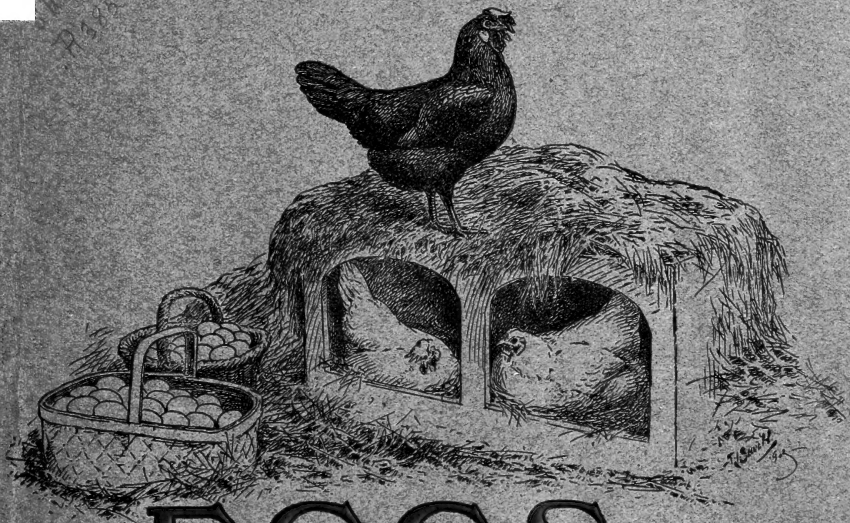

EGGS AND EGG FARMS

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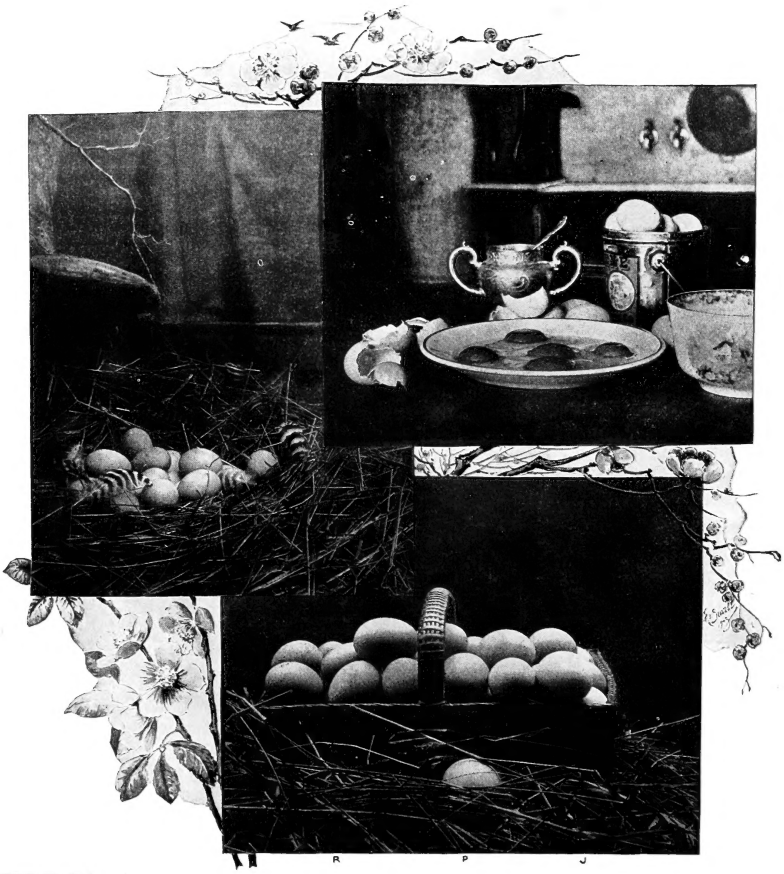


THE FRUITS
OF ....
POULTRY RAISING.

EGGS and EGG FARMS

DEVOTED TO

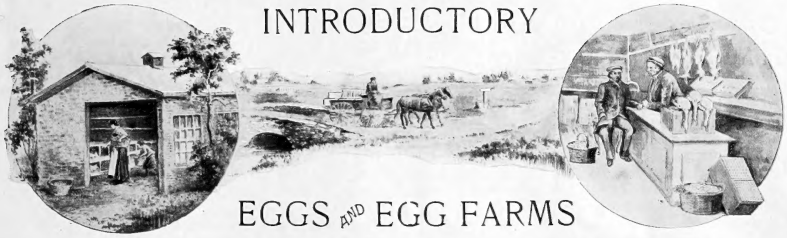
INCREASED EGG PRODUCTION

Contributed to by Expert Authorities and Successful Breeders, who furnish Life-long Experiences in the Production of Eggs, Methods of Feeding, Market Requirements, and Desirable Breeds for the Farm and Fancier.

FULLY ILLUSTRATED.

PRICE, FIFTY CENTS.

PUBLISHED BY
THE RELIABLE POULTRY JOURNAL PUBLISHING COMPANY,
QUINCY, ILLINOIS.



INTRODUCTORY

EGGS AND EGG FARMS

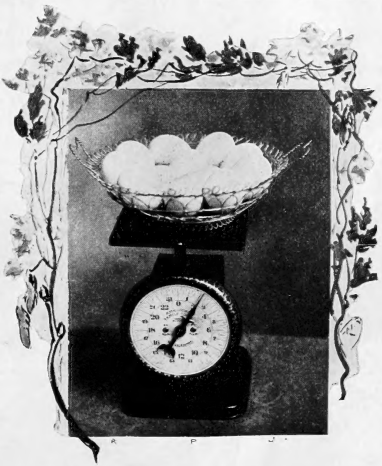
The Egg Market is Boundless, Remunerative and Easily Reached, but You Must Know How. The Mainstay of the Poultry Business is the Egg Trade.

STRIKE the average of figures that have been hashed up again and again to support the contention that there is money in poultry, and you may bank upon it they are in the main correct. There have been many failures on the ragged edge of the business and still they come. The facts are these:

It is true there is money in poultry; it is true that the business is an attractive one, and the number of people who are continually attempting to get at the profits, is evidence that they are deeply impressed with some such facts.

Years ago Mr. Rankin who is well known to every poultryman, said that he made more money from 350 pullets, than from 16 cows. It takes two men and a team to care for the cows and deliver the milk; while one man can easily get around the work connected with the 350 pullets, and yet, farmers will keep working away with their cows from four o'clock in the morning until after dark at night, and spending on hired help money that might go into their pockets.

Breeding hogs has not been remunerative for the past two years at least. In company with one of the best posted breeders and experts in the country we have, during that time, visited many farmers' gatherings where the subject has turned upon hog raising. Try as they would, expert after expert, they could not show such profit in the business as would warrant continuing it. The lecturers themselves "acknowledged the corn," and said they did not pretend that it paid to raise hogs, but farmers would do it, and they were there to instruct them in the cheaper methods of carrying it on. It was easy sailing, talking poultry after that.



THE KIND THE HOUSEKEEPER SELECTS.
One dozen Minorca eggs which weigh two pounds. Laid by winning pullets, owned by J. H. Doane.

Poultry Beats Them All.

Hogs, sheep, cattle, horses, all received attention in the discussions, and it seemed to be upon the closest margin of profit, if any, that they were bred. We remember in particular a farmer who became interested in fowls, and was prevailed upon to give them such care as he gave his hogs. He placed his fowls in the basement of the barn alongside the swine and horses. That was in the late fall. Soon they began shelling out the eggs, and from that time kept his wife busy going to market to sell the new-laid product. She obtained a good price for the eggs, as she marketed them regularly and the purchasers knew they were to be relied upon. Shortly the farmer began to have doubts about his hogs, and we noticed that upon entering the barn he usually passed the pen of fowls and took up his troubled stand opposite the hog pen. Doubts had arisen in his mind whether or not the hogs were paying, and being an intelligent man, he made up his mind to settle the question. He said he would weigh the hogs and keep account of the food for a month or so. When asked what was his idea, he responded, "Well, I believe these fowls pay me 'way ahead of the hogs, and I tell you what it is, I am going to make sure, and if I find my idea is correct at the end of the month, out go the hogs." It is needless to say the hogs went, and now he is a confirmed chicken crank and making money at it, that is, he and his wife are. We could go on multiplying such instances indefinitely, but are satisfied to take it for granted that people now know there is money in poultry, and to rest the case with those who so admirably present their experiences in subsequent pages.

The Demand Unceasing.

It is intended in this book to relate what we know—to induce experienced breeders to tell what they know—and to present to you as clearly as possible what you want to know about egg-production. There are two ways to gain experience profitably: First, by beginning on a small scale and growing with the business. Second, by obtaining information under the practical tuition of successful poultrymen.

To either or both of these methods let us add the instruction which can be obtained cheaply by reading the best books on the subject.

The egg market holds firm notwithstanding booms and failures in other businesses. You say, "If it is so remunerative, why is the market not overdone?"

There are two main reasons:

First—(and even the men in the business acknowledge this): The consumer entertains doubt as to the quality of the goods, but will buy an increased amount if convinced that the article is just what is wanted.

Did you ever see a man taking breakfast in a hotel, supremely satisfied that the egg in front of him was perfectly fresh? There is always a doubt of it. Yet good prices are paid for this delicacy (for a new-laid egg is a delicacy even these days), and in most cases the landlord is just as expectant as his guests. Who can be otherwise, when in every grocery and provision store, eggs are quoted at all prices, as new-laid, fresh, strictly fresh, etc. It rests with the consumer to break the shell and see what is what, and sometimes the evidence is not confined to the eyesight.

A reliable man with a reliable egg, has a reliable market, and always will have. The demand increases with the supply.

Second—Egg farming, like every other calling, demands experience. The novice cannot realize this. He makes his investment, then gains his experience, when it is perhaps too late. Although the following little incident has been frequently related, it appeals so forcibly as an illustration that it will bear repetition.

It was on the Atlantic coast, and Mr. A. G. Gilbert, well known as a lecturer on poultry, had impressed upon those present the vast importance of the poultry industry, when a young man in the audience questioned him thus:

"I am anxious to invest $500 in a business undertaking. Would you advise me to engage in the poultry business?"

"Do you know anything about the poultry business?" inquired the lecturer.

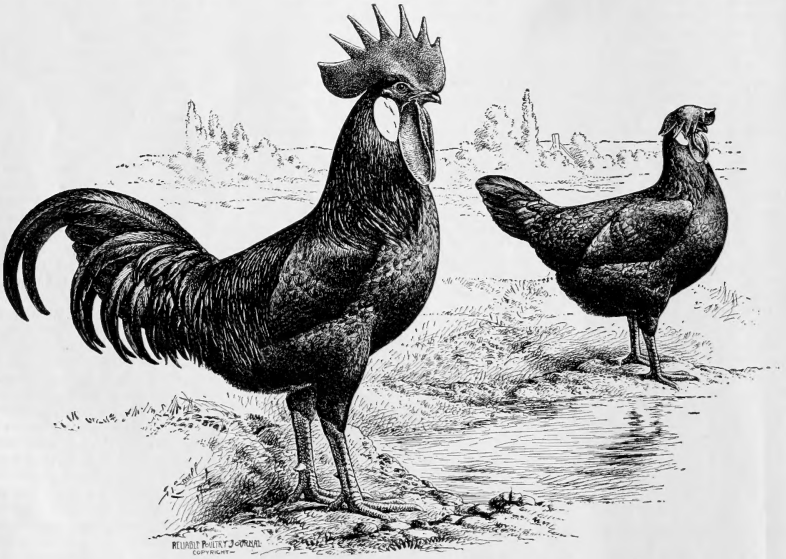
"No, sir," was the reply.

"Oh!" said Mr. Gilbert, "Do you know anything about the drug business?"

"Why, no, sir," was the astonished rejoinder.

"Well, then, my friend," said Mr. Gilbert, "I tell you what it is; I would advise you to tackle the drug business first."

Everybody will at once see that the drug business was



BLACK MINORCAS—BY SEWELL.

Unexcelled as layers of white shelled eggs and possessing a frame that will carry more meat than any other of of the Mediterranean class of layers the Black Minorca is steadily coming into favor. Few exhibits are more attractive than a pen of up-to-date Minorcas. Comb, wattles and lobes of size and quality and a long sloping back with profusely feathered tail of low carriage are the chief requirements in the show room. The standard weights are cock, 8 lbs.; hen, 6½ lbs.; cockerel, 6½ lbs.; pullet, 5½ lbs.

chosen as an example of a profession requiring knowledge, experience and care; and it was a happy illustration of the fact that equal industry, experience, and care are necessary when about to engage in catering to the requirements of poultry. Does an artist assume to paint before he has mastered the mixing of the colors? Does he beautify his ideal while yet unable to produce the outline? Does the naturalist attempt to enlighten us on the habits of the feathered tribe before he is competent to distinguish the individual types of his pets? No; yet a young man who cannot tell a cock from a cockerel, a hen from a pullet, a Leghorn from a Brahma, or a sickle from a scythe, assumes to pose as a poultryman, and to know that this most remunerative business is his simply for the asking.

The foregoing are two main reasons why the poultry industry is not overdone.

The Local Market.

A report of the Director of Rhode Island Agricultural Experiment Station simply bears out what the poultry press has been impressing upon their readers for so many years. It has this advantage, however—it will be free from any charge of a biased view of the situation. The Experiment Stations are created for the benefit of the people of this country, and every care is taken that none but the most reliable information be sent out. Now let us see what this report states of interest to poultrymen. It applies chiefly to local trade, such as can be worked up in nearly any locality.

The director says: "Another market has come to Rhode Island, furnished by the demands of the wealthy summer visitors and cottagers who desire to obtain and will pay well for fresh fruit and vegetables, dairy and poultry products. Farmers favorably located are learning to supply this special demand. Opportunity is thus offered for largely increased profit if the farmers who cater to this trade will supply the very best products, prepared according to approved methods, put up in attractive style, and delivered fresh daily at the customer's door. * * *

"In the extreme eastern part of the state the farmers have turned their attention to raising poultry on a large scale. They have in large numbers succeeded so that now their poultry farms are sought by the dealers in poultry and eggs instead of the poultryman having to seek markets for their products. * * *

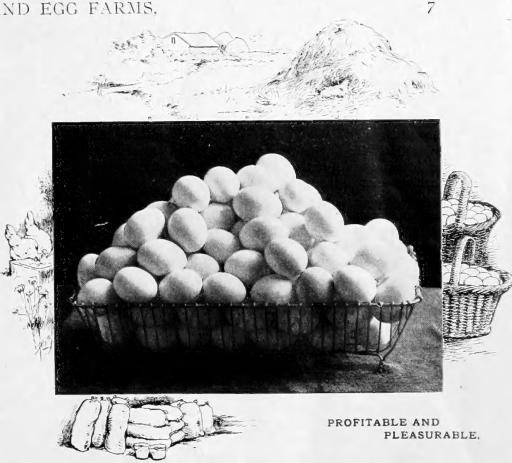
"It seems inevitable that there should come in the near future a great increase in poultry keeping in the state. Large areas of land now neglected but well adapted to poultry farming may be economically and profitably turned to this purpose. * * *

"On many a farm the poultry is in reality the most profitable part of the business. This plan should be extended until on every farm adapted to the business poultry is kept to the extent of several hundred fowls. If the farmer himself has no interest in this kind of live stock, he can at least give the son or daughter or wife this opportunity to increase the farm profits, or to gain well deserved pocket money."

Gathering and Shipping for Market.

Care must be exercised in gathering the eggs, in packing them, and in shipping to market.

The following extract from the Canadian Department of The Reliable Poultry Journal amply illustrates this contention:



PROFITABLE AND PLEASURABLE.

"The egg trade, I am led to understand, has been abused by the farmers, who form the chief source of supply. Their ideas have been to carry to market a full basket of eggs whenever it is convenient to go to town on any business whatever. 'Gather them in,' is the policy; fill up the basket; old and young, great and small; good, bad, and indifferent; and he is a rascal of a commission merchant who has the audacity to inform the honest farmer that 'ten per cent of your last delivery was bad,' which means ten per cent off the price. The unsophisticated (?) farmer won't believe it, and claims he is being 'done up.'"

"A member of the firm of D. Gunn Bros. & Co., had the kindness to illustrate to me, while on a visit to their large establishment, the difficulties they meet in the course of their business. "In the first place," said Mr. Gunn, "the farmers will not convey their eggs to us in a proper manner. The great majority of eggs are received in baskets, rattled over a country road for many miles, and naturally many are broken, and more are injured by the jolting and shaking. To illustrate this, come along and see our men candling the eggs. Here is a consignment of eighteen dozen eggs from which three dozen have been taken as being defective. These are called checked eggs, and result from the severe handling they have experienced. The shells are not necessarily cracked, but (holding one before the light) you will observe the yolk has a muddled appearance; it is distributed through a larger portion of the albumen than is the case with this egg, which is perfect. Here is another defective egg, wherein the yolk is so dark that we simply have to discard it altogether."

"Why, there's a chick of about ten days' growth in that egg," I exclaimed, and sure enough, upon breaking it, there were the eyes and blood vessels of the—mongrel, I guess. Several other eggs were broken, some containing chicks, others showing growth of four or five days, but most numerous were the badly shaken yolks.

"Actually," continued Mr. Gunn, "I had to bring a farmer in here to convince him that sometimes we did get bad eggs from him."

"The best of these defective eggs, namely, those which have simply been shaken, are sold for, say, two or three

cents a dozen less than the prevailing price, and of course the farmer loses a portion of his profit."

Color and Selection of Eggs

"Have you any preference for brown or white eggs," I inquired.

"Well, the brown eggs always sell better; there may be a difference of a cent or two a dozen in their favor, but we seldom receive them all one color. All sizes and colors are mixed. The farmer has not yet learned that eggs of one color, or assorted sizes, will fetch a bigger price than those of all descriptions, and it is our knowledge of this portion of the business which enables us to make up on good stock what we lose on inferior. Oh, yes, the brown eggs are in greater demand and bring higher prices."

In reply to a query, Mr. Gunn stated that he found brown eggs averaged considerably larger than white eggs. This was the reply received also from Mr. DeLaporte, another prominent commission man. It set me thinking, as my experience is the opposite; and I finally decided that the white eggs they received from the farmers are from the common barnyard stock, which has deteriorated in size, and in egg production, while the brown eggs are from birds which have been improved by the introduction of thoroughbreds of the American or Asiatic classes. So few farmers keep a high class of the Mediterranean variety that the large white eggs of this class are few and far between. On examination I found only a very few which might pass for either Minorca or Leghorn eggs.

"The English market," said Mr. Gunn, requires a fifteen pound egg that is, fifteen pounds to the long hundred, or ten dozen. Colored eggs are preferred. A large business might be done there, if I could only obtain the high grade egg required; but when it becomes necessary to grade eggs from stock having three dozen defective out of eighteen dozen, this trade is simply impossible; otherwise it would be most remunerative to those engaged in the poultry business."

Mr. Park, a prominent merchant, acknowledged that he could give two cents a dozen more for selected eggs (that is, large or brown eggs) than for ordinary stock.

"The market in Toronto last winter," said he, "was very unreliable. From the 1st to the 15th of December, eggs went flying up to forty cents a dozen; then, from the 18th to the end of the month, they were down to twenty cents on account of the great supply. The average price for the month of November to February, inclusive, would be twenty to twenty-five cents per dozen, wholesale."

The egg circular issued by D. Gunn Bros. & Co. contains some valuable pointers, as the following extracts show: "The loss in the value of eggs offered in Toronto and other markets through careless handling, is each year siderable. The slightest crack renders the eggs valueless for picking or cold storage purposes, and when sold as "checks" or cracked eggs, from two to three cents per dozen less than standard prices must be accepted. Collected from the nests in a haphazard way and carried to market over rough roads in an ordinary basket, there is usually considerable breakage before the eggs reach the store, where they run the chance of further loss by the handling of the merchant or his assistants. Loss in this way is inevitable so long as proper egg cariers are not used. These egg cases can be purchased at a very nominal figure, say twenty-five cents for a thirty dozen case, and by careful usage will last for years.

"Keep the eggs clean," is the advice which every merchant would impress upon the

WELL BARRED, BUT NOT A BARRED ROCK.

ONE OF THE PESTS OF POULTRY ON THE FARM.

owners of poultry. An abundance of fresh straw in the hen house is not a heavy expense, and it is essential to a profitable market. If in spite of care the eggs should become dirty, then by no means wash them, as this process removes a glutinous covering from the shell and impairs their keeping qualities."

This advice coming from a responsible firm makes us think. We are, however, of the opinion that the inducement to wash the dirty eggs would be too strong. It certainly would affect the price of the product.

Prof. Hilgard, of the University of California, experimented with a view to solving the problem of whether dark or light eggs are richer in their elements. He has made an analysis of the following varieties: Dark Eggs—Partridge Cochin, Dark Brahma, Black Langshan, White Langshan, White Wyandotte, Barred Plymouth Rock. Light Eggs—Brown Leghorn, White Minorca, Black Minorca, Buff Leghorn. No practical difference, in a given weight of eggs, was found in the quantity of waste and edible portions and of white and yolk. Chemical analysis yielded a similar result, no differences which might not occur between specimens of the same variety were detected between the several varieties. So far as the examination went, one egg was as good as another, irrespective of the breed which laid it or the color of the shell.

The demand for brown eggs, however, has caused intelligence to be brought to bear on the production of a brown egg layer that might equal the white egg breeds, and a fair amount of success has attended these efforts. The result has been the production of a general purpose fowl, that is, a fowl which meets the requirements of the table and the egg basket, a "go between," as it were. These have been principally bred from crosses of the egg producer, upon the larger Asiatic breeds (which lay brown eggs), with sometimes a touch of Indian Game blood. From these crosses was obtained an indefinite color in the egg, sometimes white, sometimes brown, sometimes neither. This opened up the way for more experiments, which are being carried on to-day.

Some fanciers have taken a general purpose fowl and successfully endeavored to breed a strain of brown egg layers, which can be relied upon; and this tendency has been so much followed that the majority of these breeds now lay a decidedly brown egg.

Other fanciers have made endeavors to increase the egg yield of one or more of these breeds, and so successfully, that in individual strains they have been found to be the equal of the Mediterraneans. It has been done by pedigree breeding. Upon that method of increasing the egg yield more will be said later.

The interviews we have referred to suggest that there is, in the egg trade, "room at the top."

The poultryman who will ship, in properly constructed cases, eggs that have been graded according to size and color, can obtain recognition from the commission man, and that quickly. The breeder of thoroughbred Leghorns, or Minorcas, which have been selected from an egg-producing strain, can build up a trade at two cents a dozen higher than market price. The breeder of Plymouth Rocks, Wyandottes, Brahmas, in fact of any of the brown egg layers can do likewise. The farmer shall not be out in the cold, if he will only use common sense, and grade up his stock by the introduction of thoroughbred male birds. Stick to one variety, and purchase a standard-bred male each year, and your common barnyard fowl will lay the golden eggs.

Why Thoroughbreds are to be Preferred.

Before going into the main elements of profitable egg production, there are a few thoughts we want to share

ONE OF THE PLEASURES OF POULTRY ON THE FARM.

BARRED ROCKS, BUT NOT YET BARRED.

with you, which are really necessary to a satisfactory commencement. They relate to the selection of a breed or variety. It is not merely a question of which is your favorite fowl, but rather for what purpose was that fowl designed, and what are its attributes or peculiarities aside from egg production, because tributary to this branch of the industry is the disposal of surplus cockerels and of hens which have passed the line of profit from an egg producing point of view. Much in this particular depends upon your selection.

Thoroughbreds should form the foundation of your flock. Why? Because they lay better than mongrels; because their eggs may be sold for hatching, and even when disposed of on the market will command a higher price on account of their uniform color; because the surplus cockerels will fetch a good price as breeders, and because being composed of one variety all your pens may receive similar attention and feeding, which economizes labor.

Note what the Reliable Poultry Journal says on this point:

"Every farmer who raises common poultry can put money in his pocket this coming season by investing $2 to $4 in a thoroughbred rooster. It is as plain as simple arithmetic. Buying a large, vigorous bird that outweighs your present rooster by two pounds, is equivalent to adding one pound of weight to every healthy chicken you raise next spring and summer. The saying that the male is half the pen applies in this case. The farmer need not pen up his fowls to make this true.

"One pound of weight added to each of the few hundred chickens raised each year on many farms is a big item. The quantity of marketable chicken meat is not only increased by this simple process, but also the quality, for the larger and finer looking fowl, alive or dressed, is easier sold, and at a better price.

"The farmer who wishes to improve his finances will look carefully after just such matters as these. And where the farmer's wife is the 'chicken man' she will do so. It is these strokes that count. Brute force does not hold its own on the farm as well as it once did. The thinking, planning,

experimenting farmer is the one who now makes headway and finds life on the farm worth living.

"Then there is the important matter of an increased egg-yield. This can readily be brought about with any common farm flock by introducing male blood from the great egg-laying breeds, the Leghorns, Minorcas, Andalusians, etc. A male of this kind, suitable for the purpose, can be bought at a low figure, and he will earn his homestead right several times over by the increased number of eggs his descendants will put into the basket.

"Farmers, do not neglect such opportunities as these! With the prices of farm products so low it is wisdom for you to put your thinking cap on and be resolved to improve every chance to better your condition, to earn money.

"Talk the matter over with your wife."

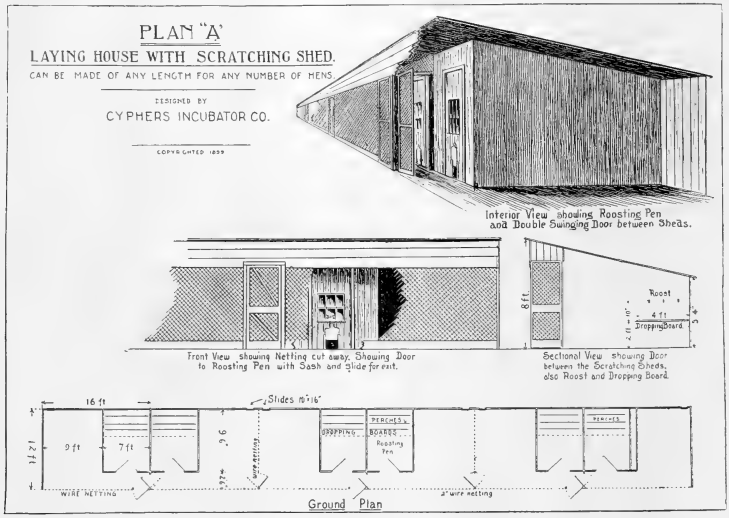
In the show room you may hear visitors exclaim, "Why, dwindle when you get them into a coop alongside these fellows!"

Next, as to the egg producing qualities of thoroughbreds. There are hundreds of men in this country who cater to the egg trade, and we know of none who would think of handling anything but thoroughbreds. They are not in the business for fun, but they cling to the thoroughbreds every time. Take a look through the subsequent pages of this book and see what experienced breeders have to say upon this point.

Pedigree Breeding for Egg Production.

Tributary to the subject of thoroughbreds arises the question of Pedigree Breeding.

Experiments have been made to see if the number of rows of corn on the cob could not be increased with success.



my fowls at home on the farm are just as good as these; they are just as big, and I guess they lay as well." Then they'll turn around and say, "Don't you think so, mister?" We tolerate people who talk that way. It is better so. Life is too short to argue with them. If such comments were confined to one or two individuals we might feel inclined to argue the case on the spot; but we have found that there are so very many of these spots, that it is better to overstep them. These people cannot realize how different their birds would look if placed alongside the thoroughbreds which occupy a coop in the show room; but they can learn, and if they "mean business," it is to their interest to do so.

Many and many a fancier has taken his medicine right in the show room, and not always in homeopathic doses. Men of experience in the poultry business have received an eye-opener, when placing their birds on exhibition for the first time. "Well, sir," they exclaim, "it beats all, I could have sworn that my birds were bigger, but they seem to

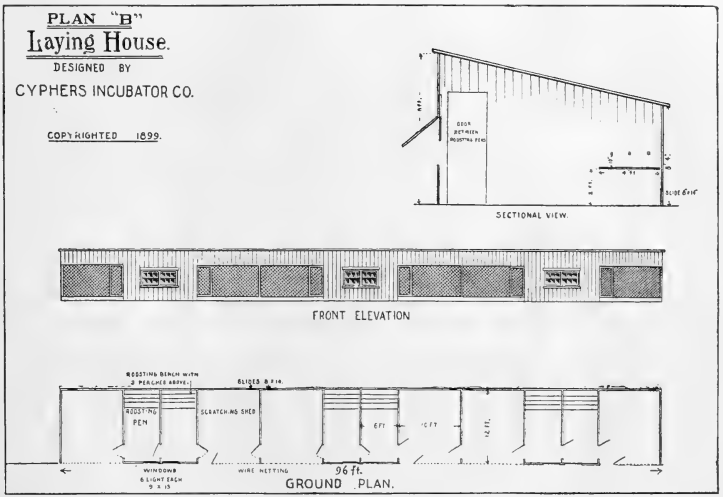
A similar method to that pursued with the corn is applicable to poultry breeding. For example, one starts with fowls which lay 120 eggs each in a year. Among their descendants are some which lay 150 eggs per year, and these are selected for breeding. From these some are produced which lay 175 eggs per year, and from these, perhaps, the 200-egg-per-year-hen is produced. The problem is not quite so simple with fowls as with corn, for it is necessary to breed the males as well as the females, year after year, from prolific layers, in order to succeed. If one looks after the breeding of the females only, he may introduce on the male side blood which is lacking in prolificacy and thus check every attempt at progress. It becomes necessary therefore to breed the males from hens which are varying in the desired direction and which show a cumulative variability in that direction. If the 200-egg bird is to be produced it is just as essential that the male should be from a hen which laid 175 eggs and from a male that was bred from a hen

that laid 150 eggs, as it is that the hen was from one that laid 175 eggs and whose mother laid 150 eggs. Improvers of laying fowls are too apt to forget this and introduce males with little regard to their breeding and then wonder why the prolificacy of the flock does not increase.

Attractive! Interesting! Profitable! are terms which can be applied to pedigree breeding. The day is now at hand when no first-class breeder will take any chances on the prepotent quality of his breeding stock, and the fact that there are so many now who follow no system to identify their best breeders accounts in a large measure for the kaleidoscopic rapidity with which poultry fanciers come to the front and just as rapidly disappear from view. It is all chance work with them. They breed a few good birds one year and win. The next year they fail to produce even one, and are at a loss to tell why. The chances are that the sire and most perfect instrument that man possesses for the modification of living organisms."

Prof. A. A. Brigham, Ph. D., Director of the Rhode Island Experiment Station, expresses himself clearly upon this question, and what he says will appeal to every intelligent breeder. Coming from such authority it should effectually remove any doubts which exist on the necessity of pedigree breeding, which subject has so far received little consideration by poultrymen. The time is close upon us when the list of winners at poultry shows will be entirely made up from the list of pedigree breeders.

Mr. Brigham says: "The aim in poultry breeding is to produce and perpetuate the best birds, i. e., such as, in their form and other characteristics, answer the purpose of the breeder. The object of the art as usually practiced is to produce the largest quantity of the best quality of certain



or dam of the winners went as a martyr to the block, or was inadvertently sold, and perchance caused another man to imagine for a year or so that he, too, had become a successful breeder.

Plants are affected by selection.

It has been our pleasure to notice divergencies in the color or shape of a flower, and by selecting its seed to inculcate such divergence in the plants raised therefrom, sometimes with less success.

A leading authority says: "The word selection, taken in its general sense, means choice. In natural history, when applied to plants or animals which man raises under domestication, it assumes a more restricted meaning and is applied only to the choice of individuals considered as agents of reproduction." * * * Much has been said of cultivation as a means of improving plants. The writer believes, however, that the selection of the individual intended to reproduce a sort, has done infinitely more in this direction than cultivation." His conclusion is that "Selection is the surest animal products with the least waste and largest net profit.

"The scope of stock breeding is almost unlimited, and gives ample room for the largest and best, the deepest and highest study and practice of agriculturists.

"When we consider that the excellent improved breeds of poultry of the present day all originated from wild and slightly esteemed progenitors in the past, we gain some idea of the amplitude of opportunities which are open to the intelligent breeder in the present condition of poultry culture.

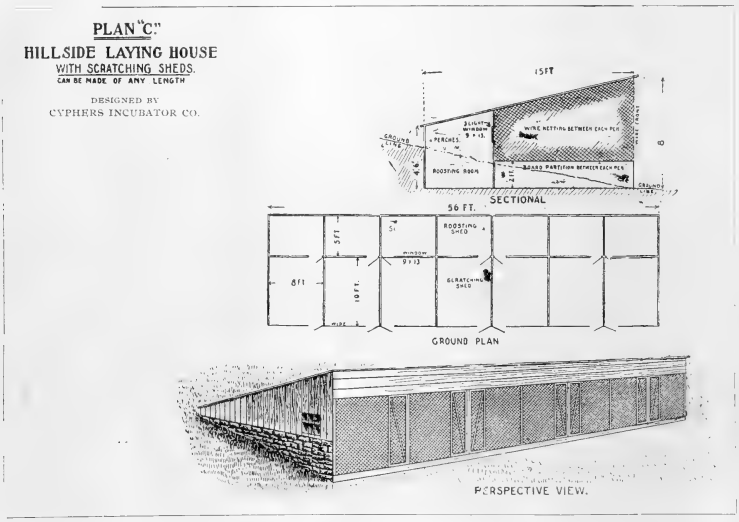
"Success in stock-breeding depends upon the certainty that the progeny will at the time of procreation, inherit the general or mingled qualities of the parents. Color and outward shape, and the characteristics and tendencies of the internal organs and structure are thus transmitted. Heredity extends even to the transmission of longevity, fecundity, disposition and habits. * * *

"Prepotency is increased by carefully breeding together animals of like inclination, and the longer this process is continued the more certainly is the peculiarity transmitted.

Prepotency in a given respect may thus come to be a quality of a flock, of a family and of a breed.

"The principle of prepotency is of special value to the poultry breeder, in that it enables him to select for his particular purpose an adapted breed which is, as a breed, prepotent in the line desired; next, to obtain as foundation stock individuals from a family known to be especially prepotent in the particular respects desired; and, finally, to use as the sire of his animals' offspring a male individually prepotent and most certain to transmit the desirable characteristics to his get. Prepotency is of great practical utility in crossing males of pure breeds upon common stock, to rapidly improve the poultry of a country or district. * * *

"It is a principle in stock-breeding that coupling two animals possessing the same quality, defect, or disease, will tend to fix and intensify that quality, defect, or disease in the offspring.



Essential Conditions for Pedigree Breeding.

"Two essential conditions must invariably attend successful inbreeding, viz., sound constitution and perfect health. With these as a foundation, close inbreeding may be practiced with the best of results, as shown by the breeds thus produced and perpetuated by successful stock-breeders.

"The qualities of fattening easily and quickly, of early maturity, of enormous egg production, all have been brought to the highest perfection in individuals and families which have resulted from close inbreeding. * * *

"From the study we have made of the principles of breeding we must conclude that the ancestry of our breeding animals is of very great significance in determining results. The development of the best breeds of farm stock has been in a very striking degree the fixing of the desirable and prepotent characters of a few ancestors upon numerous descendants.

"The pedigree of an animal is his line of descent, his list of progenitors, in short, his ancestry. * * *

"The perfectly prepared pedigree of an animal shows the foundation stock of the breed that enters into his line of ancestry, and then step by step exhibits the different links in the chain of life, indicating to what extent the foundation stock and their progeny re-enter the pedigree, the closeness of interbreeding, the outbreeding, the use of unknown, doubtful, or undesirable sires or dams, in fact, all the blood relationships of which the animal is the result." * * *

"Thus, gradually, a type is developed, which, after several generations, becomes fixed and certain of transmission to continued generations. What the family type shall be depends upon the environments and the standard fixed in the mind of the breeder, who selects, at first, and continuously, those animals which come nearest to his ideal, or possess qualities which he wishes fixed in his stock. He breeds them together in accordance with the laws of heredity and variation, continuing a process of selecting and discarding according to his fixed ideal or standard of excellency, and gets his desire."

That's just it—"gets his desire," and the poultry fancier's desire is to be at the top. By adopting this method of breeding he will get there. The egg farmer's desire is that his hens shall lay 200 eggs a year. He adopts this method of breeding and they lay 200 eggs a year; but as this trait has yet to be generally established, it means years of endeavor, although every year's results will spur him on to greater efforts.

Quality, Not Quantity.

In this age of so-called over production it should be plain to everybody that what is wanted is not quantity, but

quality. We have an over production, no doubt, of inferior and medium grade stuff, but quality still brings good prices, still sells at a premium. While there is no overproduction in poultry and eggs, there is a decided difference in price. Quality governs.

Mr. C. H. Wyckoff told the editor of the Reliable Poultry Journal of a case which illustrates the point.

"Two years ago the plum trees in his poultry yards were fairly matted with young fruit. There was more fruit by far than the trees could ripen into large, showy plums of good flavor, or, in other words, into salable fruit." Mr. Wyckoff knew that the wise thing to do was to thin out the crop. This he did, assisted by his wife and hired man. They did the work at odd times, keeping account of the number of hours each worked at this task. The three put in what was equivalent to thirteen days of one person's time. They simply used scissors, thinning cut from one-third to one-half of the crop. Said Mr. Wyckoff: "The result was this: while my neighbors and others hereabouts were peddling their plums in Groton at 30 and 40 cents per bushel I sold mine without any effort at $1.50 per bushel, and they were well worth the difference in price. They were uniformly large and of good flavor, while those that had been permitted to grow wild were half size and hardly fit to eat!"

In writing of this the editor of R. P. J. continued:

"We could cite several similar cases that have come under our personal knowledge. Quality must be the watchword if we are to do a profitable business in fruit, in poultry, in almost anything. It costs extra effort, it calls for hard work, but it is still the short and pleasant road to success. Referring to the quality of dressed poultry, we some time ago had a talk with a Mr. Allen, a celebrated dressed-poultry dealer. He said to us that he was then getting twenty-eight cents a pound for chickens. We looked up the market quotations and found chickens, dressed, quoted at twelve to thirteen cents per pound. The difference in price was due to quality. Quality is what pays. Mr. Allen said that he bought from certain poultry raisers whom he had years ago carefully instructed what to raise and how to raise it, who always brought him chickens of a grade that other dealers could not duplicate, and these he never had any difficulty whatever in selling at the highest price. It was the poor, cheap stuff that did not pay. For the best there was always a demand beyond the supply. The general law of supply and demand operates uniformly the world over, where it is not interfered with by unwise legislation. If the demand exceeds the supply, so that the customers bid against each other, the price will go up; but if the supply exceeds the demand, so that the sellers bid against each other, the price will go down. It makes a great difference which class does the bidding, but always quality pays, for the supply of the best is always inadequate to meet the demand the best."

QUALITY AND QUANTITY IN THE POULTRY YARD.

"Two years ago the plum trees in my poultry yards were fairly matted with young fruit. There was more fruit by far than the trees could ripen into large showy plums. We used scissors, thinning out from one-third to one-half of the crop. The result was that while my neighbors were peddling plums at 30 and 40 cents a bushel, I sold mine at $1.50 a bushel, and they were well worth the difference in price."

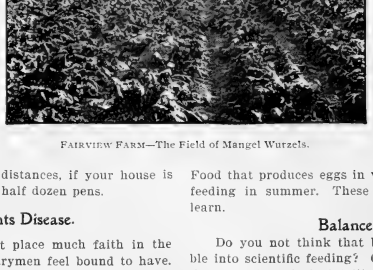
Housing the Fowls.

Assuming that you have sufficient land for your purpose, the number of fowls to be kept should be governed by

the house accommodation you can afford. That is where many poultrymen fail. This year's stock is bundled into last year's houses, although there may be half as many again chicks. This won't do; it is the commencement of trouble. Lice, disease, puny stock, and continual worry, with an accompanying proportion of non-success, may be attributed, in many cases, to want of house room. Therefore, limit your stock to the expenditure in this direction. There is no need to build elaborate poultry houses; the simpler they are the better. Study your climatic requirements, then put up houses which may be well aired, and which are so conveniently arranged as to economize labor, and provide accommodation for your every requirement in all seasons.

You should have pens for the chicks when they leave the brooders, and furnish them sufficient house room to prevent crowding. Overcrowded chicks never attain health or size; and even if they should happen to come along well, it means so much extra care and attention. You must allow for the separation of the cockerels from the pullets before they attain maturity. You should provide pens for fattening the surplus cockerels, as they will need to be fed separately. You must allow for breeding and laying pens, and lots of room for exercise during the time the fowls are confined to the house. Pens or coops for surplus males should be made, and it is well that they should be able to exercise themselves. Then, if you think of placing any of your birds in a show room in the best possible condition, there should be coops in which you can prepare them.

The room for your food should be rat proof, and of course the hen house, too, if you can afford it. It is advisable to have solid wooden partitions in your house at certain distances, if your house is a continuous one—at least every half dozen pens.



FAIRVIEW FARM—The Field of Mangel Wurzels.

Fresh Air Prevents Disease.

As to ventilation, we do not place much faith in the many appliances that some poultrymen feel bound to have. Given a house where we can open our windows and doors during the fine weather, and we want no patent ventilating apparatus. In nearly all cases where ventilators are used there arises a question whether or not the houses are properly aired, and in many cases a draft is created. This is detrimental to the health of the fowls.

One of the chief preventives of disease is fresh air, and it can be better introduced by opening all the windows of the house than by means of any ventilator that has ever been invented.

If the houses are kept well cleaned the necessity for ventilation is reduced fifty per cent, that is to say, the foul air is not allowed to accumulate so rapidly.

Much depends upon the location of the houses. "High and dry" is a good motto in this connection. Some poultrymen prepare a long building of continuous pens, others what is called the scratching shed plan, which provides for an open shed for every pen. In all your constructions bear in mind the necessity for time saving in attendance upon the fowls—economy of labor; have as few nooks, corners and uneven surfaces as possible; provide for natural warmth at night in winter; have no fixtures that you can dispense with; make the nests, roosts and dropping boards movable; windows not too large; floors as you choose, boarded or not, according to circumstances, but they must be dry; in fact, keep in view economy, cleanliness and the health of your stock, and never mind the frills.

Damp, frosty walls in hen houses have troubled many a poultryman. The open, well-aired house is one of the best preventives of this annoyance. The house that becomes warm during the day and cold at night will have damp walls just as sure as a dirty house will harbor lice. If you are bothered with damp walls and do not care to open your windows continually, the only way to dry them will be to light a fire periodically as the houses require it.

Feeding for Eggs.

The young blood in the poultry business is apt to become discouraged by the complicated suggestions he reads on the food question. The more he reads the more discouraged he becomes. Don't let a little thing like that throw you off the track. All the rations you read about are good, that is, all those that are recommended by reliable publications. The kind of food a hen should get, the amount she should consume, and the time she gets it, should be governed entirely by circumstances. What will cure a horse will kill a man, and, for that matter, what would kill one man will not materially affect another. Sometimes it depends upon the strength of the man, and sometimes on the strength of that he imbibes. And so it is with fowls. A Leghorn and a Brahma should be fed differently. A fowl on a big range must not be fed similarly to one that is confined to a house. Food that produces eggs in winter will be considered heavy feeding in summer. These are things the novice has to learn.

Balanced Rations.

Do you not think that breeders are beginning to dabble into scientific feeding? Certainly they are; it is one of the several methods intelligent men are using to increase the egg production of their flocks. The cattle men have been at it for years endeavoring to increase the supply of milk, and with very beneficial results. They feed a balanced ration which possesses, as nearly as possible, all the forms of nourishment that enter into the composition of milk and possesses them in like proportion.

Some poultrymen are working upon similar lines, taking the composition of an egg as their basis.

The Experiment Stations are doing good work, and breeders will await the result of their investigations. Some of the results will be useful in determining the food question, but they are not of necessity so.

We have in mind an experiment that was conducted over a period of seven months to discover the effects of nitrogenous as compared with carbonaceous food upon fowls. One group was fed heavily with corn, the other with wheat—both with a proportion of other grain. We will, for simplicity, call them corn fed and wheat fed fowls respectively.

The conclusions arrived at were as follows:

(1) The wheat fed fowls gained 354 pounds, while the

corn fed fowls only gained 34 pounds during the same time.

(2) The wheat fed laid 17,459 eggs, the corn fed only 9,709.

(3) A larger per cent of the eggs laid by the wheat fed fowls were fertile, the corn fed laying many unfertile eggs.

Such experiments as these would have a far-reaching effect on the poultry industry, if the conclusions were generally accepted. They would seem to prove that nitrogenous feeding is away ahead of carbonaceous feeding, but they prove nothing of the kind, when we come to analyze them.

Take conclusion No. 1 for example, which says the wheat fed fowls gained 354 pounds in seven months and the corn fed gained only 34 pounds. Any practical poultryman when he considers the ration will be surprised to find that the corn fed fowls had any gain at all registered against them at the end of seven months. Fancy a fowl thriving on potatoes, corn and oats. There was, we admit, a feed of clover on the third, fourth and fifth months and some wheat screenings during the second and third months; but during the first, second, sixth and seventh months, the two last being most important of all, there was nothing but corn, potatoes and oats, and during the fifth month they existed on corn and potatoes with some clover hay thrown in, while on the sixth month the poor things were fed corn and potatoes alone.


FEEDING THE CHICKS

On the other hand see what the wheat fed fowls reveled in every month — potatoes, hominy feed, brown middlings, corn, oats and fresh bone; wheat screenings for three months, clover hay for three months and oil-cake two months. They also received every month from 200 to 450 pounds of food more than the corn fed fowls. The chances are that the corn fed fowls got sick of their rations and would not eat. The fact is, instead of making any gain in flesh they lost regularly during the last four months of the experiment, which proves they were not getting properly balanced rations.

As to the second conclusion: If a poultryman were to feed his fowls as these were fed, he would not expect any eggs, and the fact that those experimented upon were losing flesh during the last four months, should have shown the persons in control that something was wrong in their manner of feeding. If the fowls were not vigorous it is natural to suppose their eggs would be infertile. The conclusion arrived at states that, "Although the nitrogenous ration costs slightly more, yet it was more profitable, because more eggs were laid and the fowls gained more in weight. The eggs from the nitrogenous fed fowls were larger, more fertile and hatched better and produced far more vigorous chicks than those laid by hens fed on carbonaceous rations. Both lots of fowls remained in a healthy, vigorous condition during the entire test."

It has been impressed upon poultrymen again and again that fowls need a variety of food. It has been proved that fresh cut bone is one of the best egg producers in existence, and yet somebody argues that because corn fed—ill-fed—fowls do not lay as many eggs as fowls that are fed wheat and cut bone, therefore carbonaceous feeding is comparatively undesirable.

Our conclusion is, that incorrectly balanced rations, or those that contain no green food, and no animal food, are dear at any price. Further, the fact that eggs become smaller is one of the signs of unhealthy fowls. Again, fowls which lose weight during the last four months out of seven, cannot be in a healthy state, unless at the beginning of that period they were far too fat. Furthermore, it is not wise to adopt on the spur of the moment the conclusions based upon experiments which were not conducted upon parallel lines.

Green Food Important.

Among the valuable experiments that have been conducted are several on the value of clover as a food. At the Kansas Experiment Station, Alfalfa (Lucerne) was tested as food for hogs, and proved pretty clearly the advisability of using green food, if only to promote digestion.

The hogs were divided into four lots of ten each.

