

# New York Agricultural Experiment Station.

PETER COLLIER, DIRECTOR.

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BULLETIN No. 39—NEW SERIES.

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FEEDING EXPERIMENTS WITH POULTRY.

SKIM-MILK FOR GROWING CHICKS.

FEEDING TALLOW TO HENS.

FEEDING SALT.

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\*Connected with Fertilizer Control.

## BULLETIN NO. 39—NEW SERIES.

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The skim-milk of the farm is generally all fed to pigs and calves, but it can as profitably be fed to chicks or laying hens. For the benefit of those farmers who have skim-milk to feed, or any who grow chickens where skim-milk can be cheaply obtained, the results of a feeding experiment with chicks are given in this Bulletin. As of interest to poultrymen, an experiment in feeding to laying hens rations differing widely in proportion of fat is also reported; and the results of a trial in feeding salt are included.

### SKIM-MILK FOR GROWING CHICKS.

During the past year quite a number of chicks were grown to maturity at this Station with no drink other than skim-milk being given them, excepting not more than three or four days when skim-milk was not available and water was supplied. No water was accessible to them except as dew, or that to be found for a few hours after a rain. These chicks were raised by the ordinary method of keeping them with a hen in a small coop, the chicks being allowed to run at will over the grass in a young apple orchard. No sickly chicks were at any time noticed among them, the few lost when young being from accident and from lice getting among one brood. The growth of feathers was much more rapid and full than usual, and this was especially noticeable in the case of Light Brahma chicks.

In order to obtain information as to the cost of growing chicks by the methods in general use on farms, where skim-milk can be obtained, two lots of chicks were grown in pens. The pens were 10x12 feet, having a tight wooden floor. The open yards connecting with them, and which were deeply covered with coal ashes, were 11x20 feet. A hen was kept with each pen of chicks until they were pretty well feathered;—with one pen 7½ weeks

and the other  $5\frac{1}{2}$  weeks. The chicks were of several breeds and crosses :—B. Minorca, W. P. Rock, Light Brahma, Indian Game-Cochin, cross; P. Rock-Minorca, cross. They were from one to three days old at commencement of feeding experiment, and the total cost of food from hatching until this time was less than one cent for each lot. During most of the experiment 14 chicks were in one pen and 16 in the other. More chicks were put in at the start, but the visit of a rat reduced the number. The chicks and hens were weighed once a week.

No green food was fed to one pen until the chicks were about 6 weeks old, and not to the other pen until  $11\frac{1}{2}$  weeks old. The skim-milk, of which they had most of the time an abundant supply, was usually sweet. One pen (No. 11) was without milk for eight days (from Sept. 17 to Sept. 25), when water was substituted, and during this time they made a smaller gain for the food consumed than at any other.

The results averaged for periods of one and two weeks are given in the following tables :

## PEN NO. 10—HEN AND CHICKS.

No. chicks	No. days	PERIOD.	Av. age of chicks.	Av. wt. per chick at end of period.	Gain in wt. of chicks.	Gain in wt. of hen.	Mixed grain aver. age per day.	Wheat aver. age per day.	Skim-milk aver. age per day.	Clover aver. age per day.	Total water-free food per day.	Water-free food for 1 lb. gain live wt. of chicks.	Cost of food per day.	Water-free food consumed per day for each live wt. hen and chicks.	Water-free food consumed per day for each live wt. chick.	Cost of food 1 lb. gain in live wt.
			Days.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Lbs.	Cents.	Oz.	Oz.	Cents.
18	9	June 8 to June 17	10	3.3	32	4	8.9	0	29.8	38.7	10.9	3.06	1.00	1.45		4.50
14	15	June 17 to July 2	25	8.2	68	10	10.6	3.7	29.0	43.3	15.6	3.43	1.48	1.52		5.22
14	14	July 2 to July 16	39	15.0	95	6	16.6	4.5	44.6	65.7	23.1	3.40	2.16	1.46		5.71
14	14	July 16 to July 30	53	24.6	134	18	19.4	10.0	55.2	84.6	31.4	3.28	3.07	1.32		5.13
14	7	July 30 to Aug. 6	60	28.6	56		17.6	13.6	43.6	74.8	31.7	3.96	3.16		1.36	6.31
14	14	Aug. 6 to Aug. 20	74	38.6	140		18.6	13.2	48.0	79.8	32.8	3.28	3.24		1.12	5.19
14	7	Aug. 20 to Aug. 27	81	43.9	74		20.0	15.9	58.9	94.8	37.4	3.54	3.76		1.04	5.70
13*	14	Aug. 27 to Sept. 10	95	56.0	164		18.2	20.6	56.8	97.6	40.3	3.44	4.12		1.01	5.63

