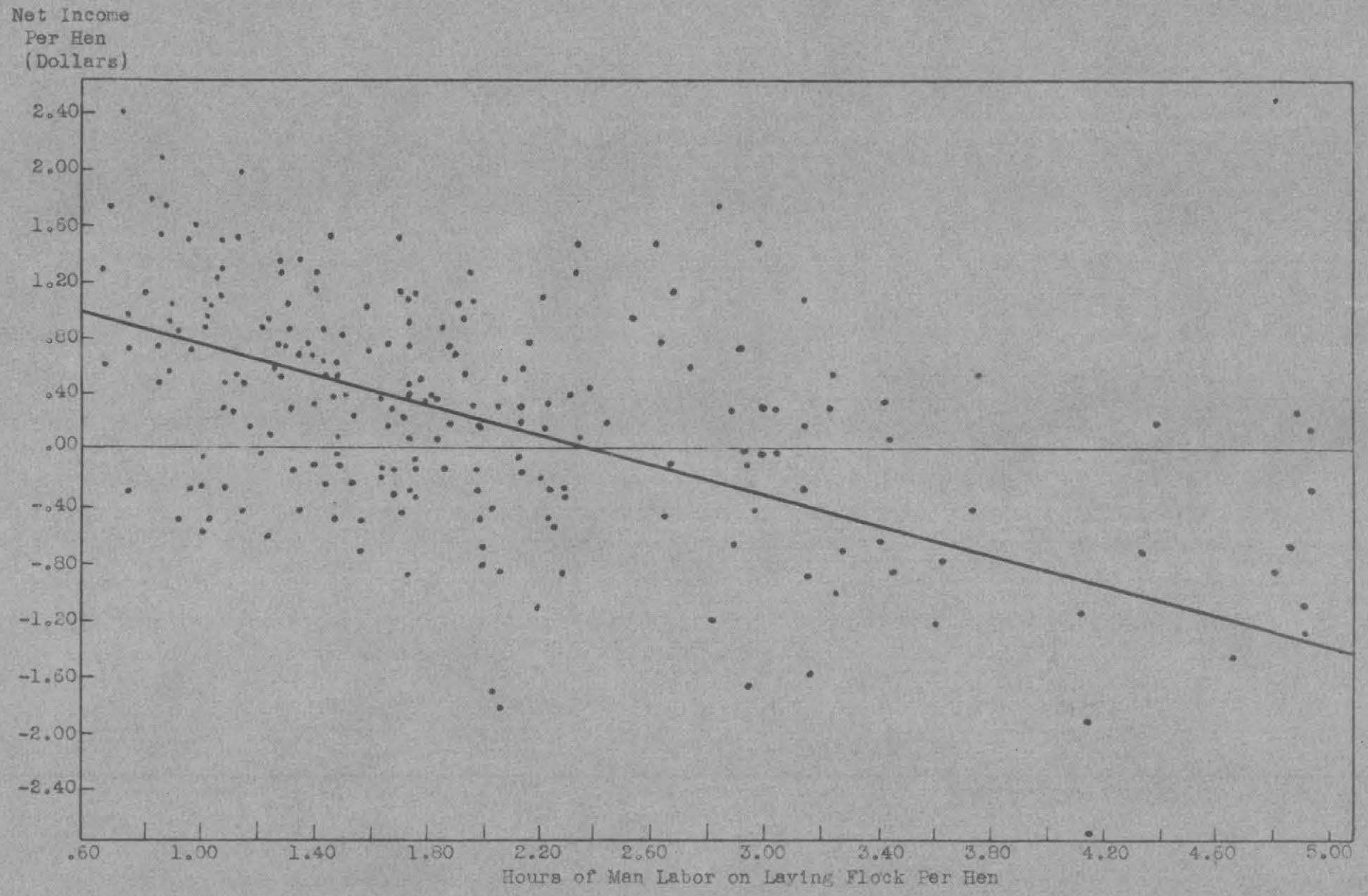

Figure 1: The Amount of Man Labor Used on The Laying Flock in Relation to Net Income Per Hen, 1929-1930

As the amount of labor used increases, the net income decreases. Each dot represents the location of an individual flock in this particular relationship.

Table 13. The amount of man labor used on poultry farms in relation to net income per hen, 319 Utah poultry farms, 1929-1931.

Year	Man Hours Per Hen				
	1.15 or Less	1.16-1.65	1.66-2.15	2.16-2.65	2.66 or More
	Net Income Per Hen				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	.932	.388	.098	.012	-.665
1930	.673	.498	.238	.142	-.129
1931	-.051	-.294	-.435	-.257*	-.649
Three Year Average	.518	.197	-.033	-.034	-.481

* 6 records only.

The most efficient users of labor on flocks of different sizes also had the highest net income per hen (Table 14). For the groups of more than 1500 hens the poultrymen who used their labor to the best advantage had an average net income of 32 cents per hen above that of poultrymen who used their labor less efficiently.

Table 14. The efficient use of man labor on poultry flocks of different sizes in relation to net income per hen, 319 Utah poultry farms, 1929-1931.

Year	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Efficiency in Use of Labor							
	Least	Most	Least	Most	Least	Most	Least	Most
	Net Income Per Hen							
	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's
1929	-.48	.01	-.37	.26	.51	.48	.36	1.02
1930	-.15	.12	.25	.34	.17	.54	.61	.97
1931	-.61	-.80	-.53	-.30	-.20	-.13	-.11	-.15
Three Year Average	-.41	-.22	-.22	-.10	.16	.30	.29	.61

Table 15. The efficient use of man labor on poultry flocks of different sizes in relation to net returns per dozen eggs, 319 Utah poultry farms, 1929-1931.

Year	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Efficiency in Use of Labor							
	Least	Most	Least	Most	Least	Most	Least	Most
	Net Returns Per Dozen Eggs							
	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's
1929	-.043	-.014	-.048	-.051	.033	.043	.026	.067
1930	-.019	.004	.017	.021	.007	.034	.039	.062
1931	-.49	-.021	-.048	-.027	-.017	-.015	-.009	-.015
Three Year Average	-.037	-.010	-.026	.015	.008	.021	.019	.038

The net returns per dozen eggs show the same general trend as was shown for net income per hen (Table 15). For flocks of more than 1500 hens the poultrymen who made the most efficient use of their labor had an average net income per dozen of 3.8 cents which was just twice as large as the 1.9 cents received by poultrymen who were less efficient in the use of their labor.

