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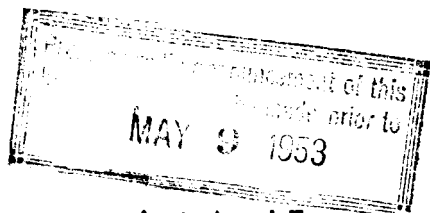
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# Growth and Feed Consumption of Broiler Chickens

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# Growth and Feed Consumption of Broiler Chickens

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Growth and feed consumption data which may be used as standards to guide operations are of value to chicken broiler growers. Much of the existing data were collected a number of years past with strains of chickens not developed for meat production and not fed the high-efficiency rations in use today. Some of the current data on chicken broilers, particularly those from some of the well-known broiler tests, are incomplete at the early ages. Weights were not taken in some instances until the chicks were 8 weeks of age.

## Method of Testing

To provide additional information on the growth and feed consumption of broiler chickens, an experiment involving 2,000 chicks, representing eight different kinds, was started at the Oregon Agricultural Experiment Station in November, 1952. Eight lots of 250 chickens each were housed in 16' x 16' pens of a continuous brooder house equipped with electric hover-type brooders. The chicks were sexed after being hatched in an electric incubator in the O.S.C. poultry department and 125 chicks of each sex were placed in each pen. In all pens approximately 1 square foot of floor space was provided for each chick.

The chicks were fed a high-energy broiler mash, supplemented with an antibiotic and Vitamin B<sub>12</sub>. Sulfaquinoxaline was fed continuously in the mash at the rate of 5 ounces per ton to control coccidiosis. The chicks were fed only mash, granite grit, and water throughout the trials. Feed was weighed at weekly intervals and chick weights were taken at 2-week intervals. Thirty cockerel and thirty pullet chicks taken at random in each pen were weighed individually at hatching and at 2, 4, 6, 8, and 10 weeks of age. This size sample permitted weights in the eight pens to be taken within 2½ hours' time and caused less disturbance than weighing all chicks.

At 10 weeks of age the total group weight of all chicks in each pen was determined. On the day that each lot was expected to average 3 pounds weight, 30 cockerel and 30 pullet chicks in each pen were weighed as a group.

## Results

Data on average weights and feed conversion for the 2,000 broilers are shown in Table 1. As there was no outbreak of disease or any other disturbing factor, these data have special significance. The chicks averaged 3.1 pounds in weight at 10 weeks, with a conversion ratio of 2.8 pounds of feed per pound of gain. Any lot of good chicks with a good broiler mash and good management should approach this weight and conversion ratio.

Cockerel chicks were slightly heavier than the pullet chicks at 2 weeks and thereafter the difference in weight between the two sexes increased. The data in Table 1 indicate that cockerel chicks reach market weights before the pullets. Since cockerels and pullets were raised together in the same pen, comparative feed conversion data for the two sexes are not available.

Table 1. Growth and Feed Conversion of Broiler Chickens

(Based on 2,000 chicks of 8 different kinds)

Age	Average weights <sup>1/</sup>			Feed per pound gain (Both sexes)
	Both sexes	Cockerels	Pullets	
	Pounds	Pounds	Pounds	Pounds
0 weeks . . . .	.08	.08	.08	0
2 weeks . . . .	.31	.32	.30	1.50
4 weeks . . . .	.76	.79	.73	1.99
6 weeks . . . .	1.40	1.48	1.33	2.31
8 weeks . . . .	2.23	2.39	2.08	2.53
10 weeks . . . .	3.12 <sup>2/</sup>	3.42	2.82	2.79

<sup>1/</sup> Based on 30 cockerel and 30 pullet chicks of each kind at each age.

<sup>2/</sup> Actual weight of all chicks at 10 weeks determined by group weighing was 3.08 pounds.

Feed consumption per chick, by weeks, and cumulative feed consumption through any of the 10 weekly periods are shown in Table 2. As the chicks became older and increased in size they ate more feed. An average of 8.6 pounds of feed was required to raise a broiler to 10 weeks of age and a weight of 3.1 pounds. These feed consumption figures may be less than some broiler growers are obtaining with just as good growth because mortality was low in the trials and every effort was made to prevent feed wastage. Each chick consumed .18 pound granite grit in addition to the 8.6 pounds of broiler mash.

Mortality to 10 weeks of age averaged 2.05 per cent for the 8 pens of broilers. Slightly over half of the losses occurred during the first week of brooding and only one-sixth (.35 per cent) during the last 4 weeks. This very low death loss was, as has already been pointed out, a contributing factor to the favorable feed conversion obtained. The cumulative feed consumption figures in Table 2 will illustrate the approximate amounts of feed lost when chicks of different ages die.