\* One cockerel removed for caponizing.

## PEN NO. II—HEN AND CHICKS.

No. of chicks.	No. of chicks, days	Period.	Av. age of chicks.	Av. wt per chick at end of period.	Gain in wt of chicks.	Gain in wt. hen.	Mixed grain average per day.	Wheat average per day.	Skim-milk average per day.	Meat scraps average per day.	Clo- ver for- age per day.	Total water- free food per day.	Water- free food for lb. gain in wt. of chicks.	Cost of food per day.	Water- free food consumed per day for each lb. live wt. of hen and chicks.	Water- free food consumed per day for each lb. live wt. of chicks.	Cost of food for lb. gain in live wt. of chicks.
			Days.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Lbs.	Cts.	Oz.	Oz.	Cents.
17	17	July 20 to Aug. 6	19	4.6	53	10	5.9	3.7	18.9	1.0		29.5	3.63	1.20	1.57		6.13
16	14	Aug. 6 to Aug. 20	33	10.6	85	13	7.6	6.7	28.7	2.4		45.4	2.94	1.99	1.48		5.23
16	7	Aug. 20 to Aug. 27	40	13.1	49	6	9.3	7.0	44.1	3.0		63.4	3.08	2.44	1.28		5.59
16	14	Aug. 27 to Sept. 10	54	21.9	140		12.3	13.2	36.4	2.6	.5	65.0	2.86	3.08		1.63	4.92
16	14	Sept. 10 to Sept. 24	68	28.4	104		17.8	13.7	18.2	2.0	.5	52.2	4.22	3.09		1.25	6.66
16	14	Sept. 24 to Oct. 8	82	38.6	163		16.9	17.0	50.9	2.1		89.9	3.23	3.92		1.12	5.38
16	7	Oct. 8 to Oct. 15	89	43.5	79		24.0	15.9	50.9	3.0		96.8	3.86	4.37		1.06	6.15

The mixed grain was composed of 2 parts corn meal, 2 parts wheat bran, 1 part wheat middlings and 1 part linseed meal, and is calculated at \$20. per ton. The wheat is rated at \$1. per bushel, the skim-milk at 25 cents per hundred pounds, the clover forage at \$2. per ton, and meat scraps at  $2\frac{1}{2}$  cents per pound.

With one pen the average cost of food for every pound increase in weight during the whole time was 5.66 cents. For the other the cost of increase for all but the last two weeks was 5.36 cents, and during these two weeks 5.63 cents. The cost per pound gain in weight for each period will be found in the tables. In one pen, chicks averaging 2.4 pounds weight at  $10\frac{1}{2}$  weeks of age were grown at a cost for food of 5.31 cents per pound, or an average of 12.7 cents apiece. In the other pen, chicks averaging 2.4 pounds at  $11\frac{3}{4}$  weeks of age cost for food 5.36 cents per pound, or 12.9 cents apiece. This cost of production of course includes the cost of feeding the hen during the first few weeks. These results are not so good as are those sometimes reported by incubator manufacturers, but they are obtained by methods that are well understood and in use among farmers. Although these chicks were rather closely confined, they were kept freer from lice than, unfortunately, are the chicks as a rule on farms.