The Relation of Feed Costs Per Hen to a Number of Measures of Poultry Efficiency

The amount of feed given poultry determines to a large degree the success of poultry farmers. They would like to know to what extent they can profitably go in feeding their flocks. If they feed too little, egg production will be low and as a result, profits will be decreased. If they feed too much, they may obtain a high egg production, but the increased cost of feed may more than offset a higher income derived from the increased production.

In studying the effect of feed costs upon the profitableness of the poultry business, the farms were divided into five groups. This division was based on the average cost of feed per hen. As a result of a drop in feed costs of about 35 cents per hen between 1930 and 1931, the year 1931 did not fit into this grouping. It was, therefore excluded from this feed cost study.

A slight tendency was shown for the percentage death loss of hens to decrease as the amount of feed given poultry was increased (Table 16). The fact that so few records were found in the low feed cost group makes it difficult to make any definite comparisons. In the group of flocks with feed costs of $1.25 to $1.50 per hen, the average death loss for both years was 20.2 per cent while in the highest feed cost group, it was 14.4 per cent. This was a difference in death loss of about 6 per cent. The other figures, however, varied so greatly that there is no justification in claiming a relationship of feed costs and percentage death loss of hens.

Table 16. The relation of feed costs per hen to percentage death loss of hens, 219 Utah Poultry Farms, 1929-1930.

Year	Feed Cost Per Hen (Dollars)				
	1.25 or Less	1.26-1.50	1.51-1.75	1.76-2.00	2.01 or More
	Percentage Death Loss of Hens				
	Per cent	Per cent	Per cent	Per cent	Per cent
1929	20.5	15.8	15.7	18.5	17.0
1930	12.0*	24.5	21.2	22.2	11.8**
Two Year Average	16.3	20.2	18.5	20.4	14.4

* 2 records only.
** 5 records only.

A comparison of feed costs to all other production costs showed a tendency for other costs to increase as the amount of feed fed was increased (Table 17 and Figure 2). In 1929 the farms where the cost of feed averaged $1.26 to $1.50 per hen had total costs, other than feed, of $1.97 per hen, while farms where total costs averaged more than $2.00 per hen had total costs, other than feed, of $2.32 per hen. This was 67 cents per hen higher costs other than feed that must be born by the high feed cost group. The same general trend was shown for the year 1930. In this year all the groups with the

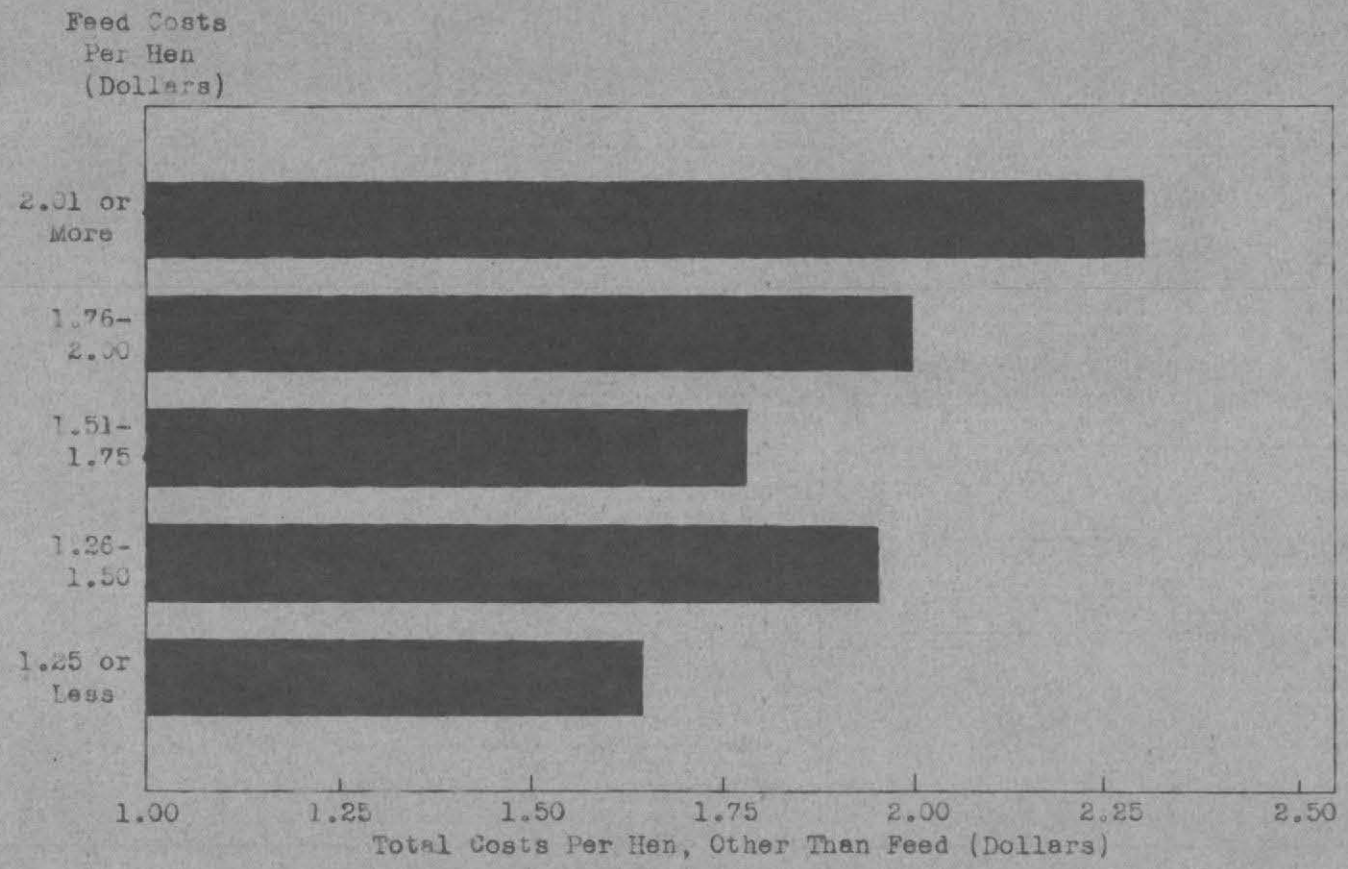

Figure 2: The Relation of Feed Costs Per Hen to All Other Costs Per Hen, 1929

As feed costs increase, there is a tendency for other costs to increase.

exception of the lowest feed cost group and the group with feed costs of $1.51 - $1.75, had costs other than feed which averaged very near $2.00 per hen and did not vary more than a few cents.

