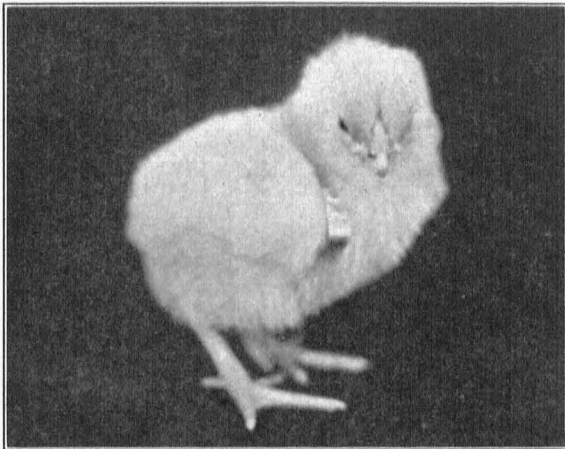


UNIVERSITY OF MISSOURI      COLLEGE OF AGRICULTURE  
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# Some Production Costs with Growing Chicks

H. L. KEMPSTER AND E. M. FUNK



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# Some Production Costs with Growing Chicks

H. L. KEMPSTER AND E. M. FUNK

Poultrymen are vitally concerned with production costs. They are interested in rapid growth and efficient gains. Any data contributing knowledge to these problems should be valuable to practical poultrymen. This publication presents such data, secured with the Station poultry flock in 1931.

## STOCK

The birds used in this investigation were the strains of Single Comb White Leghorns, Rhode Island Reds, and White Plymouth Rocks which have been bred at this Station for a number of years. The Leghorns and Rocks average slightly below standard weight at maturity, but the Reds are standard weight when mature.

## HATCHING

The chicks were hatched at weekly intervals from February 7 to April 11, each hatch being numbered consecutively, thus hatch number 3101 was hatched February 7, hatch number 3105 March 7, etc.

## BROODING

All chicks were placed in battery brooders when removed from the incubator and kept there for four weeks. Each chick was pedigreed, being wing-banded when removed from the pedigree baskets at hatching time. After four weeks in the battery brooders the chicks were placed in 10-by-12 colony brooder houses which were heated with colony brooder stoves.

## FEEDING

An all-mash ration was fed for the first eight weeks. This ration was placed before the chicks as soon as they were taken from the incubator and was kept before them continuously. The all-mash mixture used was:

Yellow corn meal .....	50	pounds
Bran .....	15	"
Shorts .....	15	"
Dried milk .....	15	"
Bone meal .....	4	"
Cod liver oil .....	1	"
Salt .....	1	"

When the chicks were 8 weeks old the mash was changed to the following mixture:

Yellow corn meal .....	100	pounds
Bran .....	100	"
Shorts .....	100	"
Meat scrap .....	40	"
Dried milk .....	20	"
Bone meal .....	16	"
Salt .....	4	"

Beginning at eight weeks cracked yellow corn was placed in hoppers and kept before the chicks at all times. These rations were continued until the birds were transferred to the laying house or sold.

### COLLECTION OF DATA

**Feed Records.**—While the chicks were confined to the battery brooders weekly records were made of the feed consumption. After they were transferred to the colony houses feed consumption was recorded by the month. There was very little waste of feed in the battery brooders but in the colony houses waste was increased, though in no case was it appreciable. Range hoppers were used when the weather permitted the chicks to be outside. Both mash and grain were hopper fed.

**Growth.**—Each chick being individually banded was weighed separately every four weeks, beginning at the time of hatching. The chicks were weighed in grams for the first twelve weeks and thereafter in tenths of pounds. After being transferred to laying houses they were weighed the first of each month.

**Fuel Consumption.**—Two types of battery brooders were used, gas and electric. Since gas was used also as a source of auxiliary heat in the battery room no attempt was made to measure the gas consumption of the battery brooder alone. A meter was attached to the electric battery brooder and its consumption of electrical energy measured. The temperature of the brooder room was kept as near 70° F. as possible and, therefore, the use of electricity was practically constant.

