Feeding High-Energy Rations to Laying Hens

Rollin H. Thayer
and
Don L. Brooks

OKLAHOMA A&M COLLEGE
DIVISION OF AGRICULTURE
SCIENCE SERVING AGRICULTURE
EXPERIMENT STATION

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CONTENTS

A Feeding System Based on Research

A feeding system for laying hens in which high-energy or high-efficiency rations are fed has been developed at the Oklahoma Agricultural Experiment Station. Data obtained in feeding tests* and from practical feeding experience in the Oklahoma Egg Laying Test were used as the basis for this feeding system. Feed formulas and an explanation of the feeding system are presented in this bulletin. Detailed reports of the feeding tests are given in Technical Bulletin T-66.

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By Rollin H. Thayer and Don L. Brooks
Department of Poultry Husbandry

What High-Energy Rations Are

High-energy layer rations, from a nutritional standpoint, represent more than just low-energy rations with the energy increased. High-energy rations contain not only levels of energy, but also levels of protein, vitamins, and minerals which are higher than the usually recommended nutrient allowances for laying hens. In addition, all nutrients are in better balance. Therefore, a higher percentage of the nutrients is utilized for egg production, and less feed is required to produce a dozen eggs.

The energy level of a poultry ration is measured in calories of metabolizable energy per pound of ration. The metabolizable energy is that part of the feed which is actually digested by the chicken and is therefore available for growth or egg production.

High-energy rations contain metabolizable energy levels from 10 to 15 percent higher than those found in low-energy or ordinary rations. For example, a typical low-energy ration contains 1175 calories of metabolizable energy per pound, while a typical high-energy ration contains more than 1300 calories.

The increased amount of metabolizable energy required in high-energy rations is provided in two ways. Highly-digestible, low-fiber feed ingredients are used in formulating the high-energy ration. These feed ingredients provide more metabolizable energy than do high-fiber feedstuffs. In addition, feed-grade fats which contain 2.25 times the metabolizable energy of the starches and sugars in grain are used to further increase the energy level of the ration. It should be emphasized, however, that additional amounts of energy are not utilized efficiently unless adequate levels of high-quality protein are provided.

The adequacy of the protein in any poultry ration is determined by the amount of each amino acid which it contains. Two things have been given special consideration in high-energy rations in order to supply these amino acids in amounts adequate to meet the needs of the hen for high egg production: (1) the protein level in high-energy rations has been increased by 10 percent; and (2) a careful selection of the protein concentrates used in these rations has been made, based upon their amino acid content. In this way, amino acids have been provided in the amounts and proportions best suited for high rate of lay and sustained egg production.

Once the amount of protein has been determined, the amount of energy in the high-energy ration is adjusted so that a definite calorie-

protein ratio is obtained. This ratio is known as the C-P Ratio and represents the calories of metabolizable energy in each pound of ration per percent of protein. It is calculated by dividing the calories of metabolizable energy in each pound of ration by the percent of total protein in the ration.

Preliminary feeding tests with high-energy rations at the Oklahoma Agricultural Experiment Station and at other laboratories indicated that vitamin levels need to be increased in order to obtain maximum efficiency of feed utilization. For this reason, the ration levels of vitamin A, vitamin D, riboflavin, niacin, pantothenic acid, and folic acid in the high-energy rations presented in this bulletin have been increased by two to three times the allowances established by the National Research Council.

Mineral levels in the high-energy rations given in this bulletin have not been increased above recommended allowances. However, an attempt has been made to provide mineral sources in which the mineral elements are more readily available to the laying hen. This is particularly true of phosphorus, where supplements being used contain high levels of readily available phosphorus. In addition, the full amount of calcium required for normal egg production has been added to the laying mash, with less dependence being placed upon the supplemental feeding of oyster shell as a source of calcium.