It was significant that farms with feed costs averaging $1.51 to $1.75 had a short drop in costs other than feed in comparison to the group just preceding it. This drop averaged about 18 cents per hen.

Table 17. The relation of feed costs to all other costs per hen, 219 Utah poultry farms, 1929-1930.

Year	Feed Cost Per Hen (Dollars)				
	1.25 or Less	1.26-1.50	1.51-175	1.76-2.00	2.01 or More
	Total Cost Other Than Feed				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	1.65	1.97	1.79	2.00	2.32
1930	1.79*	1.98	1.81	1.99	2.03**
Two Year Average	1.72	1.98	1.80	2.00	2.18

* 2 records only.
** 5 records only.

As feed costs increased there was a definite trend toward a higher egg production (Table 18)./ (Figure 3) In 1929 the eleven farms in the lower feed cost group had an average production of 117 eggs per hen while farmers whose feed cost was more than $2.00 per hen had an average production of 186 eggs. This was a difference of 69 eggs per hen in favor of the high feed cost group.

The average production for both years for the feed cost group of $1.26 to $1.50 was 149 eggs per hen, while for the highest feed cost group it was 186 eggs per hen.

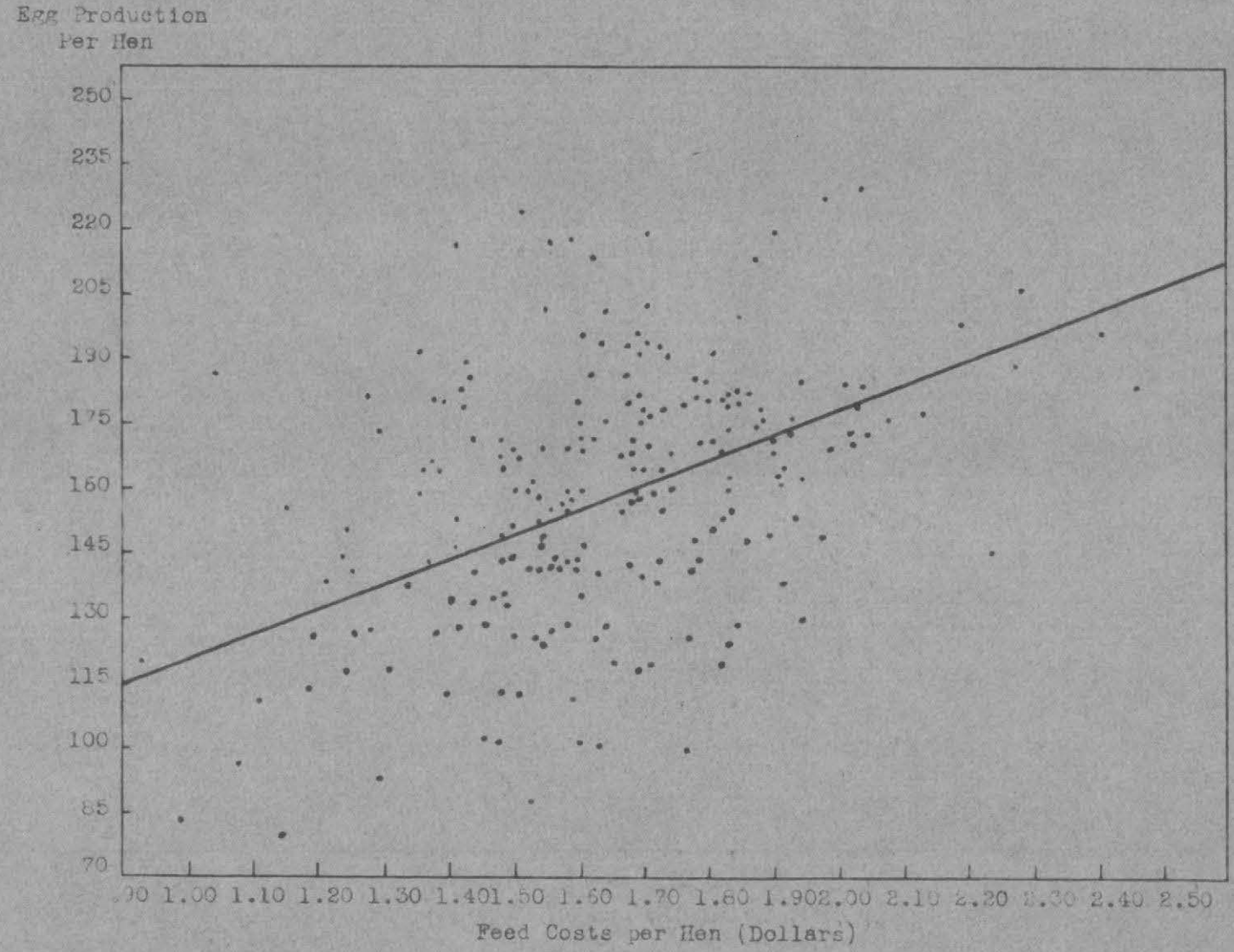

Figure 3: The Relation of Feed Costs to Egg Production Per Hen, 1929-1930.

As feed costs increase, egg production per hen increases. Each dot represents the location of an individual flock in this particular relationship.

Table 18. The Relation of feed costs per hen to egg production per hen, 219 Utah poultry farms, 1929-1930.

Year	Feed Cost Per Hen (Dollars)				
	1.25 or Less	1.26-1.50	1.51-175	1.76-2.00	2.01 or More
	Egg Production Per Hen				
1929	117	149	154	164	186
1930	168*	149	165	172n	186
Two Year Average	142	149	159	168	186

* 2 records only.

Poultry farms in the two extreme feed cost groups proved to be the least profitable (Table 19 and Figure 4). For the year 1929 the 11 farms with feed costs averaging $1.25 or less lost on the average 14 cents per hen. In this same year, farms whose feed cost was $2.00 or more per hen lost on the average 11 cents per hen. This same general trend was also indicated for the year 1930. It is significant that the farms with feed costs between $1.51 and $1.75 per hen had the highest net income per hen. As has already been indicated this group had costs other than feed of 18 cents per hen lower than the feed cost group just preceding it. This difference in costs other than feed may be one of the main factors influencing the profitableness of this group of farms.