Records of oil and coal consumption were made for all the colony houses used. The later hatches, of course, consumed much less fuel than did the early hatches.

**Labor.**—One attendant had charge of the battery room and recorded the time spent in caring for the battery chicks. Another attendant had charge of the colony houses and recorded the time spent in brooding the chicks while they were in the colony houses.

### FEED CONSUMPTION

Table 1 shows the feed consumption for White Leghorn chicks by weeks during the first four weeks. The average feed consumption for the four successive weeks was 7.27, 17.86, 27.79, and 37.59 pounds

respectively, or a total of 90.51 pounds per 100 chicks for the four weeks. It will be observed in Table 2 that the feed consumption for the general purpose breeds for this period was approximately 10 per cent less, the feed consumption for 100 chicks being 5.53, 15.03, 25.77 and 32.69 pounds respectively or 79.03 pounds for the first four weeks. The average total feed consumption for the first four weeks for both types of chickens was 84 pounds. Table 3 shows the feed consumption by four-week intervals to the age of 12 weeks and the total up to the age of 20 weeks. The average feed consumption for the three four-week periods was 84, 257 and 397 pounds respectively. Thus to the age of 12 weeks the total feed consumption per 100 chicks was 738 pounds, consisting of 621 pounds of starting and growing mash and 117 pounds of grain. To the age of 20 weeks the total feed consumption per 100 chicks was 1578 pounds. This was made up of 341 pounds of starting mash, 669 of growing mash and 568 pounds of grain.

TABLE 1.—FEED CONSUMPTION PER 100 CHICKS  
Leghorns

Hatch Number	Number Chicks Started	First Week	Second Week	Third Week	Fourth Week	Total Pounds
		Lbs.	Lbs.	Lbs.	Lbs.	
3103	81	5.63	16.54	22.23	34.01	78.41
3106	102	7.06	18.86	31.83	38.13	95.88
3106	102	7.72	18.67	31.14	36.83	94.36
3107	112	5.47	19.46	31.35	42.78	99.06
3107	113	5.59	16.55	24.49	34.38	81.01
3108	100	9.60	16.12	26.30	37.27	89.29
3108	75	9.81	18.80	27.22	39.73	95.56
Total	685	50.88	125.00	194.56	263.13	633.57
Average		7.27	17.86	27.79	37.59	90.51

TABLE 2.—FEED CONSUMPTION PER 100 CHICKS  
Heavy Breeds

Hatch Number	Number Chicks Started	First Week	Second Week	Third Week	Fourth Week	Total Pounds
		Lbs.	Lbs.	Lbs.	Lbs.	
3103	104	6.52	19.23	21.60	34.31	81.66
3104	94	5.61	14.44	24.30	33.14	77.49
3104	93	5.25	14.30	25.20	30.50	75.25
3105	130	5.16	16.62	26.91	32.65	81.34
3105	130	5.14	15.92	26.00	31.51	78.57
3109	116	5.95	13.20	23.91	31.82	74.88
3109	116	5.74	15.02	26.73	32.18	79.67
3110	101	4.83	13.37	29.77	33.87	81.84
3110	100	5.58	13.18	27.51	34.26	80.53
Total	984	49.78	135.28	231.93	294.24	711.23
Average		5.53	15.03	25.77	32.69	79.03

It will be observed in Table 3 that the later hatched chicks consumed slightly less feed. There are two possible explanations for this reduced feed consumption: less rapid growth and a greater opportunity to secure feed from the range (an unmeasurable quantity). Feed consumption appears to be less during the warmer weather.