We quote: "Lot 1 was fed dry Kafir-corn meal and alfalfa hay, lot 2 whole Kafir-corn, lot 3 dry Kafir-corn meal, and lot 4 wet Kafir-corn meal. The alfalfa hay was of the best quality and carefully cured. It was dry fed in a large feeding trough. The pigs were confined in large pens with open sheds. The test began November 24, 1898, and covered 9 weeks. Lot 1 gained 90.9 pounds or 10.88 pounds per bushel of dry corn meal and 70.83 pounds of alfalfa; lot 2 gained 59.4 pounds or 8.56 pounds per bushel of grain; lot 3 gained 52.4 pounds or 7.48 pounds per bushel of grain; and lot 4 gained 63.3 pounds or 8.09 pounds per bushel of grain. These results are not due to the feeding value of the alfalfa alone, but also to its influence in aiding the hogs to better digest the Kafir-corn. The alfalfa hay also gave a variety to the ration, making it more appetizing and inducing the hogs to eat more grain. * * * The hay fed hogs ate more grain and gained more for each bushel eaten.

"In a former experiment at this college pigs were pastured through the summer on alfalfa with a light feeding of corn. After deducting the probable gain from the corn, the gain per acre from the alfalfa pasture was 776 pounds of pork."

Those breeders of poultry who have used clover would not be without it, and there is every reason to suppose that its use results as satisfactorily as in hog feeding. We are not to imagine that clover is the best green food in existence, but reckoning on its cost compared with other foods, we are not far astray in saying it is the cheapest. Cabbage, for instance, contains more nutriment than clover, and, fed in equal quantities, will likely be a better egg producer, but it is a much more expensive food.

To obtain best results Lucerne should be cut between the periods of medium and full-bloom, and should be carefully cured, bearing in mind that the leaves are most nutritious. We cannot place too much importance on the feeding of green stuff. It goes a long way towards successful breeding.

Cut Bone Versus Animal Meal.

Sometimes we jump at conclusions too quickly altogether. Experiments, even when conducted on a proper basis, are not always conclusive. Cases in point are inves-

tigations which have been made regarding the comparative value of cut bone and animal meal. Of four experiments, two resulted in favor of the bone, and two in favor of the meal. Now, if a reader had known the result of only one of these experiments, he would have sworn by it, of course. Therefore, beware.

We are not sure that the final conclusion of the experimenter is quite correct. Referring to the last experiment, in which the use of animal meat resulted most favorably, he says: "The results have been twice favorable to bone, and twice to animal meal, but this last experiment is more decisive than any preceding."

If that be so, we do not understand the facts. We have before us details of two of the experiments, including that from which we have quoted. In the test wherein the meal fed fowls came out ahead, the cost per egg from them was about three-quarters the cost of those from the bone fed fowls; while in the test wherein the bone fed fowls were winners the eggs from them cost only about one-half the cost of those from the meal fed fowls.

So that as between the two most decisive experiments, the cut green bone finished considerably in the lead.

Corn Versus Wheat.

The most notable and surprising information on the food question that has been given to poultrymen within our recollection is that which appeared in the Reliable Poultry Journal for December, 1899, and which we cannot allow our readers to overlook. It refers to the use of corn, and clearly demonstrates that while we have been paying eighty cents a bushel for wheat, corn at forty cents has been a good egg producer. The value of this information cannot be overestimated. We have reproduced it in this book with additional matter that has come to us in the same connection. It is worth many dollars to you.

Flavor of Eggs.

Another point which should not be overlooked is the effect of certain foods upon the flavor of eggs.

It seems to be a fact that if hens are largely fed upon highly pungent foods the eggs will be to some extent tainted by those foods. A fishy diet will impart a fishy flavor; onions will give some of their pungency to the eggs. We have read of fowls eating the carcass of a dead muskrat and laying eggs with a musky flavor. All of the instances which have come under our notice where eggs have been affected unfavorably by the food have been cases where the food possessed a strong odor and had been consumed in considerable quantities. Other foods that have been equally disgusting to our sense, but which lacked volatile properties, have seemed incapable of noticeably affecting the flavor of the eggs.

Incubators and Brooders.

It is absolutely impossible to compete with the present-day breeders who raise poultry and eggs for market unless you use incubators and brooders. To begin with, the stock cannot be bred in sufficient numbers, and again, just at the time when you want to place your eggs in incubation you are at a standstill if you depend upon hens; the result is the produce is not hatched at proper season and therefore can not be placed on the market when high prices prevail, and it is by marketing at such times that the poultry business returns enormous profits. Unless you compete at such periods you might as well drop clean out of sight.

The breeder of a few fowls needs no incubator if he has a variety of fowl which incubates. On the other hand, if he breeds Minorcas, Leghorns or any of the non-sitting breeds, he either must have an incubator or purchase hens for setting. Our experience is that when the number of chicks raised exceed a hundred or so the incubator saves time, trouble and money.

Leading Breeds of Fowls.

It is better that you should confine yourself to one breed; you will be more successful, and like it better; you can pay more attention to perfecting that breed, and you will feel as happy as a man with "just one girl."

In the poultry kingdom there are egg producers, market fowls, general purpose fowls, and fancy fowls.

The egg producing field, until late years, has been monopolized by the Mediterranean breeds; so called by reason of their origin on the north shore of the Mediterranean Sea. These birds have been bred purely for egg production, and they all lay white eggs of various sizes. Other fowls that have been carefully bred with a view to increased egg production have given satisfactory returns, and as we have said elsewhere, there are individual specimens that equal the Mediterranean breed. We will refer shortly to the principal breeds and leave the reader to take his choice.

THE BARRED PLYMOUTH ROCK. The Barred Plymouth Rock is nearly too old to need description. Nearly every farm in the country has had this variety at some time, and the reader will readily recognize them by the cuts which this book contains. During the past ten years there have been more Barred Rocks than any other breed placed by farmers upon the roaster and boiler market. They are good winter layers.

Plumage—A bluish gray, barred with a very dark blue, which approaches black.

Comb of All Varieties of the Plymouth Rock—Single, and comparatively small.

Standard Weight of All Plymouth Rocks—Cock, 9½ pounds. Hen, 7½ pounds. Cockerel, 8 pounds. Pullet, 6½ pounds.

Cockerel, 8 pounds. Pullet, 6½ pounds.

THE WHITE PLYMOUTH ROCK. The White Plymouth Rock is a more recent variety, claimed to be a sport (or accidental production) from the Barred Rock It is similar to the Barred Rock in every respect except color. They are not so extensively bred, but have an advantage, as a table fowl, over the Barred, in the absence of the dark pin-feathers which disfigure the first named variety when plucked. The greatest difficulty experienced by fanciers, is to eradicate the creamy shade from the plumage, and at the same time, preserve the yellow legs and beak. Every year this trouble is becoming less noticeable, so much so that at the best shows few creamy birds are now seen. As layers they equal the Barred variety.

Plumage—White.

THE BUFF PLYMOUTH ROCK. The Buff Plymouth Rock is the most recent addition to this general purpose breed, and has in a short time become very popular. It is claimed that the plumage assists in producing and maintaining the much desired yellow skin of a table fowl. It will take some years before the black and white in wings and tail, which breeders have to contend with will totally disappear. Pure buff birds are extremely valuable. All the Rocks excel as winter layers, and this variety is no exception to the rule.

Plumage—Golden Buff.

THE SILVER LACED WYANDOTTE, The Silver Laced Wyandotte perhaps matures quicker that the Plymouth Rock, but at maturity averages about a pound less. The difficulty to be encountered is the breeding of well-defined lacing which, when obtained, renders this fowl particularly attractive. It is of a more blocky

build than the Plymouth Rock; makes a good table fowl, and is its equal as a winter layer. It has a rose comb, which should fit closely to the head, and should not be too meaty. The dark pin-feathers appear in this variety, as in the Barred Rocks.

Comb of All Varieties of the Wyandotte—Rose and low.

Plumage—Black and white, distributed as illustrated in this book.

Standard Weight of All Varieties of the Wyandotte—Cock, 8½ pounds. Hen, 6½ pounds. Cockerel, 7½ pounds. Pullet, 5½ pounds.

THE GOLDEN LACED WYANDOTTE is similar to the Silver in every respect except that golden bay is substituted for white in the plumage. It makes an equally handsome bird.

THE WHITE WYANDOTTE. The White Wyandotte has had a big run among the broiler men. Rapid maturity, absence of dark pin-feathers, and a blocky little frame quickly filled out, has made it possible to place a meaty morsel on the market at twelve weeks. As a winter layer it equals the other varieties of the Wyandottes, and has been bred extensively by the fancy, who have been working hard to retain the yellow legs and skin, while breeding out the creamy tinge in the plumage.

Plumage—White.

THE BUFF WYANDOTTE. The Buff Wyandotte is one of the most recent productions in the Wyandotte class and the demand for it has increased very rapidly. It has the same advantage of color as that claimed for the Buff Plymouth Rock. Like the other Wyandottes, it matures quickly, and is being extensively tried for broilers. It makes a good winter layer. The black and white in wings and tail will take some years to breed out, but perhaps this lends additional zest to the pursuit by the fancier

Plumage—Golden Buff.

PARTRIDGE WYANDOTTES. This variety, with its cousin, the Silver Pencilled Wyandotte, is the most recent addition to the Wyandotte class. Its plumage is similar to that of the Partridge Cochin, a much older breed. Being a new breed, there is of course some difficulty in breeding it up to standard requirements.

SILVER PENCILLED WYANDOTTES. One of the most beautiful of the Wyandottes; admitted to the standard in 1903. The plumage is similar to that of the Dark Brahma. Difficulties in breeding to standard requirements will arise for some years.

THE BLACK WYANDOTTE is similar to the other varieties, except that it is black throughout, and perhaps not as desirable as a table fowl for that reason. In egg production there is little difference.

THE BROWN LEGHORN. The Brown Leghorn is a favorite family egg producer. A sprightly, ever scratching bird, which lays perhaps as well as any variety, though the eggs are on the small side, except in individual strains.

Comb—Single, rather large.

Plumage—Male: Breast, black; back, red, striped with black; neck and saddle, brilliant red, with black stripes. Female: Breast, salmon; back, brown, penciled with darker brown; neck, yellow, with black stripes.

THE ROSE COMB variety is identical, with the exception of the comb, but there has existed a difficulty in getting them up to size.

There is no standard weight for Leghorns.

THE WHITE LEGHORN. The White Leghorn is identical in size and shape with the Brown; it lays just as well, but the eggs are larger as a rule. More of these birds are being bred for laying purposes than in former years. Many of them are used as a cross on larger varieties to produce broilers, but this method has not been commonly adopted. The creamy shade of plumage invades this variety, as it does other white birds.

Comb—Single, rather large.

Plumage—White.

THE ROSE COMB variety is identical, with the exception of the comb, but the majority of the birds are slightly smaller, and lay smaller eggs than the single comb birds.

THE BUFF LEGHORN. The Buff Leghorn is a comparatively recent addition to this breed, and has not yet generally acquired the sprightliness, shape, and style of the other varieties. It should run the Whites close in the competition for popularity, by reason of the favorite color of its plumage. They are larger in many cases than the Browns or Whites, and compete with the Whites in the size of their eggs. In the race for perfect plumage, it has jumped to the front of the Buff breeds.

Comb—Single, rather large.

Plumage—Golden Buff.

BLACK LEGHORNS, AND SILVER DUCKWING LEGHORNS are less extensively bred than any of the other varieties named. The Blacks are in advance of the Duckwings in this respect. The plumage of the Black is as its name indicates; while the Silver Duckwing male's hackle is silvery white with black stripes; back, white; breast, black; tail, black. Female—Hackle, silvery gray, with narrow black stripes; back, light gray; breast, light salmon; tail, black or brown, becoming gray in the top feathers.

Comb—Single in each case.

THE ANDALUSIAN, Or, as it is frequently called, the Blue Andalusian, is another of the egg producers not very widely bred. In size it lies between the Leghorn and the Minorca. Andalusians are first-class layers. They are becoming more popular. It is a surprise that more have not been bred, but probably this is because so great a number of the chicks are culls in color, running very light.

Comb—Single, rather large.

Plumage—A slaty blue, laced with a darker shade. In the male, the neck, back, saddle and tail approaches black.

Standard Weight—Cock, 6½ pounds. Hen, 5½ pounds. Cockerel, 5½ pounds. Pullet, 4½ pounds.

THE BLACK MINORCA. The Black Minorca is a favorite breed, combining size with production of large white eggs. During the last ten years a great increase has been made in the size of the comb, which, on exhibition specimens, is now required to be quite large. This renders it difficult to preserve it from frost bite in severe climates, and therefore the egg production is affected in extremely cold weather. In warmer seasons they are unequalled as egg producers.

Comb—Single, very large.

Plumage—Glossy black, with a green tinge.

Standard Weight—Cock, 8 pounds. Hen, 6½ pounds. Cockerel, 6½ pounds. Pullet, 5½ pounds.

THE WHITE MINORCA is similar in every respect to the Black, with the exception of color, though a difficulty has been experienced in keeping them up to size. Prominent breeders are now overcoming this drawback.

Comb, and Standard Weight—Identical with the Black variety.

Plumage—White.

THE BLACK SPANISH has not as many friends as formerly. The impression is gaining ground that continual breeding for the white face has undermined the vitality of the breed. However, it may be that the difficulty of obtaining this pure face accounts for the lack of breeders of the bird. In egg production it resembles the Minorca.

Comb—Single, rather large.

Face—White.

Plumage—Glossy black, with a green tinge.

Standard Weight—Cock, 8 pounds. Hen, 6½ pounds. Cockerel, 6½ pounds. Pullet, 5½ pounds.

There Are Others.

There are yet other fowls from which a choice might be made, but as a class they have little reputation as egg producers, although individual instances of prolificacy in this particular will appear in this book. The question of breeds will have been gone into deeper than was intended, but, having "taken hold of the plow," it is deemed wise to omit no fowl which might by any chance be accepted as an egg producer such as might be satisfactory to the egg farmer. Birds that are omitted, are either distinctly non-utility breeds, or are inferior to those which have been named in their respective classes.

The Asiatic Class.

The Asiatics are considered to be table fowls rather than egg producers. They are of great size and mature slowly. They possess feathered legs to a greater or less degree, and are a fluffy, full-feathered class, composed of:

Brahmas (Light and Dark); **Cochins** (Buff, Partridge, White, and Black); and **Langshans** (Black and White).

Standard Weights—

Light Brahmas—Cock, 12 pounds. Hen, 9½ pounds. Cockerel, 10 pounds. Pullet, 8 pounds.

Dark Brahmas—Cock, 11 pounds. Hen, 8½ pounds. Cockerel, 9 pounds. Pullet, 7 pounds.

Cochins (Buff, Partridge and White)—Cock, 11 pounds. Hen, 8½ pounds. Cockerel, 9 pounds. Pullet, 7 pounds.

Black Cochins—Cock, 10½ pounds. Hen, 8½ pounds. Cockerel, 9 pounds. Pullet, 7 pounds.

Black and White Langshans—Cock, 10 pounds. Hen, 7 pounds. Cockerel, 8 pounds. Pullet, 6 pounds.

The French Class.

These are composed of table fowls, pure and simple. Of course they lay eggs, but as in the Asiatics, it is only individual strains that distinguish themselves in this particular. The class consists of **Houdans, Creve Coeurs, and La Fleche.**

Standard Weights—

Houdans—Cock, 7 pounds. Hen, 6 pounds. Cockerel, 6 pounds. Pullet, 5 pounds.

Creve Coeurs—Cock, 8 pounds. Hen, 7 pounds. Cockerel, 7 pounds. Pullet, 6 pounds.

LaFleche—Cock, 8½ pounds. Hen, 7½ pounds. Cockerel, 7½ pounds. Pullet, 6½ pounds.

The English Class.

This class is made up of ideal table fowls, that is, from an English point of view. The skin is white. In egg production they are about equal to the French class. The following are the varieties contained in this class:

Dorkings—White, Silver Gray, and Colored.

Standard Weights—

White Dorking—Cock, 7½ pounds. Hen, 6½ pounds. Cockerel, 6½ pounds. Pullet, 5 pounds.

Silver Gray—Cock, 8 pounds. Hen, 6½ pounds. Cockerel, 7 pounds. Pullet, 5½ pounds.

Colored—Cock, 9 pounds. Hen, 7 pounds. Cockerel, 8 pounds. Pullet, 6 pounds.

Buff Orpington—Admitted to the American Standard in 1903. A popular general purpose fowl, but somewhat larger than the American breeds of that class. Standard weights: Cock, 10½ pounds. Hen, 8½ pounds. Cockerel, 9 pounds. Pullet, 7 pounds.

The Game Class.

With the exception of the Indian Game and Malay, this class is purely an exhibition collection, and possesses no standard weights.

The Indian Game is a first-class table fowl, and has been freely used as a cross upon other breeds to improve their size or quality. It is a fair layer. There are both Cornish, and White Indian Game.

Standard Weights—

Indian Game—Cock, 9 pounds. Hen, 6½ pounds. Cockerel, 7½ pounds. Pullet, 5½ pounds.

Malay—Cock, 9 pounds. Hen, 7 pounds. Cockerel, 7 pounds. Pullet, 5 pounds.

The Hamburg Class.

The Hamburgs are a small, rose comb breed, of great egg producing capacity; but their eggs are, in most cases, too small to be of use for market purposes. The class consists of:

Black, Golden (Penciled and Spangled); **Silver** (Penciled and Spangled), and **Whites.**

No standard weights are allotted to them.

Exert Earnest Effort.

And now, having offered such suggestions as have occurred to us as being necessary to your welfare, we advise you to study carefully, and not hastily, the experiences of the good men, who, for your benefit, have given of their knowledge in the subsequent pages of this book. Overlook not even the smallest items—these are often of the greatest importance—then, having the benefit of their many years' accumulation of knowledge, it simply remains with you to profit by it.

Do not consider the poultry business a ready made recreation, but enter it with such a vim, with such earnestness as will assuredly present to you that which is most highly prized by every man who is a man—independence.

ROBERT H. ESSEX.

DEMAND FOR EGGS THE FARMERS' OPPORTUNITY.

Poultry-Keepers Have an Inexhaustible Market for Eggs—Enormous Demand by the Export Trade—One City Alone Imports Eggs to the Value of About $7,000,000.

By JOSEPH A. TILLINGHAST, of the Rhode Island Experiment Station.

I HAVE beeen asked to give you some practical thoughts on "Poultry on the General Farm." The importance of this subject in the course must be acknowledged when we consider, that with all the specialists in poultry culture, we must still look to the general farm for a large part of our supply. That you may not fear of over doing the business, at least for a little time, and to show the extent of the industry, let me give you a few figures. The dairy products of the United States for one year amounted to $254,000,000. We are in the habit of looking at this branch of farming as one of large extent, but we find the poultry products for the same year to be $560,000,000, or more than twice as much and still not enough, for during the same year 13,000,000 dozens of eggs were imported, and the total value of poultry and eggs imported was probably $20,000,000.

Immense Foreign Trade.

This $20,000,000 ought to have been jingling in the pockets of American farmers and poultrymen rather than to have been sent to foreign countries. Even our little state of Rhode Island used from outside of the state about $800,000 worth of eggs. Britain imported eggs and poultry to the value of £5,675,000 sterling, or $27,637,250. London alone used other than English eggs to the value of $6,915,000. France reckoned the value of her poultry products at $77,920,000, from which she furnished her own people and exported largely. This large value we find derived largely from the farms. With such figures before us, a growing population, and a surety that as cost of production is decreased by skillful management, that consumption of poultry products will be largely increased, we may rest assured of a market for some time to come. Now let us look at some of the reasons for making poultry culture a prominent department on the general farm, and especially on our New England farms.

"First in importance is the small amount of capital necessary to invest. You have doubtless read Fannie Fern's story of the shrewd Yankee, who, wishing to start in the poultry business, borrowed from one neighbor a broody hen and from another a sitting of eggs. He soon had a fine litter of chicks and was ready to return the hen to her owner. But how was he to repay the eggs? He soon solved that by keeping the hen until she laid the required number of eggs, returned both hen and eggs and 'guessed he had as fine a litter of chicks as any one, and about as cheap, too.'

"Next is quick returns. One reason why a farmer can not make money so rapidly as one can in many other lines of business is because he can not turn his money over quickly enough. Poultry keeping will help the farmer in this respect by giving him steady cash returns if the business be rightly managed.

"Another and very important reason is greater profit. For the same investment of capital and labor no other department of the farm will yield such generous returns. Dollars and cents are what all of us are striving for in business, so this is a most potent argument in its favor. You remember the old saying, 'Take care of the cents and the dollars will take care of themselves.' This is a most excellent piece of advice, but I think it would be still more applicable to the poultry business if it read like this, 'Look out for the sense and the dollars will look out for themselves,' for in no kind of work is good, plain, common sense more valuable than in poultry culture. Another reason especially applicable to our farms that are at a distance from market is that it is a concentrated product, easy to handle and market at a distance, which is not true of more bulky products.

"Still another reason is that waste products of other departments may many times be utilized, and instead of being a waste become a source of profit. For instance, dairying and poultry culture go hand in hand. When butter is made or cream sold, leaving the skim-milk at home, the milk will give far better results financially, fed to poultry than when given entirely to swine, as is so commonly done.

"Fruit and poultry make a good combination. The fowls aid you in the fight against insect pests and also much of what would otherwise be wasted is made to be of value.

"Another point in favor of this industry is that you are continually enriching your farm and at the same time deriving a profit from the business. This is an important point, for much of our New England soil has been managed in such a way in the past that the farmer of to-day has the difficult problem to solve of making a living and at the same time of bringing the soil from its worn out condition to one

of fertility. I have seen this done by means of poultry culture. A friend of mine has more than doubled the crop capacity of his land and almost entirely by this means. While I would not advise every farmer to take up poultry culture to the exclusion of other lines of farm work, yet it seems to me that there is a chance to make this a paying department on nearly every farm. Good markets are assured us in the many manufacturing villages of New England for fresh fruits, vegetables, poultry and eggs, and as we can in no way compete with the western farmers in the cereals and many other farm products, it seems to me that the salvation of the New England farmer lies in producing the best and freshest of such products as our city and village people are and always will be so glad to obtain.

Method and Patience Brings Success.

Now for a few thoughts as to how this line of work can be made a practical success. First, there are personal traits of character which underlie success in any business, and these must naturally be possessed or else acquired before we can look for the best results from a man's labors. He must have application, patience, persistence, and in every sense of the word be a hustler. Be on the alert for every new idea in your business, but do not be greedy and attempt to swallow more than you can digest. Season your scientific knowledge with lots of common sense, and above all, run your business on sound business principles. Be a genuine Yankee, but do not 'guess,' always know your business. Keep strict accounts and records and study them. A good system of accounts is the surest guide you can have to success in any business, and you will find farming to be no exception, though comparatively few farmers keep them. Study your markets, the particular likes and dislikes of your customers. Learn to fill every want, and just as you wish it, and never know more than your customers. If you wish to make changes in any way, do it in such a manner that they will think they are the ones making the change rather than you.

"Do not begin too expensively. Remember every dollar you put into business is an interest-bearing factor and must be accounted for out of your profits. Expensive or fancy buildings are not a necessity, but convenience of labor and proper conditions are. Make your plant cost as little as possible, but do not sacrifice convenience or proper conditions under any circumstances. Above all, look after the details, for no department of the farm needs so close attention to the many little details, or will suffer so quickly for lack of attention, as this. Careful attention to these littles, a love for the work, and a never failing will to succeed under any and every condition will bring you success. Never depend upon luck, but always spell it with a 'p,' and never expect success till you have earned it."

REQUIREMENTS OF THE EGG TRADE.

Market Requirements for Home and Export Trade in Eggs and Poultry—Preservation of Eggs—A Valuable Collection of Information for Poultry Farmers.

Compiled by FRANK C. HARE, Chief of the Poultry Division Department of Agriculture, Ottawa, Canada.

GGS to be palatable should be eaten in a strictly fresh condition; therefore they should reach the consumer without unnecessary delay. This requires (1) that the eggs be collected regularly every day and stored in a cool room (temp. 40 degrees F. to 50 degrees F.) until a sufficient number are on hand to deliver to a dealer; (2) that the dealer forward the eggs to the merchant at least once a week; and (3) that the merchant should protect the eggs from deterioration while in his possession.

Some farmers are so situated that they can send fresh eggs regularly to the town or city consumer or merchant. When this is done, the farmer generally receives for the eggs a premium of several cents per dozen. The selling of fresh eggs to the exporting firms is a large business during the spring and summer months.

The most profitable branch of the business is the trade in fresh winter eggs. There is a great demand for strictly fresh eggs every winter, and so far the supply has been very limited.

Market requirements.—The shells of fresh eggs should be wiped clean, if necessary, and the eggs graded in size. For shipment the eggs should be packed into cases holding twelve dozens or thirty dozens each; all small, poorly-shaped eggs should be packed in a case by themselves. The color of the shells of the eggs is not a consideration on the home markets, but the exporting firms prefer brown-shelled eggs.

Egg Preservation.

It is important in keeping eggs for an extended time to pack none but fresh eggs. Stale eggs are not only bad in themselves, but they will affect those packed with them. Eggs must be fairly clean, as eggs that require washing are poor "packers." All eggs thus put away should be infertile. No food should be given the hens that would impart an objectionable flavor to the eggs.

Eggs can be preserved in lime-water, or placed in cold storage.

Lime-Water Preservation.—The lime-water is prepared by slaking one pound of freshly burnt quicklime with a small quantity of water; the milk of lime so formed is stirred into five gallons (fifty pounds) of water. After the mixture has been kept well stirred for a few hours, it is allowed to settle. The supernatant liquid, which is now "saturated" lime-water, is drawn off, and poured over the eggs, previously placed in a crock or water-tight barrel. As exposure to the air tends to precipitate the lime (as carbonate), and thus weaken the solution, the vessel containing the eggs should be kept well covered. The air may be excluded by a covering of sweet oil, or by sacking upon which a paste of lime is spread. If after a time there is any notice-

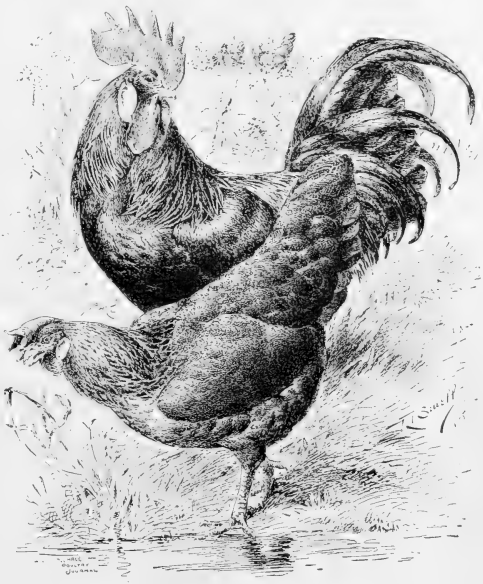
able precipitation of the lime, the lime-water should be drawn or siphoned off, and replaced with a further quantity newly prepared. The eggs should be completely immersed throughout the whole period of preservation.

Although not necessary to the preservation of eggs in a sound condition, a temperature of 40 to 50 degrees F. will no doubt materially assist toward retaining a good flavor, or rather in arresting that "stale" flavor so characteristic of packed eggs.

Cold Storage.—Eggs should be held in cold storage at a temperature near 32 degrees Fahrenheit. The air of the room should be dry and pure. Unless the egg cases have projecting pieces that prevent close stacking, laths should be placed between the cases to allow the necessary circulation of air. The pores of the egg should not be coated with any preservative, nor should the eggs be washed.

The following information concerning the requirements of the British egg market is from the report of the Dominion Commissioner of Agriculture:

"The grade of egg which is in good demand in Great Britain is one weighing 15 pounds per great hundred, that is, 15 pounds per 10 dozen, which is equal to two ounces per egg or 1½ pounds per dozen. A small quantity imported into Great Britain from France go as high as 17 pounds per great hundred. For every half pound which eggs weigh less than 15 pounds per great hundred the value is lessened by about one cent per dozen.



Single Comb Brown Leghorns.

"Eggs should be graded as to size. A higher value will be obtained for a given quantity of eggs graded into three sizes—large, medium and small—than if they are sent with sizes mixed promiscuously. Eggs of a brown shade of color are preferred.

"The preferred size of egg case for export is a wooden case holding thirty dozen eggs, paper-filled—that is, having pasteboard frames with a separate space for each egg. These cases, holding thirty dozen each, measure about 28 inches long by 12¾ inches wide and 13 inches high outside.

"For the safe carriage of the eggs, it is important that they should not be stored in a warehouse, on the cars, or on board the steamship, in proximity to any cargo from which they would acquire a flavor. The carrying of eggs with a cargo of apples has been known to impart to them a flavor which impaired their value.

"They should be carried on the cars and on the steamship at a temperature of from 38 to 42 degrees Fahrenheit. When cases containing eggs are removed from the cold storage chambers, they should not be opened at once in an atmosphere where the temperature is warm. They should be left for two days unopened, so that the eggs may become gradually warmed to the temperature of the room where they have been deposited. Otherwise a condensation of moisture from the atmosphere will appear on the shell, and give them the appearance of sweating. This so-called 'sweating' is not an exudation through the shell of the egg and can be entirely prevented in the manner indicated."

Eggs that are placed in cold storage from April till July are shipped to Great Britain for the September and October trades. Eggs that go into cold storage in the fall are exported during the winter months. Cold storage eggs are sold in Great Britain as "Canadian fresh eggs," and the prices last year (1901) ranged from 7s. to 7s. 6d. per long hundred (120 eggs) during September and October, and from 8s. to 9s. per long hundred during November and December.

Pickled eggs should be exported to Great Britain so as to reach there during November and December. The eggs that were sold during November and December last year realized 7s. to 7s. 6d. per long hundred.

"There is undoubtedly a growing inclination among consumers to give preference to Canadian eggs for winter trade, and the shipment to the United Kingdom may be very largely increased without injuring consumption, provided always in the first place that the quality is maintained up to last year's standard; and secondly (a most important one for Canadian shippers), that the price is not prohibitive."

"We believe it is only a question of a comparatively short time when the American hen will be used almost exclusively for the production of eggs, rather than to have her valuable time wasted in doing work that can be done better and cheaper by artificial means. The hen has a monopoly in the production of eggs. We can hatch her eggs for her and raise her chicks, but we cannot manufacture eggs that will hatch. She will always be in demand, therefore, and it is plainly to the advantage of poultry keepers to use her exclusively for egg production."—Grant M. Curtis, in Artificial Incubating and Brooding.

DEMAND GREATER THAN SUPPLY.

And the Demand is Increasing—Not Enough Fresh Laid Eggs.

Editorial from the Reliable Poultry Journal.

WE have received a letter of more than common interest from a firm of commission merchants in Boston, Mass. They write: "We are having a constantly increasing demand for absolutely fresh-laid eggs that are large in size, brown in color and which run uniformly fine. We probably receive more of this kind of eggs than any several of our friends in the business, and these eggs have usually come from henneries here in New England, but with increased inquiry they are not able to give us sufficient supplies.

"Now, if you have in mind among your subscribers and acquaintances people who have large flocks of fowls which produce this kind of stock we would like very much indeed to have their names. The writer is and has been a subscriber to your Journal for several years and thinks by writing to you we may be able to make connections that would be mutually satisfactory with both shippers and ourselves.

"We make a rule of always sending our check promptly for all eggs shipped and cannot see why we cannot make it to advantage to write to any names that you might send us."

This letter is but one of many similar that we have received this winter; at least three such have come into the writer's hands within two weeks. What reply can be made to it? It is manifest that the supply of reliably "fresh-laid" eggs is insufficient to meet the demand, and the demand is increasing more rapidly than the supply. There is encouragement in this fact for preachers of the gospel of "More Eggs and Better Eggs," for only in an increased supply will there be found a solution of the problem. Even then the demand increases more rapidly than we can hope to see the supply increase, for the more fresh eggs people get the better they like them; and the problem is still unsolved.

THE BOSTON EGG MARKET.

Methods of Marketing Eggs at Boston—Brown Eggs Sell Best—How they are Graded—Wholesale Prices During Consecutive Two Years.

BY GEORGE H. POLLARD.

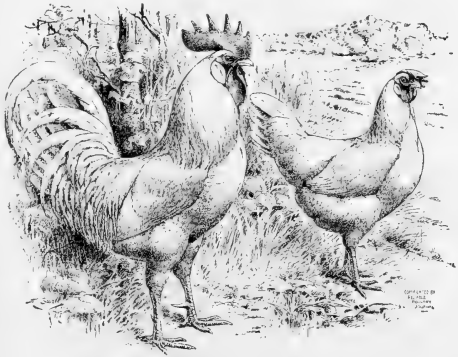
THE uses of eggs are so universal and so varied, that to fully cover the subject much space would be required. Extensive excursions would have to be made into, not only the more domestic culinary branches, but the manufacturing and mechanical arts as well. Obviously, all these cannot be suitably treated in an article of moderate length and scope, nor would it be desirable. To the average mind it is fully as satisfying to know by the undoubted assertion of authorities on the subject that there is an ever increasing call for eggs, and that the supply of fresh eggs is seldom equal to the demand, as it is to have to wade through long rows and columns of figures and statistics in proof of the facts asserted. Figures are delusive things, and though they never lie themselves, those who manipulate them often do. Did they not, few of us have the comparative faculty which would allow any just appreciation of numbers and quantities, which reach the magnitude of millions. The sense of comparison becomes bewildered and is lost in a maze of figures. Leaving to others the statistics of the case, we shall merely attempt to tell something of the conditions, together with the uses of and demand for eggs in the Boston market.

There is no other branch of the poultry business which holds out such promise of fair and sure profit in return for sensible work, as the production of fresh eggs for the nearby markets. There are, moreover, few places where eggs can not profitably be produced and shipped to larger markets at considerable distances from the point of production. There is no other farm product which can be so easily and readily packed and shipped. The main thing is that a reputation shall be established for prime fresh goods. The consumer will do the rest. There is no more fussy individual than the consumer of table eggs, consequently when you have given him what he likes and wants, you are assured of a steady customer, and—though there may now and then be some grumbling—fair prices. Eggs shipped from a distance, which may be relied upon to be true to the mark in color and quality, will find a ready sale in average times and conditions of the market, and are always sought after by the better class of trade.

Eggs Shipped From Many States

It may prove a surprise to some of our readers to know that the best average eggs in size and color come from the west. They are all packed in cases of thirty and thirty-six dozens each. The cases are divided in the center and are fitted with pasteboard fillers, which are the right size to leave a small compartment for each egg. There are three dozens in each layer on either side. The boxes are made of a tough light wood and are sold with the contents and are not returnable. In the earlier days from ten to twenty years ago, most, in fact all, the western eggs used to be shipped east packed in cut straw, bran or oats, and were sent in barrels and boxes; the larger part in barrels, which were closely filled and shaken down and then securely headed and nailed. When the barrel was opened it was turned on its side, and pulling it along with the bottom

end up the straw and eggs were left in winrows on the floor. While some suffered the fate of the under dog and were bruised and broken, the casualties were wonderfully few, considering the circumstances. Cheap cases, while doing away with these methods, have also provided packages, which can be examined and the quality of their contents more easily determined. Indiana furnishes the best grade of boxed eggs (boxed is a term to distinguish the western and far away from the nearby stock); they are larger and better in style, i. e., shape, color and general appearance, and preferable in all seasons except the very hottest weather, when the Michigan eggs come in better condition and usurp the place; otherwise filled by the Indiana stock. When the mercury does its greatest climbing and reaches 90 degrees and over, the nearby eggs have the call for family and table use. Ohio eggs also hold a secure place in the affections of the trade. In the early spring Missouri eggs come good, but as the warm season approaches the quality rapidly deteriorates. Southern eggs are not fancy. They lack in style and are small in size, off in color and have generally a very inferior appearance. They also lack richness and flavor. It might be made an interesting subject of inquiry why this is the fact. The western eggs are accounted the richest and best flavored eggs, excelling even the nearby in this respect. This is of course only during proper weather conditions, allowing them to get through to the east in the best condition. This flavor is attributed by the dealers to the fact that the laying hens get so much wheat in the west. The average dealer prescribes wheat for eggs and corn for fat. While the trend of recent opinion seems more in the favor of corn as an egg food, we doubt if it is fully determined as yet which of the two grains gives the better all-round results. At the present season (December) nearby eggs are scarce and are selling at 40 to 43 cents per dozen. The best nearby eggs are Cape eggs for the eastern and southeastern sections of Massachusetts, also Maine eggs. They are the best sellers and give the most satisfaction in warm and hot weather. No eggs are imported from Canada, or not enough to make an appreciable impression on the market. The duty prevents the importation at profitable figures.



Single Comb White Leghorns.

In the winter of 1898-99, however, during the memorable egg famine, quite a considerable number came from Canada to other New England markets. During the late fall and winter months not so many western eggs are received and the demand is supplied by "held eggs," or eggs from the cold storage houses, where they have been kept in cold rooms till the demand encouraged their withdrawal.

For cold storage purposes April eggs are accounted the best and are preferable to those of any other season. There are, however, large numbers put away in September and October, when prices are low enough to favor such a course, and the market gives indications of profits ahead. One of the reasons why so many more April eggs are stored, is that the price is then at its lowest ebb. At the cold storage rooms they are kept in a temperature of from 33 to 34 degrees and will keep reasonably fresh, or rather sweet, for from six to seven months. In the Boston market brown eggs sell best and will average from two to five cents per dozen above the price to be obtained for eggs with white shells. This may be merely a fad or a fancy, but so long as it is a fact there is no use in trying to make the purchaser prefer otherwise. Generally the person who pays for the article is the one who does the choosing, while this rule may differ sometimes in millinery and dry goods, it will always hold good with eggs and poultry.

Grading the Eggs.

The New York market demand is the reverse of that in Boston and there white shelled eggs sell higher and are so quoted in the current market reports.

All packages of eggs are opened and the contents inspected and candled by the wholesaler before they are turned to the jobbing and wholesale trade. This is the invariable rule except where sold in large lots subject to the regular marks and grades of the wholesalers. They are tested, or to use the professional phrase, "candled." This is done by passing the eggs before a strong electric light, which is placed behind a tin shade, through which are cut two holes. The operator takes two eggs in each hand and passing them before the light quickly determines the grade and the relative freshness of the stock. Every egg is tested in this manner and the assorted product can then be graded and sold with a guarantee of the exact quality to be expected. The candling is done by men who become very expert. The average for a day's work of ten hours is from fifteen to twenty cases, though at least one man can do from twenty to thirty cases. The men are paid by the day and earn from $10 to 12 per week.

Many Uses for Eggs.

The uses of the eggs are many. Aside from the consumption in the different arts and mechanical pursuits, the great mass of course find their chief end in some one of the many culinary purposes. The family use of course is generally understood. Less may be known of their use in hotels, restaurants, etc. In cool or cold weather the restaurants and hotels depend altogether upon western eggs for table use. The best grades are of good color and size and cost less than the nearby stock, while answering the purpose just as well. As the weather gets warmer and through the summer they fall back upon the nearby eggs and the consumption then helps out the market prices for fresh local stock.

Many eggs are also used in saloons, drug stores, etc., where fancy drinks are sold. The number used in this way in a large city would amount to an immense total were it

possible to get the exact figures. The cheaper and poorer eggs go mostly to bakeries, where they are used in the production of the various pies, cakes and pastries which are made to tempt the New England appetite and help the venders of dyspepsia tablets and spring medicines to a life of wealth and elegant leisure.

In candling the "heavy" eggs, that is, those with unsettled and displaced yolks and such as are otherwise in a precarious stage of health, yet not really bad, are broken and the contents put in small cheap tin pails and when full the pails are covered and put in the freezers, where they are frozen solid and kept so until they are needed for use. They then are withdrawn, allowed to thaw out and take their place in the domestic economy of the bake-house, thence to fill an aching void in the being of some weary mortal. If the void did not previously ache it may fairly be excused if it suffers some pain under the influence of such doses as these. These frozen eggs cannot be successfully used in the making of custard pies unless they are previously put through a fine sieve, which breaks up the lumps and makes the mass smooth. This will be a valuable pointer to the housewife who wants to manufacture custard pie of disabled and frozen eggs. The general opinion has been that a bad egg could not be spoiled. This is so, perhaps, but they do come pretty near being saved. It is found that all considerable dealers in eggs are able to get from 25 to 50 dollars per year for the absolutely rotten eggs. Consumers of bakers' food will no doubt be pleased to know that they again have a share in the delicacies. They are put through a clarifying process and the good parts are used in the same old cookery schemes which appeal to the hungry. The parts which are too far gone for good results in the clarifying process are utilized in the manufacture of mucilage. The whites are said to produce a very sticky article. The gathering of these bad eggs is made a regular industry and is reputed to be a following which yields big profits. It certainly is a calling which has inherent strength.

Methods of Marketing Eggs.

All western eggs are shipped to Boston by large western wholesale houses and are handled on the Boston end, either by direct agents of the western houses or through the medium of brokers who buy and sell on margins of so much per dozen. Very few small lots are received by the commission houses because they, as well as the jobbers, prefer buying of responsible and easily located firms, so in case of trouble or disputes as to quality of the shipments, the parties can easily be found and matters promptly adjusted. In the case of small local shippers this often cannot readily be done and the additional trouble and expense make the transaction too burdensome. Contrary to the customs of other branches of trade in food products in Boston, nearly all the egg trade is confined to the city of Boston and nearby towns and cities. In all other departments of the provision trade the dealers, through drummers and mail efforts, reach the whole of New England and gather together a trade which uses immense quantities of the various commodities sold. With eggs, however, the trade is more restricted and most of the outside cities and towns have local firms which get the bulk of the business. This result has been made surer and more complete by the almost universal possession by every considerable community of either local or nearby facilities for cold storage. This gives the local dealers the same facility for handling and keeping boxed or western eggs, and this advantage is more generally followed in the egg trade than in the case of other products susceptible of the same or similar treatment. As a rule all nearby and strictly newly-laid eggs are sold near the point of production, although in the aggregate large numbers are shipped to the Boston market.

The facts all pointing to the special desirability of a supply of newly laid eggs during the months from September to March, it seems proper that some attention should be given to the means whereby they may be had in sure and profitable numbers. A pretty comprehensive survey of the subject in a practical way shows only one method of attaining such results with any degree of surety. In order to get eggs at this season the pullets must be depended upon to do most of the work. The old hens are generally resting from their fall molt and will not produce with regularity, any number of eggs before the late winter and early spring months. Quite often March finds them only fairly under way. We must then have the pullets as workers, and not only pullets, but early pullets are absolutely necessary to gain the desired end. However much we may read of the pullet which matures and lays in five months, we cannot depend on that time. The facts probably are that with the common stock under ordinary conditions the time of first laying will average nearer to seven months than it will five months. We believe this to be true of nearly all breeds. We must get our chickens not later than the middle of April to make a sure thing of the business, and March is even better.

The conditions of successful hatching point to the use of the incubator and brooder, to artificial incubation, as the method which solves the problem of early hatched pullets and high-priced eggs. A full treatment of these means would, however, be not strictly in line with the spirit of this article, and so will not be followed. We append a statement of wholesale prices, for which we are indebted to Messrs. A. M. Stone & Co., of Boston:

Wholesale Prices of Eggs at Boston.

1898.	Cape.	Western.	1899.	Cape.	Western.
March 31..12to12½	.....		Jan. 5....30to32	24	to27
April 1.....	10½to10¾		Jan. 19....24to25	20	
June 9....13to14	.....		Feb. 16....28	27	
June 23.....	15	to16	Feb. 24....35to36	35	to36
June 30.....	11	to12	March 2...25to28	24	to28
July 7....16to17	17	to18	March 16..15to16	14	to15
July 14...18to20	13½to14		April 13...16	13½	
Aug. 18...20to22	14		June 1....18	13	to14
Sept. 15..21to22	.....		July 27....21	13	to14
Oct. 13...23to25	.....		Aug. 31....21to22	15	to16
Oct. 20...25	13½to19		Sept. 28...28	17	to18
Nov. 10..28to30	19	to23	Oct. 12....28to30	18	to20
Dec. 1....32to35	21	to25	Nov. 16....30to32	20	
Dec. 22...32to35	22	to26	Nov. 23....32to35	19	to23

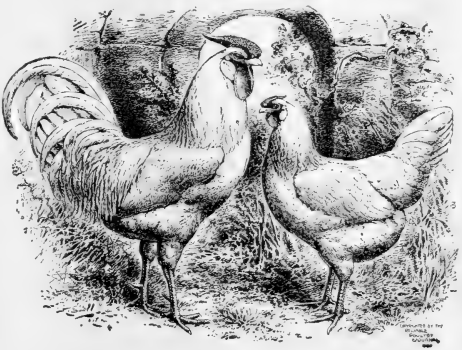
GEORGE H. POLLARD.

EGG MARKET IN EASTERN CITIES.

A Regular Rise and Fall in Prices—Some Remarkable Differences in Prices—A Better Quality Demanded—Regular Egg Collecting Depots Desirable.

By A. F. HUNTER, in the Reliable Poultry Journal.

A STUDY of the market quotations or prices of eggs in the three leading eastern cities is exceedingly interesting, and some profitable lessons may be extracted from them. There is a regular rise and fall in market prices, which is frequently compared to the rise and fall of the tide; the rise of price in the autumn is due to the scarcity of supply, and the fall of price to an increasingly abundant supply. A curious example of a great jump in prices is seen in the March quotations in the table given herewith. A severe cold wave and snow blockade passed over the country in February, greatly checking egg production and so hampering travel over the country roads that the egg supply was largely cut off for about two weeks. Cold storage stocks were exhausted and the cities were pretty much short of eggs, causing a very unusual jump in prices of eggs of all grades.



Rose Comb White Leghorns.

The three great cities of Boston, New York and Philadelphia receive regularly, from the great agricultural states of the central west, enormous quantities of eggs; in fact, the eastern cities are the regular outlet for the surplus product of the western states. And it is surprising, in view of the fact that poultry and egg production is so great in the New England and Middle States, that there should be so constant a demand for those products from other sources, but the explanation of it is found in the fact that the great bulk of the population of those eastern states is of the consuming class, and there is a constant demand for all kinds of food products to supply their needs. This is true not only of the manufacturing cities and towns, which are commonly spoken of as consumers in contra-distinction to producers, but in many secetions there is a steady demand for food supplies which are not produced locally; in some instances also there is an interchange of such products, owing to the demand in one market for a particular quality drawing to that market all of the product of another state, and the immediate local supply being exhausted creates another demand.

Boston Wants Them Brown.

A curious example of this exchange of products the writer came upon in visiting the Boston markets in the month of March last. A large commission house, that handles hundreds of thousands of cases of eggs each year, has a very great call for a fancy brown egg that is strictly fresh-laid, such as usually command a premium of three to five cents a dozen in that market. At the time mentioned we were shown, in the storehouse of this firm, twenty to twenty-five cases of fine, brown, strictly fresh eggs received that day from Maine—and at the door was a stack of twenty cases of choice western eggs being loaded onto a dray to be carted to the Portland boat for shipment to Maine. At that time "strictly fresh" were selling at twenty to twenty-three cents a dozen and "choice western" at about eighteen cents. Those western eggs had had freight paid on them from the western states to Boston, had been candled to test them for freshness and quality, and now were being shipped to Maine to take the place of the strictly fresh, fancy brown eggs, which Maine was shipping to the Boston market. In one sense they did not take the place of those eggs because the strictly fresh, fancy brown were shipped from country towns, one case here and another there, while the choice western were going to a Portland commission house, and would be sold to consuming centers; such, for example, as the city of Portland and the manufacturing cities of Biddeford, Saco, etc. At the time of greatest scarcity of strictly fresh eggs, which is from Thanksgiving time to Christmas, there is a considerable difference in price between the fancy brown, strictly fresh and choice western eggs, and it might seem reasonable then that such an exchange as we have described would be profitable, but at the time of which we speak, with a difference of only three to five cents, it would look as though there was but a very small margin of profit in the transaction.