The average gains in body weight by 2-week periods and the feed required to produce 1 pound of gain during each 2-week period are shown in Figure 1. Gains in weight increased steadily through the 7-8 weeks' period. The gain during the 9-10 weeks' period was about the same as that during 7-8 weeks, which indicates that after 10 weeks the actual periodic gains would decline. Pounds of feed required to produce 1 pound of gain increased from 2 pounds during the first two weeks to 3.5 pounds during the last two weeks. The greatest amount of increase, 2.9 to 3.5 pounds, was from the 7-8 weeks' to the 9-10 weeks' period.

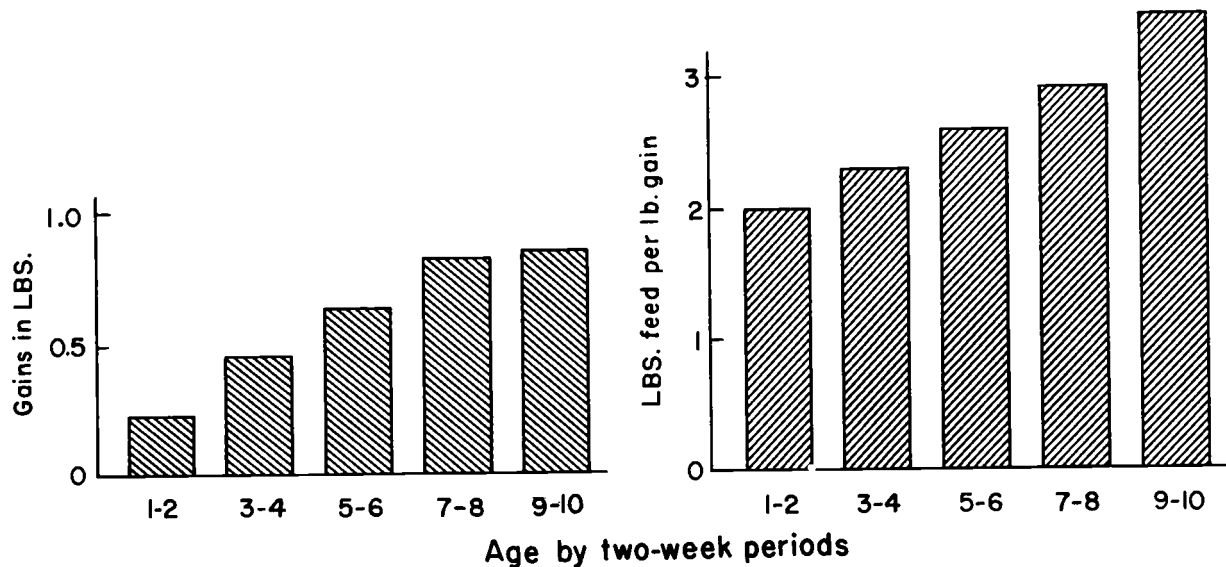


Figure 1. Broiler chicken gains and feed conversion, by 2-week periods.

Table 2. Feed Consumption and Mortality by Weeks

(Based on 2,000 broiler chicks)

Age	Feed consumption		Mortality		
	Weekly	Cumulative <sup>1/</sup>	Weekly		Cumulative
	Pounds	Pounds	Number	Per cent	Per cent
1 week . . . .	.17	—	22	1.1	—
2 weeks . . . .	.29	.46	1	.05	1.15
3 weeks . . . .	.45	.91	2	0.1	1.25
4 weeks . . . .	.59	1.50	4	0.2	1.45
5 weeks . . . .	.73	2.23	5	0.25	1.70
6 weeks . . . .	.96	3.19	0	0	1.70
7 weeks . . . .	1.16	4.35	1	0.05	1.75
8 weeks . . . .	1.27	5.62	3	0.15	1.90
9 weeks . . . .	1.41	7.03	1	0.05	1.95
10 weeks . . . .	1.55	8.58 <sup>2/</sup>	2	.1	2.05

<sup>1/</sup> Based upon number of chicks alive at end of each 2-week period. Feed consumption per chick to 10 weeks based upon number alive at 10 weeks was 8.61 pounds.

<sup>2/</sup> Each chick consumed .18 pound of granite grit in addition to the 8.6 pounds of broiler mash.

Comparative data for average body weight, feed conversion, and mortality at 10 weeks for the 8 different pens of broiler chickens are shown in Table 3. In these tests two strains of New Hampshires, three different types of Cornish x New Hampshire crosses, a Delaware x New Hampshire cross, a White Rock x New Hampshire cross, and White Rocks were involved. The White Rock used in the cross (Pen 2) was one pure for the silver plumage factor, whereas the straight White Rocks (Pen 6) were of another strain. The New Hampshires used to produce chicks for Pens 1 to 5, inclusive, were of the same strain.

