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Horace Atwood

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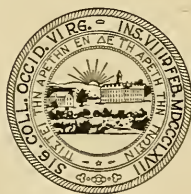
Agricultural Experiment Station

College of Agriculture, West Virginia University

HENRY G. KNIGHT, Director
Morgantown

A Balanced and An Unbalanced Ration Fed Prior to the Hatching Season As Affecting the Hatchability of Eggs and the Vigor of the Progeny

(Technical)



By
HORACE ATWOOD

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*In cooperation with the U. S. Department of Agriculture, Washington, D. C.
 †In charge of the Lakin Sub-Station, Lakin, W. Va.
 **In cooperation with the State Department of Agriculture, Charleston, W. Va.
 ‡In charge of the Reymann Memorial Farms, Wardensville, W. Va.

A BALANCED AND AN UNBALANCED RATION FED PRIOR TO THE HATCHING SEASON AS AFFECTING THE HATCHABILITY OF EGGS AND THE VIGOR OF THE PROGENY

The period during which hens can produce eggs profitably is usually limited to the first two years of their lives. This makes it necessary, in practice, to replace about one-half of the laying flock with pullets each fall, and as this requires raising at least twice as many chickens as there are birds in the laying flock any information which sheds light on the factors which affect the hatchability of eggs or the vigor of chickens is of practical importance to the poultryman.

Does heavy laying during the winter and early spring months measurably decrease the hatchability of the eggs, or the vigor of the progeny produced later in the season? If this should be the case it would be necessary, for best results, to feed and manage the breeding flock so that few eggs would be produced during the period immediately prior to the hatching season.

The experiment herein reported was planned to give the information desired.

General Plan of the Experiment

The experiment was begun November 1, 1923, and was concluded September 19, 1925. The fowls used were Single Comb White Leghorns of the strain developed at the West Virginia Agricultural Experiment Station. The birds were hatched May 9, 1923, and they were raised under practically free range conditions.

Six pens of fowls were employed, each consisting of 16 female birds. They were housed in separate colony houses, numbered 4 to 9, and trapped. During the winter of 1923-24 the fowls in houses 5, 8, and 9, hereafter designated as Lot 1, were fed for egg production, while the other fowls were fed principally upon whole grain so that few eggs were laid. During the succeeding winter, however, the rations were reversed, the fowls in Lot 2 being fed for eggs and those in Lot 1 receiving the whole grain ration.

In the spring of 1924 and also in 1925 eggs laid by these fowls were incubated and a record was kept of the fertility and hatchability of the eggs and the mortality and rate of growth of the offspring.

RATIONS USED

The mixture of whole grain consisted of two parts by weight of yellow corn, two parts of wheat, and one part of oats. The mash was composed of two parts of yellow corn meal, and one part each of wheat bran, wheat middlings, and meat scrap. The mash was self-fed in hoppers and the whole grain in straw litter. The fowls fed for egg

production also received a moderate allowance of semi-solid buttermilk. The fowls fed for low egg production were fed liberally upon the whole grain mixture until a short time before eggs were saved for hatching. Then these fowls, also, received mash and semi-solid buttermilk.

WEIGHING THE FOWLS

Each bird was weighed at the beginning of each calendar month, beginning November 1, 1923. This was done at night soon after the birds had assembled on the perches.

Table 1 shows the number of pounds of feed consumed by each lot of 48 fowls per month, the total number of eggs laid per month, and the average weight of the birds.

TABLE 1.—Feed Consumed, Eggs Laid, and Average Weight of Birds by Months for Lots 1 and 2 During the First Year.

Lot 1, Pens 5, 8, and 9, Fed for High Egg Production					
Months	Pounds Whole Grain	Pounds Mash	Pounds Semi-Solid Buttermilk	Number of Eggs Laid	Average weight of Birds in Pounds
1923					
November	181	83	45	408	3.22
December	175	122	46	395	3.49
1924					
January	169	114	46	173	3.57
February	150	114	43	529	3.67
March	154	165	48	1012	3.68
April	167	183	46	1109	3.64
May	173	181	46	1084	3.63
June	172	150	38	964	3.54
July	164	171	35	877	3.61
August	132	158	35	632	3.37
September	119	141	33	301	3.37
October	131	117	35	128	3.41
Total	1894	1699	496	7612	

TABLE 1.—Continued.