The Formulas

Two series of formulas for high-energy rations, as developed by controlled feeding tests at the Oklahoma Agricultural Experiment Station, and proved by experience in the Oklahoma Egg Laying Test, are shown in Table I. Each series includes a laying mash to be fed with scratch grain and an alternative mash which is complete in itself and requires no grain supplement.

Mash Formulas

Series One formulas were developed for commercial egg production in either cage or floor units where the best-laying strains and the most up-to-date management practices are used. These feeds are more expensive than Series Two because of the kind and amount of ingredients used in their formulation. The amounts of certain regular ingredients have been increased and other special ingredients have been added in an effort to supply optimum quantities of all the nutrients required for high rate of lay and sustained egg production.

Series Two formulas were developed for use in commercial enterprises and in poultry flocks where an above average feed is needed, but where cost and nutritional adequacy must be given equal consideration. These feeds cost less than Series One, and are not as adequate from a nutritional standpoint.

Table I.—High-Energy Layer-Breeder Mash Formulas for Hens.

Ingredients	Series One BMC 560 (Grain-Mash)	Series One BMC 561 (All-Mash)	Series Two BMC 562 (Grain-Mash)	Series Two BMC 563 (All-Mash)
	(Percent)	(Percent)	(Percent)	(Percent)
Ground yellow corn	28	44	20	42.5
Pulverized oats		10		10
Wheat shorts	10	5	20	10
Alfalfa meal (protein 17%)	5	2.5	5	2.5
Fish meal (protein 60%)	10	5	5	2.5
Soybean oil meal (protein 44%)	20	15	25	15
Meat and bone scrap (protein 50%)			5	2.5
Dried brewers yeast	2	1	2	1
Dried whey	3	1	2	1
Dried fish solubles	3	2		
Dried butyl solubles	3	2		
Feed grade fat	8	5	8	5
Calcium carbonate	3	2	3	3
Di-calcium phosphate (18% phosphorus)	4	4	4	3
Trace mineral mix[1]	0.05	0.05	0.05	0.05
Salt	0.5	0.5	0.5	0.5
Vitamin concentrate (VC-55)[1]	0.5	0.5	0.5	0.5
Optional Ingredients				
	gm/cwt	gm/cwt	gm/cwt	gm/cwt
Folic acid conc.[1]	3	1.5	3	1.5
Vitamin E conc.[1]	3	1.5	3	1.5
	percent	percent	percent	percent
Coliver[2]	3	2	3	2
Feed grade DL-methionine	0.02	0.01	0.02	0.01
Calculated Analysis				
Protein (%)	23.1	17.7	23.8	16.9
Calcium (%)	3.08	2.31	3.23	2.49
Available phosphorus (%)	1.34	1.14	1.45	1.00
Fiber (%)	4.3	4.2	4.3	4.03
Fat (%)	11.9	9.0	12.3	9.1
Metabolizable energy (Calories per lb.)	1305	1319	1307	1332

[1] These vitamin concentrates add 0.7 mg vitamin E and 0.8 mg of folic acid per pound of finished mash.

[2] A liver preparation consisting of the water soluble fraction of cod fish livers. The product used in these formulas is at present manufactured by the Silmo Chemical Corporation, Vineland, New Jersey.

Possible Modifications

Certain modifications may be made in these formulas without materially altering their nutritional effectiveness. Some recommended modifications which are based upon data from feeding tests are given in the following paragraphs.

Optional Ingredients—The ingredients listed as optional ingredients may be omitted from these formulas without seriously impairing egg production. However, best feeding results require that all be included. Cost and availability may make it desirable to use these ingredients only in the stress feeds (See "Stress Feeds," page 9).

Corn or Grain Sorghums—When grain sorghums cost less than corn and the supply is plentiful, one-half of the corn in any one of these formulas may be replaced with a suitable grain sorghum. Grain sorghums with light-colored seed coats are best suited for use in poultry rations and should be used instead of the varieties having a red or dark-brown seed coat. The light-colored varieties are more palatable than the darker varieties. When red or dark brown seed coated varieties are available and must be used, they should be ground and the level of replacement in the mash should not be higher than 10 percent of the ration.