The New Hampshire chickens in Pen 1 were the smallest of the eight lots at 10 weeks, whereas the New Hampshires in Pen 8 were the second heaviest. This illustrates very strikingly that strain is more important than breed.

Chicks produced from crossing New Hampshire females with males of different breeds (Pens 2 to 5) grew a little faster and utilized feed more efficiently than straight New Hampshires of the same strain (Pen 1). The lots that grew the fastest generally utilized feed more efficiently. A striking exception was the New Hampshires in Pen 8—which were the second heaviest at 10 weeks and which required the most feed to produce a pound of gain. The fact that 3 chicks were lost during the last 3 weeks was partially responsible for this reduced efficiency of feed use—but not entirely, because after adjusting the figures for this mortality 2.84 pounds of feed were still required to produce a pound of broiler. The feed conversion data in Table 3 illustrate two points: (1) In general, broilers that grow the fastest utilize feed most efficiently, but (2) in some instances two strains of broiler chickens with comparable growth rates may vary to some extent in their efficiency of feed use.

Table 3. Weights, Feed Conversion, and Mortality of Eight Kinds of Broiler Chickens at 10 Weeks of Age

Pen number	Kind	Average weight <u>Pounds</u>	Feed per pound gain <u>Pounds</u>	Mortality <u>Per cent</u>
1 . . . . .	New Hampshire <sup>1</sup> *	2.83	2.86	4.8
2 . . . . .	W. Rock <sup>1</sup> x N. Hamp. <sup>1</sup>	2.85	2.78	1.6
3 . . . . .	Cornish <sup>1</sup> x N. Hamp. <sup>1</sup>	3.02	2.77	1.2
4 . . . . .	Delaware x N. Hamp. <sup>1</sup>	3.05	2.80	4.0
5 . . . . .	Cornish <sup>2</sup> x N. Hamp. <sup>1</sup>	2.94	2.81	0.4
6 . . . . .	White Rock <sup>2</sup>	3.21	2.73	0.8
7 . . . . .	Cornish <sup>3</sup> x N. Hamp. <sup>2</sup>	3.45	2.72	0.4
8 . . . . .	New Hampshire <sup>2</sup>	3.32	2.87	3.2
Average	--	3.08	2.79	2.05

\*Numbers indicate strains within the breed. Same numbers indicate same strain, different numbers different strains.

Broiler growers want chicks that grow rapidly and uniformly. Comparative variations in growth of the eight groups is expressed in Table 4 in two ways: (1) To show sex difference at 10 weeks of age the pullet weights were expressed as a percentage of the cockerel weights, and (2) to show variations between individuals in each sex and between individuals in each pen coefficients of variation were determined. The greater the variation the greater is the coefficient of variation.

Table 4. Variation in 10-Week Weights of Eight Kinds of Broilers at 10 Weeks of Age

(Based upon individual weights of 30 cockerel and 30 pullet chicks of each kind)

Pen number	Kind	Pullet weight Cockerel weight Per cent	Coefficient of variation		
			Pullets Per cent	Cockerels Per cent	Both sexes Per cent
1 . . .	New Hampshire <sup>1</sup> *	84.2	11.5	12.6	14.9
2 . . .	W. Rock <sup>1</sup> x N. Hamp. <sup>1</sup>	80.1	8.4	9.3	14.3
3 . . .	Cornish <sup>1</sup> x N. Hamp. <sup>1</sup>	80.7	12.2	12.3	16.3
4 . . .	Delaware x N. Hamp. <sup>1</sup>	83.7	7.6	9.6	12.7
5 . . .	Cornish <sup>2</sup> x N. Hamp. <sup>1</sup>	83.1	10.0	9.5	13.4
6 . . .	White Rock <sup>2</sup>	82.5	9.0	8.5	13.0
7 . . .	Cornish <sup>3</sup> x N. Hamp. <sup>2</sup>	81.1	8.6	10.6	14.4
8 . . .	New Hampshire <sup>2</sup>	84.6	10.2	11.9	14.0

\*Numbers indicate strains within the breed. Same numbers indicate same strain, different numbers different strains.

As broilers are usually marketed at a given weight more often than at a given age, the time required for chicks to reach this weight as well as feed conversion at this weight is of importance. Since 3 pounds is an average weight at which broilers are often marketed, the 8 pens were compared with respect to time required for the broilers to reach this weight as well as with respect to feed conversion at this weight (Table 5). The fastest growing chicks (Pen 7) reached 3 pounds average weight at 62 days, which was 10 days earlier than the slowest growing group (Pen 1) and 6 days earlier than the average for the 8 pens.