TABLE 3.—FEED CONSUMPTION PER 100 CHICKS  
Leghorns and Heavy Breeds

Hatch Number	Age in Weeks						Total
	0-4	4-8	8-12		0-20		
			<i>Mash</i>	<i>Grain</i>	<i>Mash</i>	<i>Grain</i>	
1	93	307	262	129	1187	587	1774
2	88	244	353	121	981	751	1732
3	82	259	288	121	873	698	1571
4	76	206	310	161	957	599	1556
5	86	261	276	133	993	448	1441
6	79	201	315	80	1048	489	1537
7	92	243	295	62	1039	490	1529
8	82	339	173	145	1005	481	1486
9	81	250	251	99			
Average	84	257	280	117	1010	568	1578
To date	84	341	621	117			

## LABOR

The labor required to rear 100 chicks is shown in Table 4 by four-week intervals up to the age of 20 weeks. The labor cost varies with the number of chicks in each unit, and the convenience of the equipment. Under the conditions which prevailed the labor required to grow 100 chicks was approximately 6 hours for four weeks. To the age of 12 weeks the expenditure for labor was 18 hours and to the age of 20 weeks 33.5 hours. The earlier hatched chicks required a larger expenditure of labor due to the need of more careful attention during the colder weather.

TABLE 4.—HOURS OF LABOR REQUIRED TO GROW 100 CHICKS

Hatch Number	Age in Weeks			
	0-4	4-8	0-12	0-20
1	5.8	11.2	25.0	37.8
2	5.8	9.1	22.0	39.8
3	5.8	8.1	20.0	36.4
4	5.8	7.8	19.0	31.1
5	5.8	5.7	16.0	40.5
7	5.8	3.6	15.0	29.0
8	5.8	3.4	15.4	29.0
9	5.8	4.8	15.0	29.0
10	5.8	3.5	15.4	29.0
Average	5.8	6.4	18.1	33.4

GROWTH

At the age of 12 weeks the pullets averaged 1.62, 1.88 and 1.82 pounds for White Leghorns, Rhode Island Reds and White Rocks respectively and the cockerels 1.94, 2.14 and 2.18 pounds. The weights at other ages are shown in Table 5.

TABLE 5.—RATE OF GROWTH

	Age in Weeks—Weight in Pounds					
	Day old	4	8	12	16	20
<b>Females</b>						
White Leghorns-----	.089	.38	.99	1.62	2.17	2.50
R. I. Reds-----	.093	.40	1.06	1.88	2.67	3.36
White Rocks-----	.092	.37	1.05	1.82	2.54	3.23
<b>Males</b>						
White Leghorns-----	.091	.414	1.18	1.94	---	---
R. I. Reds-----	.093	.40	1.6	2.14	3.36	4.40
White Rocks-----	.092	.40	1.22	2.18	3.34	4.37

The details for the pullets of different breeds are shown in Tables 6, 7, and 8. The data for hatches 6 and 7 are extremely variable and are not representative. This is due to outbreaks of pullorum and coccidiosis which resulted in relatively high mortality and slow growth. The Leghorns in hatch 5 also experienced an outbreak of coccidiosis. This is evidenced by the weights at ages 8 and 12 weeks. Disposal of the inferior birds is responsible for the apparent recovery of these groups so that due to culling there appears little, if any, difference in weight at later dates.

TABLE 6.—RATE OF GROWTH OF WHITE LEGHORN PULLETS

Hatch Number	Weight in Pounds—Age in Weeks					
	0	4	8	12	16	20
1	.089	.37	1.07	1.86	2.36	2.52
2	.090	.37	1.04	1.68	2.17	2.65
3	.088	.37	1.00	1.70	2.38	2.43
4	.091	.34	.93	1.66	2.20	2.43
5	.088	.41	1.04	1.53	2.02	2.38
6	.090	.41	.91	1.40	1.88	2.51
7	.090	.36	.91	1.53	2.11	2.54
8	.089	.40	1.00	1.58	2.13	2.61
9	.091	.40	.89	1.44	1.89	2.22
10	.087	.41	.92	1.49	2.03	2.41
Average	.089	.38	.99	1.62	2.17	2.50