Oats or Barley—Barley may be substituted for oats on a pound for pound basis.

Wheat Shorts or Wheat—Ground wheat may be used to replace the wheat shorts if supply and price make this substitution desirable. When wheat shorts are to be replaced by ground wheat, pulverized oats should be added to the mash at the rate of 5 pounds for each 10 pounds of ground wheat. The addition of pulverized oats counteracts the gummy properties of the ground wheat and helps prevent a tendency of the feed to pack into the upper mandible of the hen.

Soybean Meal or Cottonseed Meal—Cottonseed meal should **not** be used to replace soybean oil meal in these layer rations because of the adverse effect of the gossypol in cottonseed meal upon egg quality.

Dried Whey or Fluidized Hydrolyzed Whey—Fluidized hydrolyzed whey is superior to dried whey from the standpoint of palatability and nutritive value and may be used in these formulas in place of dried whey. The level of fluidized hydrolyzed whey to be included in the formulas will be determined by the manufacturer's recommendations. When the recommended level of fluidized hydrolyzed whey exceeds the level of dried whey called for in the formulas, the amount of ground yellow corn should be reduced by an amount equivalent to the amount of excess fluidized hydrolyzed whey.

Dried Fish Solubles or Condensed Fish Solubles—Either dried fish solubles or condensed fish solubles will give satisfactory results. The choice of which product to buy will depend upon its availability, its cost, and the equipment to be used in mixing the feed. Adequate mixing facilities to handle liquids are required to insure a uniform mix when condensed fish solubles are used. Dried fish solubles, on the other hand, can be handled easily with the usual mixing equipment.

Dried Butyl Solubles or Distillers Dried Solubles—Distillers dried solubles may be used in place of dried butyl solubles when availability and price permit this substitution to be made.

Di-calcium Phosphate—The di-calcium phosphate called for in these formulas contains a minimum of 18 percent of phosphorus. When other phosphorus supplements must be used, the amount of supplement should be calculated on the basis of the total level of phosphorus in the supplement and the availability of this phosphorus. It is important that phosphorus in an amount equivalent to that provided by the 18 percent di-calcium phosphate be supplied by the phosphorus supplement which is used in its place.

Trace Mineral Mix—Any trace mineral mix formulated for use in poultry rations may be used. Best results will be obtained, however, by using a mineral mix which has been formulated and processed in such a way that it has a minimum of destructive action upon the vitamin content of the ration. The trace minerals which should be present in the trace mineral mix include manganese, iodine, iron, copper, zinc, and cobalt. If the vitamin concentrate which is used includes the trace minerals, the trace mineral mix may be eliminated from the formula.

Vitamin Concentrate—The level of each vitamin added to each pound of finished mash by the vitamin concentrate VC-55 is as follows:

Vitamin A	4,000 USP Units
Vitamin D-3	2,000 ICU
Riboflavin	3 mg.
Pantothenic acid	4 mg.
Niacin	20 mg.
Choline	300 mg.
Vitamin B-12	3 mcg.
Procaine penicillin	2 mg.
Menadione	3 mg.

Other suitable vitamin mixes may be used if they provide supplemental vitamin levels equivalent to those given above. The addition of 0.7 mg. of vitamin E and 0.8 mg. of folic acid per pound of finished mash is desirable for best results.

Stress Feed

The Purpose of Stress Feed—Laying hens maintained under practical production conditions in Oklahoma are subjected to a number of stress factors. These include increased rate of egg production, exposure to respiratory diseases, high temperatures, sudden temperature changes, mistakes in management procedure, or a combination of these factors. When hens are under stress, laying rations which contain additional protein, and high levels of antibiotics and vitamins, are fed to reduce the effect of stress. These rations are known as stress feeds.