Interpolation of weight data on cockerels and pullets showed that the cockerels attained 3 pounds average weight 7 to 10 days before the pullets. For all 8 pens the average was 8 days.

# Chicken Broiler Mash

This mash was used in the 1952-53 Oregon Agricultural Experiment Station broiler experiments. Average weight of 2,000 chicks fed this ration was 3.1 pounds at 10 weeks. An average of 2.8 pounds of feed was required to produce a pound of chicken. This is a high-energy type of mash. Since it contains sulfaquinoxaline for coccidiosis control, it is not recommended for continuous feeding of chickens grown for flock-replacement purposes.

## Broiler Mash Formula

Ground yellow corn .....	1,300 pounds
Soybean meal.....	530 pounds
Herring fish meal.....	70 pounds
Dehydrated alfalfa leaf meal.....	20 pounds
Steamed bonemeal.....	45 pounds
Oyster shell flour.....	25 pounds
Salt (iodized).....	7 pounds
A & D oil (300D—2,250A).....	$\frac{1}{2}$ pound
Irradiated animal sterol (2,000 D per gm) .....	$\frac{1}{2}$ pound
Manganese sulfate.....	10 ounces
Riboflavin.....	5 grams
Calcium pantothenate.....	5 grams
Antibiotic--B 12 supplement.....	2 pounds*
Sulfaquinoxaline.....	5 ounces
	<hr/>
	2,001 pounds

\*Supplement contained 2 grams procaine penicillin and 3 milligrams of Vitamin B 12 per pound.

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**NOTICE:** Formula recommendations are subject to frequent change as new research indicates and as prices and availability of feedstuffs vary.

Table 5. Comparison of Eight Kinds of Broiler Chickens  
with Respect to Time Required to Reach 3-Pound Average Weight  
and Feed Conversion at this Weight

Pen number	Kind	Time to reach 3-pound weight		Feed per pound gain
		Actual	Difference	
		<u>Days</u>	<u>Days</u>	<u>Pounds</u>
1 . .	New Hampshire <sup>1</sup> *	72	10	2.9
2 . .	W. Rock <sup>1</sup> x N. Hamp. <sup>1</sup>	71	9	2.8
3 . .	Cornish <sup>1</sup> x N. Hamp. <sup>1</sup>	69	7	2.8
4 . .	Delaware x N. Hamp. <sup>1</sup>	69	7	2.8
5 . .	Cornish <sup>2</sup> x N. Hamp. <sup>1</sup>	69	7	2.8
6 . .	White Rock <sup>2</sup>	67	5	2.7
7 . .	Cornish <sup>3</sup> x N. Hamp. <sup>2</sup>	62	0	2.6
8 . .	New Hampshire <sup>2</sup>	65	3	2.8
Average	—	68	—	2.8

\*Numbers indicate strains within the breed. Same numbers indicate same strain, different numbers different strains.

## Summary

Results with 2,000 broiler chickens of eight kinds housed in eight pens and fed a ration of mash, grit, and water showed that the average weight at 10 weeks of age was 3.1 pounds, the cockerels weighing 3.4 pounds and the pullets 2.8 pounds. Each broiler marketed required 8.6 pounds of mash. Two and eight-tenths pounds of feed were required to produce 1 pound of broiler. Mortality to 10 weeks of age was 2.05 per cent, with over half of it occurring during the first week. Feed consumption per chick increased from .17 pound the first week to 1.55 pounds the tenth week.

Actual gains increased during each 2-week period to 8 weeks. Gain during the 9-10 weeks' period was about same as for the preceding 2 weeks. Pounds of feed to produce a pound of gain increased from 2 pounds the first two weeks to 3.5 pounds during the 9-10 weeks' period.

The fastest growing group of chicks averaged 3.45 pounds in weight at 10 weeks with a conversion of 2.72 pounds of feed, whereas the slowest growing group averaged 2.83 with a conversion of 2.86 pounds of feed per pound of broiler.

The fastest growing chicks reached an average weight of three pounds at 62 days on 2.6 pounds of feed, whereas the slowest growing chicks required 10 additional days to reach the 3 pounds, and required an additional .3 pound of feed to produce a pound of broiler. The average time required for all groups to reach 3 pounds was 68 days, with an average conversion of 2.8 pounds of feed. Cockerels reached 3 pounds average weight 7 to 10 days before the pullets, the average being 8 days.