Under ordinary conditions, chicks ought to be hatched, making a fair allowance for value of eggs and food for sitting hens, at a cost of less than 5 cents apiece. The highest cost per pound gain during any week, while growing chicks to  $3\frac{1}{2}$  pounds average weight, was less than 7 cents, and the cost averaged much less than 6 cents. At the prices generally obtained for chicks of this and lesser weights the growth was certainly a profitable one. With chicks having the liberty of the fields it seems reasonable to expect a still cheaper production of meat, and it would appear that a profitable use for some of the skim milk of the farm would be in the growing of chicks for home use or for the market.

An unlimited supply of sweet skim-milk can apparently be given to chickens with advantage, but sour milk must be fed with caution. Where sour milk only is available it is best to coagulate thoroughly by moderate heating, and feed only the curd, straining out as much of the whey as possible.

## FEEDING TALLOW TO HENS.

In order to observe the effect of feeding more than an average amount of fat in a ration, two pens of hens were fed for a few months, one having as much tallow as was readily eaten with a moderate grain ration, and the other having a similar ration with linseed meal (o. p.) substituted for the tallow.

This feeding trial was not begun until March 3, and although it extended over the larger part of the ordinary laying season it did not include the whole. From May 5 to Oct. 6, during the latter five months, eight hens were in each pen and, for the two months preceding, fewer (six, five and four). The fowls were S. C. B. Leghorns with the exception of two of Game-Wyandotte cross in each pen. There was fed, besides tallow and linseed meal,—wheat, corn silage, cabbage, alfalfa forage, timothy forage and two grain mixtures. Mixture No. 10 contained 6 parts wheat bran, 3 parts wheat middlings and 1 part linseed meal. Mixture No. 16 contained 6 parts wheat bran, 3 parts corn meal, 2 parts linseed meal. The results are averaged in the tabular statement for irregular periods consisting of from 21 to 48 days, according to the green foods, etc., available.

Although there was a constant and considerable difference between the two rations, neither ration was an extreme. The ratio of total protein to the total carbohydrates was, on the average for the seven months, 1 : 4.47 in the linseed meal ration, and 1 : 5.53 in the tallow ration. With the weight of fats multiplied as usual the average ratios were 1 : 4.78 and 1 : 6.75. The proportion of fats to the total water-free food showed, however, greater difference, in the one ration being that of 1 : 29.5 and in the other 1 : 8.1.

The average egg product was somewhat in favor of the hens having the less fat in their food, and the average size of the eggs laid by them was a little larger. During one period, however, of 42 days in July and Aug. more eggs were obtained from the hens having tallow. During the first period while the hens were newly confined there were few eggs laid, and during the latter period many hens were molting.

The greatest difference observed was that the hens having the linseed meal molted nearly all at the same time, earlier in the season and more rapidly. Only few of the hens which had been



fed tallow had begun to molt at the close of this feeding trial, Oct. 6th, by which time several hens from the other pen were in new plumage. The tallow ration was apparently too deficient in nitrogen to encourage the growth of new feathers, and the results are in support of the advice to feed during the summer a highly nitrogenous ration to help early molting.

The amount of tallow fed was not enough to affect the health of the fowls, and they were throughout in better apparent condition than those of the other pen. The average weight of the tallow-fed hens was but slightly the greater.