Stress feeds reduce the adverse effect of stress factors upon production in at least two ways: (1) The antibiotics contained in stress feeds destroy disease bacteria and by so doing prevent the development of a diseased condition which is more apt to occur under stress conditions because stress reduces the natural resistance of the hen and opens the way for

the invasion of disease-producing agents. (2) The high protein and vitamin levels in the ration provide the extra nutrients needed to build back or replenish the nutrient reserves in the hen's body and to strengthen her natural resistance to disease. Unless the natural resistance is restored, the hen will not be protected against other bacterial invasions once the feeding of the antibiotics is discontinued. This emphasizes the fact that high-level antibiotic feeding, to be fully effective against stress, must be used only in well-fortified, nutritionally-balanced rations.

Formulating Stress Feed

The following modifications are made in the laying mash fomulas (Table 1) in order to formulate stress feeds suitable for use with each laying mash.

1. Double the amount of VC-55 or of the vitamin concentrate which is used.
2. Substitute fluidized hydrolyzed whey for the dried whey, or feed a condensed milk product free-choice in blocks.
3. Add any one or any combination of the optional ingredients listed in (Table 1), if they are not already being used.
4. Add antibiotics at levels of between 100 and 200 grams per ton of total ration, or add other suitable drugs at recommended levels. Specific recommendations as to the kinds and levels of antibiotics and drugs to use may be secured by writing: Poultry Nutritionist, Department of Poultry Husbandry, Oklahoma A. and M. College, Stillwater, Okla.

Scratch Grain

The choice of a scratch grain mixture to be fed with BMC 560 and BMC 562 will depend upon the kinds of grains available and their relative prices. No more than 20 percent of oats or barley should be included in the scratch grain mixture. The remaining 80 percent may include any one or any combination of kafir, milo, wheat, and corn. A suggested scratch grain mixture is corn, 40 percent; kafir or milo, 40 percent; and oats or barley, 20 percent.

The Feeding Procedures

General

Each of the two series of formulas given in Table I includes a laying mash formula (BMC 560 and BMC 562) which is to be fed with a scratch grain, and an all-mash laying mash (BMC 561 and BMC 563) which is a complete ration in itself and requires no additional grain. Feeding schedules by months for each type of ration are outlined on pages 12 to 16.

Oyster Shell—It is recommended that oyster shell be available to the hens in separate hoppers to provide additional calcium when BMC 560 and BMC 562 are fed. Approximately one linear foot of calcium supplement hopper space is needed for each 100 layers.

All of the calcium required by the hen for egg production is included in BMC 561 and BMC 563. For this reason, no supplemental calcium is required except under conditions of extremely high egg production. When these all-mash rations are fed to high-producing hens under floor conditions, it is desirable that oyster shell be fed in separate hoppers. This procedure is not practical when the hens are housed in cages. Under cage feeding conditions it may be necessary in some situations to increase the calcium level in the all-mash rations or to feed oyster shell on top of the mash in the feed hoppers.

Grit—Efficient feed utilization requires that grit of the proper size and hardness be available to the laying hens at all times. This grit is to be fed in separate hoppers which provide approximately one-half a linear foot of grit hopper space per 100 hens. These hoppers should be kept free of trash and litter and the grit supply should be replenished whenever the hoppers become less than one-fourth full. Grit should be hand fed to cage layers once each week by sprinkling it on top of the mash.

Water—An adequate supply of clean water is an important ingredient in any laying ration. The water requirement of the laying hen becomes even more critical when high-energy or high-efficiency layer rations are fed. This increased demand for water must be met by providing:

(1) A minimum of one eight gallon gravity flow tank waterer or its equivalent per 100 layers; OR

(2) A minimum of one round automatic or jet-flow waterer per 150 layers; OR

(3) A minimum of eight linear feet of waterer space per 100 layers when troughs are used.