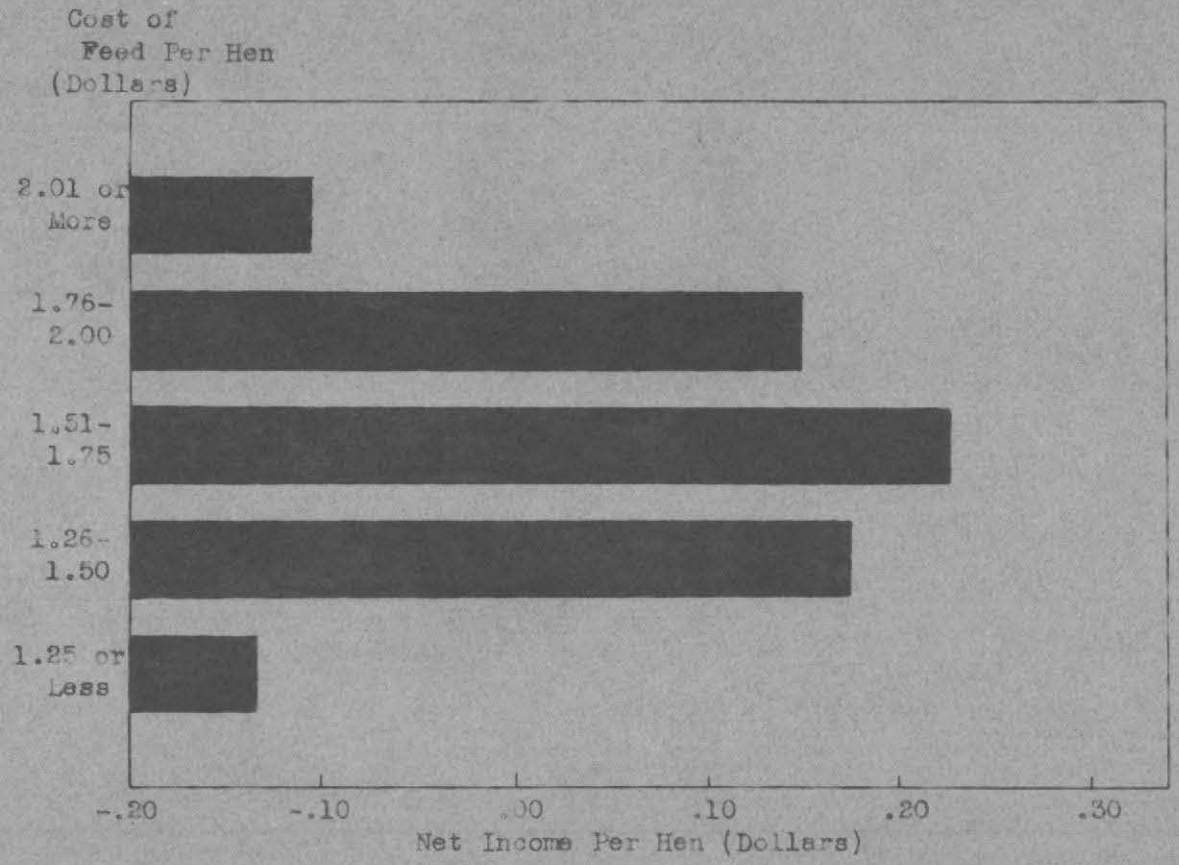

Figure 4: The Relation of Feed Costs to Net Income Per Hen, 1929

As the amount of feed given poultry is increased, net income increases, but only up to a certain point. Thereafter, increased feed only results in decreased profits.

Table 19. The relation of feed costs per hen to net income per hen, 219 Utah poultry farms, 1929-1930.

Year	Feed Cost Per Hen (Dollars)				
	1.25 or Less	1.26-1.50	1.51-1.75**	1.76-2.00	2.01 or More
	Net Income Per Hen				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	-.142	.178	.233	.151	-.113
1930	.696	.069	.464	.250	.122
Two Year Average	.277	.124	.349	.200	.005

* 2 records only.

** In 1929 $1.60 on the average would have bought 39.5 lbs. of scratch feed and 36.7 lbs. of mash. In 1930 $1.59 on the average would have bought 37.6 lbs of scratch feed and 42.5 lbs. of mash. The standard ration for white leghorn hens has been figured at 35 lbs. of mash and 40 lbs. of scratch feed per hen. From these figures, $1.63 (the average of the feed cost group of $1.51 to $1.75) would have bought more than an adequate ration for either of these years even including miscellaneous feed such as skim milk, and cod liver oil.

The Effect of Egg Production Per Hen Upon a Number of Measures of Poultry Efficiency

High production is in general, one of the main essentials of business success. The higher the production the more units it is possible to sell. As a rule poultrymen with a high egg production have high net returns. Some poultrymen, however, in working for a high production lose sight of the cost element so that in the end the cost of extra feed and labor more than offset any additional income derived from the higher egg production.

In studying the importance of egg production and its affect upon other poultry factors, the farms were divided into five groups which were based upon the average egg production per hen. The lowest production group included farms with an average production of 125 eggs or less per hen while the upper group included all farms with an average production of more than 200 eggs per

hen. In addition to this grouping another division was made on the basis of number of hens kept. These groups were then subdivided into those farms with the largest and smallest egg production.

No relationship was shown between egg production and percentage death loss of hens (Table 20). In 1929 the flocks of 501 to 1000 hens and those flocks of more than 1500 hens had the highest mortality rate with the smallest egg producing flocks. In 1930 the high death loss tended to be with low producing flocks. The relationships in 1931 were the same as those in 1929. The year 1929 shows a generally lower percentage death loss than in either of the subsequent years. This is due to the fact that in 1930 and 1931 there was considerable disease among poultry flocks in Utah. The disease may also have influenced the production on some of the flocks.

Table 20. Production of eggs per hen for poultry flocks of different sizes in relation to percentage death loss of hens, 319 Utah poultry farms, 1929-1931.

Year	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Egg Production Per Hen							
	Largest	Smallest	Largest	Smallest	Largest	Smallest	Largest	Smallest
	Per cent Death Loss of Hens							
	perc't	perc't	perc't	perc't	perc't	perc't	perc't	perc't
1929	19.2	15.3	16.1	17.0	18.9	16.8	16.7	18.2
1930	22.2	23.1	16.4	23.8	21.4	28.4	20.9	18.1
1931	17.9	16.0	19.4	20.9	21.5	16.0	25.7	25.8
Three Year Average	19.8	18.1	17.3	20.6	20.6	20.4	21.1	20.7
Avg. Egg Production	182	135	176	134	174	136	177	141

With few exceptions the flocks with the largest egg production per hen had the highest percentage of eggs in the extra grade (Table 21). In 1929 and 1930 there were two exceptions to this, while in 1931 there were no

exceptions. The percentage of eggs for the largest sized flocks were in general higher than for the smaller flocks. Farms of 500 hens or less had on the average about 37 per cent of their eggs in the extra grade, while farms with more than 1500 hens had, on the average, about 49 per cent in the extra grade. This was due to the better care in gathering and handling eggs that most large producers employ. The high production and quality of eggs for the large producing flocks probably results from the cleaner coops and better care these flocks received.

