A G R I C U L T U R A L E X P E R I M E N T S T A T I O N

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ARTIFICIAL PROPAGATION OF PHEASANTS

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by

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ARTIFICIAL PROPAGATION OF PHEASANTS

Purpose of the Study

There being little authentic information available regarding the artificial propagation of pheasants, the poultry department undertook a preliminary study of the problem at the request of and in cooperation with the Oregon State Game Commission.

It was not the purpose of the study to attempt a solution to what might be considered an existing problem, but rather to determine the nature of the problems that might arise with the idea of later making a definite study of such problems.

The experimental work reported herein is divided into two distinct parts:

1. (A) Artificial and Natural Incubation
   (B) Results with Different Types of Incubators

2. (A) Artificial and Natural Brooding
   (B) A Comparison of Three Different Rations on Livability and Growth

ARTIFICIAL AND NATURAL INCUBATION

Hatching Eggs

The eggs used were furnished by the Game Commission and were produced on the Eugene Game Farm. They were produced by the same breeding stock that produced the hatching eggs for the game farm. It required eleven days to collect the desired number. During this period the eggs were gathered daily. They were kept in a cool place and when packed, each egg was carefully wrapped and packed in a standard thirty-dozen egg case. They were delivered to the College at three-day intervals. They were held in a room at fifty-five degrees and turned daily while being held for setting. The eggs varied in age from one to eleven days when set.

Hatching Equipment

Incubators: Three different types of incubators were used - a Mammoth Buckeye, a Newtown Giant, and a Charters.

The Mammoth Buckeye incubator represents a type of circulating air machine. The heat is generated by an electric element and circulated throughout the machine by an electric fan. It is equipped with an automatic egg turning device and automatic humidifier. It is one of the popular hen egg hatching machines because of its simplicity of operation and generally good results in chicken egg hatching.

The Newtown Giant incubator is a sectional hot water heated machine with individual temperature regulation for each compartment of 150 chicken egg capacity. It is also equipped with automatic egg turning devices. Moisture is

supplied by means of trays with damp sand placed under the hatching egg trays. This machine has been used successfully by the department for a number of years in hatching chicken eggs.

The Charters incubator is a so-called small type hot water, lamp heated machine of 540 chicken egg capacity. Moisture is supplied by means of a water pan located near the heater. Automatic turning may be provided for each tray but was not used in this experiment. It is one of the popular makes of small capacity machines used on the Coast. The department has used machines of this make successfully for a number of years.

Natural Hatching. In order to serve as a check on the machine hatching, five chicken hens were used. Their nests were constructed in such a way as to permit the hens to leave them at any time for feed, water, and exercise. Each hen was provided with an individual yard joined to the setting nest. The nests were located in the incubator room, and consisted of four inches of moist loam placed on the cement floor. The loam was concaved and a nest made of fine soft meadow hay placed on top of it.

Management of Incubators and Hens

Hatching Eggs. The eggs used, having been laid on eleven successive days, were divided as evenly as possible, according to the number laid on a particular day and the number to be set in the particular machine. Eggs set under hens were divided in a similar way so that each machine and each hen had eggs as near alike as possible.

Operating Temperatures. Each machine was operated according to the manufacturer's directions for chicken eggs. With the exception of the Buckeye machine, the thermometer bulbs rested on the top of the eggs. Temperatures of both room and incubators was recorded morning, noon, and night throughout the hatching period.

Moisture. This was supplied in the manner prescribed for each different machine by the manufacturer. It was supplied from the start of the hatch and continued throughout the hatching period except in the case of the Buckeye where because of low egg moisture loss, it was discontinued during the second week. No moisture was added to the hens' nests. Moisture losses were determined by weighing the eggs at six-day intervals.

Turning and Cooling. Starting the third day, the eggs were turned twice daily, morning and evening, until the twentieth day at which time they were arranged for hatching and left undisturbed until the hatching was completed.

The eggs set in the Newtown Giant, Charters and four trays in the Buckeye incubators were hand turned; the remaining trays in the Buckeye were turned automatically and were not cooled. All hand turned eggs were taken from the machines and turned. The only cooling of eggs provided was during the process of turning. In returning the trays to the machines, they were reversed and alternated once daily.

Combination Hatches

In order to determine the variation in results of both setting and hatching, a representative sample of eggs was taken from each incubator on the twentieth day and placed in each of the other two machines for hatching. Table No. 2 shows the difference in chicks hatched, dead in shell, and eggs pipped of those recorded dead in shell. Table No. 1 gives results of eggs set in each machine irrespective of where hatched.