TABLE 7.—RATE OF GROWTH OF RHODE ISLAND RED PULLETS

Hatch Number	Weight in Pounds—Age in Weeks					
	0	4	8	12	16	20
1	.092	.41	1.24	2.31	3.19	3.73
2	.094	.37	1.16	2.06	2.95	3.50
3	.096	.39	1.11	2.02	2.95	3.63
4	.092	.35	.98	2.02	2.73	3.40
5	.091	.40	1.11	1.88	2.78	3.41
6	.093	.45	.96	1.52	2.20	3.22
7	.088	.39	.93	1.51	2.30	2.81
8	.093	.45	1.09	1.84	2.45	3.28
9	.094	.42	.95	1.67	2.31	3.10
Average	.093	.40	1.06	1.88	2.67	3.36

TABLE 8.—RATE OF GROWTH OF WHITE ROCK PULLETS

Hatch Number	Weight in Pounds—Age in Weeks					
	0	4	8	12	16	20
1	.090	.34	1.18	2.08	2.70	3.64
2	.090	.32	1.04	1.90	2.55	3.10
3	.089	.37	1.07	1.92	2.82	3.20
4	.091	.32	.90	1.82	2.62	3.20
5	.092	.39	1.11	1.85	2.64	3.44
6	.093	.42	1.02	1.63	2.25	2.94
7	.096	.37	1.00	1.71	2.40	3.10
8	.092	.40	1.05	1.81	2.41	3.05
9	.093	.40	1.03	1.74	2.41	2.94
10	.091	.39	.89	1.66	2.41	3.05
Average	.092	.37	1.05	1.82	2.54	3.23

### INFLUENCE OF HATCHING DATE ON GROWTH

Table 9 shows the weights of the pullets at the age of 12 and 20 weeks for the various hatches. There appears a marked tendency for the birds to make less rapid growth as the date of hatch occurs later in the season. The advantage of early hatching as influencing growth is readily apparent as one compares the weight at 12 weeks of hatches No. 1 and 2 with hatches No. 8 and 9. Table 10 presents similar data for the cockerels, showing similar results. In the case of the White Leghorn males in hatches 1 and 2, these birds at the age of 10 weeks were transferred to feeding batteries where they failed to make expected gains. The White Leghorn males from these hatches which were retained as prospective breeders and allowed to remain on the range averaged 2.25 pounds. In the remaining hatches the cockerels were retained in colony houses until marketed.

At the age of 20 weeks the advantage of early hatching is plainly evident for the general purpose breeds although not so marked for the Leghorns. The advantages of early hatching are to be found



in considering the percentage of pullets which were banded and placed in laying quarters. The percentage of pullets retained from hatches 1, 2 and 3 hatched February 7 to February 21 was 78 as compared to 61 from hatches 8 and 9 hatched March 28 to April 4. In these data the Rhode Island Reds were eliminated due to a much higher degree of culling because of the failure to meet the color requirements expected of the breed.

It is thus seen that as a rule the earlier hatched chicks made more rapid growth due, no doubt, to the fact that they were less susceptible to outbreaks of coccidiosis and intestinal parasites. The earlier hatches experienced a lower mortality, consumed slightly more feed and necessitated a greater labor and fuel cost in brooding but these additional costs are compensated for by the superior pullets produced as evidenced by the larger proportion of pullets retained as prospective layers.