Table 21. The effect of egg production per hen, for flocks of different sizes on the percentage of eggs in the extra grade, 319 Utah poultry farms, 1929-1931.

Year	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Egg Production Per Hen							
	Largest	Smallest	Largest	Smallest	Largest	Smallest	Largest	Smallest
	Per cent of Extra Grade Eggs							
	perc't	perc't	perc't	perc't	perc't	perc't	perc't	perc't
1929	39.3	41.2	49.0	44.7	52.8	47.0	53.0	47.7
1930	29.2	26.7	34.4	37.1	40.1	39.3	46.6	43.4
1931	43.2	42.6	48.8	45.8	54.7	52.2	53.3	52.5
Three Year Average	37.2	36.8	44.1	42.5	49.2	46.2	51.0	47.9
Avg. Egg Production	182	135	176	134	174	136	177	141

A definite relationship was shown between egg production and total costs of production (Table 22 and Figure 5). As production increased total costs increased. Poultrymen in the smallest production groups had average total costs for all three years of $2.97 per hen, while poultrymen in the production group of 151-175 eggs had average total costs for all three years of $3.52 per hen. With but two exceptions this relationship prevailed for each of the three years. In 1929 and 1930 total costs in the production group of 151 to 175 eggs per hen were slightly lower than in the production groups of 126 to

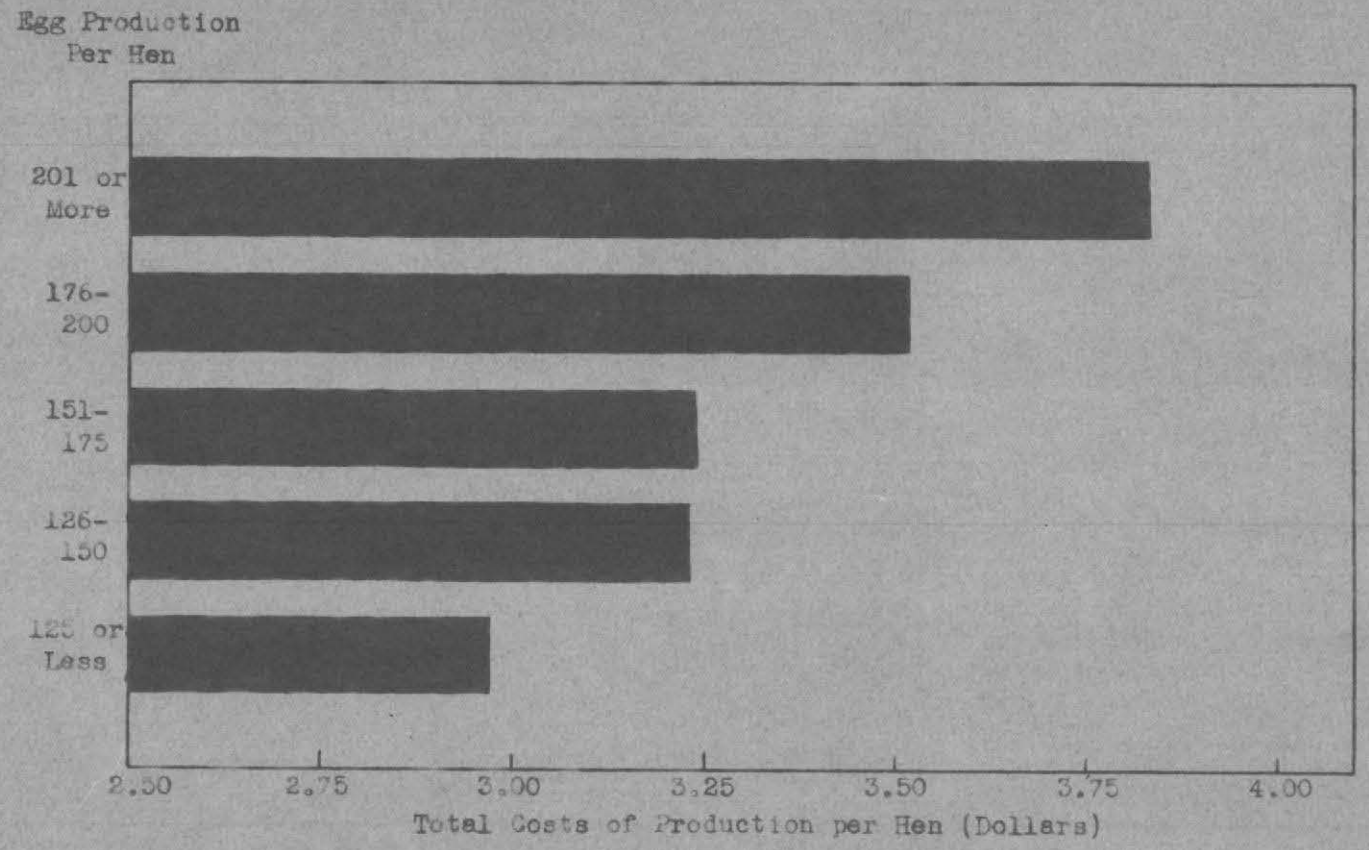

Figure 5: The Relation of Total Costs of Production Per Hen to Egg Production Per Hen, 1929-1930

As egg production per hen increases, there is an increase in total costs.

150 eggs per hen.

Table 22. The effect of egg production per hen on total costs of production per hen, 319 Utah poultry farms, 1929-1931.

Year	Production of Eggs Per Hen				
	125 or less	126-150	151-175	176-200	201 or more
	Total Production Costs Per Hen				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	3.22	3.51	3.48	3.86	4.64
1930	3.08	3.50	3.45	3.71	3.72
1931	2.61	2.68	2.79	2.98	3.14
Three Year Average	2.97	3.23	3.24	3.52	3.83

As egg production increased there was a large increase in gross returns (Table 23). Farms with a production of 125 eggs or less had on the average, for all three years, a gross income of $2.29 per hen while farms with an average production of more than 200 eggs had gross returns of $4.64 cents per hen. In 1929 the difference between the gross income of the highest and lowest production groups was $2.77 per hen in favor of the high production group. In 1930 this same difference was $2.97 per hen in favor of the high production group. The average for all three years for the smallest production group was $2.29 per hen while the flocks producing between 176 and 200 eggs per hen had a three year average gross income of $3.97 per hen.