Results and Conclusions

While the results, as anticipated, are not conclusive, they are extremely interesting and indicate that pheasant eggs can be successfully incubated by artificial methods. Table No. 1 summarizes the results of the entire series of hatches. The results credited to each incubator include the results of the combination hatches. Table No. 2 gives the results of hatching by the various combinations. The hatching results indicate a problem in the use of circulating air incubation. The difference in the number of eggs taken out as infertile and dead germs from the incubators or hens do not appear to be significant. Candling on the twentieth day did not indicate that the germs in the eggs set in any one type of machine were stronger or different than those in the other two types of machines or of those eggs set under the hens.

With but the small number of hens and the one hatch with the incubators, it is considered unwise to attempt to draw conclusions as to the comparative hatching value of natural and artificial methods. The results indicate that pheasants may be hatched economically by artificial methods. Also, that the quality of the chick hatched appears to be equal to that of natural methods.

ARTIFICIAL AND NATURAL BROODING

Objective

The purpose of the brooding experiment was to determine the results produced by feeding three different rations, upon growth and quality of baby pheasants. It was felt that if satisfactory results could be obtained by using a ration that was not only less costly than the present game farm ration in its ingredients and requiring less labor in mixing and feeding, a saving could be effected and this part of game farm management greatly simplified.

While the results obtained would not justify a radical change in the ration or method of feeding now being followed on the State Game Farms, there is sufficient evidence to justify the feeling that with another season's experimental feeding tests, a less expensive ration and one giving satisfactory growth and quality would be developed.

Stock

The baby pheasant checks used were a part of those hatched in the incubator tests previously reported. The chicks hatched with hens were kept intact and brooded with hens in order to serve as a check upon the artificial brooding.

ARTIFICIAL PROPAGATION OF PHEASANTS

Summary of Hatching Results

Hatch No.	Date Set	No. of Eggs Set	Fertile Eggs		Dead Germs 1st 20 days		Eggs Pipped		Healthy Chix	Dead in Shell	Per Cent Hatch	
			No.	%	No.	%	No.	*%			Eggs Set	Eggs left in
Hen A	May 22	20	17	85.	0	0.	0	0.	12	5	60.	70.6
Hen B	" 22	20	16	80.	0	0.	0	0.	16	0	80.	100.
Hen C	" 22	20	16	80.	1	5.	0	0.	10	5	50.	66.6
Hen D#	" 22	20	19	95.	0	0.	0	0.	16	3	80.	84.2
Hen E	" 22	20	19	95.	0	0.	0	0.	18	1	90.	94.7
Charters	" 22	790	664	84.05	29	3.67	11	9.72	521	114	65.4	82.
Newtown	" 22	1951	1646	84.3	79	4.1	76	12.64	966	601	49.5	61.6
Buckeye	" 22	950	783	82.4	32	3.36	179	39.86	302	449	31.7	41.7
Total		3791	3180	83.9	141	4.4	266	22.6	1861	1178	46.4	58.5

* % of dead in shell eggs pipped.

\# Hen D died 5/29/34. Eggs transferred to Newtown for remainder of incubation period.

Table No. 1

ARTIFICIAL PROPAGATION OF PHEASANTS
COMBINATION HATCHES

Eggs set first 20 days in Charters Incubator -

Eggs set	Infertile		Dead Germs		No. of eggs left in and eggs transferred	Chicks hatched		Dead in Shell		Pipped	
	No.	%	No.	%		No.	%	No.	%	No.	%
790	126	15.9	29	3.67	535	454	84.8	81	15.1	5	6.1
Eggs transferred on 20th day to:											
Newtown Giant					50	40	80.	10	20.	0	0.
Buckeye					50	27	54.	23	46.	11	47.8
					- Eggs set first 20 days in Newtown Giant Incubator -						
1951	305	15.6	79	4.1	1417	894	63.	523	36.9	52	9.9
Eggs transferred on 20th day to:											
Charters					50	34	68.	16	32.	0	0.
Buckeye					100	38	38.	62	62.	7	11.2
					- Eggs set first 20 days in Buckeye Circulating Air Incubator -						
950	167	17.69	32	3.36	751	253	33.	398	52.	145	36.
Eggs transferred on 20th day to:											
Charters					50	29	58.	21	42.	11	52.
Newtown					50	20	40.	30	60.	23	76.