TABLE 9.—INFLUENCE OF HATCHING DATE ON GROWTH (Pullets)

Hatch	Date Hatched	Age in Weeks-Weight in Pounds					
		R. I. Reds		White Rocks		White Leghorns	
		12	20	12	20	12	20
3101	Feb. 7	2.31	3.73	2.08	3.64	1.86	2.52
3102	Feb. 14	2.06	3.50	1.90	3.10	1.68	2.65
3103	Feb. 21	2.02	3.63	1.92	3.20	1.70	2.43
3104	Feb. 28	2.02	3.40	1.82	3.20	1.66	2.43
3105	Mar. 7	1.88	3.41	1.85	3.44	1.53	2.33
3108	Mar. 28	1.84	3.28	1.81	3.05	1.58	2.61
3109	Apr. 4	1.67	3.10	1.74	2.94	1.44	2.22
Avg.		1.88	3.36	1.82	3.23	1.62	2.50

TABLE 10.—INFLUENCE OF HATCHING DATE ON GROWTH

Hatch	Date Hatched	Weight of Males at 12 Weeks-Pounds		
		R. I. Reds	White Rocks	White Leghorns
3101	Feb. 7	2.47	2.40	2.02
3102	Feb. 14	2.34	2.40	1.87
3103	Feb. 21	2.19	2.20	2.11
3104	Feb. 28	2.08	2.35	1.87
3105	Mar. 7	2.18	2.16	2.04
3108	Mar. 28	1.91	2.06	1.87
3109	Apr. 4	1.88	1.92	1.70
Avg.		2.14	2.18	1.94

### FUEL COSTS

Due to the methods employed in brooding and changeable weather conditions attempts to secure comparative fuel consumption data were extremely difficult. As previously stated oil, coal and electricity were used as sources of heat in the colony houses.

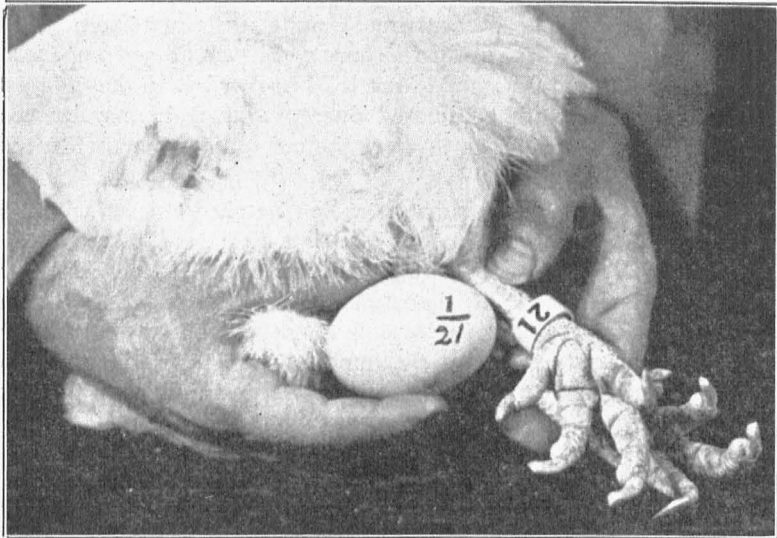


Figure 2.—Pedigreed egg. The leg band number of the hen is 21 and she is located in Pen 1. Eggs marked on the small end as shown do not need additional labelling when placed in the pedigreed basket. The chick seldom breaks the small end of the egg.

**Oil.**—Hatches 1 and 3 after being transferred from the battery brooders were brooded with the drum type of oil heater. Three hundred chicks were in each lot. The average oil consumption was 25 gallons of oil per 100 chicks for a four-week period. It is possible that the amount of oil consumed may be too high since hatch 1 was brooded at a temperature somewhat higher than necessary.

**Coal.**—Hatches 2 and 4 were brooded with coal stove brooders. During the four-week period, with 300 chicks to a hover, the coal consumed was 165 pounds per 100 chicks or at the rate of 17 pounds of coal daily per stove. Briquets, a pressed product, were used.