Boston prefers a brown (or brownish) egg and is willing to pay a premium for that preference, New York as a rule prefers a pure white egg, but we are assured by producers of eggs for the New York market that there is some call for a fine brown egg, which is called a "table egg" in New York and adjacent cities. Philadelphia mainly prefers brown eggs, but on the whole is not willing to pay so high a price for a choice article as is New York or Boston. Boston is

undoubtedly the best paying egg market in this country, as a comparison of the prices quoted, as well as the fact that so many large shippers prefer to send their supply there, attests. We have arranged a table of the monthly quotations for one year in columns, so that a comparison can be made, and the generally higher average prices in Boston are manifest at a glance; the difference ranging from one up to as much as eight or nine cents per dozen on the best quality which we have listed as "strictly fresh."

Grading the Eggs.

For convenience we have quoted but four grades, namely, strictly fresh, choice eastern, fresh western, and cold storage; the latter being mostly western eggs put into cold storage in April, May and June, and sold at the time of greatest scarcity in the late fall and winter months; it will be noted that storage eggs are not quoted in March, April, May, June, July, August and September, although at times a few of them are sold during these months; in October they are quoted in New York and Boston, but not in Philadelphia; in November, December, January and February they are quoted in Boston, New York and Philadelphia. There are gradations of these market reports which we cannot spare the space to enter into, for example, eastern eggs are in some market reports listed as choice, fresh, fair to good, Vermont and New Hampshire choice; western appear as Michigan, Indiana and Illinois choice fresh; do. candled; western selected, fair to good; and cold storage eggs appear as April and summer; the April eggs being worth a cent to a cent and a half more per dozen than those graded as summer. In New York reports the highest quotations are for New York and New Jersey and Pennsylvania fancy selected white; fresh gathered, fancy mixed, New York and Pennsylvania, then fair to good, and held and mixed; western are quoted as best fresh gathered, average prime, fair to good, inferior; Kentucky and Tennessee fair to prime, inferior. In the Philadelphia prices current they are classified as Pennsylvania and near-by, western, southwestern, southern, refrigerator firsts and seconds. These different gradations of eggs tell very much to the expert marketman, but not very much to the average reader, who cannot understand the intricacies of the different qualities under consideration; this is our excuse for condensing the divisions of our table into strictly fresh, choice eastern, fresh western and storage quotations.

Talking with marketmen themselves we find that there are still other qualities, such as "dirties," "checks," "cracks," etc., and it would be well if farmers knew how much the dirty, checked and cracked eggs shrink the value of the eggs they sell. That shrinkage (or loss) does not fall on the marketman, nor on the shipper who forwards the eggs to market,—it invariably falls on the farmer, in the shape of a lower, average price for all the eggs he sells. A marketman in speaking of this one time used a case of eggs he was repacking as an example. He threw two and a half dozen soiled (stained) and small eggs out of the thirty dozen case, and filled the places with other "choice western" eggs from another case. "There," said he, "these eggs are now worth twenty-five cents a dozen by the case, while before grading them up they were worth but twenty-two cents"; in other words, the twenty-seven and a half dozen of choice eggs were worth $6.87½ when the thirty dozen of poorer quality eggs were worth but $6.60, the putting in of the two and a half dozen of small and dirty eggs had lowered the average value of the whole, the twenty-seven and a half dozen would have actually brought the farmer more money if he had shipped them by themselves, keeping the two and a half dozen of soiled and small eggs at home. The bulk of the farmers, however, do not ship their eggs; they sell them to the local store in trade or to the collector, who in turn ships them to the city commission dealer and this round-about method of getting so perishable a product to the table of the consumer is in many ways unfortunate, causing evident deterioration of fine quality, and that deterioration effecting a shrinkage of price, as well as a lessening of demand.

EASTERN EGG MARKETS IN 1902.

MONTH.	QUALITY.	BOSTON.	NEW YORK.	PHILA.
January...	Strictly Fresh.....	30 to 35, up	35 and up	28 to 30
	Choice Eastern.....	25 to 35	28 to 31	26 to 28
	Fresh Western.....	25 to 30	26 to 30	25 to 28
	Cold Storage.....	21 to 22	17 to 19	19 to 21
February...	Strictly Fresh	30	25 to 28	25 to 30
	Choice Eastern	24 to 27	28 to 31	25 to 27
	Fresh Western.....	24 to 27	27 to 26	24 to 24½
	Cold Storage.....	22 to 23	20 to 23	20 to 22
March.....	Strictly Fresh.....	35 to 38	37 to 39	35
	Choice Eastern.....	34 to 37	36 to 37	33 to 34
	Fresh Western	34 to 37	37	33
April	Strictly Fresh.....	20 to 25	16 to 17	16
	Choice Eastern.....	17 to 18	16 to 16½	15 to 16
	Fresh Western.....	16 to 17	15 to 16	15
May.....	Strictly Fresh.....	19 to 20	18 to 19	17½
	Choice Eastern.....	18 to 18½	17 to 17½	17
	Fresh Western.....	17½ to 18	16½ to 17	16½
June.....	Strictly Fresh	19	18 to 18½	16½ to 17
	Choice Eastern.....	17½	17 to 17½	17
	Fresh Western.....	16½ to 17	17	17
July.....	Strictly Fresh.....	20 to 27	19 to 20	18 to 19
	Choice Eastern.....	18 to 19	18	18½
	Fresh Western.....	17	17 to 18	18
August.....	Strictly Fresh	24 to 26	21 to 22	18 to 19
	Choice Eastern.....	19 to 21	19 to 20	18
	Fresh Western.....	18 to 19½	18¼ to 19	16 to 17
September.	Strictly Fresh.....	27	22 to 23	21
	Choice Eastern.....	21 to 22½	19 to 21	19 to 20
	Fresh Western.....	18 to 20	19¼ to 20	21
October....	Strictly Fresh	28 to 30	25	24
	Choice Eastern.....	23 to 25	21 to 22	21 to 22
	Fresh Western.....	21 to 23	20 to 21	22
	Cold Storage.	19 to 21	18 to 20	
November.	Strictly Fresh.....	28 to 30	25 to 26	24
	Choice Eastern.....	23 to 25	22 to 24	22 to 23
	Fresh Western.....	21 to 23	20 to 24	21 to 23
	Cold Storage.....	18½ to 21	19 to 21	18 to 21
December..	Strictly Fresh.....	38	28 to 30	29
	Choice Eastern.....	28 to 30	24 to 25	26 to 27
	Fresh Western.....	25 to 27	24	28
	Cold Storage	18 to 21	17 to 21	18 to 21
Average of Twelve Months.	Strictly Fresh.....	27½	24⅝	23 1-12
	Choice Eastern.	23 5-12	22⅝	21 5-6
	Fresh Western.....	21 5-6	21⅝	24⅛
	Cold Storage ..... (5 Mos.)	20 3-5	19 2-5	20

Cause of Loss of Quality.

One cause of deterioration in quality in eggs is their being left lying in boxes, etc., in the country stores for days at a time when the temperature is so high the germ of life begins to develop; this could be largely prevented by farmers killing off the pernicious and worse than useless surplus males and breeding males instantly the hatching season is over, and having no male birds running at any time with the birds kept for egg-laying only—the male bird should only be allowed to associate with the females whose eggs were used for hatching. The loss (waste) of these eggs in which the germ has started is almost beyond belief. I have seen a carload of western eggs (received in Boston in June) test a little over fifty per cent "struck," and a New York egg commission dealer told me he had seen the loss run as high as forty to fifty per cent in very exceptional cases; it seems a pity that farmers should be so blind to their own interests.

Talking with one of the editors of the New York Produce Review about this he said he had seen a full three-quarters of the eggs collected in Kansas (in June and July) hopelessly bad, and a man and team had to be hired to haul them off and bury them! This well illustrates the desirability of there being regular egg-collectors (similar to cream collectors), who will gather the eggs daily, store, pack and ship them to market in refrigerator cars. This is done in some countries. In England the "National Poultry Organization Society" has for one of the duties of its depots the collecting of eggs of the members, and in Denmark there is an egg association, into which some 24,000 farmers have been joined. In the latter country the eggs are collected into the district stations, each member's eggs being numbered and marked with his letter and figure so that, upon candling them, a bad one can be revealed and the farmer contributing it detected. A first offense is punished by a fine and a second offense by expulsion from the association; as the farmers get a substantially better price through this co-operative marketing they are naturally jealous of their reputations and are careful not to put in an egg that is in any way doubtful. We in America have much to learn about the best methods of marketing our farm products to the end that they return us the best prices and also that they reach the consumer in the best possible condition; the former directly appeals to our pockets, the latter tending to a promoting of the appreciation and greater consumption of our products. That suggestion of regular egg collections similar to the cream collections is worth thinking of. Why cannot the two businesses be united and one collector handle both products? It would effect a saving in cost of collecting by dividing the cost between the two lines of products, and effect an increase in average returns for eggs marketed. Why not put the thing into operation? A. F. HUNTER.

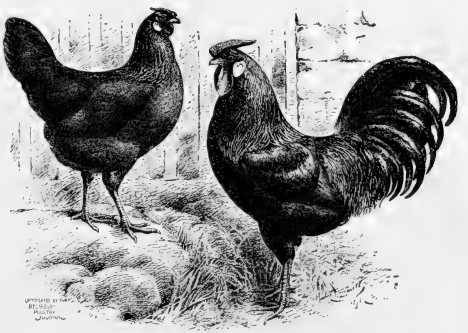
Score Card—Eggs.

	Perfection.	Outs.
Entry No.		
Shape	30	
Large and oval and showing a similarity in size		
Color	10	
Very dark brown for brown eggs and very white for white eggs over all the shell		
Weight	15	
The heaviest standard and others to be cut one-half point for every ounce under the heaviest		
Condition	15	
Fresh laid and perfectly clean.		
Total	100	

Disqualifications:

Double yolk, unsound and cracked eggs

.....Judge.



Rose Comb Brown Leghorns.

During the last three or four years the Boston Poultry Association has given much encouragement to dressed poultry and eggs, offering attractive premiums, cash and otherwise. The result has been two or three large and interesting displays. The size and color of eggs are important matters. So are the color of the yolk and the flavor of the egg. All these matters bear weight with the fastidious eaters and their importance will increase rather than diminish.

The utility poultryman, and the fancier back of him, who gives serious thought to these matters, will act wisely. They have to do with the foundation principles of poultry for profit. "More eggs and better eggs" should be the companion motto to "Better poultry and more of it."

SCORE CARD FOR EGGS.

From the Reliable Poultry Journal.

OUR friends down around Boston who think a great deal of utility poultry—and for good reasons—have formulated a score card for judging eggs. Principally it is the brain work of Mr. George V. Fletcher, breeder and judge of Light Brahmas, and marketman, though he took counsel of other wise heads.

Neither the public nor the fancy would object if this should be the thin end of the wedge which will some day rend asunder the custom of merchants who charge one price for eggs, be they large, small, good, bad, or indifferent.

LEGHORNS AS LAYERS

Go into the smallest village of Europe or America and the Leghorn will be found crowing as cheerily, strutting as proudly, and flying the fence as aggravatingly as here in the center of chickendom, and every man, woman and child will tell you these are some of its characteristics and will add with the greatest assurance—"it is the best layer on earth."

There is no doubt that continual selection of this breed for egg production has been the means of placing it at the front in that respect. As a general thing the average citizen, speaking of a layer, has in mind the Leghorn, and knows no other; yet the type of Leghorns differs in each country. If an English bird were placed beside an American production, there would be seen few points of similarity except, perhaps, in color, and this dissimilarity in types of Leghorns seems to have had little effect upon their egg-producing capacities.—R. H. Essex, in "The Leghorns."

PRIVATE TRADE IN POULTRY AND EGGS.

Why This Trade is Desirable—What It Demands—Eggs Must be Strictly Fresh and Attractive—How to Build Up and Retain Trade at Premium Prices.

By JOHN H. ROBINSON, Editor Farm-Poultry.

THERE are two reasons why a market poultryman who wishes to sell his goods direct to consumers and thus retain for himself all possible profits must produce extra choice articles. First, because it costs as much to produce poor eggs and poultry as it does to produce stock of superior quality, and costs more—takes more time and trouble—to sell the poor stock; and, second, because unless he does produce extra choice goods he can not get and hold the trade which buys good poultry and eggs freely and is willing to pay the price for them.

In eggs the demand of the best trade is for a strictly fresh article of good quality, medium to large in size, with the color of the shell a matter of indifference in all but a very few markets. If your trade prefers eggs with shells of a particular color, dark brown or pure white, it is good business policy to cater to this demand. Never make the mistake of trying to force or persuade the trade to take something which it does not want.

The trade wants simply fresh eggs. In winter an egg less than a week old will readily pass as strictly fresh. In summer an egg more than three or four days old begins, usually, to be a little stale. As the sale of eggs is the mainstay of a private trade in poultry products, deliveries must be so timed as to keep customers always supplied with fresh eggs. There will then be two regular deliveries each week in summer and a weekly delivery in winter, and it will be found that this system is also well adapted to the needs of the dressed poultry branch of the business. But eggs which have no merit but their freshness will not suit this trade. To please it an egg must be of good quality. Fresh eggs can be procured from any hens that will lay at all, but nice, rich eggs come only from hens in good condition and well-fed. To keep a large stock of hens, producing a steady supply of eggs quite uniformly up to the standard of the trade we are considering, is no light test of a poultryman's ability.

Working Up a Business.

It is not hard for a poultryman who is producing what the best trade wants, to work up a good route of profitable, prompt paying customers, who will stay with him through all seasons, year in and year out. It is not hard, but it takes tact, patience, time and, above all, some diligent soliciting. If one has read and remembered the old saying, "All things come to him who waits," now is a good time to forget it. Those who wait for this trade do not get it. It is the special perquisite of those who go out and hustle for it. As has been intimated, the way to get it is by personal solicitation. There may sometimes be an exceptional case, where it will pay to advertise for this trade. As a rule advertising would not pay, because the volume of business is small, because the expense would be too great in proportion to the probable returns from advertising, and because it is desirable that the route should be kept as compact as possible. Our experience in advertising in local papers for this trade was that our advertisement appealed most to persons we did not want as customers, because we could not deliver to them without extending our routes more than the amount of their purchases would justify us in doing.

Our best drawing card when soliciting custom was this: "Take a dozen, or two dozen, or as many as you want of our eggs. Try them. If you don't find them better than what you are using you need not pay a cent for them. If you find a bad egg in a lot bought from us, we will give you a dozen fresh eggs for it." In selling poultry we would sometimes make a special price (the regular market price) for a trial purchase, to a person whose custom it seemed worth while to make a special effort to secure, always, of course, giving them to understand that the special price could not be obtained on future purchases. This little scheme was a good trade-getter.

As the poultryman's trade, like the order-wagon trade, of the grocer and butcher, is solicited at the kitchen door, it is well for him to get his dealings at each house on the right basis at the start and keep them there. When he first solicits custom at a house his errand should be to the mistress of the house, and if any fault is found with the goods he should ask to see her for explanation or adjustment of the matter. Many housekeepers give the purchase of supplies their personal attention, but often the girl in the kitchen is the active agent in the buying of table supplies, and, if she is not too honest, or if she wishes to favor the grocer—who also has eggs to sell, and who occasionally makes her a small present—or if she has a tender interest in the driver of the meat wagon, it is the easiest thing in the world for her to give your trade a black eye. Right here is where many find the family trade in poultry products disagreeable. It is not always pleasant to have to do business under the conditions described, and one would, perhaps, rather let the matter drop and lose his customer than go to the trouble of putting things straight. But he ought not to let such a matter pass without being made right. He can not afford to let a customer quit dissatisfied with his goods and displeased with him when there is no ground for dissatisfaction, and the displeasure should fall elsewhere. After good goods, pleased customers are one's best advertisement, and after poor goods, the lost customer who thinks that he has a grievance can do a trade the greatest injury.

One important consideration in soliciting trade must always be your ability to supply customers regularly and fully. The agreement to do this will often secure trade when other considerations fail. Such an inducement, however, ought never to be offered unless one is sure of being able to carry it out. It is not a wise thing to do to take on all the regular customers you can get at the season of the year when your plant is producing best. If you do you soon find it necessary to drop some of them, and in that case it may be difficult to get their custom again when you would possibly be in a position to handle it permanently.

Finally, it is only in rare cases that a poultryman can build up a good private trade in eggs and poultry if he attempts to handle the products of others. If he knows his business as he ought to, and produces genuinely choice stuff, he will find that not one person in ten of those from whom he could buy has goods equal to his own. He will find also that, like himself, those who have good stuff to sell want all the profit there is in it. JOHN H. ROBINSON.

CANDLING EGGS BY MACHINERY.

The Importance of the Egg Trade Exerts an Influence in the Handling of the Product—An Invention that Tests Over Twenty-six Thousand Eggs an Hour—How it is Operated.

By WILL B. CORWIN.

EGG candling by machinery is the latest innovation to be introduced by Swift & Company in their cold storage plant at the stock yards, Chicago. The new machine is the work of an English inventor and is being used exclusively in our country by this firm. It has a capacity of 26,020 eggs per hour, and requires twenty people to operate it.

The machine in itself looks like a great dry goods box, oblong in shape, and standing upon its end. On either side there are two curtains which drop down after the expert inspectors enter and prevent light from striking upon the eggs, which would hinder their being candled with so much effectiveness. On one end, as shown in the picture, is the receptacle wherein are deposited the eggs. This receptacle consists of a shallow trough, eighteen inches wide and three inches deep. On the bottom of this trough there is an endless rubber belt. This revolves and carries the eggs along the "chute" into the "inspection" booth, where they are deposited upon a set of grooved rollers—twelve in number—which are constantly revolving. Beneath these rollers there are four powerful electric lights with reflectors which throw the light upon the eggs, causing them to become transparent.

Inside this booth are stationed four experts, whose duty it is to detect the defective eggs, also those that are cracked, as they pass along upon the rollers. The cracked ones are placed upon an upper "chute" and carried to the receiver on the north end of the machine. The defective eggs likewise are placed on a "chute" just below the other, to be used later as land fertilizer. Eggs that are so badly cracked as to affect their sale are broken and the white and yolks separated and placed in cans, which are taken into the freezer and the contents frozen. Eggs of this quality are sold to bakers and used by them in their baking operations. After the good eggs have passed along the rollers and have run the gauntlet of the keen eyed experts, they finally roll out upon a rubber belt which carries them into chutes similar to the one into which they are first deposited, and from this receptacle they are gathered up by the packers and then placed into crates. On the upper right hand corner of the machine may be seen the "controller." This operative controls the speed of the machine and when he finds the inspectors are getting behind because of the large number of defective and cracked eggs, he slows down the machine to enable them to catch up.

An Extraordinary Egg-Candling Machine, whereby over Twenty-six Thousand Eggs an Hour can be Examined.

The former method of candling eggs by hand required anywhere from forty to fifty persons and their ideas could not be made uniform, hence their inspection would not be as satisfactory as by this new method. Superintendent C. O. Young claims the machine will be able to do better and more rapid work as the operatives become accustomed to their work and the positions necessary for rapid handling of eggs.

WILL B. CORWIN.

A WHITE LEGHORN EGG FARM.

A Matter-of-Fact Account of What the Editor of the Reliable Poultry Journal Saw During a Visit to the White Leghorn Farm of C. H. Wyckoff—Not an Outside Dollar Invested in the Business; The Fowls Paid for Everything.

WHEN a man has succeeded to the extent that Mr. Wyckoff has, he owes it to his conscience to tell other people how he did it. We can afford to be our brother's keeper to that extent. It gives us pleasure to say that Mr. Wyckoff agreed fully with this view of the case and has promised to write one or more articles for R. P. J. readers as soon as he can spare the time. The winter season finds him with leisure time at his disposal and we may therefore look forward to some valuable help from him. What he gives us will be facts, pure and simple, gleaned from his personal experience.

We desire in a plain way, in imitation of Mr. Wyckoff's modest recital, to tell the readers of the Reliable the story of this man's success with poultry. It is perhaps a story without parallel, though there is nothing fabulous or improbable about it. It is a story of oneness-of-purpose, of steady effort, of intelligent application, of making the most of one's opportunities, be they great or small, which is the true measure of man or woman.

Years ago Mr. Wyckoff came to his present home a moneyless man. There lived near, on a sixty-acre place, an old man who was very anxious to find a purchaser for his weed-grown farm. He wanted to sell so bad that a man without any money was able to buy. Mr. Wyckoff's father went security for the first payment (deferred) and loaned the son enough cash to half way stock the farm, buy a few tools and put some seed in the ground. On entering upon the task of reclaiming and paying for this neglected farm, with its tumble-down buildings, Mr. Wyckoff had in mind the poultry business. He had touched the business lightly while living in Ohio, and was of the belief that there was good money in it for him. Being without funds he had to begin small. The first year he owned twenty-five mixed hens, which were housed in a ramshackle building. These he soon replaced with some Plymouth Rocks and Brown Leghorns. From eggs sold from these he saved up $75 during one winter and spring and invested in White Leghorn eggs. A year later he had a flock of 180 White Leghorn hens. This was his third year on the place. His hens now began to serve him in good earnest. It so happened that market eggs went up a kiting that winter and in January alone his flock of Leghorns earned him $90 in eggs laid. From that year on new buildings and parks were gradually added, the hens paying for everything as they went along.

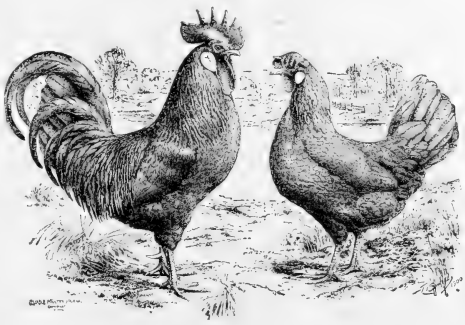
Said Mr. Wyckoff: "It is the plain truth that after the money which I spent on those first twenty-five mixed hens I never invested an outside dollar in my poultry. They gradually earned every dollar, every cent that went to buy more hens, to build new houses and new parks. It took five or six years for me to get things fairly under way, but as I had no money I could not do otherwise. All I could rake and scrape out of the farm went for interest on the purchase price, or was put back onto the place in improvements of various kinds. To-day you see what I have as the result of fifteen years work, with the help of my hens. The farm has been paid for these two years, and my hens did it. Yes, sir, they not only bought and paid for themselves and the quarters they live in, but paid every dollar of the purchase price of this farm. I am now selling about $4,000 worth of produce from this place each year and fully $3,500 of it is in poultry and eggs. I keep cows and market butter, but my cows cost me all they earn and have for the past three or four years. During the past two years I have cleared $2,800 from my poultry."

The Houses.

Let us briefly describe Mr. Wyckoff's place as we found it. He has seven double poultry buildings 12x40 feet in size and one single house 12x20. The 12x40 foot houses are divided into two equal apartments and each of the fifteen apartments opens into a park 33x128 feet. These parks are fenced with 1x2 inch unplaned pine pickets six feet in height. At the bottom laths are nailed to the stringer between these pickets to prevent the fowls picking each other through the fence. The houses are placed some thirty feet apart in order to make room for the width of the parks. The partitions in the houses are boarded up "so that the fowls in one side will not know what is going on in the other and throw themselves against the partition when I am feeding," explained Mr. Wyckoff.

The houses are built of common, unplaned, foot-wide barn-siding, with double roofs, shingled. The walls are of two thicknesses of the foot-wide boards, with building paper between, but no air space. No artificial heat is used. Last winter was a record breaker for low temperature. The mercury went down to 36 below zero. In the above described houses the combs of a few male birds were slightly nipped, losing the slim points of some of the serrations, but Mr. Wyckoff reports that he has never yet found one of his White Leghorn hens with a nipped or frost-bitten comb. One important reason for this is to be found in the small windows in his houses.

Mr. Wyckoff uses board floors in his houses and told us he could not keep them dry until he did put in the board floors. During the winter time dampness is sure to come up out of the ground into the poultry house, being drawn out by the warmer atmosphere of the house. One of two things should be done: Either fill in four to six inches of cinders or dry gravel and put three or four inches of fresh earth on top of this material, or use board floors. We prefer cinders and earth, with three to five inches of cut litter on top of this, but many prefer board floors. No matter how a poultry house is built, it will be moist on the interior during extreme winter weather. Frost will gather on the walls during the night and melt during the day time, creating moisture but this can be largely avoided by constructing a floor as here recommended and by thoroughly airing the houses every day that the fowls are let out in the yards.



Single Comb Buff Leghorns.

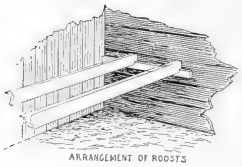
Leghorns, or any other variety kept for winter eggs, should not be allowed the freedom of the yards during stormy days or when a bitter cold wind is blowing; in fact, we should not let them out even on sunshiny days when the temperature registers below ten degrees above zero. Leghorns' combs will freeze in bright sunshine when the thermometer is six above zero. Where the scratching shed plan is used canvas curtains are placed in front of the scratching sheds, inside of the wire netting, and on cold stormy days the fowls are let out into these sheds. Here they are protected from the wind and much of the cold. Protected in this way, they will lay when fowls kept in the ordinary way will not lay an egg.

Mr. Wyckoff's houses are quite large in size, which is an advantage. They are double boarded and have quite small windows. These small windows keep the house warm at night, and as each apartment contains fifty fowls, they help keep one another warm. Solid board partitions separate the two apartments. Houses thus built have proved comfortable for active fowls like Leghorns, even during severe winter weather. Should it be thought necessary to provide greater warmth, this can be done by building a cover over the roost poles a few inches above the heads of the fowls and dropping a curtain down in front, reaching below the roost poles, this curtain to be thrown back out of the way during the day time and again let down during severely cold nights. The top or cover of this inclosure can be made of burlap, or of thin boards, the latter preferred. By this arrangement, all the heat that is generated by the bodies of the fowls and that thrown off by their breathing will be confined in narrow limits and will increase the temperature ten to fifteen degrees. The smaller the inclosure, the greater the warmth.

Hens yarded fifty to each park were kept by Mr. Wyckoff solely for market eggs, not for breeding purposes. Where hatchable eggs are wanted and the breeders have to be kept confined in moderate sized yards, one Leghorn male to fifteen to twenty females is the limit, where best results are sought. If a vigorous yearling or two-year-old cock bird is used, twenty hens are not too many. On an egg farm where 2,000 to 5,000 layers are kept, an acre or two should be devoted to the breeders. This same plan of houses will serve all purposes, but instead of putting fifty hens to each pen, fifteen to twenty and one male bird should be the limit. Thirty to forty hens with two male birds will not do so well, unless the yard is planted with rows of corn or contains shrubbery. Where fowls used for breeding purposes have considerable range, with shrubbery or other obstructions to an unlimited view located thereon, they may be allowed to run in large flocks, as they do on an ordinary farm, accompanied by a half dozen or more male birds, but in confinement in small yards where all the birds are in view of one another, this plan will not give the best results. Mr. Wyckoff does not get nearly as many eggs during December, January and February as he does during March, April and May, but he gets a number, even during the winter months, enough so that the last year he kept a careful record; his six hundred hens averaged one hundred and ninety-four eggs per hen. So far as our knowledge goes, this is the best record reported thus far for so large a number of layers.

Among the illustrations accompanying this article will be found one showing the floor plan of Mr. Wyckoff's style of house, one showing a simple construction of roosts, and another showing the style of nest boxes which he recommended. We do not remember what style of nest box is used by Mr. Wyckoff. We would advise that in houses of this kind partly closed nest boxes be located under the windows or along the front wall of the house and that a lid be built partly over them as shown in the illustration, this lid extending six inches or so beyound the edge of the nests in order to darken to a still further extent the interior of the nests and thus prevent egg eating, to a degree. Nests located under the windows in this manner will be sheltered from the direct light.

For Leghorns, make the nests twelve inches square and not more than seven inches high. This is lower than com-

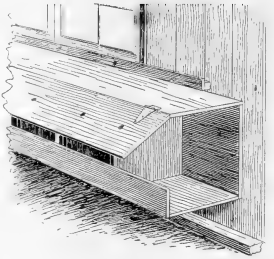


Style of Roosts or Perches.

mon for hens' nests, but Leghorns can readily get in and out, and if the height does not permit of their standing up, there is less danger of their picking at their eggs, breaking the shell and thus becoming confirmed egg eaters, an abomination in the poultry business. Fill the nests an inch or so deep with fresh earth and put cut straw, or common straw, on top of this for nest material. The soil in the bottom of the nests will prevent the hens pushing all the straw aside, leaving the bottom of the nest bare, thus presenting another danger of egg breakage. These broken eggs and their inviting appearance encourage egg eating, which we should take every precaution to prevent.

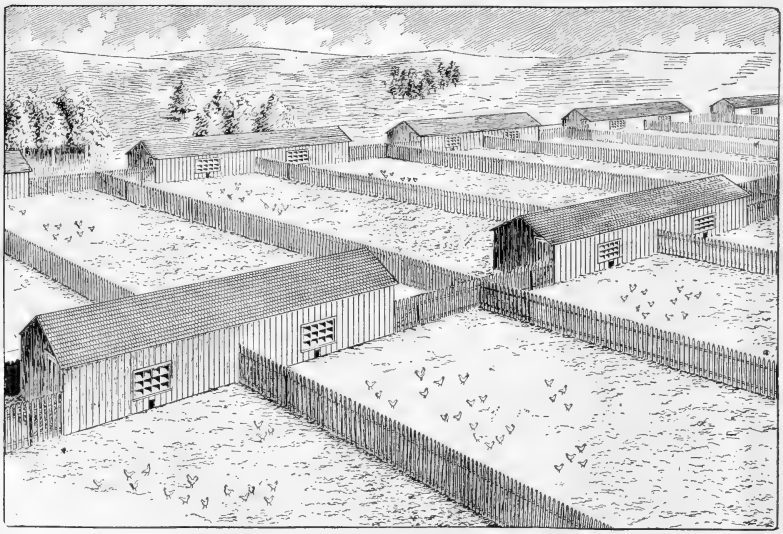
The roosts may be made of 2x4's, rounded off on one edge and stood on edge in slots and sawed in the end cleats. They should be removable for cleaning and oiling. For Leghorns, if supports are located under the roosts at a distance of five or six feet apart, 2x4's may be ripped lengthwise, yielding pieces 2x2 inches in size for roosts. This will answer just as well as twice as much value in lumber put into the roosts.

A droppings board, to be located under the roosts and extending out twelve to fifteen inches in front of them, is recommended as a matter of convenience and cleanliness, although it is not essential. The use of a droppings board keeps the droppings out of the way of the fowls, which is an advantage. This droppings board may be quickly cleaned every day or two by using a simple rake made by nailing a lath or similar strip of wood to the end of a broom handle. By making a V-shaped rake of this kind, the droppings can be drawn forward into a bucket or basket and quickly removed. Fresh earth, ashes and slacked lime are good materials to dust on the droppings board to keep down the odor. Earth is a good absorbent, and one need look no farther for a suitable material for this purpose.



Plan of Nest Box to Prevent Egg Eating.

The fences used by Mr. Wyckoff are built in the ordinary way with 2x4 stringers, to which are nailed 1x4 pickets sharpened at one end. These pickets are six feet high and the fence is the same height, Many will be surprised that Mr. Wyckoff's hens keep their place when separated by a simple low fence of this kind. As pullets they do not keep their places so well, but as hens, they become wonted and cause little trouble. It is not often that one of the hens leaves her yard, but if she does no damage is done except that Mr. Wyckoff prefers to have an equal number in each



Plan of Houses and Yards in Use on Egg Farm of C. H. Wyckoff.

yard and house. Pullets of all varieties of fowls cause far more trouble than hens in the matter of flying fences. They are much lighter in weight and perhaps more giddy. As hens they become decidedly heavier and more sedate in their manners.

If difficulty should be experienced in confining the fowls to their runs a single wire may be strung about six inches above the top of fence. It should be so small as to be nearly or quite invisible to the fowl from the ground. If she flies for the top of the fence, as they generally do, to alight upon it, the single wire will prove an obstacle to further attempts to get out.

Use your fowls well. Do not excite them, and you will experience little difficulty in this connection. It is the flighty, excitable layers that fly the fence on the slightest provocation.

POULTRY FOR PROFIT ON TEN ACRES.

"If we owned or controlled ten acres of land and proposed to go into the poultry business to make a living out of it, and decided that we were not qualified at present to undertake the breeding of standard poultry, we should undertake the production of eggs in large numbers, beginning on a moderate scale and increasing as rapidly as we thought best."—Editor of the Reliable Poultry Journal.

ONE result of what we have seen in our rather extended travels among poultrymen, east and west, has been a growing belief that among the practical branches of the poultry business, that of producing eggs to be sold on the market at a premium as "strictly fresh," and as "eggs for hatching" in small and large lots, is the safest and one of the most profitable. If we owned or controlled ten acres of land and proposed to go into the poultry business to make a living out of it, and decided that we were not qualified at present to undertake the breeding of standard poultry, we should undertake the production of eggs in large numbers, beginning on a moderate scale and increasing as rapidly as we thought best.

We never visit a poultry show and see the choice specimens of the different varieties that we do not feel a strong desire to go in debt for about 500 acres of land and cover the whole area with a poultry farm, and to spend the rest of our life trying to breed choice specimens of every variety in the American Standard of Perfection. This is not exaggeration,

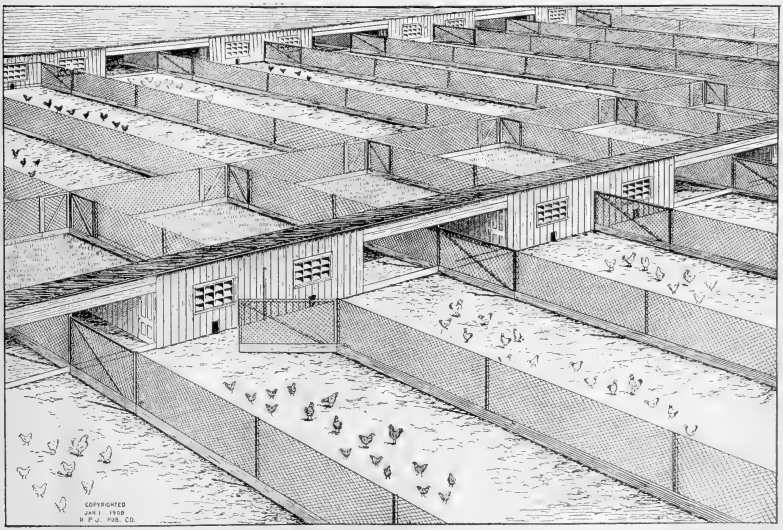


FIG. 1. POULTRY HOUSES WITH SCRATCHING SHEDS AND YARDS WITH GREEN FOOD LOTS.

NOTE.—This plan is recommended for Egg Farms; also for ordinary breeding, on either a small or large scale. The plan of houses and yards is popular in the east and gives general satisfaction.

but a statement of fact. If we had the time we should be in the poultry business neck deep, not only breeding standard specimens, but conducting an egg farm of large proportions, producing eggs for a select market and eggs for hatching in incubator lots and in small lots. One season when we were in the poultry business on quite a large scale we sold within less than five hundred of fifty thousand eggs for hatching. For incubator eggs in 100, 200 and larger lots we obtained $8 to $12 per hundred, and for eggs in single, double and triple sittings, $2, $3.50 and $5, respectively. We did not sell eggs from our best matings at any price, nor did we advertise to do so. Occasionally some visitor to the farm induced us to part with a sitting at from $3 to $5 per thirteen, but every time we sold a sitting of the choicest eggs even at these high prices we regretted it. Somehow money is not an equivalent for a sitting of eggs from one's favorite mating, or for a favorite breeder.

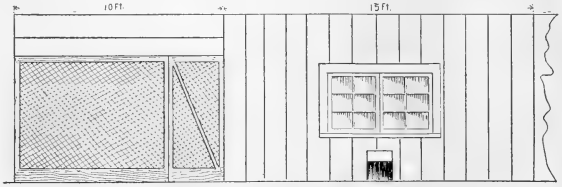
A. & E. Tarbox, breeders of Silver Laced and Buff Wyandottes, decided some four years ago not to sell any more eggs for hatching. They then were obtaining with ease $5 per thirteen. They decided that they could not afford to sell for $5 the chances, in the thirteen eggs, of hatching and raising a $15, $25 or $40 bird, hence, discontinued the practice of selling eggs and have sold none from that day to this. Sharp Brothers, proprietors of Oakland Poultry Farm, breeders of Buff Cochins, Light Brahmas, and Cochin Bantams, quit selling eggs when they were readily obtaining $10 per sitting for Buff Cochin eggs. They, too, decided that they could not afford to sell their chances in thirteen of these eggs for a ten-dollar bill. The above are facts and they are not exceptional. We could fill several pages with cases of this kind. Those given should be sufficient to show what can be done in producing standard poultry.

It must be understood, however, that it takes years to learn how to produce exhibition stock and to establish a strain of standard fowls that will reproduce themselves to a profitable extent. We are well acquainted with men who have been in this branch of the business ten to twenty years and who are still free to confess that they are puzzled every season at the new facts that arise and the unexpected results which present themselves. Nevertheless, these experienced men are the ones who approach nearer and nearer to perfection in standard breeding, and they are the men who readily secure from $10 to $30 each for the best pullets they will consent to sell, and $25 to $75 each for the best cockerels they are willing to part with.

We repeat here what we stated above—if we owned or controlled ten acres of land and proposed to go into the poultry business to make a living out of it, and decided that we were not qualified at present to undertake the breeding of standard poultry, we should undertake the production of eggs in large numbers, beginning on a moderate scale and increasing as rapidly as we thought best.

On this and following pages are shown illustrations of laying houses with scratching sheds as used on extensive egg farms, also by many breeders of exhibition stock throughout New England and the east. We do not remember to have ever visited an egg farm, or the yards of a poultry breeder where the green food lots shown in the large illustration on page 33 are in use, but we recommend this addition, for it is of special value. By locating these green food lots as shown in Fig. 1, they can be used by the flocks of fowls ranging in the large yards connected therewith, or, if it should be convenient, the flocks of fowls in the houses adjoining the green food lots can be turned into them through openings in the scratching sheds or in the closed part of the houses.

The dimensions of the houses and yards shown in Fig. 1 are as follows: Closed part of house 10x15 feet; scratching shed, 10x10 feet; regular yards, 25x75 feet, green food lots, 25x25 feet. Each of these houses with the yards connected will accommodate 10 to 50 fowls, depending on the object for which they are kept. If kept for breeding, 10 to 20 hens and one male bird will do best; if for eggs for market, 30 to 50 hens can be kept in each closed house with scratching shed attached by using the green food lots and giving the fowls admission to these lots one or two hours each day. Green food like rye, oats or blue grass can be kept growing in these lots during the entire season. Rye will last far into the winter, in fact, will stay green underneath the snow and furnish green food whenever the snow disappears. We have a rye patch this winter that has been green since last fall and



FRONT VIEW WITH WIRE SCREEN & DOOR TO SHED.

FIG. 2.

has furnished an abundance of fresh green food to many growing chicks and adult fowls since early last October.

We recommend a liberal supply of gates, as shown in Fig. 1. Locate horse gates in front of the long houses, so that you can drive along with a cart or wagon to remove the droppings and litter from the houses and scratching sheds and can haul in new material by the wagon load. Locate small gates connecting the green food lots with the regular yards, also with one another.

The windows in these houses should be comparatively small, say 2½x5 feet, that is, windows made of two six-light sashes, one sliding to the right and the other to the left. These half-sashes are inexpensive. A still better plan is to hinge them at the top, so that they can be swung outward, thus keeping out the rain when open in the summer time. Prop them a third way open. It is a good plan to whitewash them, with a view to keeping out a portion of the heat during hot weather.

In a majority of cases the houses of this style that exist in New England and the east are covered with roofing paper held in place by wooden strips, but we recommend a shingled roof in every case. Shingles will be found cheaper and more satisfactory in the end. Twelve-inch wide boards will do for siding, and the house should be snugly lined with good building paper or tar felt. There is no danger whatever of making a poultry house too warm. On the other hand it is unwise to go to unnecessary expense. Make sure that no draft can get in through cracks to strike the fowls when at roost, for this is certain to result in colds, with roup in pros-

pect. Do not worry about ventilators, provided the houses are kept reasonably clean. Plenty of fresh air will find its way, in, especially during the winter time, when it is most needed. No ordinary poultry house is likely to be built tight enough to keep out the necessary fresh air.

Fig. 2 shows an enlarged front view of this plan of house with scratching shed, giving dimensions. Any person who is handy with tools, by consulting these illustrations, can build a house of this style, and equip a poultry plant on this plan.

Fig. 3 is a sectional view showing the style of partition recommended for use in dividing each closed section into two apartments and for use between the scratching sheds. It is advised that these partitions in both locations be built up solid four to six feet, so that there will be no fighting through the wires by the birds, either when on the roosts or in the scratching sheds. Furthermore, this plan will make the houses and sheds warmer and will lessen the danger of drafts blowing over the fowls at night.

Fig. 4 shows ground plan of closed house with scratching shed attached, also location of roosts and nests.

Fig. 5 shows style of nests. These should be located on the ground underneath the windows. If the top lid be made to extend over the openings to the nests, thus rendering the interior darker, it may prevent egg eating.

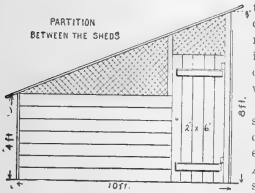


Fig. 3.

It will be understood that this plan can be added to or enlarged as desired. A single house with scratching sheds can be built, or a double house with two scratching sheds and yards or any number of the double houses, as shown in Fig. 1.

Questions of Timely Interest.

Under date of January 8, 1900, Mr. H. L. Keller writes as follows: "Editor R. P. J.—I have read with interest your article entitled 'Poultry for Profit on Ten Acres,' as I have just bought ten acres and will embark in the poultry business. Permit me to ask a few questions.

(No. 1.) In starting an egg farm, how would a cross of a White Wyandotte male with Single Comb White Leghorn hens do for winter layers?

(No. 2.) Under the same conditions as to food and care, would this cross produce more eggs than the pure White Wyandottes?

(No. 3.) Do you suppose a hen house that has corn fodder placed around the north, west and east sides would be as warm as one with a double wall?

(No. 4.) Are mangel-wurzels or cow beets good for poultry in winter? H. L. Keller.

(No. 1.) First rate, but with this disadvantage: You could not sell eggs for hatching to the many people who every year want straight Wyandottes, nor stock for breeding purposes of these two popular varieties. Mr. C. H. Wyckoff and others who are engaged in this branch of the business sell thousands of eggs for hatching every year, obtaining $2 per sitting, $3.50 for two sittings, $5 for three sittings in a single order, and $10 per hundred in hundred lots. Not only this, but these men sell dozens of cockerels and hundreds of pullets to persons who desire stock from egg-laying strains of standard-bred White Leghorns. By standard-bred we

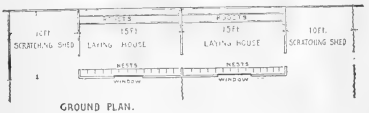
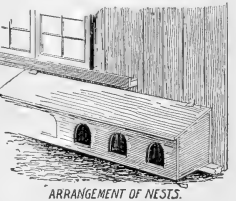


Fig. 4.

mean that they would not be disqualified under the requirements of the American Standard of Perfection, and while they are not bred as closely to the standard as some specialty breeders bring them, they are, nevertheless, standard-bred. We are of the opinion that the cross referred to would lay but few more eggs than the straight Wyandottes. They would not lay as large a number of eggs as straight Leghorns, so if eggs are wanted, why not use straight Leghorns, and secure the advantage of selling eggs and the surplus cockerels at good prices.

(No. 2.) Question No. 2 we have already answered. We remember that Rollins Brothers, during a number of years past, have made a practice of crossing White Leghorn males on Light Brahma females, the result being pullets that at maturity resemble White Plymouth Rocks, except that their legs are feathered to an extent and they have a variety of combs, some single, some pea. These pullets, however, lay splendidly, 108 of them averaging one season 153 eggs each in about nine months and they were kept confined during the entire period in flocks of 22 in a poultry house 12x60 feet, divided into pens 9x12 feet in size. Only pullets were used in this case, for as soon as they started to molt in August at the beginning of their second year, they were bundled off to market and young stock five to six months old was put in their place.

(No. 3.) Yes, and warmer. In constructing a poultry house with double walls, tongued and grooved lumber should be used, if the expense can be borne, and special care should be taken to line the inner side of the outside wall with a good grade of tar paper or tar felt. Even then the boards will warp and crack during changing weather, and in the winter time the cold and cold winds will find their way in to reduce the temperature of the interior, especially at night. Six or eight feet of corn stalks stood on end on the north and west sides of a poultry house will keep out the wind and help greatly to render the interior comfortably warm. The roof, as a rule, is the coldest part of an ordinary poultry house. Where sheathing is used and the boards are left one or two inches apart and shingles placed on top of this, any amount of wind is sure to sift in, making the house cold and creating drafts. Before the shingles are put on cover the sheathing (which, in our judgment, should be laid close together) with a good quality of tar felt or heavy building paper. See that the edges lap three to five inches. This will add much to the warmth of the house.


ARRANGEMENT OF NESTS.
Fig. 5.

(No. 4.) Yes, they are first rate. Permit us to quote here from an article we

wrote shortly after we had visited the egg farm of Mr. Wyckoff, Groton, N. Y.:

Green Food Important.

The noon meal consists of the green food to be fed for the day. During the winter months he feeds mangel beets and cabbage; during the summer time clover and kale. He raises these foods in sufficient quantities. He gets clover started as early as possible, and after it is three to five inches high, feeds it until mid-summer weather burns it up; then he begins on kale, which renews itself and lasts him until freezing weather kills the plants. Kale looks like a cross between beet tops and pie plant. We do not know how better to describe it. The leaves look like pale green beet leaves, but are much larger. As the outer rows of leaves are picked off new ones come out of the heart of the plant and keep on doing so until winter-killed. It is certainly a great boon to poultrymen. Mr. Wyckoff had, when we were there, a patch of about 25 feet wide by 150 feet long, which gave him all he needed for his 1,200 fowls and chicks.

The mangels used by Mr. Wyckoff are the large variety commonly fed to stock. They are used by him during the winter. He runs them through a cutter, slicing them up as fine as he can and feeding them in troughs. The cabbage is fed in much the same way. Even in the matter of green food, Mr. Wyckoff aims to give his fowls only as much as they will eat up readily. He wants them to eat their fill, but has nothing for them to waste.

In connection with the noon feed of green food some whole grain (not much of it) is scattered in the litter in the houses to "work" the fowls more or less. The green food, however, is their main diet at noon, and Mr. Wyckoff lays great stress on its value as an egg-producing food. Said he: "It seems to me that I would almost rather stop feeding grain than green food. That is, of course, an extreme statement, as green food is mainly an appetizer and bowel corrective, but I could not do business without a daily ration the year around of green food."

The evening meal with Mr. Wyckoff's fowls consists of mixed whole grain as follows: Two bushels of wheat, two bushels of oats, two bushels of buckwheat and one of corn. This is the proportion for summer feeding; in the winter time he increases the corn to two bushels, thus using equal parts of the four grains. As a variety he feeds barley with the above if it is low-priced. All grain is fed in litter. He prefers that they shall pick up at night all he feeds them, so they will meet him in the morning with sharp appetites.