Table 23. The effect of egg production per hen on gross returns per hen, 219 Utah poultry farms, 1929-1931.

Year	Production of Eggs Per Hen				
	125 or Less	126-150	151-175	176-200	201 or More
	Gross Returns Per Hen				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	2.45	3.24	3.96	4.55	5.22
1930	2.61	3.13	3.91	4.34	5.57*
1931	1.81	2.27	2.58	3.01	3.14**
Three Year Average	2.29	2.88	3.48	3.97	4.64

* 3 records only.
** 2 records only.

The importance of high egg production is reflected in the net returns from high producing flocks in comparison to flocks with a low production (Table 24 and Figure 6). In 1929, 1930, and 1931 flocks with an average production of 125 eggs or less per hen had a minus net income per hen. They varied from a minus 80 cents per hen in 1931 to a minus 47 cents in 1930, the average for all three years being a minus 68 cents per hen. All flocks with an average production of between 126 and 150 eggs per hen also had a minus income, the average for the three years being a minus 35 cents per hen. In 1929 the group with a production of between 176 and 200 eggs per hen had the highest net income or 69 cents per hen. The average net income for this whole group was 45 cents per hen which was $1.13 per hen higher than the average income for the flocks with a production of 125 eggs or less.

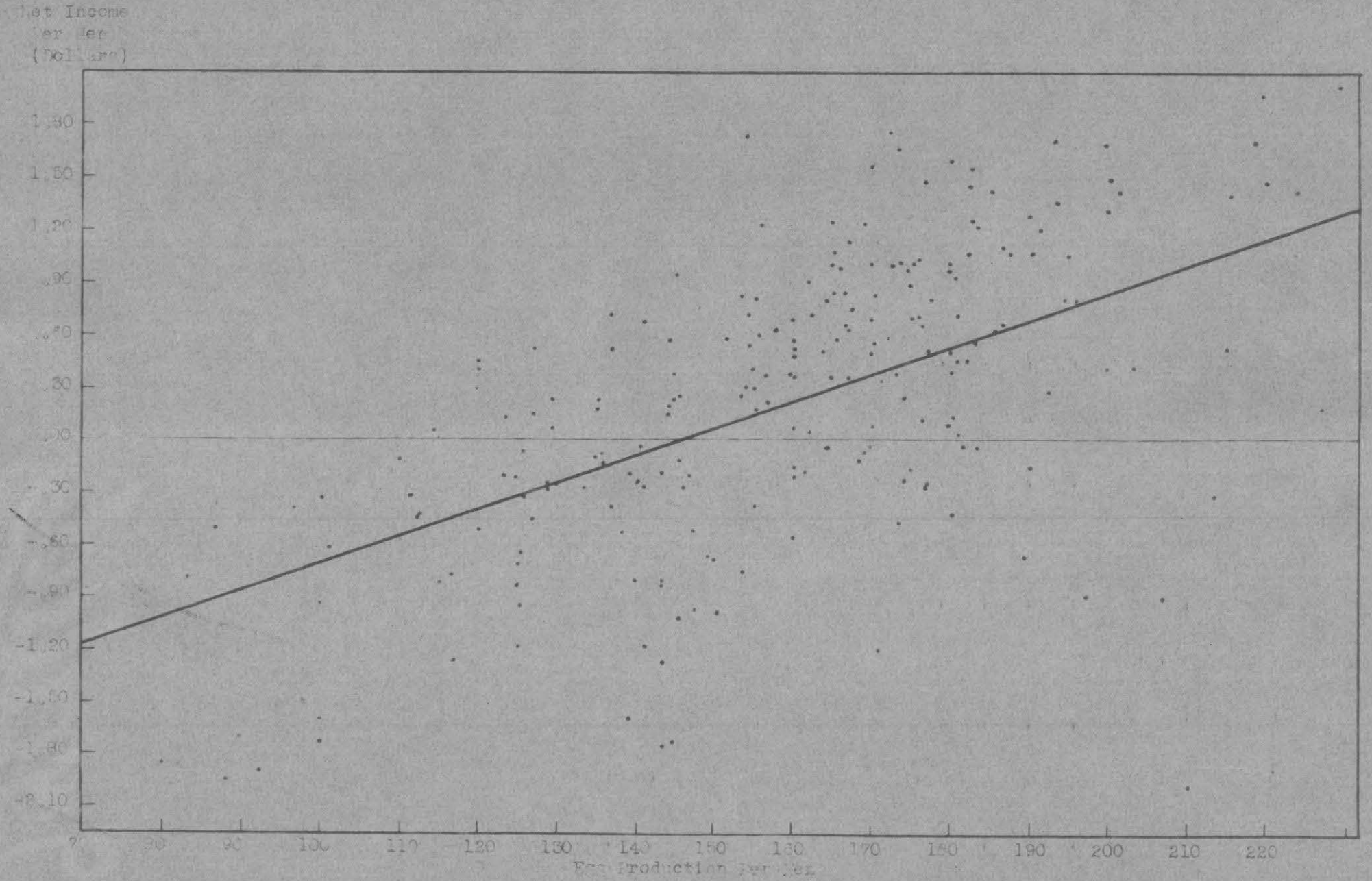

Figure 61. The Relation of Egg Production Per Hen to Net Income Per Hen, 1928-1930

is production per hen increases, net income increases. Each dot represents an individual flock in this particular relationship.

Table 24. The effect of egg production per hen on net income per hen, 319 Utah poultry farms, 1929-1931.

Year	Production of Eggs Per Hen				
	125 or Less	126-150	151-175	176-200	201 or More
	Net Income Per Hen				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	-.76	-.27	.48	.69	.58
1930	-.47	-.38	.46	.63	1.85*
1931	-.80	-.41	-.21	.03	.00**
Three Year Average	-. 68	-.35	.24	.45	.81

* 3 records only.
** 2 records only.

This same relationship was shown when the farms were divided into different size groups (Table 25). With no exceptions the highest average egg producers have the highest net income per hen. It was significant that the net income per hen increased as the flocks became larger. In 1929, for example, the net income for the highest producing flocks advanced in succession from an average of 21 cents per hen in the smallest flocks to $1.24 per hen in the flocks with more than 1500 hens. In all cases the lowest producing flocks in the small size group had a minus net income per hen while the low producing flocks with more than 1500 hens had only one year, 1931, in which there was a minus net income. In the size group of 500 hens or less the average net income for all three years was 72 cents per hen in favor of the high producers. For flocks of more than 1500 hens the average net income was 70 cents per hen in favor of the high production.