**Electricity.**—In March approximately 200 chicks were placed under a 56-inch canopy electric brooder. During the four-week intervals the fuel consumption per 100 chicks was 40 KWH or approximately 3 KWH per stove per day. Later tests in cooler weather with 300 chicks to a hover showed a fuel consumption per 100 chicks of 38 KWH or nearly 4 KWH per stove daily. With the electric hovers trouble with dampness occurred. The humidity ranged from 11-13 per cent higher than did the humidity outside the house while the humidity in the houses using coal and oil brooders ranged from

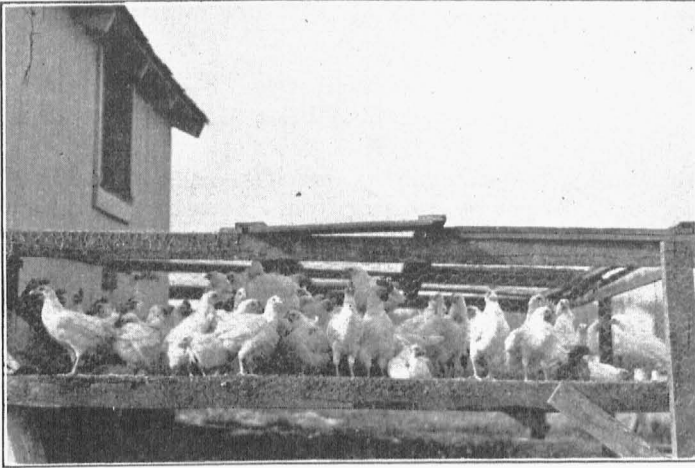


Figure 3.—Where fresh range is not available the sunporch may be used to keep the chicks from coming in contact with contaminated soil until they no longer need artificial heat.

10-13 per cent lower. With electricity at 3 cents per KWH the actual fuel costs compare favorably with the other sources of heat.

### ROASTER PRODUCTION

Forty-two White Rock cockerels from hatches No. 1 and 2 at the age of 8 weeks were selected and placed in a separate colony house. The feed consumption from 0-20 weeks when they were marketed was 1096 pounds of starting and growing mash per 100 chicks and 571 pounds of grain or a total of 16.67 pounds of feed per chick. At the age of 20 weeks the cockerels averaged 4.17 pounds. In other words they produced a pound of growth for approximately 4 pounds of feed. Due to the small number of birds in the unit the labor charge was extremely high. It required nearly .7 hours of labor per chick. This is twice the amount shown for the larger flocks in spite of the fact that the chicks were 8 weeks old before being isolated.

Fuel costs are estimated at nearly 500 pounds of coal per 100 chicks under the conditions which prevailed.

### SUMMARY

1. The average feed consumption per 100 chicks for the first four weeks was 84 pounds, ranging from 79 for the general purpose breeds to 91 for the Leghorns.
2. From the age of 4 to 8 weeks the average feed consumption per 100 chicks was 257 pounds.
3. To the age of 12 weeks a total of 738 pounds of feed was consumed by 100 chicks. This consisted of 621 pounds of mash and 117 pounds of grain.
4. It required approximately 6 hours of labor for each 100 chicks for each four weeks.
5. At the age of 12 weeks the pullets weighed 1.62, 1.88 and 1.82 and the cockerels 1.94, 2.14 and 2.18 pounds respectively for Leghorns, Rhode Island Reds and White Rocks.
6. At the age of 20 weeks the pullets weighed 2.50, 3.36 and 3.23 pounds respectively for Leghorns, Rhode Island Reds and White Rocks. At the age of 20 weeks the general purpose breed cockerels weighed over four pounds.
7. Earlier hatched chicks made more satisfactory growth, experienced a lower mortality and a larger percentage were retained as layers.
8. The daily fuel consumption per hover was: coal, 17 pounds, oil, 2.5 gallons, electricity, 3 to 4 KWH.
9. With the exception of Leghorn pullets it required from 3.39 to 4.05 pounds of feed to produce a pound of broiler up to the age of 12 weeks.
10. The feed required for producing four-pound cockerels of the general purpose breeds was approximately 4 pounds for each pound of gain.