Salt is given now and then in the soft food, though buttermilk is used each week along with the skimmed milk and sour milk to moisten the soft food, and this buttermilk contains salt. During the winter time boiling water is used to moisten the soft food whenever milk is short. This swells the food before it enters the crop, but makes it only barely warm, not hot. Hot, steaming food in winter time is a mistake, as it opens the pores of the skin unnaturally and subjects the fowls to sudden colds, with roup in prospect. Said Mr. Wyckoff: "I want the soft food as dry as I can get it and still be able to say it is moistened." Sloppy food of any kind loosens the bowels and brings on debility.

REMUNERATIVE PRICES FOR GOOD EGGS.

Where Do All the Bad Eggs Originate?—Preserve the Flavor—Gather and Market Them Frequently—Not Merely Fresh, but New-laid.

(From Report of A. G. Gilbert, Manager of the Poultry Department, Experiment Farm, Ottawa, Canada.)

THE operations of the year have been successful beyond the average. There has been a marked and gratifying increase in the number of farmers who are giving their poultry proper care and management, so as to make them revenue producers. In a letter lately written by Mr. David Moir, a farmer near Almonte, Ontario, and a director of the North Lanark Agricultural Association, he says: "There has been more money spent for lumber and tar paper, wherewith to build poultry houses, since last spring, than in five years."

Among the subjects treated in this report are the different markets for eggs; the cause of so many bad eggs being placed on the market; how to prevent bad eggs from being placed on the market; the result of different rations in egg production; the chickens hatched, their care and progress; characteristics of different crosses, and other matters which it is hoped will be found interesting and instructive to the farmers and the poultrymen of the country.

The laying stock during the moult was carefully looked after. No attempt was made to stimulate egg production during that period. The hens, however, were fed a generous diet, in order to induce the growth of new feathers, and they had the run of a grass and clover field in the rear of the main poultry building. As soon as they were completely over their moult they received a liberal allowance of cut bone, and winter laying had fairly commenced by the end of November.

As in previous years green cut bone was found a valuable incentive to egg production, and also beneficial, in smaller quantities, during the moulting period.

The British Market Prices Unlimited.

That our farmers are beginning to realize the value of their poultry as money makers, is evidenced by the increasing demand for information as to the proper care and management of their birds, as well as by the increasing number of new laid eggs placed on the market in recent winters. It may be said that if a greater number of eggs are being placed on the winter market, there will soon be enough to supply that market. Granted that there has been a greater supply of new laid eggs in recent winters, there is also the fact that prices were never higher in Ottawa and Montreal than they were last winter, which goes to show that if there has been greater production there has also been a correspondingly increased demand.

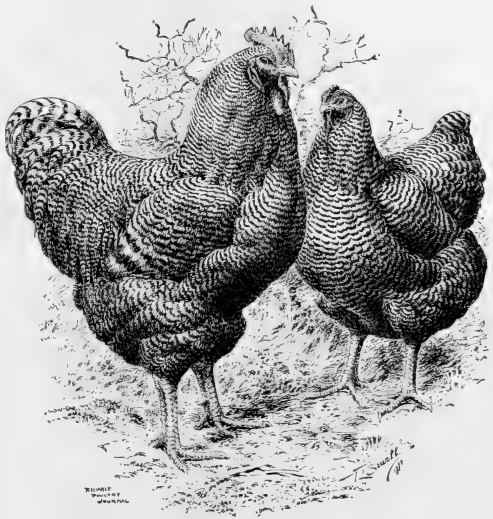
Observation and experience of the market in recent years led to the conclusion that the winter market is not the

only paying one, but that there is a great and growing demand in the summer months, for new laid eggs of unimpaired flavor.

As for the English market it is practically unlimited. A bulletin issued from the finance department in October, 1892, states in effect that an unlimited, steady and profitable trade can be done with England in Canadian poultry and eggs.

Remunerative Prices in Canada

In proof of the high prices of winter, it may be stated that the writer attended an agricultural meeting in Montreal during January of 1895, when he was informed by several farmers present that they had sold new-laid eggs the week previous at 60 cents per dozen to choice customers. It is but right to say, at the same time new-laid eggs were selling at 35 cents per dozen retail in Toronto and 25 cents per dozen in London, Ont. In Manitoba and the northwest prices ranged from 35 to 50 cents per dozen, according to locality. Mr. Sutherland, assistant secretary of the Montreal Poultry Association, wrote later on that he had sold his new-laid eggs during that winter at first named price. Eggs at 60 cents per dozen meant that they were a luxury which only the rich could indulge in. If eggs were put on the Montreal market during the winter in such numbers that lower prices would follow it is only reasonable to suppose that more people would purchase them.



Barred Plymouth Rocks.

There is no reason why the great masses should not be supplied with new-laid eggs in winter, rather than the ill-flavored, artificially preserved article, at a price within the reach of all, and there yet remain a paying margin of profit to the farmer. In order to find out what are remunerative figures, the summer market prices, at about their lowest points, viz., 12 to 15 cents per dozen, are taken. The following calculation is made, based on the experience of several practical breeders:

100 eggs from hen for 1 year, at 1 cent each	$1.00
10 chickens hatched by her, at 10 cents each	1.00
Body of hen to sell or eat	.25
	$2.25
Deduct cost of hen for year	1.25
	$1.00

We have, according to the foregoing, a margin of $1 per hen profit per annum, taking eggs at 12 cents per dozen. No figure is placed upon the manure, which is valuable when made into a compost. It may be said that the cost of producing the egg is greater in winter. But this statement may be met by the other, that the cost of production is little in summer, for at that period the farmer's hens, in most cases, are allowed to forage for their living. So that the cost of $1.25 per hen per annum is very fair—if anything it is on the high side. It will be seen that eggs, at the summer price of 12 cents per dozen, afford a paying margin. Surely, then, with the modern and cheaper rations, prices during the winter season should be much lower, and yet afford a fair profit.

But the summer price of 12 cents per dozen is a misleading one, for in reality it should be placed at twice the figure. Twenty-four cents per dozen for eggs in midsummer? Yes, and in this way: It is a well known fact that during the midsummer months it is hardly possible to buy from farmer or storekeeper a dozen or two eggs that will all be found good; in the majority of cases half of the eggs will be likely unfit for eating purposes, making the six actually worth 12 cents, or 24 cents per dozen, and probably the flavor of the remaining six will not be such as new-laid eggs ought to have.

There is not the slightest doubt that the great majority of purchasers would rather pay 24 cents per dozen, in the first place, for a reliable article than half the amount for inferior goods. There is no intention to say that our farmers bring into the markets, or sell to the dealers, or that the latter dispose of bad or ill-flavored eggs, knowing them to be such. On the contrary, the farmers as a rule unfortunately give as little attention to the age or condition of the eggs they are taking to market as they give to the fowls which laid them. The question may be asked, How can we tell what the inside of an egg is like? How can we distinguish the bad eggs from the good ones?

Practical Advice to Farmers.

The answer to the above queries is that while the farmer is not supposed to be in the van of poultry lore as to the means of discovering partially hatched, or ill-flavored eggs from the new laid ones, yet there are simple precautions which may be taken in order to secure the new article, and which he is in duty bound, in the interest of his customers, to take. By observing the following, eggs of fine flavor may be sold during the entire summer season:

1. Keep no male bird with the laying stock.
2. Collect the eggs once or twice every day.

3. Take no eggs to market gathered from under barns, nests in the fields, or from stolen nests.

4. Prevent, if possible, the laying hens eating decayed vegetable or animal substances.

5. Keep the eggs, after gathering them, in a cool, sweet atmosphere. If in a cellar, let it be dry.

6. Keep the nests the layers use clean, comfortable and free from vermin.

7. Have a sufficient number of nests for the layers. Offer every inducement to the hens to lay in these nests and not shun them.

8. Allow no brooding hen to sit on the new laid eggs, be it for ever so short a period.

9. Take the eggs to market clean and inviting in appearance.

10. Make it a rule to take no eggs to market that you are not sure are fresh, or that you are doubtful about the flavor being good.

The question is frequently asked and much speculation indulged in as to where all the bad eggs come from, particularly in summer-time? And that leads to the question: What is a bad egg?

In the past eight years large numbers of eggs have been handled in our poultry houses. Many eggs have been put under hens, or in incubators, and close observation has been made of these eggs during incubation, and afterwards of the eggs which failed to produce chickens. The eggs, in course of incubation, were also tested at the end of six or seven days and note taken of the varied appearances presented. No small amount of experience was gained, and it leads to the classification of the different sorts of eggs met with, and the cause therefor, as follows:

1. The fertile egg, in which the germ is in a well advanced stage, with the promise of making a strong, vigorous chicken.

2. The addled egg, or one in which the germ has started, but for some cause its progress has been arrested, when decay sets in and you have a very ill-flavored article.

3. The clear or unfertile, which contains no germ and presents the appearance of a new laid one.

4. The egg containing a broken or ruptured yolk, and which presents a similar appearance to No. 2.

The state of Nos. 1 and 2 can only result from fertilization.

No. 2 is the egg most frequently met with, and is probably the result of taking eggs from nests under barns, or stolen nests, or nests on which the hen has been sitting some days.

No. 3, the clear or unfertile egg, can be used for cooking purposes with every confidence after examination by tester on the seventh day. The unfertile eggs are frequently removed after the fertilized eggs have hatched (on the twenty-first day); they are boiled hard and fed to the chicks.

Having secured the non-fertilized new-laid eggs, care should be taken to preserve the flavor intact. The shells of the eggs are porous, and contaminating surroundings will doubtless affect the egg. The unfertilized egg may be kept in a cellar, with pure atmosphere, for many weeks and yet retain its flavor. In course of time it may shrink and partially dry up from evaporation, but there is no germ to start on its mission of bringing about change as soon as the conditions are favorable, or partly so.

Mr. C. A. Cyphers, the author of "Incubation and Its Natural Laws," admitted to be one of the best works on the subject ever published, in a letter to the writer, says: "An unfertilized egg will keep longer than the other, and an egg from a hen fed on corn will keep its flavor better. The eggs should be kept in a sweet atmosphere.

It must be borne in mind that it is the flavor of the egg that is all important to keep intact. And on this point a farmer in the neighborhood of New York City who sends thousands of eggs per week to that city, writes to the Rural New Yorker, "that if a brooding hen is allowed to sit on a new-laid fertilized egg for twelve hours the flavor of that egg is ruined." The same authority, who uses a large number of incubators, says that he tests his incubator eggs on the fifth day, and all the clear or unfertile eggs he removes, marks them as such, and ships them to New York City, where they are sold for cooking or baking purposes.

In our poultry department eggs have been tested on the sixth and seventh days and the unfertile eggs have frequently been boiled hard wherewith to feed the chicks. On some occasions, at the end of the hatching period of twenty-one days, the clear or unfertile eggs have been removed from the nest and boiled hard to mix up with chicken food. All poultrymen know that it is impossible to boil a rotten egg hard.

It must not be inferred from the foregoing that unfertilized eggs should be kept a long time before being taken to market. Eggs, as advised in a previous page, should be sold as soon after being laid as possible. There are cases where the farmer is some distance from the purchaser, or can not come to market as frequently as one nearer to the city. In such a case, the eggs for sale may have to be kept for some time and it is all the more important that they should be unfertilized and kept in a cool, sweet atmosphere.

In the opinion of the writer it is only a matter of time and education when eggs for sale in summer will have to be guaranteed as unfertilized by the seller before a purchase will be made. Indeed the subject is already receiving practical attention. A prospective question likely to be asked, in connection with its discussion, may as well be answered, viz: If we are to allow no male bird with the laying stock how are we to breed our chickens? Easy enough, by picking out in early spring time, or better still, if circumstances will permit, by keeping apart all winter and not stimulating them to lay—nine or eleven of your best layers and best shaped birds. Mate them with an unrelated, healthy, well-shaped two-year-old cock if the birds are pullets or yearling hens, and a cockerel if they are two years old. When eggs enough have been saved to hatch out what chickens you wish, close up, kill or dispose of the male bird, and after keeping the hens he has been mated with inclosed for a week longer, let them run with the other laying hens, with which there is, of course, no male. And having saved eggs for hatching from birds selected for good qualities, superior progeny are likely to follow. The chickens from eggs saved from such mating will certainly be better, in every way, than those bred in the usual hap-hazard manner. As to keeping the male bird with the laying stock, the following is again quoted from Experimental Farm Poultry Department report of 1899, viz.: "The cock bird is a nuisance in the pen of layers. He not only monopolizes most of the food, but teaches the hens to break eggs and so learn to eat them. Besides, the stimulating diet is too fattening for him and will ruin him as a breeder.

Conclusions Prove it a Profitable Business.

In noting, in the foregoing, the features of the different markets, the demand and supply peculiar to them and the requirements of the various seasons, the following conclusions may be arrived at, viz:

1. That our home winter market offers the inducement of high prices for new laid eggs.

2. That notwithstanding greater production in this district, prices were never better than they were last winter.

3. That there is no reason why new-laid eggs should

not be produced, in winter, in such quantity as to take the place (in a very great measure) of packed, or preserved eggs.

4. That with the modern and cheaper rations in vogue, winter prices could be much lower than they are and yet afford a profitable margin.

5. That eggs in the summer months that can be relied on as being new-laid and of good flavor, will bring better prices than the ordinary article.

6. That so many summer eggs are bad, or ill-flavored, because (a) they are not unfertilized; (b) not collected immediately after being laid; (c) not brought to market soon after being laid.

RELIABLE LETTERS ON EGG PRODUCTION.

Interesting Communications on the Subject of Eggs for Profit and How to Get Them. Record Keeping; Feeding; Fertility; Winter Eggs; Utilizing Waste Products; Yarded Stock; Profit in Eggs.

Reprinted from the Reliable Poultry Journal.

["Help one Another" is one of the favorite mottos of poultrymen. This is evidenced by the interesting and valuable communications we receive from day to day relating to some detail of the poultry business that has been observed by the writers, and which they are anxious to impart for the benefit of their fellow breeders. The following are a few of the letters we have received bearing upon egg-production.—EDITOR.]

PROFIT IN EGGS.

A Start in Poultry Raising, which Shows a Profit of Over 100 Per Cent After Paying for the Stock.

By H. C. ROTHWELL.

I ENCLOSE you herewith a statement of the practical results obtained from a small flock of fowls during 1900. My father keeps the fowls and is a very careful reader of your valuable paper, for which I subscribe. I enjoy reading your paper and think it very valuable, especially to the fanciers, but give us reports (reliable) of results and how they are obtained of poultry plants, medium sized, run for the dollars and cents to be made in the business.

What do you think are the prospects of making a fair living out of a plant of say seven hundred hens operated on a farm of about twenty acres in the vicinity of New York City; thoroughbreds of say two varieties to be kept for general purpose?

I send you a statement of the receipts from an average of twenty-four hens from the 1st of January till the 31st of October last year.

Total eggs collected, 3,381, or nearly an average of 141 for each hen.

Total Accounts.

Eggs		$41.00
Cockerels sold and used		21.00
On hand, 30 pullets	$15.00	
On hand, 12 chickens	3.00	
On hand, 19 old hens, 25c	4.75	
On hand, 1 cock	1.50	24.25
		$86.25
Cost of hens	$ 4.50	
Cost of cock	1.50	
Eggs hatched	2.00	
Feed	23.20	
Feed for chickens	10.00	41.20
Profit		$45.05

The above hens were fed a variety of grain three times a day in summer and twice in winter, with a hot mash of bran and corn meal in the morning in winter only. The chickens were fed principally wheat.

I have fairly good hen houses in compartments and do not keep more than thirty birds in any place. I feed in the straw all grains. I commence feeding just about sunrise and the evening meal an hour before dark. I feed some ground bones and meat when I can get them. I always keep plenty of gravel in their boxes and I am now feeding oyster shells. About half my hens were mongrel Barred Plymouth Rocks and some other breeds. I find the better the bird the more eggs I get.

H. C. ROTHWELL.

PROFITABLE WINTER EGGS.

In Spite of High Prices for Food, Well-Cared for Chickens Are Profitable in Winter.

By SAMUEL LOWRY.

DOES it pay to keep chickens in the winter time when the food costs as much as it has this winter? My experience with my Buff Rocks has answered this question satisfactorily to me, at least. I have kept a record since December 1st. I paid for food, $5.50 and still have enough of it left to last through half of February. I have fed seventeen cockerels, seven hens and eighteen pullets, and so far have gathered twenty-seven dozen eggs, which, at the lowest figure, are worth 25 cents a dozen, or $6.75, which leaves a balance in favor of the chickens of $1.25, while I still have the cockerels, which I can sell at a good price. I expect to be able to make a much better showing during February, as the majority of the pullets are young.

I do not get a chance to attend to them myself, except on Sunday, and I think they could be made to do even better. Many persons have asked what I feed my chickens to make them lay so well. They get wheat, corn and bran, besides plenty of oyster shells and grit. I hope this may influence others to try to keep laying hens during another winter.

SAMUEL LOWRY.

FEEDING FOR FERTILE EGGS.

The Value of Green Food and Exercise for the Breeders.

By W. H. BUSHELL.

IN READING my poultry journals I find many complaints of poor hatches and chicks dying in the shell. I had the same trouble with my Orpingtons early in the season. I was feeding them the same ration and the same amount as the Leghorns, and they got too fat. So I cut the grain down to less than half of a small handful of wheat a day and gave the fowls a free run on alfalfa. The results were grand. Almost every egg hatched and the chicks are strong. We do not get a weak nor a crippled chick out of the incubator.

I am still hatching. Had one machine come off this week with the grandest hatch of fine, strong fellows, and I will hatch two more machines yet, and shall keep tab on them to see if they do weaken as the season advances. I never saw such fine chicks as I am hatching now. I think the alfalfa is a grand food for both old and young chicks. It is just no trouble to raise them on an alfalfa run.

W. H. BUSHELL.

FERTILE EGGS FROM YOUNG STOCK.

Something About Fertility of Eggs from Young Stock—Yarded Hens as Egg Producers.

By HENRY L. ALLEN.

NOT all the theories generally accepted as true turn out to be so under the test of actual experiment. Nearly all the authorities will agree that pullets mated with a cockerel will not be productive of good fertile eggs as early in the season as December, yet an instance came under my notice a few days ago, where such a mating proved exceptionally productive of fertile eggs. A gentleman of my acqaintaince purchased a new incubator, and more to test the machine than for any other reason, he put in it thirty-nine eggs from a pen of Buff Leghorn pullets mated with a cockerel. This was on December 22, and from the thirty-nine eggs, thirty-three good, strong chicks were hatched on January 12. At the same time, this gentleman took thirteen eggs laid by a pen of Buff Leghorn hens mated with a cockerel and placed them under a hen. The hen was placed in the same room in which the incubator stood and from her thirteen eggs she hatched ten chicks. In both instances the per cent of chicks hatched was remarkably high, but there is nothing in the result attained to show that the eggs from the pen of pullets were not just as valuable to the breeder as those from the pen of hens.

My own experience has been similar. Last spring I made a single mating of one high-scoring pullet and an old cock bird. The pullet at first laid rather small eggs, in fact the first sitting was made up of eggs much smaller than suited me, but out of the thirteen I got a hatch of eleven chicks. The chicks were somewhat undersized when they were hatched, but every one of the eleven was raised to maturity and in point of size at four months of age they were as large as any of the season's hatch were at the same age.

Another belief that is founded more on hearsay than fact is that regarding the so-called advantage hens with an unrestricted run have over those confined in yards. Yarded hens properly cared for will yield better results as egg producers than hens which are allowed, or, as is sometimes the case, are forced, to roam over the greater part of a fifty-acre farm to secure a living. The only natural advantage which a big run extends to hens is the opportunity it gives them of securing plenty of animal food, green food and grit. All these necessary elements may be furnished yarded hens, and then they will be equally if not more productive than those which are allowed an unlimited run. The man who is forced to confine his breeding operations to a village lot is prone to envy the farmer whose hens may use the whole farm for a runway if they feel so inclined. His envy, however, is without reason, for the chances are that his yarded hens are doing better for him than are those of half the farmers.

HENRY L. ALLEN.

HOW TO GET WINTER EGGS.

Selection of Winter Layers as Breeders Has Much to Do With It.

By O. E. SKINNER.

DURING this winter of high priced food and consequent scarcity of eggs, poultry folks have wondered how to get more eggs. I had not thought much about it until several persons began to ask me how it was that we were getting so many.

For a number of years I have been raising most of my fowls from winter layers and I think this has a great deal to do with it. I particularly save eggs and set them from hens that lay during below zero weather. Of course, the eggs have to be gathered often. I remember three years ago I saved three eggs from a pen of five Partridge Cochins, three hens and two pullets, when the temperature that day was 24½ below zero and the weather had been very cold for the previous week. The egg laid by one of these hens produced a pullet that laid when she was four months and twenty-nine days old, which is extremely young for a Partridge Cochin to lay.

The only departure in feeding that I have made this winter is that I feed a little more wheat, and cooked turnips three times a week. About three times a week I feed lard cracklings through a bone mill; and I still make a practice of giving a warm mash in the morning.

O. E. SKINNER.

GRAIN AND EGG YIELD.

Experiments That Seem to Prove That the Amount of Grain Fed Affects the Egg Yield.

By B. F. CONELY.

I HAVE had some little experience with feeding fowls and have come to the conclusion that with hens of the American and Mediterranean classes the more grain you feed the more eggs. Of course, they may be forced so that they will become broody, but they are easily broken and will soon commence laying again.

Asiatics seem to lay only when the conditions are favorable and the law is on their side. I own at the present writing, a Buff Cochin hen nearly two years of age that has never laid an egg, and at another time I owned a Partridge Cochin female that reached the age of eighteen months without laying. Perhaps they were too fat. My first experience in heavy feeding was in the spring of '96, with a pen of White Minorcas, four hens and a cock. They had about a quarter of an acre of grass run and I was feeding them wheat screenings, but as they seemed to be in good condition and were not laying as well as I thought they ought, I decided that they were fat and stopped their grain

ration, with the result that they nearly stopped laying. Then I began to give them about double the amount of grain that I had previously and they laid nearly double the eggs they had at any previous time. They seemed to lay in proportion to the amount of grain they received.

My next experience was with a flock of Barred Plymouth Rocks, fifty-nine hens and pullets. They were on unlimited range and were fed night and morning all the whole grain they would eat. During the month of April, for fourteen consecutive days, we gathered exactly fifty eggs per day. One hen was sick, two were sitting and one had chicks. As we needed hens to sit as fast as they became broody, I cannot tell how well they did after that.

Once again in the spring of 1900 I had two small grass runs thirty feet square, in one of which I placed four Buff Leghorn hens and a cock, and in the other five Brown Leghorn pullets and a cockerel. They were fed twice a day, all the corn they would eat, and under the partition fence was a trough which we kept filled with sour milk. During the months of April and May they laid from seven to nine eggs each day. I cannot tell what they did after that, because they were turned out with the flock. It may be of interest to your readers to know that the Brown Leghorn pullets skipped a day in laying oftener than did the Buff Leghorn hens. I should like to hear from some one who has had more experience along this line.

B. F. CONELY

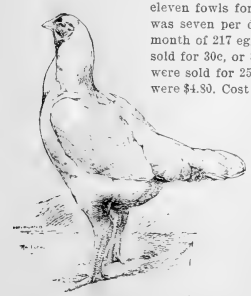
AN EGG RECORD,

Which Shows What Can be Accomplished With a Small Flock With Care.

By DR. J. MARTIN.

I HAVE noticed in your valuable Journal from time to time egg records from various flocks. My flock is small, consisting all told of thirteen, including one male and one very old hen not laying, so that the record is of eleven laying hens and pullets for one month, viz., from January 15th to February 14th, inclusive. My flock is composed of Rose Comb Rhode Island Reds and Single Comb Black Minorcas. During this time no artificial heat was used, yet the fowls' quarters were comfortable despite the fact that the coldest weather of the winter was experienced during this period.

The smallest number of eggs gathered was four, which occurred twice during the month; the largest number gathered in one day was ten, occurring but once, but quite a number of days we gathered nine, while the average for the eleven fowls for the entire thirty-one days was seven per day, making a total for the month of 217 eggs. Six dozen of them were sold for 30c, or $1.80; twelve dozen of them were sold for 25c, or $3. The total receipts were $4.80. Cost of food for the flock during this month was $1.60, making the cost of food per bird 12 1-3 cents. Count off for the male and old hen 24 2-3c, say 25c, and the total cost for the eleven was $1.35, which left a net profit of $3.45. So the eggs cost 7½c per dozen (fractions not counted), a profit of 31c per hen. The fresh bone fed cost me nothing.



White Indian Game Female.

Some may ask how were they fed to obtain these results and what was the secret of success? Well, the breeds may have had something to do with it, perhaps. They were kept comfortable and free from lice. They had good food before them at all times and additions were made three times each day; but with the exception of green bone, which was fed three times each week, and their mash once a day, composed of bran and corn meal, with a little beef meal and salt, they had to scratch and exercise for every mouthful they got. Herein, if anywhere, in the writer's judgment was the secret of success. And besides, they were given warm water to drink and they were furnished a great variety of food. A laying hen is not easily overfed if only she is made to work for it.

Cornish Indian Game Male.

DR. J. MARTIN.

TURNING WASTE PRODUCTS INTO EGGS.

Scarcity of Grain and Money Forces Us to Utilize Everything That Has Food Value—In Time of Plenty We Should Do Likewise.

By MRS. S. B. TITTERINGTON.

ONE beneficent result of the great drought of last summer was that it compelled the poultry raiser to supplement the scarce and costly grain foods with other material. Never, perhaps, have the so-called waste products of farm and household been subjected to such close scrutiny in regard to their availability in this emergency. The knowledge thus obtained under trying conditions will be turned to profit in coming years.

In the list of waste products we must place first and foremost green bone. While the use of this valuable adjunct to poultry rations has been known and urged for years, many were slow to give up the convenient and easy grain method. Necessity is a stern teacher, and under her strenuous tuition many profitable lessons are learned. The balanced ration was a term that had little meaning to many busy people in other days; but it is safe to assert that the value of what the term stands for is better understood today than ever before.

So much has been said regarding the value of cut green bone, that it will be impossible to advance any new ideas along this line. The assertion that green bone is an egg in a different form, or, in other words, that green bone contains the necessary constituents for eggs, feathers, flesh and bone is supported by results. As a supplementary food for winter egg production, enhancing fertility, as well as the number of eggs, it is easily in the lead. Bone cutters are legion, and among the multitude offered, there surely should be satisfactory machines. But for a few hens, where no bone cutter is available, a chopping block and a hatchet make possible this highly esteemed addition to the food.

For growing chicks green bone is invaluable. It insures

quick growth and sturdy fowls. Of course an over supply will work disaster, but used with care and judgment it will do wonders.

By green bone is meant a strictly fresh, untainted article. Boiled bones, or bones that have lain out in the sun and rain will not answer. Avoid also the bones of animals that have died from disease or starvation.

Table scraps are especially good for poultry. They may form, along with potato or other vegetable peelings, the basis for a warm mash. By carefully saving everything of this description, so that enough of the waste material is cooked together to make the bulk of the mash, it will not require as much ground food for making it the required consistency. It should never be sloppy, as this is prejudicial to health.

Green food can also be supplied from the store of cow beets or mangel wurzels, usually grown for the cattle. Cabbage leaves are a highly esteemed relish. Almost anything in the vegetable line may be utilized for the hens. Small potatoes, turnips, carrots are good things to have in these days of scarcity. The cow beets are not exactly waste material, yet the small and imperfect ones are just as acceptable in the poultry house as the larger ones which the cattle can dispose of more readily.

No egg shells should ever be burned. They are too valuable to dispose of in this way. Crush them and add to the mash. They will help to supply the lime for future eggs.

The by-products of the dairy are too important to be overlooked. Skim milk, buttermilk, sour milk, are all nourishing and stimulate egg production. It will be money in pocket to make the pigs divide with the poultry. It will be more profitable in the end.

Butchering time affords a grand feast from otherwise waste products for the fowls. Hog livers, kidneys, and the like, are soon disposed of if put where the poultry can pick at them. Beef heads seem to be particularly popular in chickendom. After every particle of flesh has been cleaned from the outside, split them open, if you have not a bone cutter. The inner part contains much which the busy foragers can make good use of. If you are the happy possessor of a bone cutter, do not throw aside the leg bones because hard to cut. They are especially rich in the constituents for which we feed cut bone.

Have coal ashes within reach. The fowls pick from them many tiny particles which aid digestion. Boxes of road dust are a necessity in winter. The hens delight in their dust bath when confined even more than in their summer liberty. By adding a little good lice powder to the dust, you may keep the fowls free from insect pests.

Bran, shorts, linseed meal—the by-products of flour and starch—may be bought at mill or factory at a price much below their real food value. They are, of course, far cheaper than the whole grain, and may be made to largely take its place by mixing in mashes, etc.

Grit is surely a waste product, as it is good for nothing save as a grinder in the digestive process of our feathered pets. Many people pound up broken dishes, glass, and the like for grit. The writer cannot speak from personal experience of its utility, but strong claims are made for its value. But grit, whether home-made or commercial, is an imperative necessity, if we would have our poultry in the best of condition—that health which insures profit as a return for our labor.

Enough has been said regarding waste products to suggest the wisdom of looking out carefully for such as may prove adapted to the needs of the poultry. Doubtless there are others, which some investigating person will discover from time to time. In all our work, let us heed a scriptural injunction: "Gather up the fragments, that nothing be lost."

MRS. S. B. TITTERINGTON.

FEEDING FOR EGGS.

Rations That Were Fed to Enforce Egg Production During a Competition Which Resulted in an Average of Two Hundred and Eighty-nine Eggs per Hen per Annum for the Winning Pen.

IN the egg contest promoted by the National Stockman and Farmer, Pennsylvania, 224 pens of fowls were entered. Weekly reports were required from each contestant, and the value of the eggs laid was determined according to the current price of eggs in the Pittsburg market, this value being computed on the number of eggs as reported from week to week. The six highest winners and the number and value of eggs were reported in the Stockman and Farmer as follows:

First—Pen 112, W. S. Stevens, Ohio, eight White Plymouth Rock pullets, an average of 289 eggs each, or a value of $5.02 per hen.

Second—Pen 189, William G. Dodson, Ohio, eight crossbred Leghorn pullets, an average of 283 eggs each, or a value of $4.82 per hen.

Third—Pen 115, J. G. Redkey, Ohio, eight White Plymouth Rock pullets, an average of 280 eggs each, or a value of $4.00 per hen.

Fourth—Pen 75, L. E. Bradbury, Ohio, eight Single Comb Brown Leghorn pullets, an average of 277 eggs each, or a value of $4.64 per hen.

Fifth—Pen 88, Z. N. Allen, Pennsylvania, twenty-four Single Comb Brown Leghorns, an average of 277 eggs each, or a value of $4.89 per hen.

Sixth—Pen 154, Z. N. Allen, Pennsylvania, twelve Barred Plymouth Rocks, an average of 262 eggs each, or a value of $4.24 per hen.

Not being satisfied with a mere knowledge that a stated number of fowls laid a stated number of eggs, the Reliable Poultry Journal got down to hard pan by securing from the winners the actual facts. They were obtained for your-

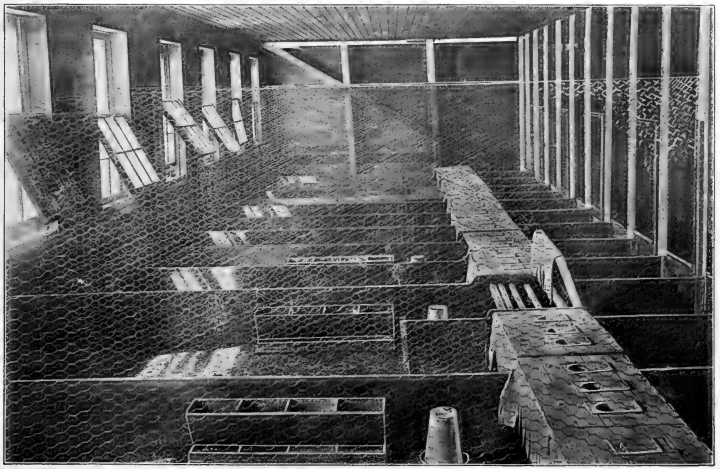
benefit. Read them. They are given in the words of the contestants.

An Average of Two Hundred and Eighty-nine Eggs Per Hen.

"You ask how I managed and cared for my eight White Plymouth Rock hens during the recent egg contest as conducted by the National Stockman. I will be pleased to tell you. This pen consisted of eight White Plymouth Rock hens and one rooster. These eight hens laid 2,312 eggs in 365 days, or an average of 289 per hen for the year. Estimated by the Pittsburg (Pa.) market, week by week, each hen laid during the year $5.02 worth of eggs. They were kept in a house 12x20 feet long, divided into two parts, each 10x12, one part being used for a scratching shed and the other part containing the nests and roosts. The building is seven feet high and is a frame, weatherboarded with pine siding and ceiled with matched pine flooring, which makes the house very warm. You will notice this pen had plenty of room. The floor consists of mother earth and is covered about four inches deep, in the fall, with road dust and sand. The building runs east and west, facing the south.

"In the south of the building are two windows, which extend from the floor to the height of the building, thus admitting plenty of sunshine and light, so necessary to the comfort and happiness of the fowls. The perches are about three feet from the floor, and under them the dropping boards. A house of this kind in which fowls are housed during the winter months, with the right kind of food and the proper care, will insure the poultryman eggs all winter. My hens were not out during last December and January, and they were as healthy, happy and contented as if they were roaming the fields during the happy summer months. They were all aglee with song and contentment and shelled out eggs every day, even during the coldest days of last winter.

"They have free access to oyster shells and grit. I give them twice a week fresh granulated bone. Their food consists of a warm breakfast, equal parts of bran, white middlings and chopped corn and oats, and into this I put for them fine beef loaf. At noon I feed wheat, which is thrown into the scratching shed. This gives them exercise in obtaining their noon meal. In the evening they are fed whole corn. During the time from the first of April until the first of November, I fed the same, with this change: In the morning their mash is mixed with cold water; in the evening wheat takes the place of corn. Cleanliness is a very important matter in regard to the maintenance of health for your fowls. I clean the house twice a week during the winter and in the summer every other day. I have been breeding Plymouth Rocks now for five years, and have not as yet had any disease, and I attribute it to cleanliness and proper care." W. S. STEVENS.



Interior View of Brooding House Showing Hovers in Position Over the Pipes. For Chicks One Day to Four Weeks Old.

Winner of the Second Prize.

Mr. William G. Dodson, who won the second prize, wrote as follows:

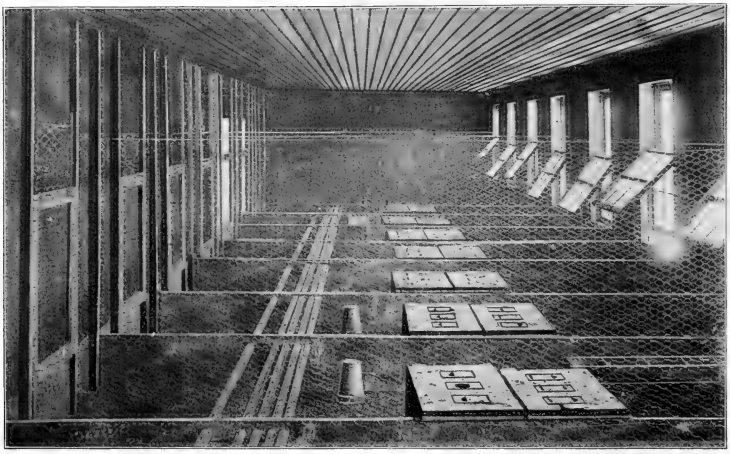
"My pen of eight pullets that I had in the National Stockman and Farmer contest laid an average of 283 eggs each in one year. The pullets were from a Rose Comb Brown Leghorn cock crossed by White Leghorn hens. The pullets I had in the contest were the result of that cross. The house I kept them in was built of lapsiding and lined with Neponset paper and roofed with the same. Not a pin crack was left for drafts to get in. I have a good-sized yard fenced in with wire netting. Each morning these pullets had a hot feed of chop, mixed with the water that the fresh bones and beef scraps were boiled in. After that some wheat and oats were thrown in the straw for them to scratch for. At noon they had ground bone and meat scraps and stale bread. At night they had in summer wheat and barley, and in winter corn and buckwheat, and at all times they had before them

fresh water, and each day fresh milk. Twice a week I gave them some buttermilk. They also had at all times a good supply of broken dishes, seashells and limestone, broken in small pieces, and once a week they had a small quantity of ground ginger and black antimony.

"The house was cleaned once a week and the floor sprinkled with air-slacked lime, and the inside of the house dosed with coal oil. The dust box was four feet square and filled with sifted coal ashes and road dust mixed. Not one of them was sick or "off its feed" one hour in the whole year, and they are still laying and look as fresh as any of my chicks. They are from my best layers singled out for several years. I breed from none but the best. I have been experimenting for some time in crossing different chicks. I could just as well have entered a pen of full-bloods as cross-breeds, but so many laughed at cross-breeds I thought I would give them a trial." WILLIAM G. DODSON.

"These houses are frost-proof, having withstood a temperature of twenty-one degrees below zero. This, I think, is one of the great secrets of winter egg production, as my twelve years' experience as a breeder of thoroughbred poultry have taught me that you cannot expect to get eggs in winter with all the feeding and care you may be able to give unless you have comfortable houses for them.

"There is also a great difference in the laying qualities of birds of the same breed, some strains laying almost double the number of eggs of others of the same breed. I have been mating some of my pens with that object in view, viz.: eggs, and I have been in a measure successful, as my record in the late contest shows. I have been giving this my attention for the past eight years, and by careful selection have increased the average per hen from 212 eggs nine years ago to 289 in 1894. In my pens of White Plymouth Rocks and in the Barred Rocks I have brought them up from 205 to 264



Interior View of Brooding House Showing Hover Removed from Pipes and Used as Cool Brooders. For Chicks Four to Eight Weeks Old.

An Interesting Communication.

Mr. J. G. Redkey, won the third prize with eight White Plymouth Rock pullets that averaged 280 eggs each for the year. He wrote as follows:

"The varieties I breed are thoroughbred White and Barred Plymouth Rocks. I feed warm food in the morning, composed of cooked meat two parts and twenty parts of cracked wheat, with whole wheat and oats at noon scattered in litter. I feed oats, wheat and corn at night, with clover heads, cabbage, beets or turnips for green food, and cut bone, oyster shells and crushed limestone for grit.

"My houses are built 14x20 feet, with a hall four feet wide in front and four six-light windows in front. There is a partition in the center, making two pens of 10x10 feet to each house. These houses are double boarded, with tarred paper between, and are roofed with Marietta roofing, double seamed. Each house is five feet high in the rear and eight feet in front. Each house has an earth floor filled in with from six to eight inches of pounded clay, with four inches of coal cinders on top, which makes a floor perfectly dry.

in the same length of time. My yards are each thirty feet wide by 260 feet long, with one house for each two yards. Each pen contains fifteen hens and one cock, except the pens that were in the contest, which contained nine hens and one cock, and ten hens and one cock respectively.

"I have never allowed my hens to rear chicks, as I hatch and rear all my fowls by artificial heat, and when I have a hen that becomes broody I remove her to a yard prepared for that purpose, containing no nests or secluded corners, and in a few days she can be returned to the pen, and she will soon be laying again, as though she had never offered to sit. It is my belief that fowls hatched in incubators and reared in brooders year after year will lose, to some extent, the habit of incubation, as my Rocks are now much less inclined to become broody than they were a few years ago, and I firmly believe that were it possible to introduce no other blood in the yearly matings, except from those that were artificially hatched and reared, the results would be much more marked. I may be wrong, but I have in one of my pens a Barred hen hatched May, 1893, that laid 297 eggs

to March 1, 1895, and has never offered to sit. This is an exception, but only goes to prove what I believe is possible."

J. G. REDKEY.

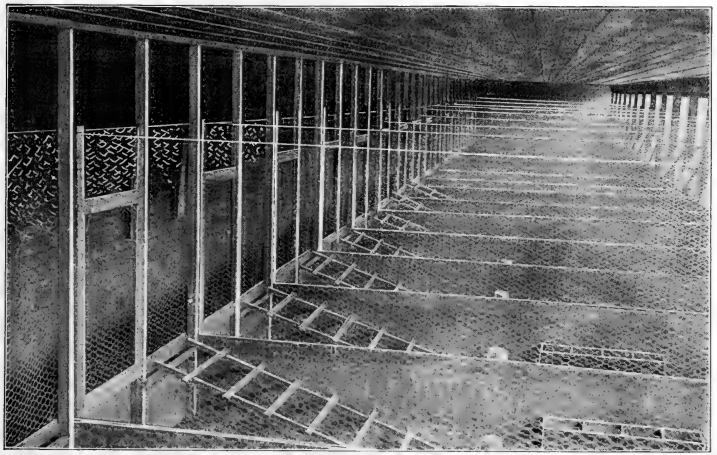
[NOTE—Mr. Redkey is confirmed in his opinion by the report of the United States Consul to Egypt, which states that the native hen of that country (where artificial incubation has been followed for centuries) has abandoned the work of hatching.]

No Excellence Without Labor.

Mr. Z. N. Allen, who came off fifth and sixth best in the contest, receiving an average of 277 eggs each from a pen of twenty-four Single Comb Brown Leghorns, and an average of 262 eggs each from a pen of twelve Barred Plymouth Rocks, favors us with the following valuable information:

"Sixteen years ago this spring I began an egg contest of my own. The preceding summer I had built a good hen house, so I determined to ascertain which of my breeds were the best egg producers. I penned six of each kind, Brown Leghorns, Silver Hamburgs, Polish and Plymouth Rocks. This gave me some experience in feeding and confinement (which lasted four months) and this experience has stood me well in hand ever since. Pens No. 88 and 154 in The Stockman egg contest were pullets from good laying stock. Those in No. 88 were hatched the first week in May, 1893; began laying about the middle of November. Those in Pen No. 154 were hatched the first of April, 1893, and began laying the last of November. They were well fed and cared for from chicks until the contest ended. Their houses were made as warm as could be without artificial heat. Their apartments were kept clean and dry and were supplied with grit, ground bone and oyster shells. They had to scratch in winter in litter, and in summer in sand. One side of their yards was spaded two feet wide. Then wheat was scattered and the sand was shoveled up against the side of the yard. To get the wheat they had to scratch it back until it was about level. This was repeated once a day during the summer unless it was too wet. When cold weather came they had to go into winter quarters and earn their living by scratching litter. They breakfasted on hot mash in winter and not very cold in summer. A short time after breakfast they went to scratching for life, some singing as they worked. For dinner they had green bone, meat and clover every alternate day, with very little exception. The noisiest time in the hen house was from daylight until noon. I thought sometimes they were trying to see which could make the most noise. I believe they had a more jolly time than I did. Along in the afternoon they turned their scratching into pecking cabbage. This sobered them down somewhat and gave them an appetite for supper, at least they got in a hurry and tried to see which would get the first bite. Some of them were so devoid of etiquette that they even flew up and lit on the side of the feed bucket. They appeared to relish very much boiled wheat and oats and some coarse bran, even if it was quite hot. Once a week the medicine man came around with his jar of cayenne pepper and made it a little hot for them in the mash. I believe the pullets in 88 and 154 laid eggs because they liked to do it. Pen 88 made a record of 6,654 eggs; Pen 154, 3,139 eggs. Thoroughbred stock, good wholesome food and plenty of it, good warm houses and good care will make a success of poultry."

Z. N. ALLEN.



Interior View of "Cool Brooder" House for Chicks Eight to Twelve Weeks Old.

POULTRY FOODS AND FEEDING.

Chickens are easily hatched—not so easily reared. A machine will do the hatching, but it needs something more than automaton to do the rearing. Hens are easily fed, but they are not so easily "fed to lay." From the time the chick leaves the shell to the moment she gives her last cackle, foods and feeding play important parts in the effort to make the greatest profit with the smallest expenditure. Whether the object be to perfect a fowl for exhibition or for market, or to secure best results in egg production, correct feeding is half the battle.—Robert H. Essex, in Reliable Poultry Journal.

PEDIGREE BREEDING FOR EGG PRODUCTION.

The Greatest Egg Producer is the Fowl That Has Been Bred for the Sole Purpose of Producing Eggs.

By R. H. ESSEX, Associate Editor Reliable Poultry Journal.

THE greatest egg producer is the bird that has been bred for the sole purpose of producing eggs. This bird will not necessarily be a Leghorn or a Minorca, although these breeds deservedly have the reputation of being the greatest egg producers living—that is, as a class. Without doubt there is a greater proportion of eggs laid by these two breeds than by any other two breeds that can be named; yet there are many individual birds of other breeds that may equal or even surpass them. If such should be the case, it will be found that these individual birds have been bred with one object in view, namely: egg production. Just as the fancier raises birds for exhibition, so may the farmer breed birds for laying purposes. Undoubtedly the proper course to pursue would be to choose your prospective layers from a class already noted for their laying proclivities, but do not imagine you have the best layers on earth simply because the breed selected has that reputation. Many Minorcas and many Leghorns have proved unsatisfactory layers, while many a Brahma and many a Plymouth Rock has abundantly helped to fill the egg basket.

As I have said, if you are commencing, select your birds from the classes bearing reputations as layers, but do not be discouraged because it is not convenient to do this. You may commence now with the stock in hand and note the best layers among your birds. Begin line breeding with as great regard to mating as you would if breeding for show purposes. Mark the pullet that is the first to lay; mark the most persistent layer; mark the hen that molts quickly and gets down to business before the hard winter sets in; mark also the best winter layers, and when you have done marking, the spring will be here and you may commence mating. Better to breed from two or three well known layers than to take chances and make up a pen containing a dozen indifferent ones. As the cock does not lay, you cannot judge whether he is likely to produce good layers, unless you know how he is bred, but you can choose the largest and most vigorous bird of the flock to mate with your selected females. After that it is easy. Never allow anybody to induce you to change the blood of your flock by the introduction of a male bird of another strain, unless you are satisfied he comes from a strain which equals your own as layers. Remember the sire controls one-half the blood of the produce, and if you desire to introduce new blood or new stamina into your flock do so by means of the best laying female you can procure. Even then I would not use her sons as sires, but would dispose of them and mate her daughters back to the old male bird; the produce from this mating would have in their veins three-quarters of the blood of your own strain, with sufficient new blood to maintain the vigor of the flock. Do not overlook the necessity for observation each year, so as to intelligently mate your birds the next season, continually choosing the best layers and limiting your breeding pen to these. The result will be that no matter what breed you start with you will eventually own layers far ahead of any that have been indiscriminately bred. The same advice applies to production of large eggs. I have had Minorcas which have laid large eggs, and Minorcas which have laid small eggs; Brahmas, layers of large eggs, and Brahmas, layers of small. During recent years in breeding Buff Plymouth Rocks I have found that some hens lay small eggs, others large; and as I have carried out the system of pedigree breeding I have noticed the fact that layers of large eggs transmit this attribute to their progeny, and layers of small eggs have produced birds which have also laid small eggs. It rests altogether with the particular strain of birds, and not with the breed, as to which will give the best return, either in size or number of eggs.

There is a material difference between 150 eggs a year, which is a fair average, and 289, which is I believe the record of a pen of fowls which had been entered for competition in an egg-producing contest. It shows what can be done by pedigree breeding and judicious feeding, and constitutes the difference between profit and loss.

If you keep many varieties you cannot give the necessary time to each one. Since I limited myself to breeding Buff Plymouth Rocks I have won more prizes and obtained more satisfaction than I did on all the others combined.

Housing, Feeding, Hatching.