The average data for these two pens are given in the following tabulated form :

## LOT A—LESS FAT.

No. of fowls.	Days in period.	PERIOD.	Average live weight		Average gain or loss in weight.	Average per day per fowl.						
			beginning.	at end.		Water-free mixed grain No. 10.	Water-free mixed grain No. 16.	Water-free wheat.	Water-free Linseed meal.	Water-free silage.	Water-free cabbage.	Water-free alfalfa.
			Lbs. Oz.	Lbs. Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
6	27	Mar. 3 to Mar. 30	3 3.8	3 12.8	+ 9.	.89		2.04	.14	.06		
4	37	Mar. 30 to May 5	3 12.	2 15.2	—12.8	.55		1.33	.20	.03	.04	
8	21	May 5 to May 26	2 13.6	2 14.4	+ .8	.68		1.19	.11	.05		
8	42	May 26 to July 7	2 14.4	2 10.	— 4.4		.73	1.58	.20	.01	Timothy forage.	.09
8	42	July 7 to Aug. 19	2 10.	2 12.5	+ 2.5		.40	1.35	.20			.13
8	48	Aug. 19 to Oct. 6	2 12.5	3 2.6	+ 6.1		.63	1.45	.21		.04	.03

## LOT A—LESS FAT.

No. of fowls.	Days in period.	Period.	Average per day per fowl.					Ratio of protein to total carbohydrates.	Ratio of protein to carbohydrates with fats $\times 2\frac{1}{2}\%$ .	Total per fowl.		Pounds of water-free food to produce 1 lb. of eggs.
			Total fresh and air dry food.	Total Water-free food.	Total protein in food.	Total N-free extract in food.	Total fat in food.			No.	Wt.	
			Oz.	Oz.	Oz.	Oz.	Oz.				Oz.	Ibs.
6	27	Mar. 3 to Mar. 30	3 81	3.13	.493	2.280	.094	1 : 4.8	1 : 5.1	3.50	5.94	14.23
4	37	Mar. 30 to May 5	2.99	2.15	.363	1.521	.070	1 : 4.4	1 : 4.7	16.75	29.29	2.72
8	21	May 5 to May 26	2.47	2.03	.328	1.451	.064	1 : 4.6	1 : 4.9	7.13	11.83	3.56
8	42	May 26 to July 7	3.28	2.61	.443	1.822	.097	1 : 4.3	1 : 4.7	22.00	36.74	2.96
8	42	July 7 to Aug. 19	2.79	2.68	.357	1.446	.075	1 : 4.3	1 : 4.6	9.25	16.22	5.48
8	48	Aug. 19 to Oct. 6	2.91	2.36	.399	1.654	.086	1 : 4.4	1 : 4.7	4.52	8.34	13.58

## LOT B—MORE FAT.

No. of fowls.	Days in peri- od.	PERIOD.	Average live weight at beginning.		Average live weight at end.		Average gain or loss in weight.	Average per day per fowl.						
			Lbs.	Oz.	Lbs.	Oz.		Water- free mixed grain. No. 10.	Water- free mixed grain No. 16.	Water- free wheat.	Water- free tallow.	Water- free silage.	Water- free cabbage.	Water- free alfalfa.
6	27	Mar. 3 to Mar. 30	3	1.7	3	13.8	+12.1	Oz. .94	Oz. 2.21	Oz. .16	Oz. .06	Oz.	Oz.	Oz.
5	37	Mar. 30 to May 5	4	0.	2	15.8	-18.0	.72	1.10	.19	.02	.04		
8	21	May 5 to May 26	2	15.3	3	0.1	+ .8	.58	1.03	.23	.05	.02		
8	42	May 26 to July 7	3	0.1	3	2.3	+ 2.2	.62	1.45	.24	.25		Timothy forage.	.08
8	42	July 7 to Aug. 19	3	2.3	3	0.0	- 2.3	.97	1.40	.25				.12
8	48	Aug. 19 to Oct. 6	3	0.0	3	3.4	+ 3.4	.26	1.16	.24	.24	.04		.02