Table No. 2

In making up the definite number of chicks for each brooder, the same number was used from each incubator. In so doing, the chicks in each brooder were similar at the beginning of the experiment.

Equipment

Pens. The stationary brooder house located at the College South Poultry Farm was used for the test. This house is similar in construction to the plan shown in Extension Bulletin No. 451. The pens are 12' x 16' with an adjoining concrete yard 16' x 20' enclosed with inch mesh poultry netting. There are two windows four feet square in the front of each pen. These are covered with muslin covered frames constructed in such a way that the upper half may be tipped in for ventilation, or the entire frame may be removed.

Brooders. Six Lyons electric brooders were used and operated according to the manufacturer's directions. The temperatures, however, were maintained at a slightly higher degree than usually recommended for chicken chicks. All feeding and drinking equipment used during the brooding period was the same as recommended and shown in Extension Bulletin No. 465.

Cut straw was used for litter during the first two periods (four weeks). Sawdust the same as used for furnace fuel was used as litter during the third period (two weeks). The concrete yards were covered with sawdust throughout the entire period.

Hen Brooding Pens. Four regulation hen brooding pens 4' x 12' were provided by the Game Commission from the Eugene Game Farm. These coops are unique in that they provide different special arrangement according to the needs of the chicks at different ages.

Rations Used

Composition of Rations. Table No. 3 gives the composition and analyses of the three rations used in the experiment. The check ration is that which is used during the early growing periods for game birds on the State Game Farms, although on the game farms lettuce and carrots are not regularly used as a part of the ration. Water and sour skimmilk was given as drink throughout the experiment.

Ration No. 1 is the regular turkey starting ration used and recommended by the College Poultry Department. It has given such outstandingly good results with young turkeys that it was thought worthy of trial with pheasants. One change was made in the ingredients. Ground oat groats were substituted for ground whole oats.

Ration No. 2 is higher in protein and lower in minerals than ration No. 1. Due to the natural rapid growth of young pheasants, it was felt that a ration comparatively high in protein might be desirable.

Feeding Methods. As mentioned in the footnote under Table No. 3, the check ration was fed moist three times daily at the start and throughout the experiment. Rations 1 and 2 were fed as a dry mash during the first period (two weeks). The chicks were weighed at the end of the first period. Considering

Composition of Rations Used

Mash	Check Ration	Experimental Ration No. 1	Experimental Ration No. 2
Corn, No. 2, Yellow, ground		150.00#	125.00#
Mill run		60.00	60.00
Wheat, ground		75.00	50.00
Oat Groats, ground		25.00	50.00
Meat Meal (special 67% protein)		50.00	100.00
Fish Meal (70% protein)		50.00	50.00
Skim Milk, powdered		37.5	37.5
Alfalfa Meal (20% protein)		25.00	25.00
Bone Meal		10.00	--
Oyster Shell Flour		7.5	--
Fine Salt		2.5	2.5
Fish Oil		6.25	6.25
Chick Starter Mash (commercial)	50%		
Spratts Game Meal No. 12	10		
Beef Liver (fresh, boiled and ground)	5		
Lettuce, Carrots, green Alfalfa	20		
Cottage Cheese	10		
Hard-Boiled Eggs	5		
Scratch Grains			
Corn, No. 2 cracked chick size	25%	50%	50%
Wheat, cracked	25	50	50
Wheat Flakes (commercial)	50		

Analysis of Rations

Rations	Protein	Calcium	Phosphorus
Check	25.68%	1.54%	.78%
No. 1	23.85%	2.03%	1.06%
No. 2	29.71%	1.30%	.99%

Scratch Grain, grit and charcoal fed in trays available at all times. Water at all times and sour skimmilk to drink after the first week.

Check Ration: This is the regular Oregon gamo farm ration and was fed moist three times daily.

Experimental Ration No. 1: This is the regular college turkey ration, excepting that ground oat groats were substituted for ground whole oats; also that a special 67% protein meat meal was used in place of a 55% protein meal. The ration was fed dry during first period. Available at all times. During second and third periods it was fed moist, with changes as noted under "feeding methods."

Experimental Ration No. 2: This ration was compounded in such a way as to increase the animal protein content. It was fed dry during first period, available at all times. During second and third periods it was fed moist with certain changes in composition as indicated in text.