There has been so much information given as to raising, housing and feeding, that anybody who reads should have no difficulty in these respects, if the directions are faithfully followed. Each breeder may have different methods, but analyzed they will be found to agree in the main. One feeds cut green bone every day, another every second day, but the amounts fed also differ, and the result is much the same. One feeds soft food for breakfast, another for dinner. Even this is regulated by the habits of the poultryman. The man who feeds early in the morning may with good results feed grain as a breakfast while the one who feeds late will do better by giving the soft food first. The hens become habituated to certain methods, and will do fairly well under any, so long as they are not too radical. Still, the man who gets up early and feeds his fowls regularly will get the best returns, and he deserves them.

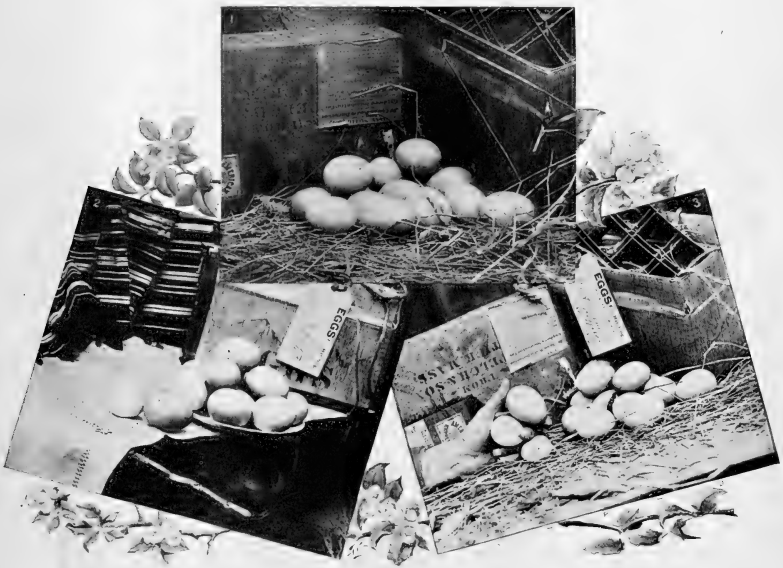
Give little soft food, a small but regular supply of meat, or ground green bone, and a variety of grain, not forgetting the green food in winter, and the principal requirements for egg production have been performed. The next important requisite is work. Feed the grain in litter, cover it well and make the hens work to find it. Do not be governed by false kindness, and throw down the food in heaps, but cover every grain. Be careful as to exciting the birds. Strange dogs, cats or even your next door neighbor going among the hens when in confinement will affect the layers detrimentally. A change of pens, removing a hen from one pen to another will cause a cessation of laying for a time. Change the position of your nests, and it has the same effect. Introduce a strange male bird, and you will notice the reduced number of eggs. Any change, every change should be guarded against.

Give plenty of room and plenty of sunshine to the workers, and never reduce the scratching space to less than six or eight square feet per hen. Even this amount is small, and when confined to such a space it is necessary to limit the number of fowls in a pen to ten or a dozen. The most important requirement has not been mentioned, that is the water. Watch the hen come off the nest after laying and see her make for the water, and you will understand the necessity for pure water and lots of it.

In the winter, if your house is dry, the fowls will keep themselves warm during the day if you feed little and often, and make them work. At night care must be exercised to see that they have a warm corner for a roosting place.

Hatch your chicks as early as possible, but certainly not later than May, and if properly cared for you will have winter layers, and receive all the way from 25 to 50 cents a dozen for your eggs. If you allow the hen to use her own sweet will she will probably incubate in June, July and August, and you will have lots of worry, lots of squabs, and any amount of expense feeding during winter chicks that bring you no return.

R. H. ESSEX.



"To-day we boxed fifteen eggs laid by nine pullets (sisters) that weigh 2 lbs. 8 oz., that is 2 lbs. to the dozen. These pullets weigh 8½ to 10¼ lbs. each."—I. K. FELCH.

LIGHT BRAHMA EGGS.

EGG YIELDING CAPACITIY OF HENS.

The Use of the Trap Nest Shows Great Variation in the Egg Production of a Flock—Work of Two Hundred and Thirty-six Hens During a Year—Barred Rocks, White Wyandottes and Light Brahmas Undergoing Experiment.

By PROFESSOR G. M. GOWELL, of the Maine Experiment Station.

IN recognition of the necessity for improvement of the egg producing capacities of hens, the work was taken up, and November 1, 1898, two hundred and sixty April and May hatched pullets were put into breeding pens and records kept of their individual productions for a year. This was done with much certainty by use of the trap nest boxes described as follows in the station report for 1898:

"We constructed a nest that proved so satisfactory that we placed fifty-two of them in the breeding house. * * * The boxes are placed four in a bank (Fig. I.) and slide in and out like drawers and can be carried away for cleaning if necessary. If desired they could be put on the floor or shelf by simply adding a cover to each box. * * * To remove a hen the nest is pulled part way out, and as it has no cover she is readily lifted up and the number of her leg band noted on the record sheet that hangs at hand. * * *

"The nest box is very simple and inexpensive, easy to attend and certain in its action. It is a box-like structure without front end or cover. (Fig. II.) It is twenty-eight inches long, thirteen inches wide and thirteen inches deep, inside measurements. A division board wth a circular opening seven and one-half inches in diameter is placed across the box twelve inches from the back end and fifteen inches from the front end. The back section is the nest proper. Instead of a close door at the entrance, a light frame of inch by inch-and a half stuff is covered with wire netting of one-inch mesh. The door is ten and one-half inches wide and ten inches high, and does not fill the entire entrance, a space of two and one-half inches being left at the bottom and one and one-half inches at the top, with a good margin at each side to avoid friction. If it is filled the entire space it would be clumsy in action. It is hinged at the top and opens up into the box. The hinges are placed on the front of the door rather than at the center or back, the better to secure complete closing action.

"The trip consists of one piece of stiff wire about three-sixteenths of an inch in diameter and eighteen and one-half inches long, bent as shown in the drawing. (Fig. III.) A piece of board six inches wide and just long enough to reach across the box inside is nailed flatwise in front of the partition and one inch below the top of the box, a space of one-quarter of an inch being left between the edge of the board and the partition. The purpose of this board is only to support the trip wire in place. The six-inch section of the trip wire is placed across the board and the long part of the wire slipped through the quarter-inch slot and passed down close to and in front of the center of the seven and one-half inch circular opening. Small wire staples are driven nearly down over the six-inch section of the trip wire into the board, so as to hold it in place and yet let it roll sideways easily. When the door is set the half-inch section of the wire marked A comes under a hard wood peg, or a tack with a large round head which is driven into the lower edge of the door frame.

"The hen passes in through the circular opening and in doing so presses the wire to one side and the trip slips from its connection with the door. The door promptly swings down and fastens itself in place by its lower edge, striking the light end of a wooden latch or lever, pressing it down and slipping over it, the lever immediately coming back into place and locking the door. The latch is five inches long, one inch wide and a half-inch thick and is fastened loosely one inch from its center to the side of the box, so that the outer end is just inside of the door when it is closed. The latch acts quickly enough to catch the door before it rebounds. * * * Strips of old rubber belting were nailed at the outside entrances for the door to strike against.

"The double box with nest in the rear end is necessary, as when a bird has laid and desires to leave the nest she steps to the front and remains there until released. With one section only she would be very likely to crush her egg by standing upon it."

Pure-bred birds from three breeds were used, viz., Barred Plymouth Rocks, White Wyandottes and the Eaton strain of Light Brahmas. As the room was needed for other birds, on October 10th some of the hens that had not had sufficient time remaining in which to reach a yield of one hundred and sixty eggs in the year since commencing to lay, and that had produced one hundred eggs within the year, were taken out of the test, consequently the average yields of all the hens for the full year cannot be given. The purpose was to save those with yearly yields of one hundred and sixty eggs and over and those with yields of one hundred or less, so as to see what variations there were in the individuals comprised in the flocks.

Of the two hundred and sixty hens put into the test, five died during the year and nineteen were stolen. Of the two hundred and thirty-six hens remaining, thirty-nine each laid one hundred and sixty or more eggs, and thirty-five laid less than one hundred each.

Twenty-four of the one hundred and twenty-six Plymouth Rocks laid one hundred and sixty or more eggs each, and twenty-two laid less than one hundred each. Nine of the fifty-six White Wyandottes each laid more than one hundred and sixty eggs, and seven laid less than one hundred each. Six of the fifty-four Light Brahmas each laid more than one hundred and sixty eggs and six laid less than one hundred each. All birds were put into the test November 1, at which time some of the earliest ones had been laying for about two weeks. The year began November 1 for all birds that laid during that month. Some of the later hatched ones did not begin to lay until January and February and they were given a full year after they began. A study of the monthly record sheets published in this connection shows the great differences in the capacities of hens, and marked variations in the regularity of their work, some beginning early and continuing laying heavily and regularly month after month, while others varied much, laying well one month and poorly or not at all the next. Accounting for

these vagaries was not practicable as the birds in each breed were bred alike, and selected for their uniformity.

All pens were of the same size and shape and contained the same number of birds. Their feeding and treatment was alike throughout. Whenever changes were made in the feed in one pen they were made in the others. That they were in good health is shown by the fact that but two were ailing, and were taken out early; two crop-bound, and one was injured by rough treatment by a cockerel.

Many of the lightest layers gave evidence of much vitality and in many instances there were no marked indications in form or type by which we were able to account for the small amount of work performed by them. Numbers 234, 70 and 236 yielded respectively 36, 37 and 38 eggs in the year. They were of the egg type and gave no evidence of weakness or masculinity. Numbers 101, 286, 36, 47 and 14 with their yields of 204, 206, 201, 200 and 208 eggs during the year were typical birds with every indication of capacity, but they were equalled in the minds of good judges by other birds that yielded a much less number of eggs. The size and uniformity of the eggs yielded are of a good deal of importance. It was very noticeable in these investigations that the eggs from hens that laid the greatest number averaged smaller in size than from those that did not produce so many. That this was not always the case was shown by the eggs from numbers 101 and 286, which were of good size and dark brown, while those from number 36 were small and lacking in color. For this defect number 36 will be excluded from the breeding pens.

No. 14 is a good, large, strong White Wyandotte and because of the quality and quantity of her productions she is a phenomenal bird. When she went into the test November 1, 1898, she had been laying over two weeks. At the end of the year she had two hundred and eight good brown eggs to her credit, and she still kept on, laying 18 eggs in November, 22 in December, 21 in January, 18 in February, 15 in March and 18 in April, just closed, giving her 112 in the first six months of her second year, and 320 in eighteen months, a little more than an egg in a day and three-fourths for the entire year and a half after she commenced laying.

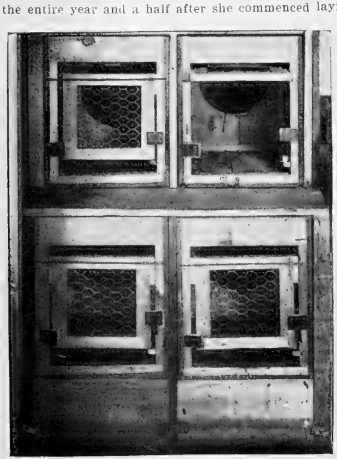


FIG. 1.—Individual Record Nests in Position.

When the eggs from the hens that had been laying long and freely were placed in the incubator, many of them were found low in fertility, or entirely sterile, notwithstanding the hens had mated freely with vigorous cockerels. The percentage of infertility was much greater than in eggs from hens that had been laying moderately. The question arises whether a large percentage of the chickens raised each year are not the produce of the tardy and moderate layers that are comparatively fresh, rather than of the more valuable and persistent layers that have been hard at work all winter? If this is so, breeding from eggs as they are ordinarily collected without a knowledge of the hens that produced them can but tend to furnish a large proportion of chickens from the poorest hens in the flocks.

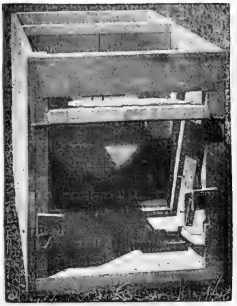


FIG. 2.—Single Nest Removed.

The cockerels as well as the pullets raised in this way furnish the breeding stock for the next year and in this manner the reproduction of the poorer rather than the better birds is fostered. This work—as undertaken—of breeding for more and better eggs will of necessity require much time, and several years will probably elapse before marked results may be looked for.

If the average yearly egg yield can be increased to the extent of only a dozen per hen, by breeding, and the stock disseminated among the people the value of the work undertaken here will be very great.

At this time cockerels are being raised from the hens that gave over two hundred eggs last year, for our breeding next season. Among the two hundred additional hens undergoing test this year, it is hoped to find other large yielders and that next year we may have some pens where both the males and females will be from large producing dams. The three breeds taken for this work are kept separate and pure. It is known that the laws of inheritance and transmission are as true with birds as with cattle, sheep and horses, and when we consider the wonderful advance in egg production that the hen has made since domestication, there is ample reason for assuming that a higher average production than the present can be secured by breeding only to birds that are themselves large producers.

Over Forty That Laid More Than Two Hundred Eggs.

During the four years in which we have been selecting breeding stock by use of the trap-nests, we have found over forty hens that have laid between 200 and 251 eggs per year. The most of them are now in our breeding pens and constitute, until other additions are made to them, the "foundation stock, upon which our breeding operations are based. All the males, as well as the females, which we breed from have been bred from them. The numbers of the foundation stock now secured make practicable the avoidance of inbreeding, and this is strictly guarded against, as it is doubtful if the inbred hen has sufficient constitution to enable her to stand the demands of heavy egg production. All the other breeding stock we are now carrying are tested hens,

that have laid over 180 eggs each in a year, pullets whose mothers laid over 200 eggs in one year and whose fathers' mothers laid over 200 eggs in a year; and pullets sired by cockerels whose mothers and grandmothers laid over 200 eggs in one year.

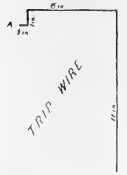


FIG. III.—Trip Wire.

The size and color of the Plymouth Rock eggs are very fine. The eggs from the Wyandottes are of good shape and size, but as yet rather too light. It is early yet to know what the results of this work are to be. It is the breeding of egg producers together to secure egg producers. No matter how great the number of eggs produced, if they are not of good size, shape and color, the bird is rejected as a breeder. While we are not breeding for fancy points or show purposes, the birds are kept within the limits of the requirements of the breed.

The purpose of this work should not be misunderstood. We are not trying to produce stock that shall average to yield 200 eggs per year. If by furnishing the male birds which we secure, to farmers and poultrymen of Maine, the average egg yields of the hens of the state shall be increased to the extent of one dozen eggs per bird, the value and importance of this work will be many times its cost.

For twenty-one years I have been at work with the same family of Barred Plymouth Rocks, and by selecting typical eggs for incubating had succeeded in very much improving the shape, size and color of the eggs yielded. That was an easy matter, for I simply bred to producers of quality in order to secure quality, and I secured it. I endeavored to increase the egg yields by selecting birds of what I thought was the "egg type," and breeding them together, I had heard a great deal about the "egg type" and had gotten to think it was a hard and fast fact. After using the trap-nests for a few years, however, and finding in the same pens, where the hens were all from the same hatch, and fed and treated alike throughout their laying year, some birds that yielded from 220 to 251 eggs, and others that laid only from forty to sixty eggs during the same time, and not being keen enough of sight and touch, to discover differences of form and feature, sufficient to account for the great variations in yield, I began to lose faith in the "Beef and Dairy Form," as indicating the internal functions of hens, sufficiently to be longer accepted as guides in selecting stock from which to breed egg producers.

It is a good way to the end of this road along which we are plodding, and the four years passed upon it are not sufficient to yield data with which to establish claims, or prove or disprove theories.

Whether we succeed or fail in establishing greater egg yielding families of Barred Rocks and White Wyandottes, the poultry breeding public will be kept informed as the generations of birds succeed each other, as results vary and data is accumulated. G. M. GOWELL.

BLACK MINORCAS AS EGG PRODUCERS.

For Annual Egg Production and Size of Eggs the Minorca is Unexcelled—Standard-breds, Winners and Layers—Pullets' Eggs That Weigh Two Pounds per Dozen.

By J. H. DOANE.

THIS article is based on the value of Black Minorcas as egg producers. It is generally considered poor policy to claim supremacy for any breed of poultry in a general sense, but when it comes to egg production it does not require any stretch of facts, or illusionary views, to assert that Black Minorcas are the Acme of Perfection as egg producers. It is a fact undisputed by those who have given them a trial that Black Minorcas are not outclassed in number of eggs laid by any other breed or variety, while in size of the egg Black Minorcas are in a class by themselves. We have not had experience with all breeds by any means, but we have bred several of the leading varieties and by every test the Black Minorcas have proved themselves the best layers at all seasons. Four years ago we decided to breed them exclusively.

When one attempts to show that the size of the egg should affect the price it is invariably cited that eggs are sold by the dozen. This claim granted; yet the housekeeper chooses the big ones every time. Any other product of the farm—horses, cattle, cheese, butter or grain, has a market value which fluctuates with the quality. A high stepping cobby horse built with the curves and symmetrical points of equine beauty, or an extra good looking draft horse, to say nothing of superior track horses, will command prices far in advance of the market. This same applies all through the long list of farm products and there is no exception in the real value of eggs. To say that an egg is an egg is about as unmeaning as the assertion that a hen is a hen. The cost of keeping a cow that produces forty pounds of milk per day is no more than that of keeping one that will produce but twenty pounds, and the cost of keeping a hen that will yield two hundred eggs in a year is no more than that of keeping one that will lay but half that number. The care in either case is equal, and the pleasure and profit is all on one side.

Black Minorcas will produce as many eggs in a given time with proper care as their nearest competitors, the Leghorns, while their eggs will outweigh the other breed by several ounces to the dozen. Again, Minorca eggs do not have to be sold at the same price as other eggs, for their large size will readily command a higher price. We have no trouble getting three to five cents per dozen above market price for all the eggs we can spare, and other Minorca breeders realize about the same additional profits. As well charge market price for small potatoes as for small undersized eggs; and if Minorca breeders could have their way, eggs would be sold by weight instead of by the dozen. This would be but justice due the purchaser, and such a measure would be a step out of dark age customs.

Although evidence is unnecessary the writer presents on

the first page of this book a cut, which is a half-tone from photo of one dozen eggs, every one of them laid by Black Minorca pullets showing an exact net weight of thirty-two ounces—two pounds—for one dozen of pullet eggs. In evidence of the fact that standard-breds are the best layers I may say that six of the eggs were laid by the first prize pullet at Madison Square Garden—the Crystal Palace show of America. Those six eggs were laid in six consecutive days—March 22d, 23d, 24th, 25th, 26th and 27th. Four of the other six were laid by one of the two pullets in the second prize pen at the same show and the other two by an unshown pullet of same breeding and quality. Can you produce pullets of any other breed that will equal that weight? Note the even size and pure white shells, smooth as you wish. Those three pullets and three more of the same breeding are mated with the first prize cock at the last New York show. Is that quality enough for you?

The old saying, "Handsome is as handsome does," is illustrated in a clear, practical and valuable manner here; but if you want more evidence of the beautiful, have a look at the first prize pullet that laid six eggs with a combined weight of an even pound in six days as sketched by Artist Sewell.

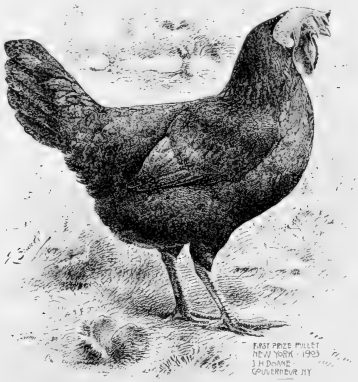
These pullets were hatched in May and June and commenced to lay in November and December. The first prize pullet began to lay eighteen days before the New York show (which fact disproves the worn out theory that a laying pullet loses her bloom), and laid during the exhibition. From March 1st to 30th, inclusive, she laid twenty-four eggs. We have three other pullets that have made even better records than this one, and it is not necessary to point out this particular pullet except to demonstrate that to breed to the highest type of perfection does not detract from the practical value of the Black Minorcas as egg producers.

We have bred Black Minorcas for fourteen years, and while our chief aim has been to breed near to the standard, we have also worked to build up an excellent egg producing strain. As the chief object in the life of a Minorca is to keep the egg basket well filled, it would not be possible to get a better variety to work upon successfully. For years we worked at a disadvantage, and in the light of modern record keeping or pedigree breeding, we worked in the dark. It is safe to assert that no man can accomplish the best results in breeding either for standard requirements or in producing an excellent egg strain without the use of trap nests. We have our pens fully equipped with them and we are convinced without a possible doubt that perfection in pedigree must come through their use. There is one exception and that is separate matings of one male and one female, but that of course is not practicable, nor profitable, nor will it ever come into general use, while the trap nest is sure to come into general use, or some will surely learn that they are not up-to-date. The expense is slight and the profits derived are very evident. The record sheet shows that two pullets have not paid their board, while one has laid but six eggs in five weeks. To be sure that does not read as nicely as the rest, but facts are appreciated and records are helpful and if all were extra good layers the trap nest would have no value in determining the best.

Black Minorcas are conceded to be one of the hardiest varieties we have among all the standard breeds. "A chick well hatched is half raised" will apply to them if to any breed. The chicks are quick growers; the cockerels are early crowers, and the pullets lay early and often. If any one has any doubts about Black Minorcas being the "Acme of Perfection," as winter layers, we invite you to give them a trial, for we are certain you have never done so. The winters of northern New York are severe in the extreme, still we have invariably had a good supply of fresh eggs, and the keynote to it all is exercise.

Keep the hens busy hunting for grains in deep litter and an increased egg yield will be the result. Eggs will hatch better, hens will thrive better and grow larger. It is the plan of nature, as it promotes vigor. To give your birds proper attention requires a love for the business and continual observation of details of the business.

J. H. DOANE.



J. H. Doane won first at Madison Square Garden, New York, on the Black Minorca pullet portrayed—one of excellent quality and of the substantial sort.

A NEW TRAP NEST.

A Home-made Trap Nest Which is Said to Do Satisfactory Work; a Novice Can Make It, and Its Construction will Occupy Time Well Spent.

By CLARK & TROLL.

LIKE MOST breeders of the present day who have decided to use trap-nests in their breeding pens, we early in our experience with the fancy and market poultry business came to the conclusion that the only practical way to breed a strain of birds up to the highest point of excellence, in the shortest possible time, either for show purposes, or heavy egg production, would be to ascertain with absolute certainty, the sire and dam of every bird we produced whether it be a prize winner, an exceptionally fine layer, or both. As our desire was to build up a strain of heavy laying prize winners, we set about devising a nest box that would assist us in securing the information we needed, and as it has to be positive (no if's about it, and therefore no two hens getting on the same nest

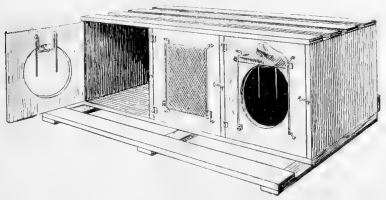


FIG. 1.

at one time) we studied the needs thoroughly, and finally succeeded in making the "Champion Trap Nest." As we like to pass a good thing around (and what has been a great benefit to us we feel sure will likewise benefit others), we give R. P. J. readers the advantage of our experience with full instructions how to make this nest box. If all who may use this nest box shall be as successful as we have been we will be gratified indeed. After experiencing the great advantage we have gained by its use we would not now go back to the old hit or miss way of breeding. We would just as soon think of going back to the breeding methods of twenty-five years ago.

As will be seen by the illustration herewith, we make three nests in one section. We need only one size, each nest being twelve inches square, inside measurement. To make one section this size, we use one-inch pine boards, twelve inches wide, for the bottom, ends, divisions and doors. Cut one piece thirty-eight inches long for the bottom, two pieces twelve by thirteen inches for the ends, and two pieces twelve inches square for the center divisions. Cut seven laths, each forty inches long, five of which are for the top, and two for the back, to hold the nesting material in.

First nail each of the two ends onto the outside ends of the bottom. This makes it forty inches long. Then nail the five laths on top, and next the two on the back. Then put in the two center division boards, thereby forming three nests each twelve inches square. To make an alighting board, cut three pieces about fifteen inches long by one by one and one-half inches. These have to be nailed on the under side of the bottom board, one at each end, and one in the center. Let each one project in front of the nest box about five or six inches, and nail a lath onto the ends of each.

Now comes the more difficult part of the work, though I believe we could make a whole section in less time than it takes to write this. Cut three pieces, each twelve inches square, for the doors, and from the center of each cut a circular piece seven inches in diameter. Now you need some No. 14 wire to make Fig. 1. Cut two pieces each eleven inches long and with a pair of plyers bend the wire into shape, as shown in illustration, the long stretch in the center of this wire is eight inches, which leaves one and one-half inches on each end to bend into shape. With some three-quarter inch poultry netting staples fasten these wires on the door, one on each side of the opening at equal distance apart at top and bottom, having the lower ends about on a level with, or a trifle below the lower edge of opening, which will allow the curtain to be raised above the trigger which holds it up. Next cut a piece of wire sixteen inches long and bend it in the shape shown by the long wire in Fig. 2; then cut a piece two inches long and bend one end to form a loop by which it will hang upon the center of this long wire. In the illustration it is shown caught up in position, but when released it simply hangs from the two-inch center bend of the long wire.

Fasten these combined pieces to back of door with two staples for hinges, so that it will swing free and easy. See Fig 2. Drive a staple about three-fourths the way into the top of the circular cut, as shown in Fig. 2. It may also be seen on Fig. 3. This forms a rest for the trigger (the two-inch piece of wire) when it is placed in position to support the curtain.

The hen on entering the nest pushes the sixteen-inch wire and the trigger, until the latter drops from its rest and releases the curtain, which then falls and covers the opening.

To make the curtain cut a piece of muslin eight inches square, and tack it upon a piece of lath one by nine inches, which leaves one-half inch extending on each end, past the curtain. Slip the laths under the guard wires illustrated in Fig. 1, and also shown on the door of the center nest in Fig. 3, and after tacking the curtain at the top, above the opening or doorway, drive a staple into each end of the lath immediately outside the guard wires, so as to keep them in place when the hen may try to get out of the nest. Be careful not to drive the staples too close to the guard wires, or they will cause friction. Procure hinges and hooks for the doors and the nests will be ready for use. Make two wire hooks and fasten them to the back of the nest box. Place two staples at proper distance apart, in the wall of house, which forms the back of nests and hang the nests up to these; it is then out of the way.

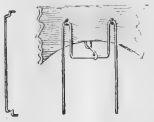


FIG. 2 FIG. 3

After getting the nests in position, raise the curtain above the openings, slip the trigger through the staple, and let the curtain rest on it until a hen enters, when down it will come, leaving her a prisoner until released, and no other hen can possibly get in with her, nor can she get out until released.

So much for making the nest. We trust it has been explained clearly, so that all will understand how to make the separate parts, and place them together in their right position.

Now for the advantages to be gained by its use. If we were to ask you if standard-bred stock were as good as common scrubs you would very likely, and with good reason, too, consider that we knew nothing about the poultry business. If we ask, is carefully bred, pedigreed stock, of any kind or variety, better than the carelessly bred hit or miss kind (especially in the matter of transmitting qualities to their progeny) your answer would be, "Certainly it is." It is an undisputed fact that some hens will lay a far greater number of eggs in a year than others, also that some hens are much better producers of prize winners than others. To take advantage of these facts every down-to-date breeder should avail himself or herself of the opportunity to secure a trap-nest of some sort, one that will enable the breeder to know the good or bad qualities of every bird, especially of those in the breeding pen. We venture to say that the time is not far distant when every breeder of note, who wishes to be up with the times, will use a trap-nest, or resort to some other means by which they can know the breeding qualities of each individual bird, which they may wish to breed from. If one has not the time to keep their nest boxes in use the year round, as it happened with us this season, they can be used during the time we are saving eggs for hatching, and after the hatching season is over the traps may be fastened up out of the way until another season comes around. On account of so much other work demanding our attention this summer we had to dispense with the use of our traps after finishing hatching, but used them all the time we were saving eggs, so that we now know the sire and dam of each chick raised and all the desirable qualities of each for several generations.

To be a live, wide-awake American poultry breeder, one must be progressive, and to progress is to advance. Get out of the old ruts, and take advantage of every opportunity that is within one's reach. Just as the old style machinery in nearly every known vocation has gone out of use to be replaced with new and modern inventions, so it is with poultry breeding. The old way was very good in its time, but the modern methods will be adopted in future to produce "better poultry and more of it." CLARK & TROLL.

THE EUREKA NEST BOX AND ITS USE.

Complete Description by the Inventor of This Superior Device for Keeping Records of the Eggs Laid by Individual Members of a Flock; It Tells "Which" Hen Laid the "Egg"—Plan of Construction—Amount and Kinds of Materials Required—Specifications for Making.

By A. J. SILBERSTEIN.

AS SOON as I was sufficiently familiar with a fowl's wants (or thought I was) to succeed in obtaining almost enough eggs for the family table, it puzzled me to know why we did not have an egg per fowl per day. To account for the egg yield at that time, I imagined that six or eight of our birds were laying, and the balance of our flock of twelve or thirteen hens were not. "Now," I reasoned, "the trick is to become acquainted with the non-layers, dispose of them, and replace them with others that will lay." And so I proceeded with various devices—all in the nature of trap-nests—with the view to learning which hens were laying.

Varying measures of success and failure attended these efforts. I tried nearly three dozen devices, the chief trouble that confronted me being in the number of eggs that were laid in the litter while the traps were occupied. I had either to make a trap for each bird, which to me was impracticable because of lack of room; to stay with the birds more than was possible, or else to devise some plan whereby the trap feature would be eliminated. The Eureka Nest Box was the ultimate result.

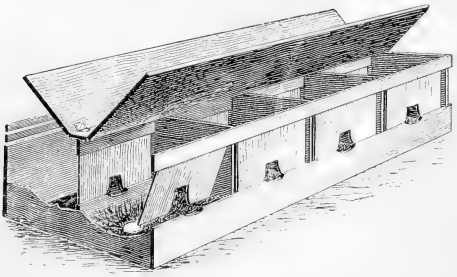
After using this device in my own pens with entire satisfaction for nearly five years, Major Roessle persuaded me to market it by offering plans and permit for sale. I sold thousands of permits, and but for the great simplicity of the invention, through which I was prevented both from exhibiting the Eureka, as well as publishing illustrations of it in my advertising (either of which would mean to give away what I had to sell), thus satisfying the very natural desire of those who contemplated its purchase to know what they were buying, I do not doubt but I could have sold many thousands more. As a result the number of letters in my daily mail, asking for details, has so largely increased as to make it impossible (with the time at my disposal) to reply fully to all, hence I have decided to publish complete plans, with helpful illustrations.

Detail of Compartments.

As will be seen by reference to cut on this page, also Fig. 1, the Eureka consists of a series of compartments, the number of compartments being limited only by one's need or taste. What is known as a four-section box is given in the illustrations referred to, which is ample for a pen of twelve to fifteen Asiatics, ten to twelve of the American breeds, or eight to ten of the Mediterraneans. All compartments are of uniform size, and the exact dimensions will depend on the breed one carries, as well as the size of his strain. The dimensions should be such as to give the fowl comfort while laying, at the same time filling the compartment completely with her body, for when she is in a nest (a) or confining pen (b) her body must prevent the door (later described) from being opened by another hen. The com-

partments should be square, never oblong, for when made oblong the fowl is apt to sit crossways, and so leave room for a second hen to enter.

Approximately the dimensions (varying with the size of different strains), are from 9 to 12½ inches square for Asiatics, from 7 to 10½ inches square for the American breeds, and from 5½ to 8 inches square for the Mediterraneans. It would require extremely large specimens of the different breeds to call for the larger dimensions given for each. Viewed from the side (see Fig. II.), the Eureka nest is in the shape



A four compartment Eureka Nest Box, with cover lifted showing interior of nests and confining pens. The nest to left shows action of door on entrance of layer.

of a parallelogram. The angle at corners in Fig. 2 should not be over 100 degrees. When slanted more the hen's body does not keep the door closed when she is occupying any of the compartments, but the door usually lays on her back, allowing her to leave it at her pleasure.

The doors are made of light weight material, such as shingles. Nothing thicker than one-half inch stuff should be used for this purpose. They are hinged to the tops at E and F, Fig. II., to open inward. They should be one to two inches narrower (see space at door shown in Fig. 3) than the width of the nests, and when hinged in place should be squarely in the middle of the opening, leaving one-half to one inch space on each side. They should be a little more than one-third as high as the boxes are. Thus Mediterraneans would call for a box 10 to 11 inches high, with doors 4 to 4½ inches high; Americans, a 11 to 13 inch high box, 4½ to 5½ inch doors; Asiatics, 13 to 18 inch box, with 5½ to 7¼ inch doors.

Plan of Trap in Door.

The cut in the bottom of doors should be one and one-half to two and one-half inches wide at its narrowest part (see opening in door, Fig. III.), two and three-fourths to three and one-half inches at its widest, and one-third as high as the door. The plan is to have it large enough for the fowl to easily insert her head and neck, but not so large that she can squeeze her body through. A fowl wanting to lay, sees a nest through the cut in the bottom of the door (see Fig. 3), inserts her head, and involuntarily pushes the door up. As she slowly enters the nest, the door slides gently along her shoulders, down her back, and as she settles herself comfortably, closes silently behind her. As explained further on, these doors open inward only; also as hereafter explained, the light that reaches the nests filters in through the confining pens. Having laid, the hen moves to the light, leaving the nest for the confining pen; so by separating the layer from the egg, we remove the temptation of egg eating; or if a fowl is already a victim to that habit, by being thus isolated each time she lays, we discover the culprit, and prevent the spreading of this vice.

As stated the Eureka Nest Boxes are made 10 to 18 inches high, according to the breed, and to facilitate cleaning they have no bottoms. When it is desired to elevate the boxes from the floor, a shelf of needed width is built, and the Eureka placed on it.

Directions for Making.

To make a Eureka Nest Box, we first decide on how many sections our box is to have; then enter our pens while the birds are laying, holding a foot rule in our hands, and without disturbing them gauge the necessary size of each compartment. Let us say the compartments will be ten inches square, let us also suppose that we have decided on a four-section Eureka, and that we are going to build it fifteen inches high. We begin by sawing out the boards for the ends and partitions. We shall need five of these boards—one more than we shall have sections. As before described, the front edge should slant at an angle of not over 100 degrees, as shown in Fig. 2, and the rear edge must slant to parallel the front. Our boards must be 20½ inches long at the top and bottom—ten inches for nests, ten inches for confining pens, and one-half inch for divisions between the nests and the confining pens, as hereafter described. Seven-eighths inch stuff will be needed for the ends and partitions. This done, we take a seven-eighths inch board, three inches wide, and cut off a piece forty-four and three-eighths inches long, i. e., four times ten inches (for each section), plus five times seven-eighths inches (for ends and partitions), and nail it across the middle of the top edges of the partitions—see A, Fig. 2—setting the latter ten inches apart (inside measurement.). The covers to nests and confining pens are hinged to this, through which the eggs are gathered and the hens released. When it is desired to gather the eggs from an alleyway, two one and one-half inch boards are used instead of one three-inch wide; one is nailed across the back ends of the top of the partitions; the other, with its rear edge ten and one-half inches from the front edge of the partitions. The cover to the confining pens is hinged to the former; the cover to the nests is hinged to the latter.

Now we take two two-inch strips, seven-eighths inch stuff, 44⅜ inches long, and nail one across the bottom of

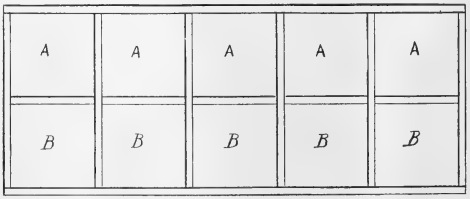


Fig. I—Ground Plan of Eureka Nest Box.

the partitions at C, Fig. 2, the other at opposite C, Fig. 2. Next we take a strip of one-half-inch stock three inches wide (or we can use two laths), 44⅜ inches long, and nail it across the front of the partitions at E, Fig. 2. To this, we

will hinge the front doors, which have been previously referred to and which we will explain in detail later.

Now we want a three-inch strip of one-half-inch stock, ten inches long (we can again use laths) for each nest, four strips in all. These we nail on the edge between the partitions, at middle of top—exactly in the middle—as shown at F, Fig. 2. We shall hinge the inside doors to these strips by and by. These strips, with doors and inside baseboards next explained, form the divisions between each nest and its confining pen.

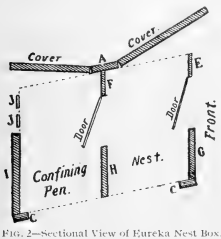


FIG. 2—Sectional View of Eureka Nest Box.

Next we want a board of either one-half inch or seven-eighths inch stuff, a trifle over one-third as wide as the box is high, which, for the box we are building would be six inches. We cut it forty-four and three-eighths inches long, and nail it across the bottom of the front—at G, Fig. 2. This is the outside baseboard, against which the front doors strike in closing, and so prevents them from being opened outward, as explained later on. We hollow out this baseboard at the center of each nest, to a depth of three-fourths of an inch, as shown in Fig. III. As we shall need baseboards for the inside doors, we find a board of the same width and thickness, and cut it into ten-inch lengths—the width of our sections—one for each section, four in all. These we hollow out at centers as described for the outside baseboards, and nail on edge between the partitions at the middle of bottom, taking care to slant them so as to be parallel with the outside edges of the partitions (see H, Fig. 2).

We cut eight doors as in Fig. 3. They need to be two inches narrower than the width of one section—which makes our doors eight inches wide (i. e., the swinging board), and one-fourth of an inch higher than the width of baseboard, which makes our doors 6¼ inches high. As before stated, these doors must be of light weight material, else the fowls will object to lifting their weight. We shall make the cut in the bottom of doors 2¾ inches high (see opening in door, Fig. III.), 3¼ inches wide at the bottom, narrowing to 2¼ inches wide at the top. To hinge the doors in place, we lay the box on edge, front down, and first attach the outside doors, then those for the inside. We hinge each door squarely in the middle of each nest and confining pen, and so leave an inch between the edges of doors and partitions, always observing to have the bottom edge lap at least one-quarter of an inch over the inside of baseboards, so that they cannot be opened outward. If the doors are cut higher than 6¼ inches (in the box we are building) they will rest on the backs of fowls, enabling them to leave the nest after laying. We shall use pieces of leather for hinges, to insure the doors opening and closing easily.

Now we take an eight-inch board, 44⅜ inches long, seven-eighths-inch stuff, and hinge it to the back of the strip first described (A, Fig. 2), for a cover to the confining pens. If we are going to gather the eggs from an alleyway, we shall hinge this cover to the front of strip at back of confining pen; next a twelve-inch board of the same length and thickness is fastened to the front of strip A, Fig. 2, as a cover to the nest. If thinner material is here used, the fowls soon find that they can release themselves, and will do so. For Mediterranean breeds, it is best to saw the cover into lengths, and have individual covers for each nest and confining pen. For the American breeds we saw each cover in half, and for the Asiatics, we leave it whole.

Our twelve-inch cover projects three and one-half inches from the front of the Eureka. This is to darken the nests, for we are going to put our Eureka with the front edge of this cover a short distance from the wall. If we place it with an end resting against another wall, we tempt the fowls to lay in the corner, thus made under the cover; hence we shall place it so as to leave about a foot at least at either end. Our box is nearly finished. (I could have made three or four in the time it has taken to write this.) We take a ten-inch board, 44⅜ inches long, and nail it across the bottom of the back edges of the partitions. (See I, Fig. 2.) Above this we nail a lath, leaving a space of about three-eighths of an inch between it and the board; then another space of three-eighths of an inch and another lath (see J, J, Fig. 2), and our Eureka Nest Box is ready for business.

Ready for Service.

We now remove our old nests, and place the Eureka as near as possible to the exact spot the former occupied. Fill each nest and confining pen to the top of baseboards with nesting material; tack all doors back to keep them open, and let the hens use them. After a week or ten days we let the doors down, and the hens will lay in Eureka as though they have never laid anywhere else. It will be observed that a single box answers for each pen of fowls; that there is absolutely nothing to injure or frighten them; nothing to get out of order; no traps of any kind to set; simply release the layer and mark her egg with the number of her leg band.

I wish to impress on the mind of the reader that the dimensions here given are not arbitrary; and to pin his mind to the fact (for a thorough understanding of these instructions) that I have here given exact measurements only to carry out my assumed illustration for building a four-section box with ten-inch square nests and confining pens. It is important to have the nests neither too large nor yet too small. If too large, a second hen can enter a nest or confining pen while it is occupied, in which case the last comer usually keeps the door on her back, allowing either the first to leave the nest at will, or other hens to squeeze themselves in on top of both. The required dimensions are easily obtained by going into our pens, holding a foot rule in our hands, and without disturbing our layers, we can quickly obtain the desired information. The baseboards must be made a little over one-third the height of the box; the top strips vary from two inches to three and one-half inches wide, according to the size of fowls.

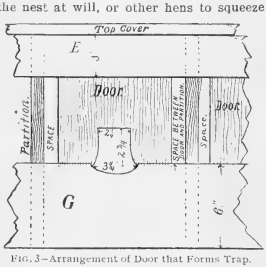


FIG. 3—Arrangement of Door that Forms Trap.

As before stated, the nests are dark. When little light enters, filters through the confining pen, hence when a nest or confining pen is occupied, the occupant's body still further darkens the nest; and as fowls cannot see in the dark, a second hen, seeking a place wherein to deposit her egg, does

not see the nest, and seeks an unoccupied one. I am often asked what is to prevent another hen entering a nest after the first one has laid there, and left it for the confining pen; also why I do not dispense with the confining pen. My reply to the first question is, there is nothing to prevent the second fowl entering the nest vacated by the first, but her eyesight; and, further, I do not want to create any other obstacle than that which nature gave her. If her sight is good enough to enable her to see it, I want her to go in, and I wish all of them were endowed with good sight.

I have a distinct recollection of the trials that attended my efforts when I was experimenting with my trap nest devices, and how I found two eggs outside of the nests for every three that were deposited where I wanted them to be. I know from a most trying experience, that one can instantly tell which one of two hens laid a certain egg—with rare exceptions; but let him try to say which one of five, or six, or a pen of fowls, laid a certain egg, and he will find it absolutely impossible to do it—with equally rare exceptions.

Accuracy of Records.

While experimenting with my many trap nest schemes, I found forty to fifty per cent of the egg yield outside of the nests—where I could not give credit to the layer, much less set such eggs. Since "I have found it" in my present simple device, the only eggs I lose are the few dropped on the roost at night, or now and then dropped in the runs. Perhaps a dozen times in the years in which the Eureka has been in use in my pens, have I found a hen in a nest, another in the confining pen in back of it, with one or two eggs under the former. In such cases, I simply marked the egg or eggs with both hens' numbers, and by comparing with a former or subsequent day's yield, I had no chance to doubt as to which hen laid it (or each), and to let no cloud of doubt question the accuracy of my pedigrees. I have never set these few eggs; but the record of laying is complete—except for the few eggs found as above mentioned—on roost or in runs, and of such, no accurate account is possible. It is only by being careful in these small matters that reliable data can be obtained. A record that is defective in the smallest particular is worse than none.

I do not dispense with the confining pens because I want to separate the fowl from her egg as far and as quickly as possible, so as to minimize the vice of egg eating and the loss from broken eggs. The attention the Eureka requires, so far as accuracy in laying records, health and comfort of fowls are concerned, is from fifteen to thirty seconds per pen at feeding time, three times daily. But whether one needs the eggs for hatching or for market, it appears to me that best results cannot be had in any season of the year, with any kind of nest, unless the eggs are more frequently gathered. For either purpose, no one wants chilled eggs in winter, nor partly incubated eggs in summer, and to avoid both I gather the eggs every hour, and in extremes of heat or cold, every half hour, from ten to three o'clock.

A. J. SILBERSTEIN.

BETTER LAYERS AND MORE OF THEM.

Individual Records the Means by Which a Strain of Layers is Produced—Proper Food, Sufficient Exercise and Free Range—Care and Feeding of the Young—An Egg-producing Ration—A New Style Laying and Breeding House Claimed to Possess the Advantages of the Scratching Shed House Without Its Disadvantages.

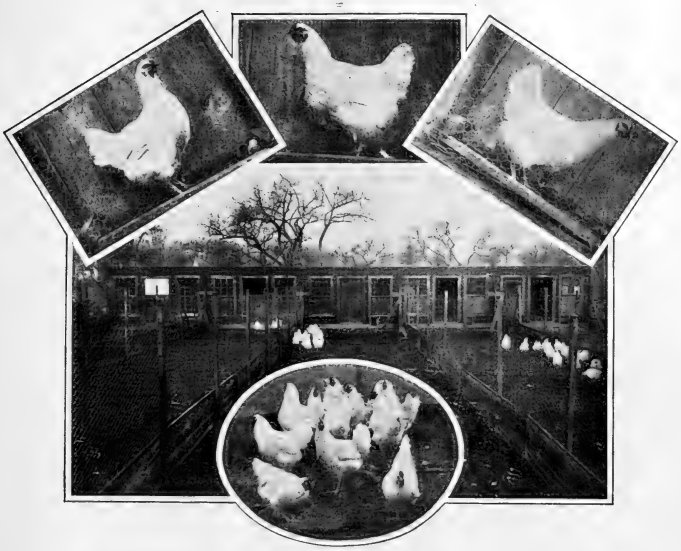
By C. BRICAULT, M. D. V.

WHEN some six years ago we began poultry keeping it was with the fixed purpose of breeding a strain that would be a source of profit as egg layers. We did not, however, lose sight of the profits to be derived from dressed poultry, as about fifty per cent of the product would be males. In order that they should be profitably disposed of they must be of a quick maturing breed, possessing the desired qualities for our markets, namely, yellow skin and legs and round, full breasts. We had these fixed ideas about what we would like in a breed, and also what we would like this breed to produce in the number of eggs laid. How we were to accomplish all this seemed to us easy at that time, but as difficulties began to present themselves we began to discover that our task was not as easy as it seemed at first. We had been reading for some time about the good practical qualities of some families of White Wyandottes, so we decided to adopt that breed for our purpose. We looked up those breeders having the desired qualities in their birds that we wanted and bought eggs and stock.

Almost from the start we saw the necessity of knowing just what each bird was doing in order that we could work along the lines we had mapped out. While we were devising some means by which we could record each hen's doings, we spoke to a friend of ours of our plan and he offered to make us a nest box which would solve that question for us. I well remember coming home that evening with the box under my buggy seat and my imagination afire anticipating the wonderful results that would follow. The box was placed that night in the pen and early the following morning I was on hand to watch its operation. Although that box was not all that could be desired, it opened to us the great possibilities that can be gained by its use. Since then we have used and are using different kinds with varying success, and we would not think we were doing our best without them. It is only by keeping an accurate record of each hen that we can ever make any progress in breeding. We mean any real progress. Don't tell us that it is by breeding from a whole pen that you can build a strain of layers. That a whole flock of hens can be bred to lay 200 eggs or more a year is no more to be doubted, but the shortest road to that end is by systematic, careful line breeding of males and females, and by knowing just what each hen is doing.

Line Breeding.

We believe in line breeding as the most successful method to obtain results, whether breeding for feather or for eggs and meat. Many things that happened to us in our breeding operations justify us in believing that feathers and



THREE GENERATIONS OF DR. C. BRICAULT'S BRED-TO-LAY WHITE WYANDOTTES AND THE "SCENE OF OPERATIONS."