Lot 2, Pens 4, 6, and 7, Fed for Low Egg Production					
Months	Pounds Whole Grain	Pounds Mash	Pounds Semi-Solid Buttermilk	Number of Eggs Laid	Average weight of Birds in Pounds
1923 November	188	60	21	323	3.09
December	195	60		200	3.30
1924 January	245			39	3.34
February	237			175	3.23
March	244			429	3.32
April	221			259	2.89
May	171	146	33	842	2.57
June	171	154	38	1036	3.29
July	164	173	35	940	3.33
August	132	159	35	843	3.27
September	126	135	33	566	3.20
October	132	117	35	205	3.32
Total	2226	1004	230	5857	

Lot 1, which received the better balanced ration during winter, consumed 4089 pounds of grain, mash, and semi-solid buttermilk and laid 7,612 eggs, while Lot 2 consumed only 3,460 pounds of these feeds and laid 5,857 eggs. This illustrates the fact that the better the ration the more the fowls will eat and the better they will lay. It may be observed, also, that the maximum rate of egg production in the case of Lot 1 was during April and May, while with Lot 2 the maximum was reached about a month later.

The ration of whole grain only during January, February, March, and April had a marked effect upon the weight of the birds. On May 1, at the expiration of the period of exclusive whole grain feeding, the

birds in Lot 2 averaged 2.57 pounds in weight or nearly one-half pound less than they weighed six months earlier and this decrease had taken place in spite of the fact that they were fed all of the whole grain mixture that they would consume. On the other hand the birds in the other lot on the better balanced ration had an average weight of 3.63 pounds, or a difference in the weight of the fowls in the two lots of more than one pound per bird. With the addition of mash and semi-solid buttermilk to the ration for Lot 2 these birds rapidly increased in weight and also in the rate of egg production.

The influence of the two rations used during the four months on the mean weight of the eggs laid during that period has been discussed in West Virginia Experiment Station Bulletin No. 201 entitled, Some Factors Affecting the Weight of Eggs.

HATCHING THE EGGS

A white Leghorn cockerel was placed with each pen of 16 birds, and beginning a few days before and during the time when eggs were saved for hatching these males were systematically and regularly changed daily from one pen to another so as to avoid as far as possible the effect of any possible difference in the breeding abilities of the males.

Two hatches were made in Cyphers 400 egg incubators. For the first hatch eggs were saved from May 15 to May 20 and the incubator was started May 21. For the second hatch the eggs were saved from May 21 to May 26 and the eggs set on the following day. Table 2 gives the details of the two hatches.

TABLE 2.—Fertility and Hatchability of Eggs Laid by the Two Lots of Fowls.

Data Recorded for First Hatch	Lot 1	Lot 2
Number of eggs incubated	194	188
Per cent of eggs hatched	83	74
Per cent of eggs fertile	91	92
Per cent of fertile eggs hatched	91	80
Data Recorded for Second Hatch	Lot 1	Lot 2
Number of eggs incubated	192	207
Per cent of eggs hatched	88	85
Percent of eggs fertile	94	94
Per cent of fertile eggs hatched	93	90

The fertility was almost the same in the eggs from both lots of fowls. In the first hatch the hatchability was greater in the eggs from Lot 1, but in the second hatch the difference was slight.

RAISING THE CHICKENS

The chicks were toe marked and brooded in Mammoth brooders. Both lots ran together and were given free range. The birds were weighed individually on September 13 at which time those of the first hatch were 94 days old and those of the second hatch 88 days old.

Deaths from weakness or disease were reasonably low as only 5.7 per cent of the progeny of the fowls in Lot 1 died, and 2.5 per cent of Lot 2.

Table 3 shows the number of chicks weighed, the sex, and the mean weight of the birds hatched from eggs laid by the two lots of fowls.

TABLE 3.—Weight of Chickens on September 13, 1924, for the Two Hatches.

Data Recorded for First Hatch	Lot 1	Lot 2
Number of males	74	77
Number of females	69	54
Mean weight of males	2.62±.02	2.60±.02
Standard deviation in weight of males	.236±.013	.212±.012
Mean weight of females	2.06±.01	2.04±.02
Standard deviation in weight of females	.145±.008	.191±.012
Data Recorded for Second Hatch	Lot 1	Lot 2
Number of males	65	90
Number of females	86	78
Mean weight of males	2.31±.02	2.37±.02
Standard deviation in weight of males	.244±.014	.265±.013
Mean weight of females	1.86±.02	1.85±.02
Standard deviation in weight of females	.193±.010	.225±.012

The table shows that there was no significant difference in the weight of the chickens resulting from the two different ways of feeding the breeding stock. There also was no significant difference in variability in weight. The males averaged about one-half pound heavier than the females.