Table No. 3.

the comparative gains in weight and the appearance of the chicks, it was deemed unwise to continue further the use of dry mash. At the beginning of the second period, pens 3, 4, 5, 6 were changed to a moist mash feeding system. Also liver broth and ground boiled liver were added to the ration of pens 3 and 5 and sour skimmilk to pens 4 and 6. From the beginning of the second period, all pens and chicks with hens were fed with moist mash three times daily.

Scratch Grain. The composition of the scratch grain is shown in Table 3. It was kept in trays and was available at all times. It is of interest that very little scratch grain was consumed by the birds in any of the pens.

Growth According to Ration Fed

In referring to Table No. 4 and Plate No. 1, it will be noted that by the end of the first period (two weeks), the chick pen chicks had made considerably greater gains than the chicks on either of the other two rations. This difference led to the change in rations and feeding method.

During the second and third periods the difference in gain was not so great as during the first period. From the standpoint of uniform growth, pens 1 and 2 were noticeably outstanding throughout the experiment. The variation in the size and weight of the chicks on rations 1 and 2 was undoubtedly in a large part due to the dry mash system used during the starting period.

The growth of chicks on ration No. 2 would undoubtedly have been more satisfactory had they been fed the same ration moistened from the start. As it was, the size and weight of the chicks in this lot were well up to those in the check pen at the close of the experiment.

Hen brooded chicks fed on the various rations showed gains comparable with chicks fed the same rations but artificially brooded.

Mortality

In this experiment mortality has been divided into three general classifications: ordinary mortality, such as caused by disease; cannibalism or chicks killed through picking by other chicks; accidental, or those killed by accident.

Ordinary Mortality. No specific disease was apparent in the chicks lost through what might be termed ordinary causes. The losses in chicks fed on rations 1 and 2 during the first period were, in a large measure, due to a wasting away through starvation. It was quite apparent in these lots that the dry mash was not palatable and therefore not eaten as readily as was the case with the chicks on the moist mash. The total loss of chicks on the check ration during the six weeks period and amounting to 2.2 per cent indicates that the quality of the chicks at the start was satisfactory. It also indicated that artificial brooding was comparable to natural methods.

Cannibalism. As in the brooding of chicken chicks, so with pheasant chicks one of the great problems appears to be the destroying of one another. The causes of this condition are not entirely understood. Over-crowding will invariably start toe-picking, feather-pulling, and vent-picking. An overheated brooder room is thought to be a common cause. Injury is also responsible, in some cases, and by many it is thought that the ration fed is responsible.

Growth of Chicks According to Ration Fed

Weight in Grams	Check Ration			Ration No. 1			Ration No. 2		
	Brooders		Hen	Brooders		Hen	Brooders		Hen
	No. 1	No. 2	No. 1	No. 3	No. 4	No. 2	No. 5	No. 6	No. 3
Avg.wt. at start	16.8	16.8	18.5	16.7	16.7	18.2	16.5	17.1	18.3
First Period*									
Avg.wt. per chick	53.2	56.2	62.5	32.2	33.4	33.6	39.9	38.8	42.2
Avg. gain " "	36.4	39.4	44.0	15.5	16.7	15.4	23.4	21.7	24.0
% gain per chick	217.0	234.6	238.2	93.0	99.6	85.0	141.0	127.4	131.2
Second Period*									
Avg.wt. per chick	129.2	135.0	175.2	96.1	87.1	102.7	120.1	109.7	127.8
Avg. gain " "	76.0	78.8	112.7	63.9	53.7	69.1	80.2	70.9	85.6
% gain for period	143.0	123.3	160.3	198.4	163.8	205.4	201.3	192.0	202.8
% " from start	669.0	703.0	849.5	475.8	426.7	465.6	626.5	543.2	600.2
Third Period*									
Avg.wt. per chick	277.2	263.2	283.9	194.9	172.7	211.1	229.1	230.4	268.1
Avg. gain " "	148.0	128.2	108.7	98.8	85.6	108.4	109.0	120.7	140.3
% gain for period	114.6	95.0	62.1	102.9	98.3	105.6	90.7	110.0	109.8
% " from start	1551.0	1454.7	1439.0	1068.0	952.6	1063.1	1285.7	1250.6	1368.8

* Each period of two weeks duration.