## LOT B—MORE FAT,

No. of fowls.	Days in peri- od.	PERIOD.	Average per day per fowl.					Ratio of protein to total carbohy- drates.	Ratio of protein to carbo- hydrates with fats. ×2½.	Total per fowl.		Pounds of water- free food to produce 1 lb. of eggs.
			Total fresh and air dry food.	Total water- free food.	Total protein in food.	Total N-free ex- tract in food.	Total fats in food.			Eggs.	Weight.	
			Oz.	Oz.	Oz.	Oz.	Oz.			No.	Oz.	Lbs.
6	27	Mar. 3 to Mar. 30	4.07	3.37	.478	2.389	.240	1 : 5.5	1 : 6.3	4.67	8.17	11.13
5	37	Mar. 30 to May 5	2.77	2.07	.295	1.365	.233	1 : 5.4	1 : 6.6	14.60	25.50	3.00
8	21	May 5 to May 26	2.33	1.89	.254	1.217	.266	1 : 5.8	1 : 7.4	4.75	7.71	5.15
8	42	May 26 to July 7	3.04	2.41	.338	1.573	.300	1 : 5.5	1 : 6.9	14.63	24.76	4.08
8	42	July 7 to Aug. 19	3.46	2.86	.404	1.752	.325	1 : 5.1	1 : 6.4	15.00	20.41	5.01
8	48	Aug. 19 to Oct. 6	2.12	1.72	.228	1.106	.269	1 : 6.0	1 : 7.8	5.75	10.28	8.00

## FEEDING SALT TO HENS.

Salt has generally been fed to hens at this Station, although in small quantities, and no injurious results have been observed to accompany its use. A short trial was made with some two-year-old hens to get indications of the amount possible to feed without injury. Six hens (two Brahmas, two Cochins and two Game crosses in each pen) were confined Aug. 27th in each of two small pens, 5x8 feet, having yards attached 5x28 feet. They were fed similar rations, consisting of a mixed grain, wheat and grass, and plenty of water was allowed them. The mixed grain contained 5 parts corn meal, 5 parts wheat bran, 3 parts linseed meal (N.P.) and 2 parts wheat middlings.

Those of one pen were fed salt in their food at the rate per day for each fowl of .021 oz. during the first thirteen days, then for nineteen days .042 oz. per day, and then during nine days .063 oz. per day. After this the amount was reduced to .042 oz. per day and continued for twenty days. This salt the hens were obliged to eat, for it was mixed in their food. Until the amount of .063 oz. per day for each hen was fed (at the rate of 6.3 oz., nearly one-half pint, a day for 100 hens) no bad effects were observed. This amount, however, was sufficient to cause diarrhoea in two of the hens. Upon reducing the amount of salt to .042 oz. per hen the trouble disappeared without other treatment.

After these hens had been confined two months (on Oct. 27th), one pen having had no salt whatever and the other all that was consistent with good health, a shallow box of salt (five pounds) was placed on the floor of each pen. After this, salt was no longer mixed with the food but the box of salt was kept in each pen for a month. Although the salt was picked over a little by the hens, not enough was eaten to injure the health of any, and the trial was carried no further.

The total gain in weight per fowl during the first two months was, for those having salt, 8.2 ozs. and for the others 10.5 oz. During the last month it was for those having had salt an average of 2.8 oz., and for the others 8.7 ozs. The total grain food consumed per day was for the salt-fed pen 4.17 oz. per fowl during first two months and 4.28 oz. during the last month. For the other pen the average was 3.40 oz. per day for the two months

and] 4.13 oz. for the last month. During the first two months 94 eggs were obtained from the pen having salt, and during the last month but one egg; while 47 eggs were obtained from the other pen during the two months and 14 during the last month. The number of eggs laid during this trial is of not great significance, as it was about the end of the laying season and the hens were old; but, inasmuch as the yield of eggs was twice as great from the hens having salt, while it was mixed in the food, it would appear that not enough was fed to very injuriously affect egg production.

The salt used was ordinary barrel-salt, although not coarse. Should rock salt be exposed or salt that contained large crystals or fragments as large as the particles of gravel and grit eaten by hens it would of course not take long for a fatal amount to be swallowed. For mature fowls it is probable that salt at the rate of one ounce per day for 100 fowls could, under ordinary conditions, be fed without injury.