Table 25. The effect of egg production per hen on net income per hen for flocks of different sizes, 319 Utah poultry farms, 1929-1931.

Year	0-500 Hen Flocks		501-1000 Hen Flocks		1001-1500 Hen Flocks		Flocks of More Than 1500 Hens	
	Production of Eggs							
	Largest	Smallest	Largest	Smallest	Largest	Smallest	Largest	Smallest
	Net Income Per Hen							
	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's	Doll's
1929	.21	-.68	.68	-.36	.87	.15	1.24	.26
1930	.53	-.51	.53	.06	.81	.13	1.25	.33
1931	-.31	-.55	-.20	-.64	.05	-.35	-.04	-.24
Three Year Average	.14	-.58	.34	-.31	.58	-.02	.82	.12
Avg. Egg Production	182	135	176	134	174	136	177	141

The net income per dozen shows the same trend as has just been indicated (Table 26). All flocks with an average production of 150 eggs or less had a minus net income per dozen. In 1929 and 1931 the flocks with an egg production of between 176 and 200 eggs per hen had the highest net income per dozen. The low production group for all three years had a minus net income per dozen of 7.7 cents while the largest production group had a net income of plus 4.5 cents per dozen. The flocks with a production of 176 to 200 eggs per hen had an average net income of 3 cents per dozen.

Table 26. The effect of egg production per hen on net returns per dozen eggs, 319 Utah poultry farms, 1929-1931.

Year	Production of Eggs Per Hen				
	125 or Less	126-150	151-175	176-200	201 or More
	Net Returns Per Dozen Eggs				
	Dollars	Dollars	Dollars	Dollars	Dollars
1929	-.096	-.024	.035	.044	.031
1930	-.049	-.032	.034	.040	.102*
1931	-.085	-.034	-.016	.002	.000**
Three Year Average	-.077	-.030	.018	.029	.044

* 3 records only.
** 2 records only.

The Percentage of Extra Grade Eggs as Influenced by Method of Transit and Distance They are Hauled to the Grading Plant

For the past few years there has been a price premium paid for extra high quality eggs. It has, therefore, been to the best interests of the poultrymen to have as many high grade eggs as possible. The type of hens, the kind of feed they are fed, and the care and handling of eggs until they are delivered to the grading plant largely determine the percentage of eggs in the extra grade. Because the handling and care of eggs in transit from the producer to the grading station is a factor in determining the percentage of extras it is therefore essential to know whether the producer who delivers his own eggs has a higher percentage in extra grade than one whose eggs are delivered by the association truck. The Poultry Association truck usually has a certain route to follow in gathering eggs. A poultryman living only 10 miles from the grading plant may have his eggs picked up on the first part of the route and carried 50 miles before they reach the grading station.

In studying the relationship of percentage of extra grade eggs to distance and to method of hauling to the grading plant, the flocks were first divided into two groups based on whether the poultryman hauled his own eggs or whether the association truck hauled them. These two divisions were then subdivided into flocks of 700 hens or less and 701 or more. The size of flocks were then subdivided on the basis of the distance eggs were hauled to the grading plant. The size groups were set up as a result of not being able to find out how often eggs were delivered to the grading plant. Large producers, as a rule, deliver their eggs oftener than small producers. This frequency of delivery would have considerable effect on the quality of eggs delivered.

Where eggs were hauled by the association truck, the poultrymen with the largest flocks and with the shortest distance to market had 50.3 per cent of their eggs in the top grade, while the poultry farms of the same size with an average distance of 15 miles to the grading plant had 36.8 per cent of their eggs in the extra grade (Table 27). This was a difference of 14 per cent in extra grade in favor of the poultryman nearest to the grading plant. This same relationship held throughout all sizes of poultry flocks, although the differences were not quite so great. The largest flocks with the shortest distance to market had in all cases the highest percentage of extras. A slight tendency was shown for the producer hauling his own eggs to have a higher percentage of extras than the poultryman who had his eggs hauled by the association. So far as these figures go, however, there is no justification in saying that poultrymen transport their eggs with greater care than the association truck would. Out of 143 farms where the poultryman hauled his own eggs, 123 of them lived on an average of less than 3 miles from the grading plant. 88 of these farms had more than 700 hens. Of the farms from which the

Table 27. The effect of distance and method of hauling eggs to the grading plant upon the percentage in the extra grade, 289 Utah poultry farms, 1929-1931.

Item	Association Hauling				Producer Hauling			
	Flock of 700 or less hens		Flock of 701 or more hens		Flock of 700 or less hens		Flock of 701 or more hens	
	Distance Eggs are Hauled							
	Long-est	Short-est	Long-est	Short-est	Long-est	Short-est	Long-est	Short-est
No. of Records	39	49	26	32	14	35	6	88
Average Distance to Grading Plant (Mi.)	16.3	2.80	14.9	3.34	9.86	2.82	17.0	2.03
Average No. of Hens in Flock	419	467	1182	1072	451	436	1036	1758
Per cent of Eggs in Extra Grade	35.9	39.4	36.8	50.3	32.3	40.8	44.4	48.9

association gathered the eggs, 65 out of 146 were on the average 15 miles or more from the grading station. The remaining 71 farms averaged less than 3.5 miles from the grading plant.

These figures show that most producers who haul their own eggs had large flocks and were located short distances from the grading plant. When the association did the hauling the farms were divided rather evenly between the two size groups. They were also evenly distributed as to distance from the grading plant.

The Relationship of Efficiency in Different Numbers of Poultry Factors to Profitableness of the Poultry Farm

The more factors in which a poultry farm can be efficient, the more profitable that farm will be. That is, farms with a high egg production, efficiency in the use of labor, and a high percentage of eggs in extra grade, would, in general, be more profitable than farms with an equally high egg

production and efficiency in use of labor but a lower percentage of eggs in the extra grade.

Table 28. Efficiency in different numbers of poultry factors in relation to net income per hen and net returns per dozen eggs, 1929-1931.