In all cases, extra drinking space must be provided when temperatures exceed 90 degrees F.

Water fountains, regardless of type, should be so placed in the laying pen that the hen does not have to travel more than 15 feet between a feed hopper and a water fountain.

Feed Hopper Space—Adequate quantities of feed must be eaten by the hens in order to meet the heavy nutrient demands of high production. To provide the necessary hopper space, it is recommended that a minimum of 40 linear feet of feed hopper space be available for each 100 laying hens. When grain is fed in the litter or when mechanical feeders are used, a minimum of 30 linear feet per 100 hens should be provided. Any type of feeder may be used as long as the hens can adequately feed from it with a minimum of waste.

Amount of Grain and Mash to Feed—The feeding schedule for the grain-mash feeding system requires that 40 percent of the ration consist of scratch grain and that 60 percent consist of laying mash. These percentages may be varied between 50 and 60 percent for the mash and between 40 and 50 percent for the scratch grain. Some means of measuring the amounts of mash and scratch grain to be fed each day will be required to maintain this ratio. It is difficult to set up an average set of figures for mash and grain consumption because of the inherent differences in nutrient requirements between breeds and strains of laying hens. It is important, nevertheless, that the hens eat a maximum amount of feed without being limited in any way. A practical method of maintaining the proper grain-mash ratio while keeping feed consumption at a maximum is to measure the mash which is eaten each day and to use this figure to calculate the amount of grain to be fed the following day. By using this procedure to calculate the daily scratch grain requirement, feed intake can be maintained at a level in line with the needs of the hens at any particular time.

Scratch Grain—Scratch grain may be fed to the hens in several ways. It may be fed in troughs or scattered in the litter. A satisfactory procedure is to feed approximately three-fourths of the scratch grain in late afternoon each day and the remaining one-fourth the following morning.

The Feeding Schedule

The following feeding schedule is the one used in the Oklahoma Egg Laying Test during the 1955-56 test year. Because of differences in the feeding conditions encountered from one poultry farm to another, some minor modifications may be desirable in the feeding schedules. This is especially true if this feeding system is to be used with cage layers. Any modifications which are made, however, should be based upon the recommendations of the Oklahoma Agricultural Experiment Station, Stillwater, Oklahoma.

TWO WEEKS PRIOR TO HOUSING

Grain-Mash	All-Mash
SCRATCH GRAIN—Free Choice	**STRESS FEED**—Free choice
STRESS FEED—Free choice	**ADEQUATE WATER**—Free choice
ADEQUATE WATER — Free choice	

The feeding of stress feed during the two weeks prior to the time the hens are housed conditions them to withstand the stresses to which they will be subjected at housing time. Under conditions where stress is at a minimum, it may be desirable to reduce this pre-housing conditioning period to one week.

FIRST MONTH AFTER HOUSING

Grain-Mash

SCRATCH GRAIN—40 percent of ration. Hand fed.

STRESS FEED—60 percent of ration during first two weeks of the month and for two days out of each week during the last two weeks of the month. Fed free choice.

REGULAR LAYING MASH—60 percent of ration during the last two weeks of the month. Fed free choice.

REGULAR MASH AS PELLETS OR WET MASH—2 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER—Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

All-Mash

STRESS FEED—100 percent of ration during first two weeks of the month and for two days out of each week during the last two weeks of the month. Fed free choice.

REGULAR LAYING MASH—100 percent of ration during last two weeks of the month. Fed free choice.

REGULAR MASH AS PELLETS OR WET MASH—2 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER—Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

The length of time the stress feed is fed after the hens are housed will depend upon the individual farm situation. In those situations where stress factors are not a major problem, the stress feed may be discontinued one week after the hens are housed. In other situations where respiratory outbreaks are likely to give trouble year after year, it is recommended that the stress feed be fed for a period of four weeks or longer.