Hen at left is No. 4, with record of 221 eggs; now four years old and still laying; dam of hen in middle, No. 25 with record of 241 eggs. No. 25 is the dam of pullet B-26, shown at the right, who has her record to make. The cockerels in oval space are sons of No. 25. Says Dr. Bricault: "This house combines all the advantages of the Scratching Shed plan, with those of the Closed House."

eggs can be bred in one individual—or, in other words, we are trying hard to breed 96 pointers and 200 eggers in one individual. We have not as yet made much progress in the 96 point line, but we have made some, and what little we have gained makes us firmer in the belief that it can be done. One thing we have proved to our satisfaction is that a bird need not be brassy to be vigorous, as some would have us to believe. We have birds that are chalk white, and still are just as vigorous and whose eggs have proved just as fertile as the most brassy ones. Brassiness has simply got to be bred out, just as large egg yield has to be bred in. We firmly believe that large egg yields can only be had when we breed in line from our best layers.

This breeding in line means to transmit the qualities and organic development of our birds by using a system with which the most successful breeders of animals in the world have been successful. It means also that the egg must be well hatched and the chick well brooded, so that it begins to develop well from the start. The proper development of the pullet is one of the principal factors which go to make the great layer. Proper food, sufficient exercise and free range when old enough are three requisites of a successful method of growing the future layer.

Hatching and Brooding.

We do all our hatching with incubators. The incubators are placed in our house cellar, a part of which has been partitioned off for that purpose. A large window on the south side admits all the fresh air that is needed. We have had some grand hatches from our machines placed in this cellar. The eggs are put in the incubator in the morning, and at night the machines are generally running steadily. Before putting the eggs in we light the lamps and get the temperature to 102½. When it has been running a whole day steadily we put the eggs in. That, of course, reduces the temperature. We put the eggs in in the morning so that at night the temperature is running at the proper degree of heat and can be left to itself without any fear. We turn the eggs twice a day. On the sixth day we make our first test, all those proving infertile are discarded. On the fourteenth day we make another test and all those not showing strong germs are rejected. On the eighteenth day we place all the eggs from each hen under a small wire box in the tray. This is done in order to identify each chick when hatched. After the chicks are thirty-six hours old we take the contents of each box, band them, inscribe the number on our record book and place about sixty in each brooder. For bands for young chicks we use pigeon bands. They are small aluminum bands numbered as desired.

Before putting the chicks into the brooder we first heat the brooders to 90 degrees. The bottom of the brooders is carpeted with green cut clover, into which we throw a small handful of millet seed. We always use great care in taking the chicks from the incubator so that they will not get chilled. We have a basket for the purpose. This basket has a lid and the whole inside is lined with two inches of

cotton batting, and is previously warmed before putting the chicks in. We believe more chicks die through not being properly cared for at the time they are moved from the incubator to the brooder than one would believe. Those chicks that paste up behind in a few days have been chilled during this removal. In the brooder we place a small fountain filled with lukewarm water, a box containing grit, charcoal and bran. Our brooders are placed inside a small house six feet wide and eight feet long, having a window and door on the south front.

Food for Young Chicks.

Our food for young chicks is a prepared bread, composed of two-thirds whole wheat flour and one-third corn meal, mixed with milk and baked thoroughly. When dry it is crumbled and fed on a small piece of board. They get nothing but this bread and the few millet seeds that they scratch for in the litter for the first fifteen days. We have tried all the different feeding methods that we read and heard of, but this one has given better results than any other. When cut bone, and what a sight it is to see the little fellows tumble over each other for these bits of bone. For green food before grass begins to grow we use cabbage leaves, cut up fine, also lettuce leaves.

As soon as we find that the chicks prefer to roost on the brooder than to stay inside at night, we remove the brooder and place at the back of the house two small roosts. We then change the clover that has been used for scratching, and replace it with clean material. When the chicks are large enough so that we can distinguish the sex, we separate them, placing the pullets on one part of the farm and the cockerels on another, giving each free range, a privilege which they do not fail to use. About that time we begin to feed three times a day, the same as we do the breeding stock. The band used on the chicks when taken from the incubator, being only a flat ring of aluminum, we are able to enlarge to suit the growing size of the chick's leg until now. We now remove this band and replace it by a permanent band, always giving to each chick the same number. They are weighed and all the details entered in our book.

Photographic View of the Dr. Bricault Combination Laying-Breeding House.

two weeks old we add a little cracked wheat and pin-head oatmeal to the millet seed, which we scatter in the litter as before, still continuing the bread every three hours as before. We feed five times a day during the first two weeks; four times a day until eight weeks old, then three times a day for the breeding stock.

When two weeks old we reduce the heat in the brooder to 85 degrees; at one month old to 75 degrees, then gradually to 70 until they are well feathered out. At four weeks old we use whole grain and begin to feed a little cracked corn. We aim to give our chicks exercise from the first day. The floor of the brooder house is coarse sand. This we also cover with green cut clover, and into this we throw all the grain. They soon learn to scratch and the way they make the clover fly is amusing. The more they scratch the healthier they will be. After the first two weeks we open the sliding windows to the yards and let them out. If any snow covers the ground we sweep it away for a few feet and let them go. We continue this way of feeding until six weeks old, when we discontinue the bread and replace it with a mash (given at night) composed of one-third corn meal, two-thirds bran with about five per cent of animal meal scalded. Three times a week we begin to feed a little We weigh them again October 1, before placing them in the breeding pens.

Egg Producing Ration.

The question of what to feed for best results has kept us awake many a night. After feeding a very narrow ration and also a very wide ration we came to the conclusion by observing the results of both methods that a ration analyzing 1:4 gave us the best results with Wyandottes. We are firm believers in as large a variety of foods as possible for best results. Green food in winter must be given with a liberal hand. Animal food is absolutely necessary, for you cannot get eggs without it. We believe in corn, but not corn alone. Cut clover we very much believe in, and should not think of going without it. We want to feed our hens with as cheap a ration as possible consistent with the largest egg yield. No doubt our method of feeding can be improved on, and we should much like to do so. We buy the best grains on the market, and all the hard grain is fed in litter six inches deep. For grain we use wheat, oats, barley, corn and buckwheat.

We have adopted feeding the mash at night, and while we doubt if this manner of feeding has improved the egg yield we continue to do so first because it has not given us

worse results, also because it cheapens the ration, and because it is much less work. Our mash at this season of the year is composed as follows: Bran, 20 pounds; ground oats, 20 pounds; ground barley, 15 pounds; corn meal, 15 pounds; buckwheat middlings, 10 pounds; linseed meal, 10 pounds; meat meal, 10 pounds. We prepare the mash by boiling about one-quarter the quantity of clover to what we use of the ground grains. To this we add the animal meal, about one-eighth to one-quarter of an ounce to each hen. When this is boiling we add the meals. We stir the whole to the proper consistency. We like the mash to be just a little "sticky." Three days in the week we use vegetables, cut up in small pieces and boiled, for the mash instead of clover. On the days we feed cut bone we feed only one-eighth of an ounce of meat meal per hen and all the cut bone they will eat.

In each pen is a large trough in which the mash is fed. This trough is long enough to permit of all the birds eating at one time. Every month we weigh our birds and any that is found overweight is put in a spare pen and dieted for a few days. When only the male bird is found too heavy we close him up in the laying room while the hens are eating the mash, and allow him to eat only the hard grain in the litter. All our pens are piped and the stock has constant access to clean, fresh water, cool in warm weather and warmed in cold weather.

Our bill of fare is arranged as follows:

	Morning.	Noon.	Night.
Monday	Wheat.	Cabbage, Oats.	Mash.
Tuesday	Barley.	Mangels, Cut Bone.	Mash.
Wednesday	Corn.	Cabbage, Wheat.	Mash.
Thursday	Oats.	Boiled Clover.	Buckwheat.
Friday	Cut Bone.	Mangels, Barley.	Mash.
Saturday	Wheat.	Cabbage, Oats.	Mash.
Sunday	Barley.	Cut Bone.	Wheat.

If at any meal the hens do not seem to be hungry, we make a note of that pen and feed only a small quantity at the next meal. If they still seem to lack their usual appetite we omit one meal. We aim to be very regular in the time of feeding, in fact we believe this small point is very important.

By properly feeding our hens, we can obtain results which a less careful poultryman will not, but no matter how well we understand this difficult part of the work, and no matter how careful we are in making use of our knowledge in this direction, it will be observed that in every flock of pullets raised, fed and cared for in the same manner and under the same conditions, that several will lay almost double the number of eggs that others will in the same pen. With but few exceptions, these large egg producers were born with this valuable trait, and it is by breeding from these heavy layers that we can increase the average egg yield of our flock. Breeding systematically and persistently from our heaviest layers will develop a strain of layers which will pay us generously for our work. No other method will give us as good results.

Trap Nests Necessary.

In order to follow this system of breeding it will be found of absolute necessity to ascertain the number of eggs each hen lays. Fortunately we have at our disposition the

White Wyandotte Cockerels and Pullets Bred from a 221 Egg Hen by Dr. Bricault

automatic nest which will help us to accomplish this accurately. This valuable addition to the practical poultryman's needs has been severely criticised by some, but its advantages cannot be overlooked and no real progress can be made without its use. By placing these trap nests in the pens it will be an easy matter to distinguish the best layers from the poorest. The members of the flock that do not lay enough eggs to pay a profit should be disposed of to the butcher.

You can overcome the greatest drawbacks to trap nests by putting in the pens half as many nests as there are layers and placing them on a platform twenty inches above the floor. By this arrangement the work is reduced to a minimum and the hens have the advantage of using the whole floor space. By this plan you can gather the eggs with more ease and at a saving of fifty per cent in time, as compared with nests that are under the drop boards. With this number of nests in the pens there will be no need of visiting them oftener than four times a day.

Keeping the Records.

When your pens are equipped as advised above, the next thing to do is to place a leg band around one leg of each hen.

These leg bands can be stamped with a number, letter, or both, then you are ready to begin record keeping. As you go the rounds of the nests, you release the hens confined in them, note their numbers on the leg bands, and mark each egg, or enter it at once on record sheets kept for the purpose. You may find some customers who object to having anything written on the eggs they buy; many grocers and merchants object to this. The only remedy is to enter the numbers on the egg record sheet, or on a small slate carried around by the attendant, and, later, enter them on the egg record sheets. If the eggs are wanted for hatching, it will then become necessary to mark each egg.

There is no need of complicated record keeping. The record sheets on which are written the number of each hen, and the dates on which she lays, checked off, and a small book are all that are required. Every page of this book is ruled off in three sections, and in each of these is entered the number of one hen, her record, her dam's record, and her sire's dam's record; also the number of each chick hatched from her eggs. When a chick dies, the letter D is written across its number. When we are ready to begin hatching each hen's eggs are incubated separately under a hen or placed in a compartment of a pedigree tray in the incubator. When the chicks are hatched each one is marked by placing around one of its legs a small leg band. As they grow older these bands are changed for larger ones.

Interior View of a Corner of the Dr. Bricault Poultry House, Showing Trap Nests.

Mating for Egg Production.

One of the most important points in mating your pen for egg production, is the selection of the male birds, for we lean to the belief that it is through her sons that a great layer transmits her qualities. Use none but well developed, vigorous sons of your very best layers. Another equally important thing in selecting your breeders, is vigor. Choose only the most vigorous hens and cockerels. Vigor is the outward sign of a strong constitution, and a good layer must be strong and vigorous to enable her to digest and assimilate the food necessary to lay a large number of eggs. By thus selecting each year the most vigorous descendants of your best layers, you will intensify both these qualities in your strain and produce layers that will lay more eggs than their ancestors did.

When you have arrived at this period of your breeding operations, that is, when by a few years of this systematic breeding you have fixed vigor, and a good egg record in your strain, you can profitably practice some inbreeding. By inbreeding you can improve your egg yield quicker than by selection. But be very careful to select only the most vigorous and healthiest individuals from your few best layers.

We will suppose you have just such a hen with a large egg record. You can mate her to her most vigorous and best developed son, and in this same pen you may also put the hens which have given you the largest number of eggs. The following year you can mate one of these inbred cockerels to the pullets bred by the first cockerel, but out of the other hens—they will be half sisters. Of course, you will always pick out your highest record hens to mate to these choice breeders.

You will be pleased with egg records of the pullets bred from this last mating. The majority will be excellent layers, and will be the very best of breeders. If you have been careful to select only vigorous birds and the best layers in your matings, you will notice very soon a great improvement in the average egg yield. You can then use these inbred cockerels on unrelated hens, but only on the good layers, and then follow up as before.

Great productiveness in our hens is a trait which can be easily fixed by breeding. The principles governing our breeding are the same as those which apply to all other classes of animal breeding; it is only the application that differs. With the fancier it is feathers; with us it is eggs; both can be developed to perfection by the same principles of breeding. There is nothing to prevent you, if you so desire, from improving both the egg yield and exhibition points of your strain, but the progress will be much slower. The results, however, will be more pleasing in the end. To us this question of breeding layers is a most fascinating one and it is one which offers more real advantages to the interested poultryman than would be believed at first. Breeding from our best layers systematically is, to our way of thinking, the only sure way of increasing the profits.

New Style Laying-Breeding House.

Several years' use of the "open scratching-shed" house made us appreciate the full value of fresh air as an important factor in keeping our breeding stock in the best of health, resulting in more fertile eggs, and in stronger chicks, more easily raised. With all its many good points, this style of house has many disadvantages, especially for our cold climate, which one would like to have eliminated. We were also familiar with the closed house and knew its many faults. Hence, in building our new house we knew what to avoid and what improvements to make. The result was the house

illustrated herewith, which we believe to be the best one yet devised in which to keep our breeding-laying stock.

We are firm believers in pure air for our hens. We have had ample opportunity to note its good effect on egg production; and it is our opinion that much of the failures in keeping hens profitably is due to this lack of pure air in the poultry house. But strong as we are in our belief of the necessity of fresh air we do not believe that our hens should be exposed to the discomfort of a cold roosting room. That is why we close the doors of our house after sundown during the cold weather and thereby provide them a warm room to sleep in. During the day when they are scratching in the litter they don't mind it at all. We noticed in our "open shed" that all the hens would stay there practically all the time during the day, even when it was very cold, so that the roosting room was practically lost room.

The large door in the south front was the simple solution to this problem. With correct handling, this door allows us to give the hens all the pure air possible, during the day, and when the house has been so ventilated in daytime, it contains all the pure air needed from the time it is closed at night until it is opened the next morning. Of course during mild weather the upper part is left open and the cloth curtain inserted in the opening for the night; the same thing is done during a very stormy day. On cold, bright days this curtain is omitted. If not too windy on these cold days the whole door is opened, and the sun just covers the whole floor of the house. How the hens like this can only be appreciated by going from pen to pen and noting their contented appearance as they stretch out in all manners all over the pen.

White Plymouth Rocks.

The pens, which are 10x12, will easily accommodate twelve to fifteen females and one male. It will cost less than the open-shed house, and no more than the closed house, over which it has so many advantages, that those using the closed house would never return to that style if they once tried this one, for it combines all the essentials necessary to a successful poultry house.

Dimensions of the House.

Our house is ten feet wide, seven and one-half feet high in front and five and one-half feet in rear, divided into pens 10x12. The frame is 2x4 for sills, plates and rafters, and 2x3 for studding. The sills are laid ten inches from the ground on cedar posts sunk two feet in the ground. It is boarded up with hemlock boards, first by imbedding the bottom board four inches in the ground, and having this bottom board come to cover half the width of the sill, or one inch only. Then the upper boarding begins at this point, being nailed on the other half of the sill, thus making a tight joint at the bottom and avoiding any drafts, a small point, but an important one.

The house is filled inside with gravelly sand up to the top of sills, making a dry, warm floor. To make the house tight along the back wall near the roof, the rafters are cut even with the plates, and boards run up even with top of rafters. Then in laying the paper we begin at the back, lapping the paper well on the roof boards. Then a course of shingles is nailed on this, and another on this one to break joints. Then the roof paper is laid over the shingles, letting these project about six inches from the back wall, to allow them to carry the water away from the building. The paper on the back wall is laid vertically, and lapped about three inches; the roof paper is laid lengthwise of the building and also well lapped.

We first cover the boards with a cheap grade of building paper; over this a thickness of Cabot's quilting is laid, then over all the Neponset Red Rope Roofing, the whole held in place with small nails and tin heads, which come with the paper. These tin heads should be painted, when they will last for a good many years. We prefer to nail the paper in this manner than to use cleats, which we do not think as good.

The South Front.

The south front contains a large door 4½ by 6½ feet; also a window on each side of it. This door is divided in two parts, the upper part, which is 2½ ft. by 1½, is hinged to the plate and swings up against the rafters, to which it is secured by two hooks. On stormy days, or on mild nights, this upper part of the door is opened and a cloth curtain is inserted in its place. The lower part of the door is hinged to the side and opens sideways. Behind this lower part of the door is a slot-like arrangement into which is slipped the curtain which is used in the upper part when this is opened. This cloth curtain is simply a 2-inch frame on which is tacked oiled muslin. The windows on each side of the door are ordinary 2-sash 12-light windows, and can be operated up and down at will. In warm weather when the doors all open, also the windows, this house is practically an open shed, and the most comfortable place possible for the hens.

A small opening one foot square was placed near the floor, next to the door, to allow the hens the use of the yards when it is necessary to close the bottom of the door in early fall or during rainy weather. This renders it optional with the fowls to go out or stay within.

Inside Arrangements.

The divisions between pens are made solid, except the doors, which are 2-inch wire netting nailed to 4-inch frames. A good fitting door we appreciate very much, and ours were made to fit well. They are hinged on double action spring hinges and work perfectly. Probably because our doors fit well and we use double action hinges we have never felt the need of a passageway. Going through the pens with a pail in each hand, it is practically no trouble to push the doors open with your foot. But in ninety per cent of the poultry houses we have visited we have found very poor fitting doors, and no wonder these poultrymen want a hallway to their house.

Along the back wall 18 inches from the floor is placed the drop board; six inches above that two roosts, which are 2x3, with corners rounded off and laid on the 2-inch side. Sixteen inches above the roosts is a row of coops, 30 inches in depth running the whole length of the back wall. These coops we find very handy for extra males, broody hens, or to put in a pair or trio preparatory to shipping.

Under the drop boards are the trap nests. We tried the nests on a platform, but did not like that, because more of the hens would not use them than when placed under the platform. In the division between pens are the drinking vessels, raised 10 inches from the floor. These are made of galvanized iron, 14 inches in diameter and 6 inches deep. Next to these is a self-feeding box 36 inches long divided into three compartments, one for beef scraps, which we always keep before our hens; the others contain oyster shell, grit and charcoal.

The floor of each pen is carpeted with clover hay, into which all the hard grain is fed. Taken altogether, this house as it is to-day is giving us the best of results, and is to our way of thinking the most comfortable, practical house we have ever used. It combines all the essentials of a practical, successful, up-to-date poultry house.

C. BRICAULT, M. D. V.

BREEDING IN PAIRS.

Commence with a Clear Object, and Take Notes by the Way.

By FRANK W. BREED.

IN MY OPINION, and my experience has warranted me in it—one pair is all any amateur or veteran can afford to start with, if he is aiming for the top. You may go to any noted breeder of good specimens and ask him how he got his start, and in nineteen cases out of twenty he will tell you of a certain old hen or cock that put him on the road to success, and he can trace all his stock back to this old bird.

The Light Brahmas were bred up from mystery and obscurity to the present degree of excellence in this manner. The best Golden and Silver Wyandottes in America to-day were six years ago embodied in two pairs of fowls of unknown parentage.

The Silver Wyandottes started from a 90½ point cockerel, mated to a 92 point hen, and by selecting the best male and female each year and mating them respectively to their sire and dam, they were raised to their pinnacle of greatness in 1894, when two cockerels scored 94 points each alongside of three pullets with scores of 95 points, and these values given by no less a man than that veteran and father of the score card, Isaac K. Felch.

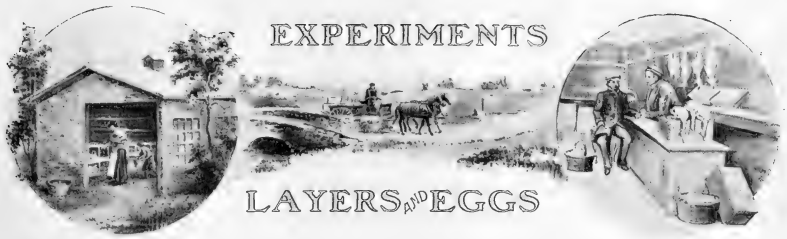
The Goldens set a mark this season, that has never been equaled and probably will never be surpassed, at 95, 94½ and 94 for cockerels, pullets 95½, 95½ and 95 points, and these cards made and signed by that peer of all judges, Sharp Butterfield. This strain, for we can with justice call it nothing else, sprung from a large, clear colored, well laced, three-year-old cock mated to a hen of unknown age and breeding. The best female from this mating was bred back to her sire and the best cockerel to his dam and so on, with new blood introduced only once up to this writing, and to-day they stand a living witness of what can be done with one pair.

Begin With a Pair.

Are not the cases cited above enough to convince us that the correct way to begin is with a pair, if we wish to quickly and firmly place ourselves at the front? Or will we go on breeding from a pen, or two or three pens, of eight to ten fowls? In what way can we make any progress by such indifferent methods? We can keep no track of the eggs laid and consequently no record of the chicks raised, only on the side of their sire, and when it comes to our next year's matings, how are we to proceed? We take our best cockerel and mate him again with our best females and expect them to throw something better than themselves; but, as a rule, do they? Is not the male liable to come in with some of his unknown dam's blood, if she is a strong breeder, and bring all of our year's work, so far as this season's work is concerned, to naught?

On the other hand, had we commenced with one pair, how would we have fared? Just in this way: We mate a cockerel that is the progeny of our best male, bred with his daughters, which gives him three-fourths of the blood of his sire to transmit his good qualities with, to a pen of pullets, the offspring of our first female bred to her best son. From such a mating can we expect anything but good ones, provided the pair with which we started were good? Birds from such a yard, if not quite up to standard requirements, are valueless as breeders when placed alongside of fowls from such a mating as first noted. Such stock cannot help but produce good ones, for they can only produce just such stock as that from which they sprung.

NOTE—We ask the privilege of adding a fact or two to the above excellent advice. On a visit to Oakland Poultry Farm, Messrs. John C. & Arthur R. Sharp, proprietors, our attention was directed to a pair of fine Buff Cochins, and Mr. Arthur Sharp remarked: "From that pair we sold, last season over $1,000 worth of cockerels." This may seem fabulous to many R. P. J. readers, but let it be known that Sharp Brothers, some three or four years ago, themselves paid an English breeder $500 for a single pair of Buffs. At Oakland Farm they mate up in pairs and trios extensively, yarding together only such birds as are, in their experienced judgment, capable of producing improved specimens. They do not sell eggs at any price, and have no time to waste in breeding backwards to inferior stock, or of hatching and rearing 90 per cent of inferior fowls in order to secure 10 per cent really choice ones, as is so often the case under the prevailing system of mating "10 and 1."—ED.]



EXPERIMENT ON FEEDING FOR EGGS.

At a Cost of Sixty-two Cents per Head for Food a Pen of Four Leghorn Pullets Lay an Average of One Hundred and Eighty-two Eggs Each per Year and Show a Profit of Two Hundred Per Cent—Feeding Based Upon the Composition of the Egg—Comparative Feeding Value of Wheat and Corn.

(Extracts from a Report by JAMES DRYDEN, Superintendent of the Utah Experiment Farm.)

ONE thing that has been demonstrated, and that by the Utah Experiment Station, is that there is money in hens. A profit of 200 per cent was made on the cost of food during the year. That is, a pen of four pullets laid an average of 182 eggs each during the year, which began and ended in November. They were Leghorn pullets. It cost during that year 62 cents to feed each pullet; that is, the food consumed charged at regular market prices cost 62 cents. Wheat, which was about half the cost of all the food, was charged at 70 cents a bushel. The eggs were sold at market prices in Logan. Several months they were ten cents a dozen and one month they were 25 cents. The 182 eggs at those prices were worth $1.88. That is a profit of $1.26 per fowl. These results have been confirmed by the experiments of the subsequent year, 1897-1898.

It is safe to say that at the present prices of eggs and food, a profit of from $1 to $1.50 on a food cost of 62 cents is quite within the reach of intelligent management. I say intelligent management. It cannot be done, however, with birds that have been bred to the dunghill for several generations. It cannot be done with birds that have been bred for the show ring for several generations; they must be bred for eggs just as the Jersey has been bred for milk. Nor can it be done with hens that have long discarded their teeth. The hen after carrying an egg laying business for two years has done her part to civilize the world and after that becomes a back number. Neither can the 200 per cent performance be reached unless the chick is hatched early enough in the spring, so that by the end of October or November she is ready for business.

What to feed is probably the most difficult of the many problems in successful poultry culture. In studying the question of feeding we ought to begin by studying the egg, just as a manufacturer of a good plow knows exactly what materials are necessary for the completed plow before he begins work on the raw material. The hen is an egg factory, and we must put the right kind of raw material into that factory if we expect to get eggs from it. We should study the composition of the egg. The egg has a composition. We must not forget that. It is composed of several constituents; we must not forget that, either. A great many people do forget it, however. From the way they feed the hen they seem to think it contains only one chemical compound. Many a man feeds the hen one variety of food, and if he does not get an egg by feeding on such a ration he declares there is no money in hens. Then he goes back to sheep farming and hog raising, cow farming and politics, and of course that is a good way back.

But let us return to the composition of the egg; let us talk of the composition of the egg, and then draw some conclusions as to how to feed for eggs. An average egg will weigh two ounces; of that, 10.81 per cent is shell, 32.47 per cent is yolk, and 56.42 per cent is white, according to a California analysis. The shell is nearly all lime, or carbonate of lime. The yolk is composed of 50 per cent water, 15.5 per cent protein and 32.4 per cent fat, and about 1 per cent mineral matter. Of the white, 86.48 per cent is water—a very cheap commodity, 12.07 per cent protein, .23 per cent fat, and .34 per cent mineral matter, of the total weight of the egg 65 per cent is water. More than an ounce of water, therefore, is stored away in every egg.

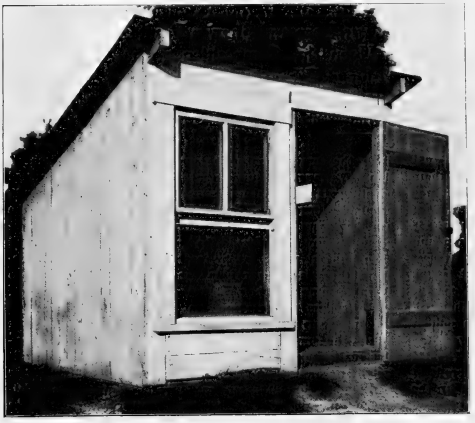
Of course, that does not mean that she must drink that amount of water, for a certain percentage of all poultry food is water. For instance, in wheat there is between 10 and 11 per cent water; in other words, a hundred pounds of wheat contains 10 to 11 pounds of water. So, if a bran mash is fed, about half of that is water. By a little figuring we discover that the egg contains a quarter of an ounce of protein. How is the hen going to obtain that protein, supposing she is fed, as she very often is fed, on wheat and water?

Wheat as a Food.

Now there is in wheat about 12 per cent of protein, or 12 ounces of protein in a hundred ounces of wheat. Supposing the hen weighs four pounds and that she eats four ounces of wheat a day—which she probably would not do very long. Supposing, further, that it takes three of those

ounces of wheat to maintain the body, there is one ounce left, which the hen is very willing to convert into an egg. In one ounce of wheat there is just .12 ounce of protein, and we have seen that the egg contains .24 ounce or practically one-quarter of an ounce of protein. So that there is just half enough protein in one ounce of wheat to make an egg. If the hen, however, were inclined to lay an egg only every other day, she could make half the egg with it and wait till the next day to get the requisite amount to furnish protein for the other half. An egg every other day is not so bad.

But the egg contains something else besides protein. It contains .23 of an ounce of fat, or nearly as much fat as protein, not quite. Now that same ounce of wheat from which we got just half enough protein to make the egg contains .72 of an ounce of carbohydrates and .02 of an ounce of fat, or say three-quarters of an ounce of carbohydrates and fat, or just three times as much as the egg contains of fat. You see what a quandary you put the hen into by feeding a straight



Colony House at West Virgina University Experiment Station.

wheat ration. You give her just half enough protein to make the egg and three times as much carbohydrates and fat as are necessary. What is the hen going to do about it? She is an honest hen. Honesty has been so bred into her through all the centuries that she could not make an egg as some of the human bipeds make the filled cheese. She could not, if she would, take some of the surplus carbohydrates and fill them into the places where the protein ought to be. If you could by some means induce her to eat an ounce more of wheat she would then have the requisite amount of protein, but she would then have six times as much carbohydrates and fat as is necessary. In that case five-sixths of the carbohydrates must be either wasted, or the protein diverted into other channels.

But what about the shell? In the ounce of wheat there is only half as much shell material as is necessary for the egg. Like protein, there is a deficiency of just one-half. So that, in this ration of wheat alone, there is, in technical feeding language, a lack of balance. There is too much of one element and too little of another. There is too much of the fat-producing elements and too little of the protein and lime. What the hen does with the food in such a case is pretty much of a problem. But it can safely be said, and there is practical experience enough to bear out the statement, that she will refuse to make eggs. Wheat has what is called a wide nutritive ratio, one of about one of protein to 9.5 of carbohydrates, whereas profitable egg production calls for a ration of about 1 of protein to 4 of carbohydrates.

Corn as a Food.

This is true also of corn, only more so. Corn has a wider ratio than wheat and more disastrous results would naturally follow an exclusive corn ration than a wheat ration.

The only thing for the breeder to do is to feed some other kind or kinds of food that are known to be rich in protein. Bran is such a food. It has a ratio of about 1 to 3.8, but enough of it cannot be fed with wheat or corn to balance the ration properly. It is all right to feed a little of it, for the hen likes a variety. Some other food must be added which is still richer in protein, such as lean meat. Cotton-seed meal is also rich in protein, so is dried blood, which is nearly all protein. But the question of poultry foods and their composition is too large a question to enter into a full discussion of here. Professor Jaffa, of the University of California, recommends the following standard rations for fowls: For 1,000 pounds of laying hens, of about three to four pounds average weight, the food requirement per day would be from 65 to 70 pounds of total food, or about 52 pounds of water free food, containing 9 pounds of digestible protein, or flesh-formers, 4 pounds of fat and about 20 pounds of carbohydrates or starchy material. Per hen the amount would be 3¼ ounces of total food, 2¼ ounces of water free food and .43 ounces of flesh-formers, and about 1.2 ounces of fat and heat producers.

For one thousand pounds live weight of hens whose weight averages about 6 pounds, the food requirements per day would be 40 to 50 pounds of total food, containing 34 pounds of absolutely dry matter, which should comprise 6 pounds of digestible protein, 14 pounds of carbohydrates and 2 pounds of fat. If we calculate this for the individual fowl we would have 4¼ ounces of total food, 3¼ ounces dry matter, with .58 ounces of protein or flesh-formers and 1.54 ounces of fat-formers and heat producers. At the Utah Station we are now running a series of feeding experiments and at the end of the year we hope to arrive at something definite in regard to rations, how much to feed, what to feed, and how to feed.

JAMES DRYDEN.

[The value of this experiment is undeniable, but the reader must not assume that corn is more valuable than wheat as a food for laying fowls simply because the wide ration in the experiment gave better results than the narrow ration. By reference to the tables given it will be seen that the narrow ration contained an excessive quantity of bran and middlings, neither of which are particularly digestible nor nutritious, while the wide ration contained a considerable quantity of wheat. The experiment therefore simply illustrates the fact that a well balanced ration of nutritious food is better than one that contains less nutrition. It cannot be successfully argued by the force of this experiment that corn is better than wheat, for the so-called corn ration contained about half as much wheat as the wheat ration. The experiment proves that a variety of well balanced nutritious food is the best ration that can be fed, and that we cannot judge altogether by its bare ratio.—EDITOR.]

PRODUCING AN EARLY MOULT.

Experiment on Feeding Intended to Hasten the Moult and So Prepare Fowls for Winter Laying How the Fowls Were Fed—Comparative Results.

By J. H. STEWART and HORACE ATWOOD, of the West Virginia University Experiment Station.

WHEN a specialty is made of producing winter eggs it is of much importance to have the hens shed their feathers early in the fall so that the new plumage may be grown before cold weather begins. In case moulting is much delayed the production of the new coat of feathers in cold weather is such a drain on the vitality of the fowls that few if any eggs are produced until spring, while if the moult takes place early in the season the fowls begin winter in good condition and with proper housing and feeding may be made to lay during the entire winter.

A few years ago Mr. Henry VanDreser proposed a way whereby fowls may be caused to moult as early in the fall as is desirable. Briefly this method consists in withholding food either wholly or in part for a few days, which stops egg production and reduces the weight of the fowls, and then feeding heavily on a ration suitable for the formation of the feathers and the general building up of the system.

The experiment designed to study this method was begun Aug. 5, 1902, with two pens of Rhode Island Reds, and two pens of White Leghorns, about two years old. One pen each of Rhode Island Reds and White Leghorns received no food for thirteen days except what they could pick up in their runs, which had been sown to oats in the spring. These runs are fifteen feet wide and one hundred feet long and nearly all the oats had been picked from the heads before the beginning of the experiment. The other two lots of fowls were fed as usual on mash, beef scraps, corn, wheat, and oats. After the expiration of the thirteen days all four lots of fowls were fed liberally. Each lot of fowls contained twenty hens and two cocks.

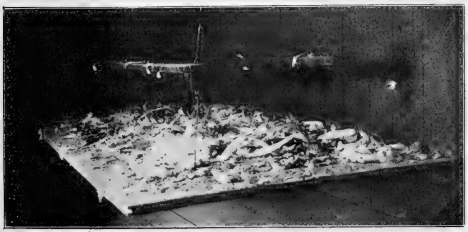
The following table shows the number of eggs produced during the first thirty days after the beginning of the test:

Lot.	Breed.	How Fed.	Eggs Produced
1 . . .	Rhode Island Reds	Fed Continuously	75
2	Rhode Island Reds	No Food	17
3	White Leghorns	Fed Continuously	172
4	White Leghorns	No Food	25

Feathers upon Droppings Board; Illustrating the Moulting of Fowls Fed Ordinarily.

Lots two and four ceased laying entirely on the seventh day of the test.

Thirty days after the test began the "no food" pen of Rhode Island Reds had practically a complete coat of new feathers, had begun to lay, and within a week from that time one-half of the hens were laying regularly, while the other lot of Rhode Island Reds were just beginning to moult, and the egg production had dropped down to two or three eggs per day. Both lots of White Leghorns were a trifle slower in moulting than the Rhode Island Reds, but otherwise the treatment affected them in a similar way. For ten days, beginning August 19, the droppings boards in the two White Leghorn houses were not cleaned. At the expiration of this time photographs were taken and the plates show the great accumulation of feathers from the "no food" lot of fowls, and the relatively small amount of feathers which had been shed by the other lot.



Feathers upon Droppings Board; Illustrating the Moulting of Fowls Fed Specially to Hasten the Moult.

Summary.

Mature hens, which are fed very sparingly for about two weeks and then receive a rich nitrogenous ration, moult more rapidly and with more uniformity, and enter the cold weather of winter in better condition than similar fowls fed continually during the moulting period on an egg producing ration.

PRODUCING EGGS AT MINIMUM COST.

Digestible Nutrients Which Should be Fed to Laying Stock to Furnish the Chemical Constituents of the Egg and Maintain the Hen in Health and Activity—Properties of Protein and Nitrogenous Materials.

By JAMES R. COVERT, of the United States Experiment Station, Department of Agriculture, Washington, D. C.

AS COLD weather approaches and the marketability of eggs increases, the problem of how to increase the yield of that toothsome article becomes interesting. The veteran, the amateur, and the good housewife vie with each other in an endeavor to compound a ration which shall produce the maximum yield of eggs at a minimum food cost. The public is awakening to a realization of the food value of the egg. More attention is given the subject of feeding, and the agricultural press are devoting more space to articles on poultry. Some of the Experiment Stations are investigating and throwing light in many hitherto dark corners. Their conclusions in many cases closely coincide with the teachings of experience and show conclusively that correct feeding is both a science and an art.

Row of Colony Houses at West Virginia Experiment Station; Front View.

If to the sum total of the chemical constituents in the eggs produced during a given season, we add the materials required to maintain the hen in health and activity, we have approximately the amount of digestible nutrients which should be present in her food. As we all know, the digestible nutrients in food articles vary in amount and quality and some breeds of chickens return a greater profit in eggs for the food consumed than others. This article, however, is confined to the subject of rations which must be prepared with due regard to the purposes for which the chickens are kept. This if we desire to produce flesh we must feed a ration richer in flesh forming ingredients than if we were feeding for eggs, which require nitrogenous materials. Reports of digestion experiments with fowls are seldom met with, presumably because they are not often undertaken. The public should take an interest in the matter and demand of those expert in the determination of feeding problems the solution of this question.

It is assumed that the nutritive ratio for the laying hen and the milch cow should be approximately the same. Their products closely resemble each other, but their relative actual cost makes milk usually much the cheaper food article for man, especially in the larger cities. The German feeding standard for a milch cow calls for 15.4 pounds total nutritive substance in the digestible portion of her food, these nutritive substances to be proportioned as follows: Protein, 2.5 pounds; carbohydrates, 12.5 pounds, and ether extract, or fat, 0.4 pound. This gives a nutritive ratio of 1:5.4. In other words, to every pound of protein there are 5.4 pounds of nitrogenous materials. The nutritive ratio may be determined by multiplying the ether extract by 2.2, adding to this product the carbohydrates, and dividing by the protein. Each pound of fat or ether extract is assumed to have a feeding equivalent of 2. 2 pounds carbohydrates. The author has been unable to find the reports of any experiments determining the amounts of these materials necessary for fowls. For want of definite information on several points he is unable to do the subject justice, but with many apologies and a few misgivings, he will attempt to formulate a ration which shall be practicable for the farmer.

It is usual to feed a ration of soft foods in the morning, with a whole grain ration at night. We will suppose we have our choice of the following feed stuffs: Bran, corn meal, ground oats, oil cake, cottonseed meal, beef and blood meal, red clover hay, skim milk, with oats, rye, wheat and corn for a whole grain ration. The following table gives the digestible nutrients found in 100 pounds of each of these and a few other articles:

PERCENTAGE DIGESTIBLE MATTER IN AMERICAN FEEDING STUFFS.

FEEDING STUFF.	Crude Protein.	Carbohydrates.	Ether Extract.
	Per Cent.	Per Cent.	Per Cent.
Red Clover Hay	6.5	34.9	1.6
Alfalfa Hay	7.6	37.8	1.3
Cowpea Hay	8.1	37.3	1.7
Potatoes	1.4	16.1	0.0
Corn (average)	7.1	62.7	4.2
Wheat (average)	9.3	55.8	1.8
Rye	8.3	65.5	1.2
Oats	9.1	44.7	4.1
Bran	12.6	44.1	2.9
Middlings	12.2	47.2	2.9
Cottonseed Meal	36.9	18.1	12.3
Linseed Meal	27.2	31.8	2.7
Dried Blood	59.1	0.0	2.3
Meat Scraps	68.4	0.3	13.5
Skim Milk	3.1	4.7	0.8

For convenience we will mix 250 pounds of soft food at a time, selecting as an experimental ration 100 pounds bran, 50 pounds corn meal, 50 pounds ground oats, 25 pounds cottonseed meal, 25 pounds beef and blood meal (assuming the latter to be composed of equal parts of blood and meat scraps). These quantities, by reference to the foregoing table, are seen to contain the following amounts of digestible nutrients: Protein, 45.34 pounds; carbohydrates, 101.90 pounds; ether extract of fat, 11.51 pounds. The nutritive ratio we find is 1:2.8, while the German standard for a milch cow is 1:5.4. Therefore, to balance the ratio we must select some material rich in carbohydrates and fat. In selecting clover hay, we secure a high percentage of carbohydrates and at the same time by properly preparing and mixing the clover with the morning mash we are able to furnish what closely approximates green food. Fifty pounds of red clover hay, added to our ration, raises the nutritive ration to about 1:3.00.

When skim milk is at hand, a very profitable use can be made of it by mixing the soft food with it. A quart of skim milk weighs about two and a half pounds. By adding in the feeding period an aggregate of one hundred pounds of milk we make it very palatable but lower the nutritive ratio to 1:2.76. This we will accept for our morning mash, feeding what each fowl will clean up quickly. For our whole grain ration, we may select corn, wheat or rye, as they are all relatively rich in nitrogenous materials and will help balance the ration. We will select corn to scatter in the litter in the evening. If we use two hundred pounds in connection with the two hundred and fifty pounds of soft feed, our nutritive ratio will stand 1:4.3—still somewhat narrower than the standard, but very practicable.

The relative amount of grain and soft food used varies with different individuals, some using more and others less. The nutritive ratio, however, should conform more closely to the standard than the average ration does if best results are desired. The experimental ration outlined above is not intended as a criterion, but simply to show how the different factors are obtained. Theoretically it would be better for the growing chick than the laying hen.

JAMES R. COVERT.

Row of Colony Houses at West Virginia Experiment Station; Rear View.

EGG PRODUCTION INFLUENCED BY FOOD.

An Experiment on the Feeding of Corn and Wheat; Cut Green Bone and Animal Meal—Vegetable Versus Animal Foods—The Use of Condition Powders.

By WILLIAM P. BROOKS, Professor of Agriculture of the Hatch Experiment Station.

IT IS the purpose of this article to bring to the attention of the public the results of several experiments carried out under my direction at the Hatch experiment Station during the past five years, which it is believed are worth the consideration of all who keep fowls for eggs. These experiments have been directed to the elucidation of but a few of the many questions which present themselves to every intelligent person who cares for hens, and this article, which will be based upon the results of our own work, makes no pretense to being a comprehensive paper upon the subject.

The questions which we have attempted to throw light upon have been the following:

1. The relative value of vegetable as compared with animal foods as sources of the albuminoids (nitrogenous or flesh forming part) of food.

2. A comparison of dried animal or flesh meal with fresh cut bone as foods for laying hens.

3. The value of condition powders as an ingredient in the food of hens.

4. The relative value of dried clover rowen and fresh cabbage as winter feeds.

5. The influence of the presence of a cock with hens upon egg production.

6. A comparison of a less with a more nitrogenous ration (in effect a study of the relative value of a mixture of feeds containing a large amount of corn and corn meal with one containing wheat, wheat shorts, and gluten meals in large quantity).

An earnest effort has been made in planning and carrying out these experiments to eliminate all disturbing influences—to insure, in short, in every instance perfect fairness, perfect equality in all conditions other than the one variation in feed or treatment which constituted the subject of experiment. It is to be feared that in many of the private experiments which have been carried out such equality in conditions has not always been secured. The one feed or treatment is tried during one part of the year—another during some other period—or perhaps even, one method of feeding has been the subject of experiment one year; another method some later year. It must be evident that under these conditions results cannot fairly be compared. Every variation, save the one under trial, must be eliminated if results are to have much value.

Attention is called to this matter—not as a reproach to the practical man; he is rather entitled to all honor for the many valuable discoveries he has made. Under the conditions under which he works, under the urgent necessity usually existing to make his business financially successful, it is rather to be wondered that his experiments have been even so well carried out as has been the case. No! not then, in criticism of the practical man, but rather to explain why it is that exact knowledge is still wanting upon many questions of great importance is attention called to the matter.

In what measure we have secured suitable conditions for just comparisons in our experiments will be apparent from the brief statement which follows:

1. **Houses**—In every instance where two pens of fowls have been compared they have occupied separate detached houses precisely similar in every dimension and detail of construction and with the same aspect and exposure. Each house has two rooms, a roosting and laying room, 10x12 feet, and a scratching shed 5x10 feet in size. The former has two windows of the ordinary size; the latter is open to the south in all but the most extremely cold or stormy weather. It may be closed by folding doors, each with glass windows. In this shed is scattered eight or ten inches of cut straw. With each house is connected a yard containing 1,200 square feet and of this the fowls have always had free run.

2. **Care and Cleanliness**—The utmost regularity in care and feeding has always been observed in every particular; droppings have always been promptly removed and suitable measures taken to keep down vermin.

3. **The Fowls**—In every experiment the fowls in the two coops under comparison have been of the same breed and age; and of the same origin and past treatment in each coop. In preparing for experiments we first place all the fowls together, then take at random one for the first coop, next a fowl as nearly like the first in every particular as can be found in the lot for the second coop; and so on to the end. In other words, the fowls are matched in pairs as closely as possible and one of each pair goes into each of the two pens which are to be compared. In most cases we have raised our own experiment stock; but in some instances we have purchased it. We have used fowls of the following breeds: Light Brahma, Barred Plymouth Rock, White Wyandotte and Black Minorca. We have not attempted a comparison of breeds.

4. **Feeding**—Our custom has been to feed a warm mash early in the morning; to scatter some whole grain in the straw of the scratching shed at noon, and to give more whole grain also in the straw of the shed about an hour before sunset. The aim has been to give all that the fowls would eat with a relish; but to make them work for the whole grain. The quantities fed have been determined by the judgment of the feeder; but an exact account of kinds and amounts of feeds has been kept and these feeds have been subjected to analysis. They have been sound and of good average quality. Artificial grit, shells and pure water have been kept always at hand.

Albuminoids—Vegetable Versus Animal.

The opinion is ordinarily held that in order to procure a satisfactory egg yield hens must be given some animal food, and this is stated to be necessary in order that the ration may be sufficiently nitrogenous. There are vegetable substances now available, however, which are so rich in albuminoids that a ration nitrogenous enough to meet all requirements can be made up by their use.

Among these the soy bean in the one case and cotton seed and linseed meals in the other were selected for comparison with meat meal in the two experiments which we carried out upon this question in 1895.

The soy bean was ground into a fine meal, which is even richer than the ordinary meat meals, as is shown by the table:

Soy bean meal, moisture.....11.61 per cent
Meat meal, moisture.....13.68 per cent

Composition of Dry Matter, Soy Bean Meal and Meat Meal.

	Albuminoids.	Fat.	Carbohydrates.
Soy bean meal, per cent...	34.37	16.38	45.22
Meat meal, per cent.....	35.98	8.31	0.00

In both experiments the fowls received a variety of other foods, but the nutritive ratio was kept substantially the same for the two coops under comparison. The foods used in the first experiment in addition to the Soy bean meal were cut alfalfa, wheat, oats, and middlings in the one coop; in the other, boiled potatoes, ground clover, wheat, wheat middlings and cut bone.

In the second experiment the supplementary feeds were wheat, oats, bran and middlings for the vegetable coop and wheat, oats, wheat meal, bran and linseed meal for the animal food coop.

The number of fowls in a coop was twenty. The first experiment lasted sixty-four days, December 9th to February 12th. The other one hundred and fifty-three days, January 1st to October 31st. The results were decidedly favorable to the animal food. The egg yields, however, were small in both cases.

Animal Meal Versus Cut Bone.

We have now carried through five experiments comparing the dry flesh meal with fresh cut bone. At the outset our practice was to give the bone by itself. This practice we soon gave up as it was found that the amount of bone eaten by the different fowls was very uneven and not infrequently individuals obtained sufficient to purge them seriously. In all these experiments we have used a variety of foods and have endeavored to keep the nutritive ratio substantially the same in the two coops under comparison.

Two of our experiments have given results slightly favorable to the bone in number of eggs; one a result slightly favorable to animal meal; and two, the two last, which have been most carefully carried out, have given results most decisively favorable to the animal meal. The latter has invariably been found the safer food even when the bone is fed in the mash. Some fowls invariably scratch and obtain more than their share. Such fowls suffer from diarrhoea, which sometimes proves fatal, and always, of course, lessens the egg production for the time being.

To give a clearer idea of the method of experiment details concerning the last one will be given.