Second Year of Test

During the second year the experiment was conducted on the same lines as during the first year, with the exception that the rations were alternated as has been already explained.

Table 4 shows the amount of feed consumed, number of eggs laid, and the average weight of the birds during the second year of the test.

TABLE 4.—Feed Consumed, Eggs Laid, and Average Weight of Birds by Months for Lots 1 and 2 During the Second Year

Lot 1, Pens 5, 8, and 9, Fed for Low Egg Production					
Months	Pounds Whole Grain	Pounds Mash	Pounds Semi-solid Butter-milk	Number of Eggs Laid	Average Weight of Birds in Pounds
1924 November	142	118	34	77	3.40
December	139	111		11	3.43
1925 January	240			15	3.74
February	242			111	4.09
March	239			272	4.11
April	240			499	3.87
May	142	135	30	831	3.24
June	73	230	33	941	4.12
July	69	228	34	821	3.66
August	79	226	34	639	3.73
September 1st					3.62
Total (10 months)	1605	1048	165	4217	

TABLE 4.—Continued.

Lot 2, Pens 4, 6, and 7, Fed for High Egg Production					
Months	Pounds Whole Grain	Pounds Mash	Pounds Semi-solid Butter-milk	Number of Eggs Laid	Average Weight of Birds in Pounds
1924 November	142	119	34	63	3.15
December	141	113	34	10	3.32
1925 January	167	109	34	92	3.76
February	169	106	31	236	4.03
March	169	111	34	663	4.02
April	171	112	33	1005	4.04
May	143	140	34	1032	3.78
June	71	232	33	958	3.84
July	67	233	34	973	3.82
August	70	232	34	810	3.79
September 1st					3.63
Total (10 months)	1310	1507	335	5842	

Although the fowls of Lot 1 during January, February, March, and April were fed liberally, they consumed considerably less feed than the fowls in Lot 2, did not lay so well, and were slightly more than one-half pound lighter in weight at the end of that period. The maximum rate of egg production for Lot 2 was reached during April and May while with Lot 1 the maximum was reached about a month later.

HATCHING THE EGGS

All of the eggs laid by both lots of fowls from May 12 to 24, inclusive, were incubated in two 400 egg size Cyphers incubators. Table 5 gives the details of the hatch.

There was no appreciable difference in the fertility or hatchability of the eggs from the two lots of fowls.

TABLE 5.—Fertility and Hatchability of the Eggs During the Second Year.

Data Recorded for the Hatch	Lot 1	Lot 2
Number of eggs incubated	415	413
Per cent of eggs hatched	83	82
Per cent of eggs fertile	91	92
Percent of fertile eggs hatched	90	89

The two lots of chicks were toe-marked and then placed together in one flock. They were brooded in two Mammoth brooders and given free range during summer. The mortality from weakness or disease was reasonably low, the number of recorded deaths being 13 or 3.8 per cent for Lot 2 and 17 or 4.9 per cent for Lot 1.

WEIGHING THE CHICKS

The chicks were weighed individually on September 19, 1925, when they were 96 days old. Up to that time 5 had met accidental deaths, 25 had lost their distinguishing marks so that it was impossible to determine to which lot they belonged, and 48 were missing, probably having been caught by cats or crows. Table 6 gives the details of the weights of the 573 chicks remaining. This table shows that there was no difference in the weight of the chickens hatched from eggs laid by the two lots of fowls.

TABLE 6.—Weight of Chicks September 19, 1925.

Data Recorded	Lot 1	Lot 2
Number of males	133	124
Number of females	159	157
Mean weight of males	2.21±.02	2.20±.02
Standard deviation in weight of males	.28±.01	.26±.01
Mean weight of females	1.74±.01	1.76±.01
Standard deviation in weight of females	.21±.01	.22±.01

Conclusion

This experiment affords no evidence tending to show that a reasonably heavy egg production immediately prior to the hatching season has a detrimental influence on the fertility or hatchability of the eggs or on the vigor of the progeny.

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