Table No. 4

In this experiment it is of interest to note that very little trouble was experienced with cannibalism in pens 1 and 2, the check pens, during the six weeks of the experiment. During the four days immediately following the completion of the six weeks period picking broke out in both of these pens, especially in pen 2. Several birds were killed and a number saved only by removing them from the pens.

The greatest loss from cannibalism was in pen 4. This was one of the low protein ration pens. There were a number of comparatively small birds in this lot. These small birds appeared to be the culprits in starting the picking of larger birds. It undoubtedly would have been good management had these small birds been removed.

There is little doubt but that losses from cannibalism could be greatly reduced by either extending the runs and thereby allowing the birds more exercising space or by reducing the number of birds per pen when four weeks of age.

Accidental Deaths. All birds killed by accident, such as being stepped upon or as was the case on two occasions, scared during the night, which caused a few of them to leave the hovers and become chilled against the sides of the brooder rooms. The loss during the first period in pen 6 and charged to accident was caused by the use of a strong disinfectant used in cleaning the pen. During the first night of the experiment, 15 chicks died. Many had affected eyes and died during the second and third days. There will always be some loss by accident, but such losses should be relatively small.

GENERAL CONCLUSIONS

1. This experiment checks with the general impression that still air incubators give better hatching results than circulating air machines with pheasant eggs.

2. There is need for further experimental work in determining the proper humidity conditions for optimum results during the setting and hatching periods.

3. The quality of the chicks hatched in still air machines was equal to that of the chicks hatched by natural methods.

4. That artificial brooding can be successfully used in rearing pheasants.

5. Artificial brooding compared favorably with natural brooding and required less labor.

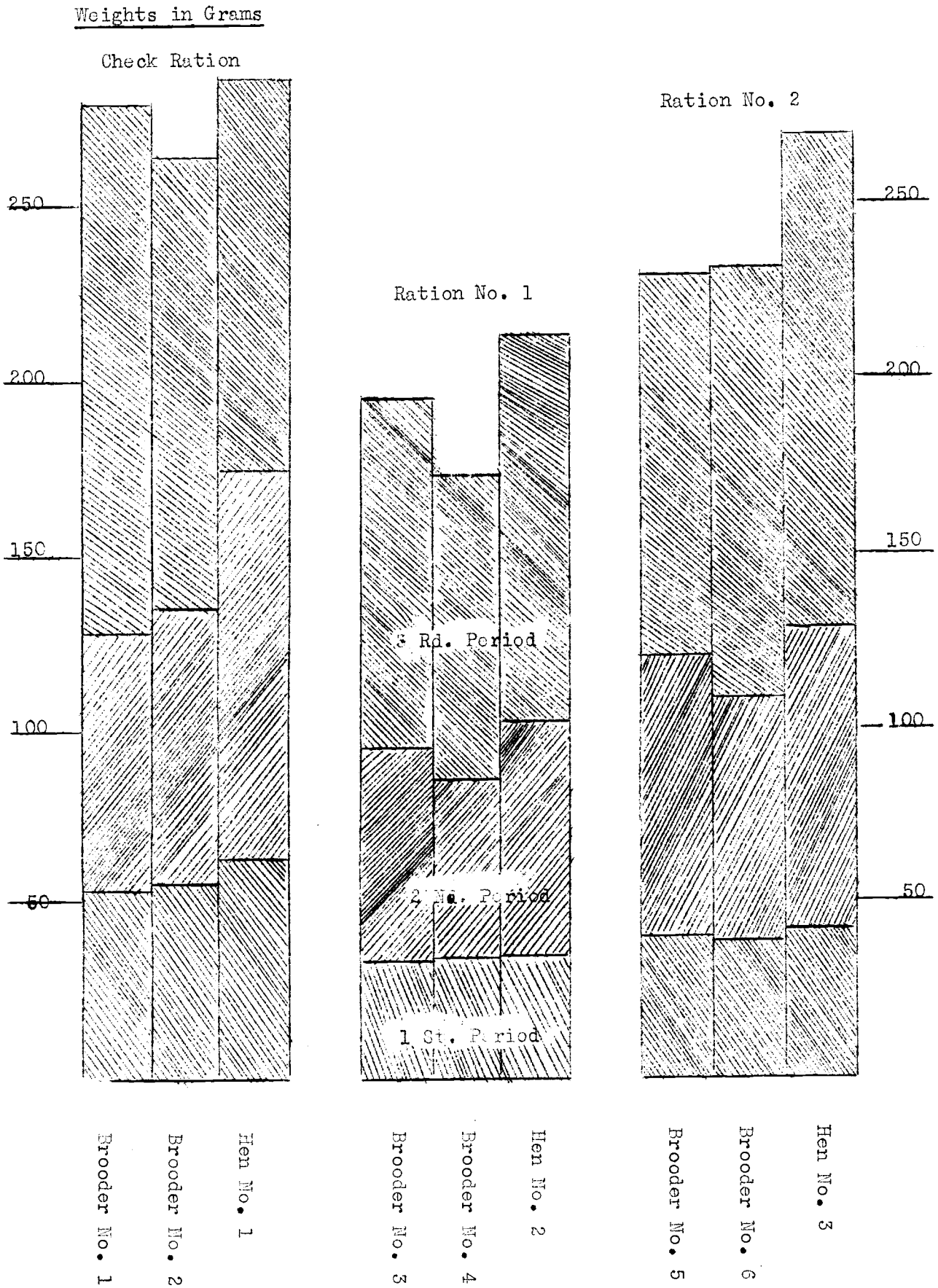
6. The dry mash feeding system used did not appear to be as satisfactory in starting pheasant chicks as did the moist mash system.