Pellets or wet mash made from the regular laying mash help to increase feed intake when fed at the rate of two pounds per 100 hens per day. This feeding procedure also conditions the hens to expect the supplemental feeding each day and it becomes an accepted part of the feeding routine. At those times during the laying year when a slight drop in egg production or feed consumption indicates that additional nutrients are needed to maintain egg production and the situation can be effectively handled without full-feeding stress feed, the pellets or wet mash may be replaced with stress feed. In this way, a needed nutritional boost can be given at any time during the laying period with a minimum expenditure of time and money.

SECOND MONTH

Grain-Mash

SCRATCH GRAIN—40 percent of ration. Hand fed.

REGULAR LAYING MASH—60 percent of ration. Fed free choice.

STRESS FEED—60 percent of ration two days out of each week. Fed free choice.

REGULAR LAYING MASH AS PELLETS OR WET MASH—3 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

OYSTER SHELL — Free choice.

GRIT—Free choice.

All-Mash

REGULAR LAYING MASH—100 percent of ration. Fed free choice.

STRESS FEED—100 percent of ration two days out of each week. Fed free choice.

REGULAR LAYING MASH AS PELLETS OR WET MASH—3 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

The feeding schedule in which stress feed is fed two days out of each week may be modified if the situation indicates that this is desirable. One day per week may be adequate to meet stress conditions, or under optimum environmental conditions the feeding of stress feed may be discontinued entirely. If a regular feeding schedule for stress feed is discontinued at this time, a close check should be maintained on the condition of the flock and the feeding of stress feed initiated at the first indication of trouble.

THIRD MONTH

Grain-Mash

SCRATCH GRAIN—40 percent of ration. Hand fed.

REGULAR LAYING MASH—60 percent of ration. Fed free choice.

STRESS FEED—One day out of each week. Fed free choice.

REGULAR MASH AS PELLETS OR WET MASH—3 to 4 pounds per 100 hens per day. Fed as a noon lunch.

All-Mash

REGULAR LAYING MASH—100 percent of ration.Fed free choice.

STRESS FEED—One day out of each week. Fed free choice.

REGULAR MASH AS PELLETS OR WET MASH—3 to 4 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

FOURTH AND FIFTH MONTHS

Grain-Mash

SCRATCH GRAIN — 40 percent of ration. Hand fed.

REGULAR LAYING MASH—60 percent of ration. Fed free choice.

STRESS FEED—One day out of every two weeks. Fed free choice.

REGULAR MASH AS PELLETS OR WET MASH—3 to 4 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

All-Mash

REGULAR LAYING MASH—100 percent of ration. Fed free choice.

STRESS FEED—One day out of every two weeks. Fed free choice.

REGULAR MASH AS PELLETS OR WET MASH—3 to 4 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free chocie.

SIXTH AND SEVENTH MONTHS

Grain-Mash

SCRATCH GRAIN—40 percent of ration. Hand fed.

REGULAR LAYING MASH—60 percent of ration. Fed free choice.

STRESS FEED—Discontinue feeding entirely except as the flock condition indicates.

REGULAR MASH AS PELLETS OR WET MASH—3 to 4 pounds per 100 hens per day. Fed as a noon lunch.

All-Mash

REGULAR LAYING MASH—100 percent of ration. Fed free choice.

STRESS FEED—Discontinue feeding entirely except as the flock condition indicates.

REGULAR MASH AS PELLETS OR WET MASH—3 to 4 pounds per 100 hens per day.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

EIGHTH THROUGH TWELFTH MONTHS

Grain-Mash

SCRATCH GRAIN—40 percent of ration. Hand fed.

REGULAR LAYING MASH—60 percent of ration. Fed free choice.

STRESS FEED AS PELLETS OR WET MASH—2 to 4 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

All-Mash

REGULAR LAYING MASH—100 percent of ration. Fed free choice.