Number of factors in which farms were most efficient.	Number of Farms	Net Income Per Hen	Net Returns Per Doz. Eggs
1929:			
Most efficient in at least one factor 1/	60	.407	.021
Most efficient in at least two factors 2/	29	.921	.062
Most efficient in at least three " 3/	17	1.15	.078
Most efficient in at least four " 4/	14	1.25	.083
Most efficient in at least five " 5/	8	1.27	.084
1930:			
Most efficient in at least one factor	50	.519	.032
Most efficient in at least two factors	23	.956	.061
Most efficient in at least three factors	17	1.12	.072
Most efficient in at least four factors	13	1.16	.074
Most efficient in at least five factors	5	1.50	.093
1931:			
Most efficient in at least one factor	50	-.200	-.020
Most efficient in at least two factors	29	-.057	-.004
Most efficient in at least three factors	15	.079	.006
Most efficient in at least four factors	10	.055	.004
Most efficient in at least five factors	3	.107	.007

1/ Above the median in size of flock.
2/ Above the median in size of flock and egg production per hen.
3/ Above the median in size of flock and egg production per hen, but below in labor costs.
4/ Above the median in size of flock and egg production; below in death loss; and above in per cent of extra grade eggs.
5/ Above the median in size of flock and egg production per hen; below in labor costs; above in percentage of extra grade eggs; and below in percentage death loss of hens.

In studying the effect of efficiency in different numbers of poultry factors upon the profitableness of the poultry farm, the median for five different poultry efficiency factors was found. The medians for each year were based upon the total number of records in that year. Out of the total

number of records for each year all flocks which were above the median in number of hens were taken out. Out of this size of flock group was then selected flocks which were above the median in egg production per hen. This selecting process was continued until three other factors, labor efficiency, per cent of eggs in the extra grade, and per cent death loss of hens, had been taken into consideration. In this manner the flocks which had the highest efficiency in different numbers of poultry factors were selected and measured as to their profitableness.

The results show that as the number of measures of efficiency in which the poultryman excelled increased, the profits also increased (Table 28). In 1929 the largest poultry farms had a net income of 41 cents per hen, while in the same year those farms that were more efficient in four other factors, in addition to being large flocks, had a net income of $1.27 per hen. This was a difference of 86 cents per hen in favor of the most efficient flocks. This same relationship prevailed for all three years. It is significant that the greatest increase in profits came when a high egg production was added as one of the factors in which the flocks were most efficient. For instance, in 1929, 51 cents of the 86 cents difference in net income between the farms that were most efficient in one factor and those that were most efficient in five factors came where egg production was added as one of the factors in which the farms were most efficient. In 1930, 44 cents of the 98 cents difference between the two groups resulted from a higher egg production. The figures presented show that efficiency in any poultry factor will increase the poultryman's profits, but the more factors a poultryman can be efficient in the greater will be his profits.

Summary

From the records studied, it was found that the poultrymen who had been in the poultry business for the longest period of time had the largest flocks. No relationship was shown between years of experience of the poultrymen and percentage death loss of hens or percentage of eggs in the extra grade. Producers with the least experience had the highest egg production per hen. There was, however, no relationship between years of experience of the poultrymen and net income per hen.

The flocks with the most floor space per hen had a lower percentage death loss of hens than flocks with a small amount of floor space per hen. The flocks with the most floor space had a higher percentage of eggs in the extra grade. Flocks with the most floor space had higher feed costs and had higher labor costs than flocks with a small amount of floor space per hen. No relationship was shown between the amount of floor space and egg production per hen. In general, farms with the least floor space had the highest net income per hen.

Practically no relationship was shown between the use of electric lights and death loss of hens. Poultry farms where lights were used had a slightly higher feed cost than farms where lights were not used. No relationship was shown between egg production per hen and the use of electric lights. Furthermore, the use of lights had no effect upon the net income per hen.

The amount of labor used on a flock had no influence on the percentage of eggs in the extra grade. Egg production was somewhat higher from flocks where the most labor was used. Increased costs, however, more than offset any advantage derived from increased production. As a consequence poultry farmers who used the most labor had a smaller net income per hen than farmers who used less labor.

No relationship was shown between the amount of feed given poultry and the percentage death loss of hens. As feed costs increased, other costs increased. The production of eggs per hen increased as the amount of feed given poultry increased. Feed costs between $1.51 and $1.75 per hen brought the poultrymen the largest net income. Feed costs above and below these figures brought smaller net incomes.

Poultry farms with the largest egg production had the highest percentage of extra grade eggs. No relationship was shown between egg production per hen and percentage death loss of hens. As egg production per hen increased, there was an increase in total costs. The higher egg production increased gross returns to a greater extent than total costs. As a consequence the farms with the highest production received the highest net income per hen.

The per cent of extra grade eggs delivered to grading stations was practically the same, whether delivered by the producer or by the association trucks. Farms located nearest the grading plant had the highest percentage of extras regardless of how or by whom eggs were transferred.

The greater the number of factors in which a poultry farm is efficient, the more profitable that farm will be. Of all the measures of efficiency, high egg production is the most essential for increased profits.

Statistical Calculations

Pearsons Coefficient of Correlation for the relationship of hours of man labor to net income per hen (Figure 1) was -.511.

The standard error was .997.

The Coefficient of Coorelation for the relationship of feed costs to egg production per hen (Figure 3) was .545.

The standard error was 20.8.

The Coefficient of Correlation for the relationship of egg production per hen to net income per hen (Figure 6) was .584.

The standard error was .640.

Formula for calculating trend line: $y = r \frac{\sigma y}{\sigma x} x$

Definitions

1. Total cost of production per hen: The sum of all costs such as for poultry feed, man labor, depreciation of flock, overhead, horse labor, and other operating costs divided by the average number of hens in the flock during the year.

2. Gross returns per hen: The total income from the sale of eggs, poultry, and other miscellaneous products divided by the average number of hens during the year.

3. Net income per hen: The difference between gross returns and total costs divided by the total number of hens in the flock.

4. Net returns per dozen eggs: The gross income less the total costs divided by the number of dozens of eggs produced by the flock during the year.

5. Per cent of eggs in extra grade: The percentage of the total production that comes within this grade. The extra grade is a classification set up by the Utah Poultry Producers Association and includes only the highest quality eggs.

6. Per cent death loss of hens: The percentage those hens which died during the year are of the number of hens at the beginning of the year.

7. Man hours per hen: The total number of man hours of labor spent on the flock during the year (child labor converted to man labor) divided by the total number of hens at the beginning of the year.

8. Average number of hens: The sum of the opening inventories for each month divided by the number of months. The opening inventory for each month was calculated by taking the opening inventory for the preceding month, subtracting the death loss and sales for that month, and adding the purchases of hens as well as pullets added to laying flock during the month.