7. That the standard college turkey ration did not produce satisfactory growth when compared with the other two rations.

8. Finally, it is appreciated that more experimental work is necessary in order to solve some of the apparent problems in artificial propagation of pheasants. This experiment indicates, however, that it is possible to rear pheasants successfully, and economically by artificial methods.

PLATE NO. 1

Growth According to Ration Fed
Each Period Equals Two Weeks



MORTALITY

First Period

Ration	Brooder or Hen No.	Chicks Put In	Ordinary Mortality		Cannibalism		Accidental Deaths		Total Loss Other Than Accidental	
			No.	%	No.	%	No.	%	No.	%
Check	1	150	1	.7			1	.7	1	.7
"	2	150	2	1.3			2	1.3	2	1.3
	Hen 1	20								
	TOTALS	320	3	.9			3	.9	3	.9
No. 1	3	150	14	9.3			7	4.7	14	9.3
" 1	4	150	23	15.3	3	2.0	6	4.0	26	17.3
" 1	Hen 2	20	2	10.0					2	10.0
	TOTALS	320	39	12.2	3	.9	13	4.0	42	13.1
No. 2	5	150	8	5.3			6	4.0	8	5.3
" 2	6	150	18	12.0			40	26.7	18	12.0
" 2	Hen 3	20	2	10.0					2	10.0
	TOTALS	320	28	8.7			46	14.3	28	8.7
Second Period										
Check	1	150	2	1.3					2	1.3
"	2	150	2	1.3	4	2.7	1	.7	6	4.0
	Hen 1	20								
	TOTALS	320	4	1.3	4	1.3	1	.3	8	2.5
No. 1	3	150	9	6.0	5	3.3	2	1.3	14	9.3
" 1	4	150	4	2.7	15	10.0	10	6.7	19	12.7
" 1	Hen 2	20								
	TOTALS	320	13	4.1	20	6.3	12	3.7	33	10.3
No. 2	5	150	4	2.7	3	2.0	4	2.7	7	4.7
" 2	6	150	4	2.7			14	9.3	4	2.7
" 2	Hen 3	20								
	TOTALS	320	8	2.5	3	.9	18	5.6	11	3.4
Third Period										
Check	1	150			3	2.0	1	.7	3	2.0
"	2	150			8	5.3			8	5.3
"	Hen 1	20								
	TOTALS	320			11	3.4	1	.3	11	3.4
No. 1	3	150			8	5.3			8	5.3
" 1	4	150	1	.7	25	16.7			26	17.3
" 1	Hen 2	20			1	5.0			1	5.0
	TOTALS	320	1	.3	34	10.6			35	10.9
No. 2	5	150	1	.7	2	1.3			3	2.0
" 2	6	150	6	4.0	2	1.3			8	5.3
" 2	Hen 3	20								
	TOTALS	320	7	2.2	4	1.3			11	3.4
Summary or Total Mortality for Three Periods										
Check	1, 2, & Hen 1	320	7	2.2	15	4.7	5	1.5	22	6.9
No. 1	3, 4, & Hen 2	320	53	16.5	57	17.8	25	7.8	110	34.3
No. 2	5, 6, & Hen 3	320	43	13.4	7	2.2	64	20.0	50	15.6