This experiment continued from December 12th, 1897, to April 30, 1898. There were nineteen Barred Plymouth Rock pullets in each house when the experiment began. Those in the flesh meal house weighed 101.5 pounds and had laid, November 8th to December 12th, eighty-two eggs. The pullets in the cut bone house weighed 101.25 pounds and had laid forty-one eggs. In the morning mash of one lot one part of animal meal to five parts total dry material was used. In the mash of the other lot the same proportion of fresh cut bones was mixed. The large, flat bones, comparatively free from meat or fat were used. In the animal meal coop the health of the fowls was good, but one fowl being out of condition in any way. The nature of the trouble was unknown. The fowl was killed.

Almost from the first bowel troubles were common in

the cut bone coop. Two fowls died, December 23d and January 11th. One hen met with an accident and was killed.

The hens in the animal meal coop laid three soft shelled eggs; the others two.

The bone fed amounted to only .27 ounces per hen daily; .5 ounces and over is usually recommended by writers upon the subject. We find it impossible to feed so largely without serious bowel trouble.

The tables will give a clear understanding of the experiment and its results.

Foods Consumed.

Kind of Food.	Pen 1. Animal Meal. lbs.	oz.	Pen 2. Cut Bone. lbs.	oz.
Wheat	256	0	262	0
Oats	143	0	145	0
Bran	44	8	39	0
Wheat middlings	44	8	39	0
Gluten feed	44	8		
Gluten meal			39	0
Animal meal	44	8		
Cut bone			40	0
Clover rowen	44	8	39	0
Cabbage	19	3	18	8

Average Weights of the Fowls (Pounds).

Dates.	Animal Meal.	Cut Bone.
December 12	5.34	5.38
January 31	5.64	5.66
February 25	5.66	5.88
March 30	5.09	5.27
April 30	5.06	5.53

Eggs Per Month (Number).

Months.	Animal Meal.	Cut Bone.
December	63	57
January	92	83
February	184	120
March	263	259
April	210	209
Total	812	728

Animal Meal vs. Cut Bone for Egg Production.

	Animal Meal.	Cut Bone.
Total number of eggs	812	738
Hen days	2,561	2,331
Gross cost of foods	$8.45	$8.29
Cost per egg	$0.0104	$0.0114
Cost per hen day	$0.0033	$0.0035
Total weight of eggs (pounds)	100.5	88.7
Average weight per egg (ounce)	1.98	1.95
Eggs per hen day	.32	.31
Dry matter consumed per hen day (lbs)	.22	.23
Dry matter to produce one egg (lbs)	.695	.739
Nutritive ratio	1:4.6	1:4.7
Sitters	22	13

It will be noticed that the fowls receiving animal meal laid many more eggs of greater average weight than those receiving the bone. The cost per egg for food was considerably less. The animal meal is, moreover, a more convenient feed to use as well as safer. The fowls at the close of the experiment weighed less, it is true, where animal meal had been the food, but the slight loss in weight is far more than covered by the greater value of the egg product.

A test of the eggs, both raw and boiled, was made by an expert, who pronounced the animal eggs somewhat inferior in color and flavor to the others.

The experiment carried out during the previous winter gave results even more decisive in favor of the animal meal.

As a result then of a most painstaking and long continued inquiry upon this subject I am convinced that the dry, fine animal or flesh meals, if sweet and of good quality, are much to be preferred as a source of animal food to fresh cut bone.

Condition Powders.

There seems to be a quite widespread opinion that something hot, something of the nature of a condiment, mixed with the mash given to laying fowls is useful. This idea receives encouragement also from some of the most prominent poultry papers and writers. An honest desire to know whether such condiments are needed or useful led to the investigations the results of which are here given.

Three experiments have been carried out. We have used in all one of the most generally advertised and recommended of the various condition powders. These powders have been used in accordance with the directions sent out by their makers. The difference in number of eggs with and without the powder has in every case been small. In one experiment a few more eggs were laid by fowls receiving the condition powder; in two experiments those not receiving the powder laid more eggs.

In the last experiment twenty Barred Plymouth Rock pullets were used in each coop. The experiment continued from December 12th to April 30th. The fowls in both coops received a variety of foods, including wheat, oats, bran, middlings, gluten feed, animal meal, cut clover and cabbage, both kinds and amounts being practically the same as in the experiment comparing animal meal with cut bone.

The leading results of the experiments are shown by the tables:

Eggs Per Month (Number).

	Condition Powder.	No Condition Powder.
December	28	59
January	90	66
February	86	101
March	217	288
April	298	291
Totals	719	745

Condition Powder for Egg Production.

(December 12 to April 30.)

	Condition Powder.	No Condition Powder.
Hen day	2,751	2,656
Gross cost of food	$8.91	$8.59
Cost per hen day	$0.0032	$0.0032
Total number of eggs	719	745
Cost per egg, not including powder	$0.0124	$0.0115
Cost per egg, including powder	$0.0180	$0.0115
Eggs per hen day	.26	.28
Total weight of eggs (pounds)	88.08	90.80
Average weight of eggs (ounces)	1.96	1.95
Dry matter to produce one egg (lbs)	.82	.77
Dry matter consumed per hen day (lbs)	.22	.22
Nutritive ratio	1:4.6	1:4.6
Sitters	8	14

There was no noticeable difference in the health and condition of the fowls in the two coops during any part of the experiment. Eggs from both lots of fowls were tested under numbers by two families. One reports no difference in quality. The other found the eggs from the ones not receiving condition powders "much preferable" to the others.

As a result of our experiments I conclude that the use of condition powders is not beneficial. The differences have never been sufficiently great to be significant. In two cases

the hens not getting the powder have produced more; in one case the others have produced a few more. In the light of these results it is believed that poultry keepers throw away money expended for condition powders.

Influence of Male Bird.

Certain experiments which have been carried on at some of our Experiment Stations have given results indicating that hens will lay more eggs when kept by themselves than they will if a male is kept with them. Should the effect of a male be found to be an invariable decrease in the number of eggs the fact would be of considerable importance as affecting the economy of the production of eggs for market. It was accordingly deemed advisable to try this experiment. Accordingly four coops of fowls (sixteen in each) were selected and cocks placed in two of them. The experiment continued from May 13th to September 2nd. As will be seen there were really two experiments. The results indicate that the cock was apparently without influence upon the number of eggs. In one pair of coops the fowls with the cock laid 631 eggs; those without a cock, 630 eggs. In the other pair of coops the numbers were respectively 629 and 526. Exact comparison is possible, however, only when we ascertain the product per hen day. This is found to be for the first experiment .35 eggs for the hens with a cock, and .36 for those without. In the second experiment it is found to be .38 for the hens with the cock and .33 for those without.

It will be noticed that in the one case the hens with which the cock was kept make the best record, while in the other case those kept without a cock make the best record. The differences are small and since they are in the one case on the one side, and in the other case on the other, the conclusion appears inevitable that the male was without influence on the number of eggs produced.

Wheat Versus Corn.

It will be understood that by a narrow ration we mean one in which the proportion of albuminoids or nitrogenous constituents of the food is large as compared with the proportion of starch and fat, and that the term wide ration signifies that the proportion of nitrogenous constituents is small. Writers upon the subject of feeding for eggs with practical unanimity advise the use of foods rich in nitrogenous constituents. They advise the "narrow" ration.

Corn, among all the grains, is relatively the least nitrogenous. It is rich in starch and fat and comparatively low in albuminoids (nitrogenous constituents). Wheat is relatively rich in albuminoids. Writers upon the subject of feeding for eggs have apparently based their conclusions largely upon the fact that the egg is very rich in the nitrogenous constituents. They have reasoned that since this is the case the hens should receive very nitrogenous food, and, accordingly, since wheat is more nitrogenous than corn, they have almost without exception cautioned against the use of much corn and strongly advised feeding wheat largely to laying hens. The practice so common among many farmers of throwing corn freely to hens has been continuously held up as an example of "How not to do it." It was the writer's belief before undertaking the experiments of the past two years that this advice was sound, and he believed that by the experiments which are to be described he should illustrate the folly of a liberal use of corn.

With this idea in view the experiments were carried out with every precaution necessary to insure reliable results. Six experiments have now been carried through. One was carried out in the winter of 1897 and 1898 (December 12 to April 30); another during the summer of 1898 (May 1st to October 4th). These experiments were conducted with Barred Plymouth Rock pullets beginning with nineteen in each coop. Those on the narrow, or wheat, ration weighing 101.75 pounds; those on the wide, or corn, ration weighing 102.5 pounds at the beginning of the experiment. During the winter of 1898 and 1899 we carried out two experiments —one with Barred Plymouth Rocks, the other with White Wyandottes. The same fowls were also used for summer experiments.

During the experiments of the first year, the fowls receiving the so-called wide ration were still given some whole wheat; during the experiments of the past year, no wheat has been used. The results during the past year have been quite as favorable to the wide ration (corn entirely replacing wheat) as were those of the first year in every single particular. The details for the past year are not, however, yet worked up and they cannot be published at this time. The tables herewith will suffice to give clear ideas of the manner of feeding and of the results:

Foods Consumed—Narrow Vs. Wide Ration.

(December 12 to April 30.)

Kind of Food.	Narrow Ration. Pounds.	Ounces.	Wide Ration. Pounds.	Ounces.
Wheat	257	0	126	0
Bran	147	0	63	0
Bran	43	0	39	0
Middlings	43	0	..	.
Gluten feed	43	0	..	.
Animal meal	43	0	39	0
Clover	44	0	39	0
Corn meal	.	.	108	0
Corn	.	.	126	0
Cabbage	18	5	16	5

Average Weight of Fowls (Pounds).

Dates.	Narrow Ration.	Wide Ration.
December 12	5.36	5.39
January 31	5.41	5.84
February 25	4.45	5.80
March 30	5.16	5.57
April 30	5.17	5.31

Number of Eggs Per Month.

Months.	Narrow Ration.	Wide Ration.
December 12 to 31	94	89
January	99	148
February	147	258
March	310	317
April	210	259
Totals	860	1,071

Narrow Vs. Wide Ration for Egg Production.

(Winter Test.)

	Narrow Ration.	Wide Ration.
Number of sitters	30	2,538
Hen day	2,529	$6.56
Gross cost of foods	$8.54	$0.0026
Cost per hen day	$0.0033	1,071
Total number of eggs	860	$0.0061
Cost per egg	$0.0099	.42
Eggs per hen day	.34	130.53
Total weight of eggs (pounds)	102.425	1.95
Average weight of eggs (ounces)	1.98	.46
Dry matter to produce one egg (lbs)	.655	
Dry matter consumed per hen day (pounds)	.22	.19
Nutritive ratio	1:4.7	1:5.6
		24

Foods Consumed—Narrow Vs. Wide Ration.

(May 1 to October 4.)

Kinds of Food.	Narrow Ration. Pounds.	Wide Ration. Pounds.
Wheat	276	131½
Oats	97	43
Bran	43	40
Middlings	43	..
Animal meal	43	40
Corn meal	..	106½
Corn	..	217½
Gluten feed	43	16

Average Weight of the Fowls (Pounds).

Dates.	Narrow Ration.	Wide Ration.
April 30	5.17	5.31
June 11	5.00	5.25
July 16	5.47	5.22
August 11	5.05	5.50
Before killing	5.07	5.44
Dressed	*4.37	†4.81

*Or 86 per cent. †Or 88 per cent.

Eggs Per Month (Number).

Months.	Narrow Ration.	Wide Ration.
May	216	292
June	182	204
July	157	210
August	151	197
September	139	174
October 1 to 4	14	18
Totals	859	1,095

Narrow Vs. Wide Ration for Egg Production.

(Summer Test.)

	Narrow Ration.	Wide Ration.
Hen days	2,355	2,512
Gross cost	$7.5600	$6.6400
Cost per hen day	$0.0032	$0.0026
Total number of eggs	859	1,095
Cost per egg	$0.0088	$0.0061
Eggs per hen day	.36	.44
Total weight of eggs (pounds)	106.3	130
Average weight of eggs (ounces)	1.98	1.90
Dry matter to produce one egg (lbs)	.57	.48
Dry matter consumed per hen day pounds	.21	.21
Sitters	67	60

Before calling particular attention to the conclusions which it seems to me must be drawn from a study of these results it should be stated that it has been found necessary to exercise more judgment in feeding the ration containing corn and corn meal than in feeding that containing wheat. The fowls receiving the corn are more easily overfed, and on a few occasions lost appetite for their feed for short periods. The health of the fowls of both rations was uniformly good throughout both the winter and the summer tests with one single exception—the loss of one fowl from the effects of indigestion on the wide ration.

Substance of Experiments.

The conclusions to be drawn from these experiments are presented in the words used by the author in the Eleventh Annual Report of the Hatch Experiment Station:

1. The hens on the wide (rich in corn) ration laid many more eggs in both the winter and the summer experiments than those on the narrower ration.

2. The difference in favor of the wide ration amounts to 25 per cent in the winter trial, and to 33⅓ per cent in the summer trial, upon the basis of equal number of hen days.

3. The total cost of feeds was less for the wide ration, and of course the cost per egg was much less. In the production of one hundred dozen eggs the saving on the basis of our winter test would amount to $4.56; on the basis of the summer test, to $3.24.

4. In the average weight of the eggs produced there is a small difference in favor of the narrow ration, but in quality the weight of family evidence shows the eggs produced by the corn-fed hens to have been somewhat superior. They were deeper yellow and of a milder flavor than the eggs from the narrower ration.

5. The fowls on the wide ration gained somewhat in weight and were heavier at the close of the experiment than the others, notwithstanding the much larger number of eggs laid.

At the close of the experiment the fowls were closely judged as to the condition of the plumage while still living, and it was decided that the corn-fed hens were farther advanced in molting than the others. The fowls were slaughtered and the judgment of the men removing the feathers coincided with judgment on the living fowls. The averages before and after dressing were as follows: Narrow-ration fowls, 5.07 pounds; dressed weight, 4.37 pounds; wide-ration fowls, 5.44 pounds; dressed weight, 4.81 pounds. The narrow-ration fowls gave 86 per cent dressed weight; the others, 88 per cent. The dressed fowls were judged by a market expert, who pronounced the corn-fed fowls slightly superior to the others.

In view of the fact that the experiments of the past year with two breeds (White Wyandottes and Barred Plymouth Rocks), in which corn entirely replaced wheat in the whole grain ration, have given results agreeing in every particular with those described in full. I believe we must conclude that wheat has been much overestimated and corn greatly undervalued as food for laying fowls. That the corn should be found superior to wheat in winter is much less surprising than that it should hold its superiority in summer as well; and that the fowls getting it should molt so much earlier and better than those getting wheat.

Calculation based upon the average number of hens in the two pens in 1897 and 1898 shows that the number of eggs per hen for the wheat fed fowls was 105.1 in 297 days (December 12th to October 4th); for the corn fed hens it was 127.9 eggs. In spite of this much larger product the corn fed hens dressed about one-half pound more per head than the others. The significance of these results, supported as they are by the more extensive tests of another year, is apparent. Our poultry keepers are paying high prices for wheat, when corn, which can be purchased for about one-half the price of that grain, appears to be better. The aggregate possible saving by substituting corn is enormous. Let me, however, express my conviction that such substitution would be attended with unsatisfactory results unless the conditions observed by us shall be secured. The fowls must be made to scratch for all their whole grain, and care must be taken not to overfeed.

Let me further suggest that nature is generally a safe guide. "Biddy," kept healthy and vigorous, will take corn always in preference to wheat. Man conceived the idea that wheat is better for large egg production. He has been endeavoring to convince the hen that she doesn't know what is good for her; and now it seems that after all her instinct, and not his supposedly scientific reasoning, has been right.

What then are the hints on feeding that I would base on our experiments? Briefly, they are these:

1. Some animal food is essential to satisfactory egg

production. Vegetable foods, even equally rich in the nitrogenous and fatty ingredients, are much inferior.

2. The dried animal or flesh meals made a part of the morning mash are safer and better animal food than cut bone; and they cost less and are more convenient in use. The proper proportion appears to be about one part by weight of the animal meal to five parts of the other dry materials used in the mash.

3. Condition powders (and presumably other condiments, such as common and cayenne peppers) are useless and money spent for them is thrown away.

4. Fresh cabbage is more valuable as a food for egg-production than clover rowen; but the eggs, while richer, are inferior in flavor.

5. Corn and corn meal may with advantage safely be used much more largely than is generally advised, whether in winter or summer; but the fowls must be forced to exercise.

WILLIAM P. BROOKS.

[NOTE.—To intelligent poultrymen these tests afford information that is valuable. As we have intimated elsewhere, however, the conclusions are not invariably correct. For two reasons this test does not prove, as the conclusions lead us to infer, that a wide ration is superior to a narrow ration, First, because neither ration can be properly called wide; Second, because the test was not conducted under such conditions as would decide this question. We call attention to this particular experiment in the *Reliable Poultry Journal* in an article entitled "Poultry Foods and Feeding," as follows: "In feeding poultry, experiments that have been conducted have not conclusively shown that either a wide or narrow ration has any advantage over the other. One experimenter assumes that the wide ration is superior because fowls which were fed in the proportion of 1:5.6 laid better than those receiving a ratio of 1:4.7. The former was styled a wide ration, and the latter narrow. As competent authorities place the governing standard at 1:6.8 and consider it a medium ration, it seems to us that neither 1:5.6 nor 1:4.7 should be termed wide. We prefer to consider that both are narrow. The conclusion then would be that a narrow ration (1:4.7) did not give such good results as one less narrow (1:5.6). There was nothing to show that a continued widening would prove proportionately advantageous." In addition to this point it is clear that the fowls supposed to have received a wide ration were fed a greater variety than were those receiving the narrow ration. Variety of food goes a long way towards producing eggs, and this we claim is the reason that the fowls so fed gave better results. As a test between corn and wheat this experiment is of no value, for the so-called corn-fed fowls also received half as much wheat as did the wheat-fed fowls. If this wheat had been omitted we have good reason to believe that results would have favored the wheat-fed fowls. This is said to have been tested in a subsequent year, but we have not had a report of the conditions of the new test and prefer to abide by our opinion until we are satisfied that said conditions were appropriate.—EDITOR.]

PULLETS VS. HENS AS LAYERS.

A Report of Experiments Showing the Value of Exercise for Fowls; the Relative Value of Hens and Pullets for Egg Production; the Yearly Cost of Food; the Food Cost per Dozen of Eggs, and the Relative Fertility of Eggs Under Different Treatment.

By MR. JAMES DRYDEN, Superintendent of the Utah Experiment Farm.

FIRST YEAR.

FROM MR. DRYDEN'S REPORT.

In November, 1896, experiments in egg production were begun at the station. They were designed to show:

1. The relative value of old hens and pullets.
2. The effect of exercise.
3. The relative value of early and late hatched pullets.
4. The effect of crossing.
5. The relative merit of the different breeds.
6. The yearly food cost per hen.
7. The average yearly production of eggs per hen.
8. The food cost per dozen of eggs.
9. The relative weight of eggs from different breeds.
10. The relative fertility of eggs under different treatments.
11. The relative fertility of fresh and old eggs.

Four fowls were placed in each pen, except Pen 9, which had five. The pens were numbered from 1 to 9. The following outline shows the arrangement:

PEN. WITHOUT EXERCISE. } ROSE COMB BROWN LEGHORNS.
1. Old hens.
2. Late hatched pullets.
3. Early hatched pullets.

PEN. WITH EXERCISE. } ROSE COMB BROWN LEGHORNS.
4. Early hatched pullets.
5. Old hens.
6. Late hatched pullets.
7. Brahma-Leghorn cross pullets.
8. Light Brahma Pullets.
9. Barred Plymouth Rock pullets.

Pens 1 and 5, 2 and 6, 3 and 4, were duplicates, the only difference being in the matter of treatment. Pens 1, 2 and 3 were given grain food in boxes; 4, 5, 6, 7, 8 and 9 in a litter of straw on the floor. All pens were fed alike in regard to variety of food, time of feeding, etc. Of certain foods, however, each pen had all it would eat, and the amount eaten, of course, varied in individual pens.

A comparison of the records of Pens 1 and 5 will show the effect of exercise on old hens. A comparison of 2 and 6 will show the effect of exercise on late hatched pullets, and of Pens 3 and 4 on early hatched pullets. When the experiment began the "old hens" were 3 and 4 years old. The "early hatched" pullets were about seven months old; the late hatched pullets about five and one-half. Pens 3 and 4 were from the same brood of chickens, and reared under the same conditions. Pens 2 and 6 were each from a later brood of chickens, and reared under the same conditions. They were evenly divided when put into the pens, so that when the experiment began the duplicate pens were as nearly alike as it was possible to make them. It should also be stated that the Leghorns, Pens 1 to 6 inclusive, were all from the same poultry yards, so that the laying qualities of the different pens were more nearly equal than if they had been secured from different breeders.

Exercise.

The exercise consisted in making the fowls scratch for their grain food, which was fed in a litter of straw about six inches deep. This straw was renewed once a week in winter and twice in summer. The "without exercise" pens were fed in boxes, just as they are fed by some kindly disposed people who think it a cruelty to make a hen scratch

for her food. The results will show whether or not such kindness is misplaced. The experiment will not show the absolute effect, however, of exercise, for it was not possible, nor was it thought desirable, to prevent the fowls in the non-exercised pens from taking any exercise whatever. The floors of the pens were the ground, and this offered an opportunity for some exercise, and during the summer months there was also opportunity for exercise in the yards outside. To show the absolute effect of no exercise, it would be necessary to confine the fowls on a board floor, but the results of such an experiment would have no great practical value.

The effect of the different methods of treatment on the fertility of the eggs is of much importance. By numbering every egg with the date laid and the number of pens, and incubating them under similar conditions, some definite results were hoped to be secured. In the same manner, the relative fertility of fresh eggs and of eggs two, three and four weeks old was to be determined as far as possible.

Feeding.

As already intimated, there was no feeding test embraced in the experiment. All pens were fed alike, except in the matter of quantity. The foods consisted of a mash composed of two parts bran and shorts, and one part each of chopped corn and oats, which was fed in the morning; about 10 o'clock a little grain was fed; then grain again in the evening. The quantities and varieties of grain varied at different periods. Three times a week, except when our butcher failed us, cut bones and meat were fed. The green food consisted of cabbages, a head being constantly hung in each pen until about the 1st of March, after which, and until green grass could be secured, cut lucerne leaves were fed dry. This was scattered in the pens. During the summer green grass was thrown into the pens. The grains fed were wheat, oats, corn and barley. Corn was fed sparingly, and barley was discarded after a few weeks' trial because it was not relished by the fowls; so that barley can be left out of account altogether. No prepared poultry foods or egg foods were fed. No stimulating foods of any kind were fed except occasionally a little cayenne pepper in the morning mash. Salt was also used in the mash. During the winter, coal ashes were kept before the fowls; also a little gravel. No oyster shells were fed until the middle of summer.

From the beginning of April to the end of the experiment the green food was not weighed. It consisted of green lucerne and clover, principally lucerne. The yards outside were seeded to lucerne and clover, and this furnished green food for a few weeks. It was soon eaten off, and thereafter the green stuff was cut outside and thrown into the pens. The fowls appeared to relish the green clover more than the lucerne, the former being eaten down in the yards before the latter. Lucerne, however, is an excellent green food, and is highly nitrogenous, the kind of food to make eggs. It grows more rapidly than clover in this country, and the same area of lucerne will furnish more food than of clover.

The idea kept uppermost in mind in feeding was to so feed as to induce the largest possible consumption of food of the right kind. The theory that the more food an animal will eat and assimilate, the greater will be the product, has been proved to be correct in the feeding of other kinds of live stock. A cow, for instance, requires a certain amount of food to maintain existence, and the first use to which food is put is to supply the requirements of the body, and anything beyond that amount which a cow can be induced to eat will go to the production of milk, if she is of a good dairy type.

A steer requires a certain amount to maintain life. Anything beyond that amount will go to make beef. So it is in feeding for eggs. The hen must be liberally fed; she must consume more than is merely necessary to support life in order to furnish eggs. But one great danger in liberally feeding the hen is that instead of the surplus above maintenance going to the production of eggs, it is very apt to go to the production of fat; at any rate, that is the theory of poultrymen. To guard against this result, the question of exercise for the hen has come to be looked upon by successful poultrymen as of vital importance. "Make the hen exercise," they say, "and instead of getting a fat hen you will get a fat egg basket." To collect some data in regard to this question was the purpose of the experiment on exercise.

The amount of the different foods consumed during the year and the cost of the same, are given in table No. 2. The weights represent the average consumption of food per fowl for each pen. A male was in each pen about a third of the year, and the total food consumed was divided by 4 1-3, to get the average per fowl. The cost of the different foods was as follows: Bran mash, 5-14 cents per pound; wheat, 70 cents per bushel; bones, ¾ cent per pound; oats, 70 cents per cwt.; barley, 70 cents per cwt.; corn, 75 cents per cwt.; cabbage, ½ cent per pound. The price charged for the wheat was more than it has been at the Station farm for several years, and this, of course, considerably increased the cost of the ration and the food cost of the eggs produced. It will be noticed that wheat constituted the principal item of the ration. The Leghorns consumed nearly half a bushel per fowl during the year, Pen 8 of Brahmas consuming 36 pounds per fowl, which was more than any other pen in the trial. Bones, which were a mixture of meat and bones from the butcher shop, were fed throughout the year. Ten and a half pounds were fed to the Leghorns, or an average of about 3¼ ounces per week per fowl. This amount, however, varied at different seasons, as will be seen by reference to table of weekly weights. The food was all carefully weighed each day. A Fairbanks scale was used, weighing to the sixteenth of an ounce. The weights should, therefore, be accurate enough for all practical purposes. Of course there is a possible error. Every grain cannot be saved, and every ounce of bones will not be eaten.

At the prices given above, the cost of the food is figured up in the table. Pen 4 of Leghorns, which made the best egg record, consumed 62 cents worth of food per fowl during the year. The cost of feeding the Brahmas was about 30 per cent more; the Brahma-Leghorn cross about 15 per cent more.

Table No. 2.

Weights of Food Per Fowl in Pounds, and Cost of the Same for the Year.

Pen.		Mash.	Wheat.	Bones.	Corn.	Oats.	Barley.	Lucerne.	Cabbage.	Cost.
	No Exercise.									cts
1	Old Hens	10	22¼	10	6	11	1	5	3	53½
2	Late Hatched Pullets	10	23	10½	6	13	⅞	4½	4	56¾
3	Early Hatched Pullets	10	35	10½	6	14	1	4½	7	61¾
	Exercise.									
4	Early Hatched Pullets	10	27	10½	6¾	14	1	4½	4	62
5	Old Hens	10	27	10½	6¾	14	1	4½	4	62
6	Late Hatched Pullets	10	27	10½	7	14½	1	4½	6	63
7	B. L. Cross Pullets	9¾	32	12	8	18	1	4½	7	73½
8	Light Brahma Pullets	10	36	12	9	20	1½	4½	6	81¾
9	B. P. Rock Pullets	7¾	30	9	8	18	1½	3½	7½	63

As to the effect of exercise on the consumption of food, contradictory results were secured. With the early hatched pullets—pens 3 and 4—there was practically no difference

EXPERIMENTS IN EGG PRODUCTION.

The baskets of eggs represent the number produced per year by pullets, hens one year old, and old hens, beyond what were sufficient to pay for the food eaten, or they represent the relative per cent of profit on the cost of food. [See Conclusions by Editor—Page 78.]

Fig. 1, pullets; Fig. 2, hens one year old; Fig. 3, hens three and four years old.

in the amount consumed with or without exercise. But with the late hatched pullets—pens 2 and 6—the exercise resulted in increasing the consumption of food about ten per cent. In comparing the two pens of old hens—1 and 5—the results are more conclusive; the increased consumption, due apparently to exercise, amounted to about seventeen per cent. In one out of three cases, therefore, exercise apparently had no effect whatever on the consumption of food. In the other two cases, it produced an increase of about fifteen per cent. But the question of greatest importance is, Did the exercise induce a better use of the food? Did it aid in digestion? In other words, did the same amount of food with exercise produce a larger number of eggs? The next table will answer the question.

The following table gives the yearly food cost per fowl, the number of eggs laid, the value of those eggs at market prices, the food cost per dozen of eggs, and the per cent profit on food:

The table shows some very positive results. Pen 4 is the ideal pen of the lot, or, rather, the only pen under the best conditions for egg production. They consumed, during the year, 62 cents worth of food each; they averaged 181¾ eggs each, valued at $1.88 at market prices of eggs,

Table No. 3—Summary Per Individual Fowls.

Pen.		Cost of Food.	No. of Eggs Laid.	Value.	Food Cost Per Doz.	Per Cent Profit on Feed.
	NO EXERCISE.	Cents.			Cents.	
1	Old Hens.....	53¼	64	$0 56	9.9	5
2	Late Hatched Pullets..	56¼	137½	1 32	4.9	135
3	Early Hatched Pullets	61¼	157¾	1.68	4.6	174
	EXERCISE.					
4	Early Hatched Pullets	62	181¾	1.88	4.1	203
5	Old Hens.....	62	106¾	1.00	6.9	61
6	Late Hatched Pullets..	63	150¾	1.51	5.0	124
7	B. L. Cross Pullets....	73¼	145	1.47	6.1	100
8	Light Brahma Pullets	81¼	147¾	1.40	6.6	72
9	B. P. Rock Pullets....	63	79¾	.79	9.4	25

which prices will be found at the bottom of table No. 5. The food cost per dozen of eggs was 4.1 cents, and the profit on food was 203 per cent. Pen 3 came second; their egg record was two dozen short of Pen 4; their value was 20 cents less; the food cost per dozen was half a cent more, and the per cent profit was 174. This result may fairly be attributed to lack of exercise. There is less difference noted in the case of the late hatched pullets—Pens 2 and 6. The exercised pen laid more eggs, but at a greater cost for food, so that the profit on the food was more for the pen without exercise. The difference is so small, however, that no conclusion should be drawn from the results. With Pens 1 and 5 of old hens the results are more conclusive on the question of exercise. Pen 1 without exercise laid 64 eggs each, at a food cost of 9.9 cents per dozen, while Pen 6 with exercise laid 106¾ eggs each, at a food cost of 6.9 cents per dozen, the per cent profit on food being 5 in the one case and 61 in the other. The cross-bred pen fell short in egg production of the pure-breeds on either side. They were very much behind the Leghorns, but the difference is very small compared with the Brahmas. They not only laid fewer eggs than the Leghorns, but the cost of feeding them was about 20 per cent more. Though the Brahmas laid more eggs than the cross-breds, the eggs were worth less, owing to the fact that the latter matured earlier and laid more eggs when prices were high, so that in the final test—the per cent profit

on food—the cross-breds came out ahead of the pure-bred Brahmas. In comparing Pen 4 with Pen 8, the interesting fact is brought out that the Leghorns, with 20 per cent less food cost, produced 24 per cent more eggs than the Brahmas, and when the per cent profit on food is considered, the results are very decidedly in favor of the Leghorns.

The greatest surprise in the breed experiment was Pen 9 of Barred Plymouth Rocks. They were good stock, matured earlier than the Brahmas, received the same treatment and care, but for some unaccountable reason their egg record was very poor. The result should not be laid to the breed. No definite conclusion can be formed from a breed test of one year, and with one strain of fowls. The breed test was only an incidental part of the experiments, but we hope to continue it, and in time something definite may be arrived at as to the real merits of the different breeds. The average weight of the Plymouth Rocks during the year was a trifle under six pounds. It is evident that the treatment which gave good results with the other breeds was not suited to this particular breed or strain. One thing can probably be said of this particular pen, and that is, they require more delicate treatment than the others. As to whether this is characteristic of the breed, it will require further observation to determine. This explanation is made in justice to this popular American breed of fowls.

Pullets vs. Old Hens.

When it comes to comparison of the records of the old hens and the pullets there is no disputing the fact that whatever other glories age may bring, it does not bring with it a profitable egg basket. A comparison of Pens 1 and 5 with 2, 3, 4 and 6, will show that the profit from the young hens or pullets is about five times greater than that of the old hens. Not only did the old hens lay considerably fewer eggs, but the eggs were worth less per dozen. Those of the old hens averaged less than a cent apiece, while those of the pullets, with the exception of Pen 2, averaged more than a cent apiece. This is accounted for by the fact that the pullets laid a larger proportion of their eggs in early winter, when the price was good. As already stated, the old hens were three or four years old. In the experiment there were no two-year-olds. In the present season (1897-8) the two-year-olds are being tested. Pens 3 and 4 of the past year's experiment are being continued, so that at the end of the second year their records as pullets and as two-year-olds may be compared.

[The second year's report has since been obtained and is printed herewith, under separate heading.—Ed.]

The effect of exercise on food consumption is also illustrated in table No. 3. The three pens having no exercise—1, 2 and 3—averaged 120 eggs, while those from the exercised pens—4, 5 and 6—averaged 146 eggs. The average food cost per dozen of eggs was, for the non-exercised pens, 6.5 cents, and 5.3 cents for the exercised pens, over 22 per cent in favor of exercise. This fact, when studied in connection with the other fact that there was no appreciable difference in the relative weights of the fowls during the year (see table No. 1), would seem to indicate that exercise such as was given is an aid to digestion; or, in other words, the exercised hen made a better use of the food. It took 22 per cent more food to make a dozen of eggs without the exercise than with it; in other words, 22 per cent of the food was wasted by the unexercised hen. It was not used in the growth of flesh, for the weights showed that the exercised hen was as heavy as the non-exercised. It seems to be a mere question of digestion: the exercise aids digestion and assimilation and prevents a waste of food.

Table No. 4—Egg Record.

Pen.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Total.	Average Per Fowl.
1	....	....		6	38	54	59	27	14	21	12	1	231	64
2	....	....	15	28	57	79	80	67	63	76	60	25	550	137½
3	15	29	53	59	67	80	75	64	57	60	44	38	631	157¾
4	19	26	54	64	76	88	91	78	68	85	62	19	725	181¼
5	....	2	11	19	21	74	73	67	51	49	56	4	427	106¾
6	....	3	41	35	73	72	73	71	72	68	52	42*	603	150¾
7	1	22	59	41	77	79	72	58	55	64	39	13	580	145
8	....	....	25	50	74	82	72	64	71	79	67	7	591	147¾
9	....	6	15	14	30	46	59	38	27	36	30	18	319	79¾

*Pen 6 laid eight eggs the last week of experiment, and these are included in the number recorded in October.

Table No. 4 gives the monthly egg record for each pen during the year. It also gives the total number laid during the year. This shows that Pens 3, 4 and 7 were the only pens that laid eggs in November, 1896. The last to stop laying at the end of the experiment was Pen 6, which was still laying when the experiment closed. The Brahmas, Pen 8, did not lay till January, and Pen 1 of old hens not till February. This pen, the last to begin, was the first to stop at the end of the year. The heaviest laying was in April and May. The record shows that the early hatched pullets began laying fully two weeks earlier than the late hatched. Pens 3 and 4, together with Pen 7, had been laying some time before being put in the experiment, and this fact should be taken into consideration when making comparisons between early and late hatched pens. No record had been kept of the number laid before the experiment began. Had these been counted, and had there been no break in the laying caused by the change of quarters, no doubt the record would have been 200 eggs for each pullet in Pen 4. This would have added much more to the profit, and reduced considerably the food cost per dozen of eggs. The pen of Brahmas made a good record during the time they were in the business. During the ten months that they laid they made a better record than the cross-breds during the twelve months. The cross-breds were broody longer than the pure-bred Brahmas, and this probably accounts for the smaller egg yield.

It should be stated that the results of this experiment have been accomplished with fowls kept in confinement. During the winter months, a period of between three and four months, they were not outside of the building. The four fowls had less than eight square feet of floor space inside the building, and when the male was with them, still less.

Table No. 5 shows the market value of the eggs laid each month by the several pens. The average monthly price of eggs is given at the bottom of the table. Taking Pen 4, the best month was August, when 85 cents worth of eggs were laid; eggs were then 12 cents per dozen. January was the next best, when 81 cents was made, with eggs at 18 cents per dozen.

Table No. 5.
Value of Eggs in Cents.

Pen.	Nov.	Dec.	Jan.	Feb.	Mch.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Total Value
1	....	....	....	.06	.32	.45	.50	.23	.12	.21	.14	....	$2.03
2	....	....	.22	.29	.48	.66	.66	.56	.53	.76	.70	.42	5.27
3	.25	.60	.80	.62	.56	.67	.63	.53	.48	.60	.51	.47	5.72
4	.32	.54	.81	.66	.63	.73	.76	.65	.54	.85	.72	.32	7.53
5	....	.04	.17	.20	.18	.61	.61	.56	.42	.49	.65	.07	4.00
6	....	.06	.61	.29	.61	.60	.61	.60	.60	.68	.61	.72	6.06
7	.02	.44	.88	.42	.64	.66	.60	.48	.46	.64	.45	.20	5.89
8	....	....	.38	.52	.62	.68	.60	.53	.60	.79	.79	.10	5.61
9	....	.12	.22	.15	.25	.38	.50	.32	.22	.36	.35	.30	3.17
Price of Eggs.	.20	.25	.18	12½	.10	.10	.10	.10	.10	.12	.14	.20	

*Market price per dozen.

Table No. 6 shows the weight of food in ounces for Pen 4 for the year, divided into thirteen periods of four weeks each. It shows the amount of each kind of food consumed during each of these four-week periods. It also gives the number of eggs laid during the same periods. This will show the relation of food consumed to the product in eggs.

Table No. 6.

Pen 4, Weight of Food in Ounces.

	*Mash.	Wheat.	Barley.	Bones.	Oats.	Corn.	Cabbage.	Lucerne.	Total Weight of Whole Grain.	No. of Eggs Laid.
Nov. 9 to Dec. 6.....	79	93¼	54	47½	.....	36	61	...	183	22
Dec. 7 to Jan. 3.....	62½	102	30	48	28	66	29	28	226	27
Jan. 4 to 31.....	74½	99	....	64	54	64	....	54	217	50
Feb. 1 to 28.....	77	123	....	55	53	32	79	68	207	64
Mch. 1 to 28.....	45	127	....	72	60	66	....	81	253	67
Mch. 29 to Apr. 25...	84	138	....	56	60	76	....	84	274	83
Apr. 26 to May 23....	84	157	....	78	71	36	....	....	270	82
May 24 to June 20....	84	161	....	54	146	....	....	....	307	73
June 21 to July 18...	75¼	207	....	51	131	....	....	....	338	52
July 19 to Aug. 15....	84	208	....	57	98	....	....	....	304	81
Aug. 16 to Sept. 12...	84	200	....	64	98	....	....	....	298	77
Sept. 13 to Oct. 10...	84	167	....	46	68	11	....	....	276	43
Oct. 11 to Nov. 7.....	81	104	....	39	95	62	....	....	261	5

* The weights of mash include water used in mixing it.

From a study of table No. 3, it will be seen that the only correct answer to the question, "Is there money in hens?" is, it depends. It depends on the kind and amount of food consumed, the number of eggs laid and the price of eggs when laid. The statement that there is no money in hens would doubtless be true, if Pens 1 and 9 only were considered. A satisfactory answer, moreover, could not be obtained by taking the average of all the pens. To prove such a statement, it must be shown that there is no money in hens under the best possible method of treatment. The record made by Pen 4, the ideal pen of the lot, is the only one that should be consulted. We see that for 62 cents worth of food this pen produced eggs worth $1.88, a profit of $1.26 on an investment of 62 cents. Of course these results will vary as the cost of food and the price of eggs vary. The money result can be figured out in any locality, knowing the average of food consumption and the product in eggs.

It may be stated that while Pen 4 was the ideal pen and made an excellent record, the record does not represent the limit of production. It was our first experiment. The quarters were new to the hens when placed in the experiment, and though Pens 3, 4 and 7 had been laying before, the change of quarters stopped them. On October 13 the pullets in Pen 4 laid their last egg, so that their egg-laying record was made in eleven months. They had been laying fully a month before being put into the experiment. Had the experiment begun a month earlier, and ended a month later, without interruption or change of quarters, the number of eggs laid by Pen 4 would doubtless have reached the 200-egg mark.

To show the effect, if any, of the different treatments on the weight of the eggs, the eggs from each pen were weighed for several weeks at the beginning of the experiment, and again during the month of April. From these weighings an average was found for the total yearly product. A comparison may also be made from these weights as to the size of egg laid by the different breeds represented in the trial. In the following table the weights are given in pounds for each pen. The pen numbers are given at the head of the table. The first column shows the average weight per dozen of eggs for each pen. The outline given elsewhere in this report will show the kind of fowls in each pen and the treatment received by each.

Table No. 7.

Weights of Eggs in Pounds.

	Pen No. 1	2	3	4	5	6	7	8	9
Average weight per dozen.....	1.57	1.40	1.49	1.42	1.52	1.39	1.52	1.63	1.48
Weight of eggs for year per fowl ..	8.4	15.98	19.51	21.46	13.54	17.42	18.39	20.03	9.8
Cost per pound of eggs, cents.....	6.3	3.5	3.1	2.9	4.5	3.6	4.0	4.0	6.3

It is worthy of note that the fowls without exercise laid heavier eggs than those with it. If Pens 1 and 5 old hens, and 2 and 6 late hatched pullets, and Pens 3 and 4 of early hatched pullets are compared, it is seen that the larger eggs were laid in each case by the pens without exercise. That would seem to be fairly conclusive. I call attention to this fact without assuming an explanation as to the philosophy of it. This column shows another rather striking fact: the eggs laid by the old hens averaged considerably heavier than those laid by the pullets.

The second column shows the actual weight of eggs per fowl for the year figured from the average per dozen given in the column above. Pen 4 leads in weight, each of the four pullets in this pen averaging 21.46 pounds of eggs; and by the way, this seems pretty good work for a little "egg machine" weighing less than four pounds. The second pen in point of weight is Pen 8 of Brahma pullets. Though they laid a considerably smaller number of eggs, as will be seen by reference to table No. 4, the total weight was within 1½ pounds of those laid by Pen 4 of Leghorns. Were eggs sold by weight instead of by the dozen, the difference in the money result from the two pens would be considerably lessened. But, of course, in figuring on profit, the cost of food per dozen of eggs must be taken into account. A column has been added to table No. 7 showing food cost per pound of eggs for each pen.

Conclusions.

From the results of the experiments recorded, the following conclusions seem warranted:

1. There is little profit in keeping hens three and four years old at the market prices of food and eggs in Utah. The profit in feeding young hens, or pullets, was six times greater than in feeding old hens three and four years old. This conclusion does not apply to two-year-old hens and hens more than four years old.

2. Leghorn pullets hatched in April gave better results than those hatched late in May. The profit was about one and a half times greater from the April hatched than from the May hatched.

3. The exercised pens, 4, 5 and 6, produced twenty-six eggs per fowl more than the pens without exercise—1, 2 and 3.

4. The three exercised pens produced eggs at a food cost of 5.3 cents per dozen; the pens without exercise at a food cost of 6.5 cents per dozen.

5. The three exercised pens averaged a profit per fowl during the year of 84 cents; the non-exercised pens, 58 cents.

6. Pen 1, representing egg production under the most

unfavorable conditions, except as to ration fed, cleared 2¾ cents per fowl during the year on the cost of food. Pen 4, representing egg production under the most favorable conditions, cleared during the year, $1.26 per fowl; this would have been increased considerably had the eggs laid before the experiment began being counted. In the one case there was a profit on food of 5 per cent; in the other, 203 per cent.

7. Exercise had no apparent influence on the weight of the fowl. The lack of exercise did not add to the weight of the fowls.

8. The non-exercised pens produce eggs weighing about 3 per cent more than the exercised pens.

9. The eggs produced by the old Leghorn hens weighed about 5½ per cent more than those produced by the Leghorn pullets.

10. The eggs produced by the Light Brahma pullets weighed 11½ per cent more than those produced by the Leghorn pullets.

11. The Barred Plymouth Rock pullets' eggs averaged about the same as those of the Leghorn pullets.

12. In two out of three pens exercise produced a larger consumption of food.

13. The exercised pens made a better use of the food than those without exercise. It required 22 per cent less food to produce a dozen of eggs with exercise than without it. The results are strongly conclusive that exercise aids digestion and assimilation of food. The chief value of exercise, therefore, seems to be in preventing a waste of food.

14. Exercise apparently reduced the percentage of fertility in the eggs.

15. The percentage of fertility was highest with the early hatched pullets, and lowest with the old hens; though the results are not conclusive.

16. The fertility of eggs averaging five days old was 300 per cent higher than of eggs averaging twenty-two days old.

17. The results noted above were secured from what was considered a good ration fed alike to all pens. Practically the same ration was fed throughout the year. The conclusions, therefore, must not be accepted if a different ration is used.

18. The results seem to indicate an average capacity for a Leghorn pullet of 200 eggs per year, with intelligent care and feeding.

19. No advantage was discovered in crossing Brahma and Leghorn.

The Pullets Excel Yearling Hens, and Greatly Excel Three and Four Year Old Hens

SECOND YEAR.

Age may bring reason to the hen, as it sometimes does in the case of a man; it may bring her experience and with experience wisdom, as occasionally happens to her owner. But do age with its reason, and experience with its wisdom, assist the hen in the production of eggs? That is the question that appeals to the practical poultryman.

Having in view the interests of this class of poultry-keepers, experiments were inaugurated at the Utah Experiment Station to test the relative egg-producing capacity of hens at different ages. Two pens three and four years old were placed in "competition" with two pens of pullets. The breed was Rose Comb Brown Leghorn in each case, and the strain was the same. There were four fowls in each pen. The pens were 5 feet by 7 feet, and attached to each was an outside yard 5x40 feet.

The following table gives the average results of the experiment for the year 1896-7:

Table No. 8.

	Weight of Food Consumed per Fowl in Pounds and Cost of Same.								No. of Eggs Produced and Value			
	Mash.	Wheat.	Bones.	Corn.	Oats.	Barley.	Lucerne.	Cabbage.	Cost.	No. Eggs.	Value.	Food Cost per Doz.	Per Cent Profit.
									Cts.	Cts.	Cts.		
Old Hens (1)	10	22½	10	6	11	1	5	3	53¼	64	56	9.9	5
Old Hens (2)	10	27	10½	6½	14	1	4½	4	62	105	100	6.9	61
Average									57⅝	85	78	8.4	33
Pullets (1)	10	25	10¾	6	14	1	4¾	7	61¾	188	168	4.6	174
Pullets (2)	10	27	10½	6½	14	1	4½	4	62	182	188	4.1	203
Average									62	170	178	4.4	188

It will be seen from the above that the two pens of old hens laid an average of 85 eggs per fowl during the year, while the two pens of pullets laid 170, or exactly double the number laid by the former. The value of the eggs laid by the old hens was 78 cents per fowl, and by the latter $1.78 per fowl. The cost of the food required to produce a dozen eggs was 8.4 cents for the old hens, and 4.4 cents for the pullets.

The pullets of 1896-7 were continued as one-year-old hens the second year, 1897-8, with the addition of another fowl of like age, breed, and former treatment, to each pen, making five fowls in each during the second year. The results of their second year's work are given in the following table:

	Second Year's Record of Food, per Fowl.							Egg Record and Value.			
	Mash.	Wheat.	Bones.	Corn.	Oats.	Oyster Shell.	Cost.	No. Eggs.	Value.	Food Cost Per Doz.	Per Cent Profit.
							Cts.		Cts.	Cts.	
Pen 1	9.1	33.5	9.6	0.5	18.2	1	62.1	150.8	168	4.9	170
Pen 2	9.1	34.5	9.8	0.5	22.0	1	66.5	114.2	111	7.0	67
Average	....	....	....	....	....	....	64.3	132.5	140	6.0	118

It is seen that Pen 1 laid during the second year an average of 150.8 eggs per fowl, against 158 the first year. Pen 2 laid 114.2 the second year against 182 the first. They averaged the first year 170 per fowl and 132.5 the second year. As pullets their eggs were worth an average of $1.78 per fowl, and as one-year-old hens they averaged $1.40, a difference of 38 cents in favor of the first year's laying. But the profit from the two is another question. Deducting the cost of food in each case we find that the profit was $1.16 per fowl the first year and 76 cents the second year. That makes the percent profit on food the first year 188, and 118 the second.