STRESS FEED AS PELLETS OR WET MASH—2 to 4 pounds per 100 hens per day. Fed as a noon lunch.

ADEQUATE WATER — Free choice.

OYSTER SHELL—Free choice.

GRIT—Free choice.

The feeding schedule in which stress feed is fed as a noon lunch will need to be modified from time to time when the eighth through the twelfth months of the laying period occur during the summer. Slumps in egg production may occur during the prolonged periods of high temperatures typical of Oklahoma weather conditions. This adverse effect of high temperature on egg production can be overcome, to some extent, by feeding the stress feed for periods of from one to two weeks duration as frequently as needed. Continuous feeding of the stress feed during this period is not recommended. It is suggested instead that each one to two week feeding period be followed by a one to two week period in which the stress feed is fed only as a noon lunch.

Feeding Results in the Oklahoma Egg Laying Test

A summary of the results of the Oklahoma Egg Laying Test from October 1, 1955 through Sept. 15, 1956 is shown in Table II[1] and III. The ration used was formula BMC 560 in Series one on page 6. Cost of feed per dozen eggs exceeded that which would be obtained under most commercial production conditions in Oklahoma. This is due to the fact that it was necessary to use the stress feed more frequently and

[1] A complete summary of the Oklahoma Egg Laying Test from 1937 to 1955 including a cost comparison is given in Technical Bulletin T-66.

Table II.—Summary of Oklahoma Egg Laying Test Results from October 1, 1955 through September 15, 1956.

Month	Breed	Egg prod. per hen	Percent egg prod. (hen housed)	Pounds feed per doz. eggs	Cost of feed per doz. eggs (cents)	Av. price per doz. (cents)	Return per doz. over feed cost (cents)	Mortality (percent)
Mar.	S.C.W. Leghorn	23.74	76.58	4.28	22.3	35.1	12.8	1.40
	R. I. Red	25.48	82.19	4.11	21.4	35.1	13.7	0
	New Hamp.	23.35	75.32	4.87	27.6	35.1	7.5	0
	W. Ply. Rock	22.54	72.71	4.49	25.8	35.1	9.3	0
Oct.	S.C.W. Leghorn	23.13	74.63	3.85	30.1[1]	38.3	8.2	0
	R. I. Red	22.71	73.26	4.30	31.4	38.3	6.9	0
	New Hamp.	18.00	58.06	5.45	41.0	38.3	—2.7	0
	W. Ply. Rock	23.00	74.19	4.45	32.0	38.3	6.3	0
Nov.	S.C.W. Leghorn	24.56	81.87	3.85	20.1	42.5	22.4	0.23
	R. I. Red	26.08	86.93	3.85	20.1	42.5	22.4	0
	New Hamp.	24.73	82.44	4.22	21.6	42.5	20.9	0
	W. Ply. Rock	24.61	82.03	4.12	20.7	42.5	21.8	0
Dec.	S.C.W. Leghorn	24.22	77.95	4.11	23.3	45.0	21.7	0
	R. I. Red	25.83	83.31	4.09	22.7	45.0	22.3	0
	New Hamp.	23.69	76.43	4.61	25.0	45.0	20.0	0
	W. Ply. Rock	24.03	77.52	4.55	25.8	45.0	19.2	0
Jan.	S.C.W. Leghorn	23.86	76.63	4.53	22.7	41.25	18.6	0.23
	R. I. Red	25.38	81.38	4.47	22.4	41.25	18.9	0
	New Hamp.	19.65	63.40	5.56	27.7	41.25	13.6	0
	W. Ply. Rock	23.45	75.63	4.77	23.9	41.25	17.4	0
Feb.	S.C.W. Leghorn	22.44	77.38	4.36	22.4	41.38	19.0	0.47
	R. I. Red	24.13	83.21	4.20	21.6	41.38	19.8	0
	New Hamp.	21.62	74.55	4.77	25.8	41.38	15.6	0
	W. Ply. Rock	22.12	76.28	4.32	22.3	41.38	19.1	0

[1] Feed costs per dozen eggs were excessively high in October because of the high cost of the stress feed which was fed and the length of time that the stress

Month	Breed	Egg prod. per hen	Percent egg prod. (hen housed)	Pounds feed per doz. eggs	Cost of feed per doz. eggs (cents)	Av. price per doz. (cents)	Return per doz. over feed cost (cents)	Mortality (percent)
April	S.C.W. Leghorn	21.79	72.63	4.44	25.4	33.33	7.9	0.70
	R. I. Red	23.79	79.30	4.24	24.4	33.33	8.9	0
	New Hamp.	21.50	71.67	5.46	29.2	33.33	4.1	0
	W. Ply. Rock	20.29	67.63	4.62	26.3	33.33	7.0	1.54
May	S.C.W. Leghorn	22.02	71.03	4.32	20.8	33.1	12.3	0.47
	R. I. Red	23.23	74.94	4.09	19.9	33.1	13.2	3.85
	New Hamp.	21.50	69.35	4.39	21.3	33.1	11.8	0
	W. Ply. Rock	19.86	64.06	4.50	21.6	33.1	11.5	0
June	S.C.W. Leghorn	20.35	67.83	4.18	19.5	29.75	10.3	1.40
	R. I. Red	20.96	69.87	4.01	18.4	29.75	11.4	0
	New Hamp.	19.50	65.00	4.22	19.4	29.75	10.4	0
	W. Ply. Rock	16.95	56.50	4.66	20.9	29.75	8.9	0
July	S.C.W. Leghorn	19.81	63.92	4.08	19.6	27.8	8.2	1.40
	R. I. Red	19.77	63.77	3.93	18.8	27.8	9.0	0
	New Hamp.	19.11	61.66	4.26	20.4	27.8	7.4	0
	W. Ply. Rock	16.92	54.59	4.73	22.6	27.8	5.2	1.54
Aug.	S.C.W. Leghorn	15.91	51.32	4.29	21.6	35.0	13.4	2.33
	R. I. Red	15.15	48.87	4.82	24.5	35.0	10.5	0
	New Hamp.	10.30	33.22	7.07	35.3	35.0	—0.3	0
	W. Ply. Rock	9.89	31.90	6.15	29.1	35.0	5.9	1.54
Sept.	S.C.W. Leghorn	6.50	43.33	4.58	23.6	35.2	11.6	2.10
	R. I. Red	6.69	44.60	5.10	26.8	35.2	8.4	1.92
	New Hamp.	5.00	33.33	6.74	33.6	35.2	1.6	3.85
	W. Ply. Rock	5.75	38.33	5.48	27.3	35.2	7.9	6.15

Table III.—Cumulative October 1 Through September 15 (50 weeks production)

Breed	Egg Production per hen	Percent Egg Production (hen housed)	Pounds feed per doz. eggs	Cost of feed per doz. eggs (cents)	Av. price per doz. (cents)	Return per doz. over feed cost (cents)	Mortality (percent)
S.C.W. Leghorn	248.33	70.95	4.24	22.6	36.48	13.9	10.26
R. I. Red	259.20	74.06	4.27	22.7	36.48	13.8	5.77
New Hampshire	227.95	65.13	5.13	27.3	36.48	9.2	3.85
W. Ply. Rock	229.41	65.55	4.74	24.9	36.48	11.6	10.77
All Breeds	241.22	68.92	4.60	24.4	36.48	12.1	9.62

for longer periods of time to effectively counteract the stresses prevalent in the Oklahoma Egg Laying Test. Stresses such as (1) moving the pullets long distances, (2) mixing pullets from different breeding farms, (3) mixing pullets from different geographic localities, (4) changes in ration, and (5) changes in management procedures, would not be so severe or might be entirely absent under commercial production conditions.

12/56—5½M