These figures will afford some basis for a discussion of the question, does it pay to keep hens two years? Figuring on food cost alone there is a very satisfactory profit the second year as well as the first; so that it does pay when food cost alone is considered. But then there are other items of cost—labor, a yet unknown quantity, and interest on investment. The expense of keeping a pullet is no greater than that of a hen, and those figures show that the profit was some 50 per cent greater for the pullet than for the year old hen. For ease of calculation, suppose a man can care for a thousand hens. If they are pullets, according to these results, they will yield a profit on food of $1,160 per year. If they are one-year-old hens the profit will be $760. In the one case the man will have $1,160 for his labor, interest on investment, etc., and $760 in the other case, a difference of $400 in favor of killing off the hens at the end of the first year. As he can care for only a limited number of

hens, it certainly would pay him to renew his flock every year, assuming that the cost of replacing the hen with a pullet can be paid with the money received from the sale of the hen. But the life of the great majority of the hens of the country is doubtless longer than two years. If we refer again to table 1, we see that the average value of the eggs produced per fowl of old hens was 78 cents. Their food cost 57½ cents, leaving only 20 cents profit on food. With a thousand such hens there would be left only $200 to pay for labor and interest on investment, as against $1,160 in the case of pullets and $760 for one-year-old hens.

In the above I have given the data obtained in two years' experiment. The results may be modified in further experiments. They are being continued at the Station and the third year will be completed in November.

All pens were fed alike, except as to quantity. A mash composed of two parts bran and shorts and one part each of chopped corn and oats, was fed in the morning. About 10 o'clock a little grain was fed. Three times a week cut bones were fed. Cabbages were fed until about the first of March, after which, and until green grass could be secured, lucerne leaves were fed dry. This was scattered in the pens. During the summer green grass was thrown into the pens. No stimulating food was fed, except a little cayenne pepper in the morning mash. Salt was also used in the mash. During the winter coal ashes were kept before the fowls, also a little gravel. No oyster shells were fed until the middle of summer.

Though it is not a part of my subject, it may be mentioned incidentally that this experiment involved a test of the value of exercise. The pen marked 1 received their grain food in a box; the others (2) were fed in a litter of straw on the floor, inducing exercise.

JAMES DRYDEN.

CONCLUSIONS BY THE EDITOR.

These experiments are of great value to poultrymen, and would be if they did no more than rouse an interrogatory feeling among us.

We are, however, inclined to direct the attention of our readers to a few of the items in the foregoing reports.

We will discuss the conclusions arrived at by Mr. Dryden at the end of the first year's experiments. They will be found numbered from one to nineteen, and clearly express the natural deductions obtained by experiment of that year.

PULLETS VS. HENS.

Let us refer to the comparison of pullets with hens. We would like to consider the results from a slightly different standpoint to that taken in the experiment work. Instead of merely taking into consideration the number of eggs laid by pullets, as compared with one-year-old hens, and with older hens, suppose we go into the question in the light of an investment; for really it is the financial aspect of the case which interests us all.

We will consider one pen of pullets, one of old hens, and one of yearlings, taking in each case the best paying pen. In considering the expense account of the pullets, we certainly should include the cost of the fowl from the time it is hatched. It is not enough simply to commence at a period when the pullet commences to lay and to compute disbursements and receipts for one year from that date. The pullet is of some value at the time it commences to lay; it also represents an outlay.

The pullets were hatched in April and commenced to lay in November. That gives just seven months in which to bring them to a laying stage. The cost of food for a year, according to table 3, was 62 cents. Reckoning on the same basis, the cost of food for the seven months would be 38 cents. Assuming that we buy the food at the beginning of the year sufficient to last throughout the year, then by the end of the first laying year (nineteen months in all from the time they were hatched) there is an outlay for food of $1. Assuming now that we sell the pullet at an ordinary market price, which would be 25 cents; adding to this the value of eggs laid by her during the year, $1.88, which gives us a total of $2.13. Deduct the original investment of $1 and we have a profit of $1.13 on the cost of the food.

Now let us refer to the three and four year old hens. As we estimated the value of the pullet at twenty-five cents when we wished to sell her, we may also estimate the value of old hens at the same figures when we wish to buy, therefore, there is an investment of twenty-five cents to commence with. Adding to this one year's food sixty-two cents, making a total investment of eighty-seven cents; then as to receipts—we get twenty-five cents upon marketing the hen; we have received $1 for eggs, making a total of $1.25. Original investment eighty-seven cents, being cost of fowl and of food for a year, which being deducted, leaves us thirty-eight cents profit.

Now, we will consider the one-year-old hens. We purchased the fowls for twenty-five cents each, food cost sixty-two cents, total investment, eighty-seven cents. At the end of the year we sell the fowl for twenty-five cents; eggs to the amount of $1.63, gives us a total of $1.93. The original investment of eighty-seven cents deducted therefrom leaves us a profit of $1.06.

Upon this basis, instead of there being a difference of twenty cents in favor of the pullets as against the one-year-old hens, we make it on these figures alone, a difference of only seven cents in favor of the pullets as against the yearlings.

We must, however, go into the matter more deeply, as there are other things to be considered outside of the food question.

First—the eggs from which the pullets are hatched cost something. If you work on the basis of a 50 per cent hatch and 50 per cent chicks raised, it means that there will be four eggs used for every chicken raised. At twenty-five cents a dozen, which would be a fair price for April, the time when the pullets were hatched, these eggs amount to eight cents. Suppose we call it three eggs and say six cents, which is to be added to the cost of feeding the pullets to maturity.

There are other items. The hen which hatches the chicks and mothers them takes at least two months' food, which would average any way two cents a chick.

If incubators and brooders were used there would be less cost. We may overlook the extra labor necessary with chicks. They will have to be fed oftener and require more all-around attention; but we throw that in. We have not hitherto considered the value of houses in this comparison, because the fowls were all on equal terms in that respect, they were all laying.

It is different with pullets. There are seven months during which they do not lay, but they occupy a certain amount of house room. We average that at seventy-five cents for every pullet. Interest at six per cent on that amount would be four and one-half cents, and surely this must be added when we wish to know the actual profit or loss.

These additional items create an extra expense of six cents for eggs, two cents for feeding the hen, four and one-half cents house room for non-layers, making in all twelve and one-half cents, and reducing the profit derived from the pullet to one dollar and one-half cent as compared with one dollar and six cents, profit on the one-year-old hen.

There is an advantage in pullets raised at home, which we do not meet with in pullets that are bought. There is a disadvantage in connection with fowls that are bought, that is, it takes, say a month, before they commence laying; during which time they have to be fed at a cost of perhaps five cents each.

These figures simply bear out the contention of the majority of first-class breeders, who advocate the keeping of fowls to the end of the second year. There is so little difference between the pullets and the one-year-old hens, if we consider every single expenditure, that we are not impressed with the statement that pullets are so much more profitable.

Our advice is—keep the fowls to the end of their second year. EDITOR.

AN EGG RATION.

The Montana Experiment Station Conducts Experiments with a View to Reducing Cost of Egg Production—The Value of Vegetables, Meat and Grain.

IN MARCH, April and May, 1900, we fed four pens of fowls, sixteen in each, fifteen hens and one cock, upon four different rations with a view of determining what effect a variety ration (meat, vegetables and grain), a meat ration (meat, meal and grain), a vegetable ration (vegetables, meal and grain), and a straight grain ration had upon egg production.

The fowls were housed in a log building in pens 9x10 feet with yards 10x16 feet. The yards were very small, as the ground in front of the building was being graded. The fowls obtained no vegetable food whatever from the yards, as they were covered with chaff and straw. Grit, burnt bone and dust baths were supplied the fowls alike, as was plenty of fresh water. The birds all remained quite healthy throughout the duration of the experiment, two months and a half, no loss or any disease occurring. Each pen contained eleven two-year-old hens and four pullets and one cock. The male birds were all vigorous yearling Plymouth Rocks and well developed, so that a maximum amount of service could be expected from each of them. The hens were about one-half scrub stock, Cochin, Game, Leghorn and Rock mongrels, and the remainder pure-bred Plymouth Rock hens. They were as evenly divided in respect to variety as possible. Feeding was done three times a day, about 7 a. m., again at 11:30 a. m. and from 4 to 4:30 p. m. In each pen the floor was covered with litter and the grain fed therein, so that, though closely confined, all had plenty of exercise.

Rations

Pen No. 1 received in the morning 12-ounce feed, ¼ bran, ¼ oat chop, ½ meat, ¼ vegetable, then a mangold was given, and at noon clover with a little meat or ground green bone. Evening feed was grain (wheat or oats).

Pen No. 2 received in the morning 12-ounce feed, ¼ bran, ¼ chop, ½ meat, later some grain, and at noon a little meat or bone. Evening feed was grain (wheat or oats).

Pen No. 3 received in the morning 12-ounce feed, ¼ bran, ¼ chop, ½ vegetable, then mangold and a little grain, and at noon clover and roots, and in evening grain (wheat or oats).

Pen No. 4 received in the morning 12-ounce feed of chop, ½ bran, ½ oats, mixed with warm water.

Cost of Different Rations.

Pen No. 1—Cost of bran, oat chop, meat and bone, vegetable, grain, $1.97.

Pen No. 2—Cost of bran, oat chop, meat and bone, grain, $2.03.

Pen No. 3—Cost of bran, oat chop, vegetable, grain, $1.79.

Pen No. 4—Cost of bran, oat chop, grain, $1.95.

It was the endeavor in composing these different rations to show the advantage of a variety, and the variety of feeds used was such as could be made use of generally.

In the second ration we endeavored to show the value of a succulent vegetable feed by eliminating it.

In the third the value of meat and bone was demonstrated in the same manner.

In the fourth we endeavor to show the fallacy of feeding, as many do, a straight grain ration. And in the results it was shown, from egg production, that the greatest egg yield was received from the first, the variety ration, while the smallest returns came from the hens fed upon the grain alone. The advantage here must be very apparent, since the cost of both rations was almost the same. The following table shows briefly and concisely the egg yield from the different pens, the weight of eggs, and their market value:

Pen.	No. Laid.	Weight	Cost.	Value.	Gain.
1.....	431	45-8 ounces	$1.97	$8.98	$7.14
2.....	407	44-4 ounces	2.03	8.48	6.58
3.....	366	39-11 ounces	1.79	7.62	5.94
4.....	342	36-6 ounces	1.95	7.12	5.29

In computing the cost of food in this experiment the following values were used:

	Per cwt.
Oat chop.....	$ .96
Bran.....	.70
Oats.....	.90
Wheat (frosted).....	.40
Mangolds.....	.75
Clover.....	.30
Potatoes.....	.50
Beef and Bone.....	1.00

The eggs were valued at 25c a dozen.

The financial results of this experiment are excellent. It has been shown that even where fed upon grain alone and closely confined, considerable gain was made, while the pen receiving the greatest variety of food, costing about the same, made a further gain of $1.84. The total returns of pen No. 1, deducting the cost of food, being $7.13 and from pen 4 being $5.29. In the meat and vegetable fed pens the one receiving the meat and bone, though the more expensive ration, was still more profitable, yielding a profit of 64 cents over pen No. 3, the total profits from the four pens of 60 birds being $24.94, or 41½c per bird for period of experiment—two and one-half months.

GREEN BONE AND MEAT MEAL FOR EGGS.

The West Virginia Experiment Station Compares the Value of Meat Meal, Ground Fresh Meat and Bone as Egg Producing Foods.

IT IS well known that ground fresh meat and bone is a very valuable constituent of a ration for egg production. In many localities, however, it is difficult to procure fresh bones and scraps from meat markets, and even when a supply is constantly available it is not usually an easy matter to grind the material for the fowls. On the other hand, beef scraps and meat meal can be bought of the poultry supply houses at any time, and being in a thoroughly dry condition, can be readily mixed with other feeding stuffs.

The experiment described below was undertaken for the purpose of comparing meat meal with ground fresh meat and bone as materials furnishing protein to laying hens.

Thirty-four Barred Plymouth Rock hens and two cocks were divided into two similar lots. They were supplied at all times with mica crystal grit, granulated bone and water. The grain ration for each lot of fowls was the same, but the amount consumed varied somewhat, and so the actual amount of grain consumed by each lot is given. At the beginning of each period the grain for that period was weighed and stored in suitable boxes. No account was taken of the daily amounts fed. At the end of each period the amount remaining was again weighed, and the difference taken as the actual amount of food consumed.

The experiment began October 25, 1899, and was continued for four periods of thirty days each.

During the experiment the fowls receiving the fresh bone laid 3,824 eggs weighing 495.2 pounds, of an average weight of 12.75 pounds per hundred eggs, while the meat meal lot laid only 3,260 eggs weighing 391.2 pounds and weighing 11.94 pounds per hundred. Consequently the fowls fed fresh bone not only gained more in weight, but they also laid more and larger eggs.

PRESERVING EGGS.

Experiments on Egg Preservation at the Agricultural College, Guelph, Ontario, Canada, Afford Valuable Information—Methods That Were Tried and Results Obtained.

From the Reliable Poultry Journal.

SEVERAL methods of preserving eggs have been tested during the year. The eggs for this purpose were taken early in June, and were tested in December. Many of the same methods that proved fairly successful last year were again tried.

Method No. 1—A solution was used composed of one part water glass (sodium silicate) and five parts water that had been previously boiled. This was a very strong solution, and unless an egg was absolutely fresh, it would not sink in the solution.

The eggs from this solution were of fairly good flavor, and all were well preserved.

Method No. 2—This was similar to No. 1, except that eight parts of water were used instead of five parts. The eggs in this were nearly as good eggs as those from No. 1. This is a good preservative where it is desired to keep summer eggs for winter use.

Method No. 3—This was composed of ten parts of water to one part of water glass. There were no bad eggs in this solution, but the eggs were inferior in flavor and in poaching quality to those kept by methods No. 1 and No. 2.

Method No. 4.—This consisted of the same solution as No. 2; but in place of allowing the eggs to remain in the liquid they were removed after having been in it for a week, except the last lot which was put in the solution. This lot was allowed to remain the remainder of the season.

(a) The eggs, after being in the solution for a week, were removed and placed in an ordinary egg case in the cellar. They were all good when tested, but had evaporated considerably and were lacking in flavor.

(b) These were the second lot of eggs to be placed in the liquid. They were handled similarly to those in (a), and were about equal quality.

(c) These eggs were allowed to remain in the liquid. They were well preserved, all being good.

They were scarcely equal in quality to those from No. 2 method, but were superior to those from No. 3.

Method No. 5.—A lime solution, made as follows:

Two pounds of fresh lime were slacked in a pail and a pint of salt was added thereto. After mixing, the contents of the pail were put into a tub containing four gallons of water. This was well stirred and left to settle. Then it was stirred thoroughly the second time and left to settle; after which the clear liquid was poured over the eggs, which had previously been placed in a crock or tub. Only the clear liquid was used.

These eggs were well preserved; but those from the bottom of the tub had a decidedly lime taste, and the yolk in them was somewhat hardened.

A Question on the Subject of Preserving Eggs

Au Gres, Mich., June 20, 1901.

Editor Reliable Poultry Journal.

Regarding the article on preserving eggs, I would like a little more information on the subject. As I understand

it, sodium silicate is a liquid, and according to the price we have to pay for same here—50 cents per gallon—it would cost about 2½ cents per dozen to preserve eggs. Now can you tell me how much liquid one pound of the powder silicate would make? Would it make one gallon or ten gallons of sodium silicate? I suppose that sodium means water. We can buy the powder for 60 cents per pound and the liquid 50 cents per gallon, and if one pound of silicate will make more than one gallon, it would be much cheaper to use the powder and furnish your own water. P. B. G.

A.—The above inquiry we sent to the experiment station from which the information referred to was obtained. We received the following answer:

Guelph, Ontario, Canada."

"I must apologize for not answering your letter at an earlier date, but I have been waiting on our chemist. He has been away looking after sugar beets and is still out, so cannot give you any definite answer regarding the powder. I cannot see why it would not act as well diluted. I presume any good druggist would be in a position to inform you upon the matter.

"I find water glass (sodium silicate) is variable in strength, also that the English water glass is much thicker and stronger than the American. We find that the American as we get it will sink in a preparation of one part water glass to six parts of water, and in some cases to five parts water, whereas with the English it will not sink in a solution of less than eleven to twelve parts of water.

"We find it costs us about one cent per dozen to put eggs in the English water glass, diluting one to twelve, and paying 80 cents per gallon for the liquid.

"Very truly yours.

"W. R. GRAHAM,

"Manager Poultry Department, Ontario Agricultural College,

PRESERVATION OF EGGS.

The Rhode Island Experiment Station Makes Tests of Various Methods of Preserving Eggs, and Secures Results that Will Interest Poultrymen—Details of the Experiments.

THERE are numerous methods of preserving eggs, all of them of commercial importance, because, were it not for them, the market would not be relieved of its surplus at the time of the greatest production, and prices would fall so as to leave no profit for either producer or dealer. A novel industry is that of canning eggs, as practiced by the large packing houses. The shells are removed and their contents sold for baker's purposes. Another method of preserving eggs is by drying the whites and yolks, which are then sold in powdered form.

Ofttimes the knowledge of a coming scarcity of fresh laid eggs makes it desirable for the housewife to keep eggs for several weeks or even months before using. After repeated requests the Rhode Island Experimental Station undertook to determine which of the numerous simple methods could best be utilized to economically and effectively preserve the surplus of eggs, produced in the spring for a few months, so that they might be used to advantage in the fall and early winter, when eggs are scarce.

The oxygen in the air is the chief promoter of the chemical changes wrought by action of the germs, hence the exclusion of the air excludes both the germs, and their supporting element. For this reason the success of most methods of preserving depends upon the absence of air. Of these methods the following were deemed worthy of a trial:

1. Water glass (a silicate of soda).
2. Salt.
3. Slacked lime and salt brine.
4. Vaseline.
5. Dry wood ashes.
6. Gypsum.
7. Powdered sulphur.
8. Brimstone fumes and sulphur.
9. Permanganate of potash.
10. Salicylic acid.
11. Salt brine.

In each test fresh eggs were used, carefully gathered and cautiously handled. When a liquid preservative was used, the eggs were carefully washed before being subjected to the process. For the parallel tests twenty eggs were used, as uniform as possible in size, color of shell and age, laid by fowls of one breed, treated alike as to food, range, care and management. During the trials the stone jars containing the eggs remained undisturbed on the floor of a cellar closet where the temperature ranged from sixty-two to sixty-seven degrees F. in summer.

RESULTS OF TESTS.

WATER GLASS.

Water glass, or soluable glass, was diluted with water in the proportion of one part water glass to nine parts boiled water. On May 18, 1899, twenty Leghorn eggs were carefully washed and placed in a stone jar. Over them was poured the ten per cent solution of water glass. In this preservative they were kept a little more than ten months, until April 4, 1900. Result: Good, 100 per cent; bad, 0 per cent.

The shells of the eggs were very clean, owing to the alkaline nature of the solution; the air cells were not enlarged. Examination showed the whites of the eggs to be clear, but not so limpid as those of fresh eggs. The eggs appeared normal in color and condition. They had kept well for ten months, and proved to be suitable for table use.

SALT.

Fine table salt used. It was packed in the jar to the depth of two inches. Twenty eggs were packed in the jar, small ends down, not touching each other, and closely packed in salt. Result, April 4: Good, 0 per cent; bad, 100 per cent.

For preserving eggs for a few months, however, this method may be recommended. It is simple, cheap, and for short periods reasonably effective.

LIME WATER AND BRINE.

One pound of quick-lime and one-half pound of table salt were thoroughly mixed with four quarts of boiled water. After slacking and settling, the clear solution was drawn off for use in the test. On May 18, twenty eggs were covered with the liquid. At the end of the period the result was: Good, 100 per cent; bad, 0 per cent.

The surface of the shells was clean and clear. The air cells were not increased in size. The whites and yolks were normal in appearance. The whites beat up nicely, but had a slightly saline taste. This old-fashioned method of preserving eggs was again proved effective.

FAILURE OF OTHER METHODS.

In this test of long duration (ten months and seventeen days), the remaining eight methods proved total failures.

To determine more fully the value of water glass as a preservative, four more tests were made. These four lots were placed in the solution May 20, 1899, and were kept until the fourth of April following, when they were pronounced nearly as good for culinary purposes as fresh eggs. Further tests proved only more conclusively that this silicate of soda was nearly perfect as a preservative of eggs. From 120 eggs not one was bad.

WATER-GLASS SOLUTION.

The keeping of eggs in a ten per cent solution of water glass for a period of nearly a year resulted so successfully that it was decided to continue the experiments and ascertain to what extent the solution could be diluted and still remain an effective preservative. The result of this series of trials is here shown in tabular form.

Test No.	Method.	Per cent.	No. of Eggs.	Period. Mos. Days.	Good. Per cent.	Bad. Per cent.
XXV.	Water glass	10	30	11—19	100	0
XXVI.	" "	5	30	11—19	100	0
XXVII.	" "	5	24	11— 6	100	0
XXVIII.	" "	3	24	11— 6	0	100
XXIX.	" "	3	20	10—21	100	0
XXX.	" "	10	20	10—21	90	10
XXXI.	" "	10	20	9—15	80	20
XXXII.	" "	5	20	9—15	85	15
XXXIII.	" "	3	20	9—15	100	0
XXXIV.	Pure Water.	.....	17	9—15	0	100
XXXV.	Water glass	2	17	9— 8	100	0
XXXVI.	" "	4	15	8—24	100	0
XXXVII.	" "	1	14	8—24	0	100
XXXVIII.	" "	3	15	8—24	100	0

The expense of the water glass at sixty cents per gallon would amount to about two-thirds of a cent per dozen eggs. This does not include the expense of the jar or other receptacle, which may be of stoneware, glass or wood.

Note.—Those who visited the incubator exhibit at the Pan-American Exposition will remember that in a small booth at one end of the building a persuasive talker was earnestly declaiming the merits of his "new and sure recipe for preserving eggs." On a table he had a three-gallon stone jar filled with eggs which he claimed had been in the colorless solution for nearly a year. He had testimonials to show that some of the purchasers of his "marvelous discovery" had kept eggs for more than a year, at the end of which time they were as good as when laid. He did a rushing business selling formulas at "$1 each, reduced from $2." "Buy eggs when they are eight cents a dozen, and sell them for forty cents when eggs are scarce," was his inducement. His preservative was a ten per cent solution of water glass.

WEIGHT OF EGGS DURING INCUBATION.

Tests Made by the West Virginia Experiment Station to Discover the Loss of Weight in Eggs During Incubation.

A RECENT bulletin of the West Virginia University Experiment Station, Morgantown, W. Va., is devoted to a report of loss in weight of eggs during incubation. Details of three tests are given, showing the original weight of the eggs, their weights respectively at the end of the fifth, twelfth and nineteenth days, and a comparison of the weights of infertile eggs with those that hatched, and with others that contained chicks dead in the shell. The summary and conclusion give results of the experiments as follows:

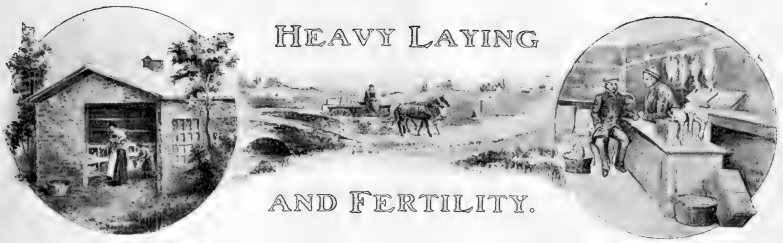
1—Fertile eggs, when incubated in a normal manner, decrease in weight.

2—The eggs which hatched lost 4.17 per cent of their weight during the first five days of incubation. During the seven succeeding days they lost 6.35 per cent of the weight of the eggs at the end of the fifth day, and during the next seven days last 6.98 per cent of their weight at the end of the twelfth day.

3—One hundred fertile eggs of average size will lose 234.9 grams, or 8.28 ounces, during the first five days of incubation; 341.8 grams, or 12.05 ounces, during the next seven days; and 352.8 grams, or 12.44 ounces, during the next seven days.

4—The unfertile eggs lost 3.6 per cent of their original weight during the first five days of incubation. During the seven succeeding days they last 5.6 per cent of what they weighed at the end of the fifth day, and during the next seven days lost 5.6 per cent of their weight on the twelfth day.

One hundred unfertile eggs will lose 217.2 grams, or 7.66 ounces, during the first five days; 323.3 grams, or 11.40 ounces during the next seven days; 306.9 grams, or 10.82 ounces, during the next seven days.



GETTING FERTILE EGGS.

Care of the Breeding Stock—Merits of Green Food—Selection of Eggs— Age and Constitution of the Layers—Maturity of the Males.

By A. F. HUNTER, Associate Editor of the Reliable Poultry Journal.

ANOTHER hatching season is at hand and we will do well to again consider the points of getting eggs that will procure strong, vigorous chicks. It is of little advantage to hatch weak, puny chicks. They linger along a week or two, then pine and die; there is no satisfaction in hatching such chicks as that, and yet, unfortunately, a great many such are hatched. If the knowledge requisite to the hatching of strong, vigorous chicks was more generally taught, and then lived up to, the now very great chick mortality would be decidedly lessened, and our profits very much enhanced

We use the term, "good hatchable eggs," and use it advisedly, because thousands and thousands of eggs are put into incubators or under hens which never ought to be used at all; they will not hatch if incubated, or, if they do hatch, the chicks produced will be so weak and puny it is impossible they should make a live of it. The witty "Autocrat of the Breakfast Table" was asked when the education of a child should begin, and replied, "twenty years before the child is born," and we ought to begin to work for the good hatchable eggs we want at least a year before the eggs are produced. This, of course, means selecting the birds for our future breeding stock while they are still chicks; their strong, sturdy appearance at that time plainly indicates strength and vigor of constitution which will make them hardy and vigorous birds.

An excellent illustration of the great benefits of strength and vigor in the breeding stock is seen in a letter from a Tennessee subscriber, which we quoted in the R. P. J.: "I give my incubator good attention and use only the best eggs, carefully tested for good, even shells, and I always set two hens at the same time. When I test out the infertile eggs I replace with live eggs from under the hens, so that all the eggs left in the machine are strongly fertile, and it is no wonder to me that I hatch nearly all of them. From time to time I compare it precisely, so that when hatching time comes the chicks hatch like popping corn. When I take off a hatch I do not expect a single chick to die, and they rarely ever do. If this sounds to you like bragging, let it go at that, but the statement is true, that from the last three hatches I have made not a single chick has died. They were raised and are now being raised in brooders, in the dead of winter, and not, as you assume, in the spring months of last year. My hens are strong—if they haven't got legs on them like mill-posts then I do not keep them. I know both a hen's capabilities and limitations, and early in the summer can pick out the pullets that will pay for their keep.

"The suggestion that you make, that I would have to incubate 5,000 eggs a month to market 2,000 broilers a month, seems to me, in the light of my own experience, simply preposterous. You may be right, but give me such hens as I have got, let me select the eggs, run the incubators and superintend the feeding and care of the chicks, and I would not give any one ten cents to guarantee me 4,000 broiler chicks from 5,000 eggs. I know I should do better than that here in Tennessee. If this sounds like foolishness to you, it must be because you have operated in the north and raised your chicks in confinement. Mine have large runs on blue grass and white clover from the time they are two weeks old, the year around, and they inherit good constitutions from parents raised in like manner, and they just simply don't die."

There is a great big moral in that story. What a splendid example of strength and vigor in the breeding stock, grown from chicks that inherited strength and vigor from their parents, and the chicks hatched from eggs produced by such strong constitutioned breeding stock "just simply don't die." Note, too, that the eggs are "only the best eggs, carefully tested for good, even shells." Far too many of us do not "select" the eggs from which the chicks are hatched, to say nothing of "selecting" the hens that are to lay the eggs! If, however, we are to have generations of strong-constitutioned stock we must work for it as does our Tennessee friend; we must build up the strength and vigor by careful and persistent "selection" for these much desired qualities.

Raising the Breeding Stock.

Our future breeding birds should be brought up on free range, where they can get plenty of fresh air and exercise and have plenty of shade when they want it, and should be

fed a ration which will produce flesh rather than fat, to the end that they grow up strong, muscular, hardy, and have much reserve strength. This stock after being brought into the houses for the winter should have plenty of fresh air and abundant exercise. To attain these things the curtained-front scratching shed house is desirable and they should be compelled to work and scratch for every kernel of grain they eat. To say, "compel" does not rightly express the idea, because it is the bird's nature to scratch for and search for its food, and it is only necessary for us to provide the right conditions to have the birds do the necessary scratching and searching—"it is their nature to!" That scratching and searching quickens the circulation and promotes digestion; in other words, it promotes and preserves good health: and such birds, fed a well-balanced ration, and breathing sweet, pure, fresh air, will produce good, sound eggs, eggs with firm yolks and whites of the right constituency and with sound, strong shells, and when put in an incubator or under hens, with the hatching conditions right, the chicks will come out of them "like popping corn," as Mr. Pollard is so fond of expressing it.

Green food in winter is most essential. When running at large in the grass fields growing pullets eat a very great quantity of grass-blades, etc., and when they are brought into the pens in the poultry houses they must have the same conditions continued in the shape of green food regularly supplied to them. if good health would be maintained. What this green food is depends upon what supplies we have; it may be any one of several things or it may be of several kinds. Cut clover or alfalfa in the mash are the best articles for this green food supply, and fresh cabbages are a close second. Almost any kind of vegetables or fruits, such as turnips, beets, carrots, apples, etc., etc., are good, and the birds eat them greedily. Not only do these green foods promote the general health of the fowls, but they are economical to feed because they "extend" the ration and thus save the consumption of grain and more costly foods; the poultryman who feeds green food regularly will find his grain bills greatly reduced thereby, besides the great advantage of better health of the fowls, more eggs, and stronger chicks hatched from the eggs.

"Select the Eggs."

Not only should we select the breeding stock, but we should "select" the eggs laid by the breeding stock that we have selected. Do not set an egg, even from your best hen, if it is a poor egg; by which we mean poorly-shelled, poorly shaped, or otherwise lacking in the qualities which make up a good egg. The fancy poultry breeder gives too little heed to the most important points of strength and vigor of the chicks, and will use misshapen and poorly-shelled eggs if the hen that laid them is all right—is possibly a first prize winner. He is thinking of the fine points of the hen and not at all of whether the chicks hatched from those eggs will grow up strong, sturdy and vigorous. The practical poultryman, on the contrary, can ignore the show qualities, and should consider only the strength and vigor of the offspring. Therefore, after we have selected our best breeding birds, paying particular attention to the points requisite for constitutional health and vigor, we should reject every egg that is questionable, and put in the incubator or under the hens only such as give the best promise of producing first quality chicks; in other words, using only "good, hatchable eggs."

Undoubtedly the eggs from the year-old-hens will produce the largest, strongest and most robust chicks, hence, if we are aiming at the very best results we will not breed from pullets, even though they be a full year old at the breeding season; it is much better that they pass through the summer and through one molt in order that their "staying power" become manifest. Not infrequently a pullet which is very promising at six or eight months old and proves a most excellent layer for a time, develops some constitutional weakness, or some defect develops which puts it out of the running—and such should never be used in the breeding pen. Similarly with those that have had colds, or other illness. Such illness is good and sufficient evidence of lack of vigor, and the manifestation of any lack of vigor should exclude the bird from the breeding pen.

Herein is the strongest argument against using pullets for breeders, even though they be in apparently excellent physical condition. We ought not to use their eggs for breeding until they have approved their constitutional vigor by a full year's work in egg production and passing through the trial of the molt. Similarly with males; do not use one that is not fully mature—that means that it is at least ten months old when put in the breeding pen. We had a letter a few days ago from a lady who had bought a sitting of eggs the last of July and hatched a clutch of chicks in August, and she asked if a cockerel from that clutch would do to use in the breeding pen this spring. Most certainly not. Cockerels so late hatched as that are "soft" and immature. To use them in the breeding pen insures poorly fertilized eggs and a lowering of strength and vigor of the chicks. Be sure that the cockerels put in the pens are early hatched and fully matured, with stout, sturdy legs and broad backs; in fact, that give abundant evidence of full strength and vigor. Such will produce good chicks if the females are right.

It is sometimes advisable, too, to alternate males in the pens. A communication published in the R. P. J. tells how the writer got 79 per cent hatch from all eggs put in his incubators, and one of the methods he employed was to have six breeding males for four breeding pens, and keep the males moving from pen to pen, each male having one day in each pen and two of the males being out resting all the time. There are many advantages to such a plan, as it prevents the male having special favorites among his mates and ignoring others. Of course, this plan interferes with what is called "special matings," which is where females have special points which need to be strengthened are mated to males which it is estimated will strengthen those weak points. For the practical poultry raiser (and that means nine-tenths of the poultry raisers) special matings are unnecessary. The points for him to consider are strength and vigor of the chicks, and to that end he should study the strength and vigor of the breeding stock and the conditions which promote the good health of that breeding stock, and then aim to produce "good, hatchable eggs" to the end that the chicks hatched from them are abundantly endowed with strength and vigor.

A. F. HUNTER.

HEAVY LAYING AND FERTILITY.

Arguments and Evidences Intended to Prove That the Two-Hundred Egg Hen is Fully as Reproductive as Her Sister, the Poor Layer. Correct and Economical Feeding and Balanced Rations

By A. J. SILBERSTEIN.

IT AFFORDED me no little gratification to read the reports of some of our experiment stations during last summer, showing that they had taken up record keeping, which I have long advocated and kept. The wide publicity given these reports was especially gratifying, but some of the deductions made from them by poultry writers were amusing.

One of the most interesting of these reports was that of the Orono (Maine) station, from which an amusing deduction was made by a well-known writer. The latter stated, "It was found that the eggs from the heavier layers were very infertile, and this is a point which calls for serious consideration of whether or not, where reproduction is desired, the heavy layers are best." In quoting this writer I wish to give him the credit of being the most conservative in his statement of the many who, under one pretence or another, have shied their castors at the heavy layer.

Those who have kept complete records for three or more years are prepared at any time to furnish sufficient facts to prove that the heavy layer is by no rule identified with the infertile hen; that, for some (as yet) unexplained causes, all flocks have their fertile and infertile hens—hens whose eggs hatch well and hens whose eggs are almost entirely infertile; that in both the fertile and infertile classes there are heavy, and average, and poor layers; but to assume that heavy layers' eggs are infertile because of heavy laying, is as wide from the facts as the statement that poor layers' eggs are infertile because of the few they lay.

The causes that induce fertility and infertility are almost entirely unknown; and if I were to hazard a guess from my own efforts to obtain light on the subject, I should be prompted to state that it will be a long time before information on this important question will be had, unless a lucky accident discloses the truth, as a fall, or idle kick at a stone has in the past disclosed a rich mine.

Where stimulation is resorted to for increased egg yield, it is doubtless to be expected that the eggs from the heaviest layer would prove the most infertile. There are many hens which cannot be stimulated to increased egg yield, and when condiments are regularly fed to such, infertility is immediately noticeable in decreased percentage of eggs hatched and increased percentage of mortality in chicks. Other hens, again, respond readily to stimulation, and at an even greater cost in fertility; the heaviest layer under such conditions being naturally the poorest in fertility. This is no guess, but a lesson learned from experience, and one that any breeder can readily verify at little cost in time.

Without knowing more of the experience in the case of the experiment of Orono station than appeared in print, I venture the assertion that if Professor Gowell were asked as to relation of percentage of fertility to laying (providing fertility records were kept of all layers, and stimulation were not resorted to) he would say that the heavy layer with the large percentage of fertility, was not exceeded in that percentage by his average or poor layers, or both; and that there were as many or more average and poor layers with low fertility records in his flock, as there were heavy layers with that failing. Where forcing is not resorted to, there is no line of fertility drawn between the heavy layers and others less prolific; nor does heavy (but natural) laying in any way interfere with the productive powers of the layer.

We find hens arrayed in classes without regard to their laying ability; some that will strongly stamp their progeny with their individuality; others that seem to reproduce themselves only at times and still others that completely fail in reproduction; and in each class, as in the fertility classes, the heavy, the average, and the poor layers are to be found, proving that natural laying has no influence whatever on reproduction.

In some poultry publications I have read articles that seek to prove the heavy layer is undesirable for breeding purposes, the argument being advanced that nothing is heard in the case of individuals or flocks that have made "phenomenal" (?) records, of their progeny having equalled or improved the "original" record. I fully realize that a wide field for misrepresentation, if not fraud, in statements of prolific laying is offered those with an elastic conscience, and also understand the kind of reception statements of seemingly large records receive from readers of poultry literature. Taking the subject as a whole, I assume responsibility for the statement that, were individual records of laying more generally kept, the two-hundred-egg-hen would be found to be quite numerous—perhaps seven to ten per cent of thoroughbred flocks would be found to exceed that mark; but large flocks that exceed an average of one hundred and fifty eggs per hen per year are extremely rare, if such exist. Speaking for myself, I am not anxious to divide the notoriety which the publication of so-called large records of individual laying brings with those who seek it; the few records of some of my birds that have been published, being with me merely an incident in the course of the work which I have mapped out and adhered to—the improvement of thoroughbred poultry in shape and plumage; in number, size and color of eggs; in weight of carcass and in early maturity.

It has also been argued that if the two-hundred-egg-hen can reproduce herself, it should be an easy matter to obtain a pen of her daughters, all two-hundred-egg-hens, the first year; that this pen could easily produce a hundred two-hundred-egg-hens another year; and so on, until this absent-minded theorist has succeeded, in fancy, in making eggs worth about ten cents a carload. On this same basis a ninety-five-point-hen ought to produce a pen of ninety-five-point-pullets the first year; this pen of pullets a hundred

ninety-five-pointers the second year, and so on, but they do not, and probably will not until we who breed them learn some of the A B C's of breeding, and I fear that day will not dawn in the lives of the present generation; but who knows?

That the two-hundred-egg-hen does reproduce herself quite as often as, and oftener, than the ninety-five-point-hen, is well known by those who have kept records for a few years. Just as breeders find it an easy matter to reproduce the ninety-two-point-breeder—harder to reproduce the ninety-three-point-bird—difficult to reproduce the one that scores ninety-four, and a rare occurrence to reproduce the male or female that reaches ninety-five, just so is the one hundred and twenty eggs per year hen readily reproduced, the one hundred and fifty egg hen not quite so readily, the one hundred and seventy-five egg hen quite difficult, and the two hundred egg hen about as easy to get a flock of as it is to get a flock of ninety-four-point hens. That "like begets like"—with intelligent allowance for reversion—is the experience of all old breeders in breeding all classes of thoroughbred stock.

To those who keep records, the above statements need not be proved, for each of them has been overwhelmingly proved in his own experience. To convince others, I give a brief statement, copied from my records, showing the effect of heavy (?) laying on fertility and the reproductive powers of so-called heavy layers. Unfortunately the records cannot be given for the complete year (I refer to current year), because of circumstances beyond my power to control. Keeping records was rendered impossible from September 12 to October 14, and parts of former years' records were lost. I give the statement without further comment:

That feeding has an important bearing on egg yield is too well known to require argument; but not in the sense in which it is very often discussed. Correct feeding is an essential to perfect health, and perfect health is essential to success in breeding. To force a fowl, and continue the

Dam's Record; Season 1899-1900	Pullets Retained for Breeding. (1900)	Pullets Began Laying	Record to Sept. 12	Total Eggs Set.	Total Chicks Hatched.	Sold.	Alive Sept. 2.
233 Eggs...	T 23	Feb. 10.	*a*134	46	22	10	4
	" 24	Mar. 17.	*b* 83	31	8	0	5
	" 89	Feb. 8.	148	31	27	15	7
	" 105	Mar. 26.	146	10	6	1	5
	" 161	Feb. 19.	173	30	24	8	11
	" 180	Mar. 20.	*c*111	35	0	0	0
209 Eggs...	" 15	Jan. 26.	157	33	26	6	14
	" 150	Jan. 20.	181	40	7	0	2
	" 51	Feb. 5.	*b*139	32	5	0	0
205 Eggs...	" 77	Jan. 9.	193	52	45	17	22
	" 85	Mar. 5.	151	27	15	4	3
197 Eggs...	" 84	Dec. 31.	189	52	38	20	9
	" 70	Feb. 17.	142	23	6	1	1
	" 149	Feb. 10.	*d* 67	7	3	0	3
195 Eggs...	" 100	Mar. 24.	125	22	15	5	6
	" 192	Jan. 6.	194	33	19	0	13
231 Eggs...	Eggs infertile during all of first year.						

a—T 23 died July 28. *b*—T 24 and T 51 sold Sept. 4. *c*—T 180 sold Aug. 1. *d*—T 149 sold May 5.

forcing beyond her natural ability, will meet with the same results that an effort to continue forcing a race horse to do the work of a draught horse would. With hens it does not always result in the death of the fowl, although I am quite sure that the breeder is fortunate who so quickly gets his proof. The results of forcing is too often evident in reduced vitality of the second and following generations, and that is the most expensive of all experiences in this line. With correct methods in feeding we can only hope for improvement in laying, and in shape, size, feather, etc., by rigid and careful selection.

What is correct feeding? Who among us knows? Speaking for myself, I am most anxious to learn. My construction of the term "correct feeding" implies the method which shall at lowest cost of material and time, keep fowls in perfect health as is evidenced by an ample yield of hatchable eggs, while maintaining the bird's size (weight) and uniform weight of eggs.

We frequently hear of instances where fowls of no particular breed, and receiving no care but an occasional feed of grain (generally corn) are yet giving good returns. If this is "correct feeding" we want to know it without delay. I had the opportunity of investigating one such case that was brought to my notice. It cannot, of course, be taken as a criterion for all, but such as it is, I give it, believing that it sheds some light on the subject.

In the case referred to the fowls had free range, access to manure cellar and every other place their fancy prompted; roosted wherever they pleased, were fed leavings from the table, and when these were scarce, were given corn. About forty fowls were giving eight to twelve eggs a day at the end of November. It was my good fortune to call when eggs were being gathered, and I counted eleven. I asked how often eggs were collected,' and was told, "Every now and then." Further questioning brought out the fact that no one had gathered eggs Thursday (Friday when I called) or Wednesday, so here we have the egg yield dwindled down to one-third.

In my effort to obtain results which seemed to me satisfactory, I have endeavored to imitate nature as far as my limited knowledge gave me a conception of her methods, and to improve on them where, in my judgment, improvement was possible.

In observing wild birds it has seemed to me that they hunt food about all day long, and in my fancy I have pictured them as often going to their roosts at night with their hunger but partly appeased.

Fowls will not exercise for the sake of exercise; given a full crop and they will doze until hunger prompts them to move. This has been my experience, and the experience of all with whom I have conversed on the subject. Given a mash in the morning they apparently do not see the grain thrown in litter for them to scratch for.

With my first lot of fowls I followed the beaten paths given in poultry literature of the day, and fed "all they would clean up quickly" of mash in the morning as instructed. "All they would clean up quickly" bothered me a bit, for I found their appetites to vary considerably, a pen of twelve fowls cleaning up anywhere from one to six pounds, so that, when making the mash, I was at a loss to know how much meal to use. The noon meal of grain scattered in litter seldom interested them, and their scratching was spasmodic and rare. I changed the bill of fare, and fed them mash for the noon meal, and after a while secured exercise in the forenoon. Another change, and mash was fed at night, and by this method was secured constant exercise throughout the day. This seems to me more in line with, and perhaps an improvement on nature's way. A careful sprinkling of small quantities of grain in deep litter during the day imitates nature in that it compels the fowls to seek for their food grain by grain, while the feeding of mash at night is the improvement on nature's way, which insures a full crop daily just before going to roost. I prefer mash to grain at night, because it digests quicker, bringing birds from the roosts the next morning with a sharpened appetite, while a full grain feed is often but partly digested in the morning. One night an accidental dropping of grain, after they had eaten all they would of mash, surprised me by causing the fowls to jump for it greedily. I thought

it over and the next night fed about half of the quantity they cleaned up the night before, then gave another portion, and a third, with about ten minutes' interval between each, and noted they ate fully one-half more in this way. Since then I have repeatedly tried feeding them at once the full quantity they ate the night before, but I never had them finish it. In short, by feeding small quantities at a time, I was coaxing them to eat more than they otherwise would. In theory, as in fact, I have never been able to see anything but improvement in results, as a consequence of this method of feeding at night mash, and it has always obtained here since.

Next, with me, came the problem—what to feed. In seeking light I dived into the intricacies of "chemical analysis" and "nutritive ratios." Taking as a basis for my figures an average of analysis of each of the grains I used, I found my bill of fare approximated about 1:9—one part protein to about nine parts of the fats. Upon the assumption that feeding laying fowls might for the purpose in view be compared with feeding milch cows that best results from the latter were had when fed a ration approximately equaling in nutritive ratio that of milk, their product, I assumed that best results in laying might be had from fowls if fed a ration equaling in nutritive ratio that of the egg, their product, and in line with this theory I attempted to compose a bill of fare, the chemical analysis of which would show a nutritive ration of about 1:2½.

I have at different times bought mongrel hens that obtained the greater part of their food on free range in the spring, and on opening their crops found them filled mostly with insects and worms, quite a little green food, with seeds, grains, etc., in smallest quantities. In the absence of a knowledge of chemistry I have assumed that this fact confirmed my theory of a narrow ration (1:2½ or lower) for laying hens, believing that analysis would show the animal food found in crops to have a value akin to lean meat.

In attempting to feed a ration approximating in its entirety a value of 1:2½ I found the need of a very narrow mash to overcome the high nutritive in the various grains. In narrowing the mash I at first added considerably to its cost, because of the quantities of expensive concentrated foods needed. Again, if a narrow ration is correct, it presents an added reason for feeding the mash at night, because of the quantity that needs to be fed, to overcome the total of fats in the grains given the fowls—a quantity which if fed at any other time would effectually stop exercise for the day. The trouble encountered at first was in the expense, and in loosening the bowels to a disagreeable extent.

As before stated, to obtain the nutritive ratio of the rations I fed, I used the figures given as the average of the grains in the various experiment station reports. The fact is that each of the grains vary widely in their chemical analysis, and I have no practical means of ascertaining how near each kind of grain I buy approaches this average, nor, for that matter, how near or wide apart each lot is compared with the last. For this reason, I have of late paid no attention to the actual figures bearing on nutritive value, except to accept the general fact that, for instance, bran figures about 1:4½, wheat 1:8, etc., framing any new bill of fare that I may compose on that basis, aiming to keep the whole ration approximately near to 1:3, which figures (based on averages) were the last I took the trouble to ascertain, and which has given me better results—fewer fat fowls and better digestion than any other, but it still leaves much to be desired.

A. J. SILBERSTEIN.

HOW TO OBTAIN EGGS IN WINTER.

Notes from the Agricultural College, Ottawa, Canada—How Farmers Take Advantage of the Market—Egg Producing Rations and How to Feed Them.

From Report of A. G. GILBERT, Experiment Station, Ottawa, Can.

WE WILL consider how our farmers can respond to the requirements of the different markets. In order to take advantage of their opportunities to make money by obtaining the eggs in winter and the rapid flesh-forming chickens in early summer the farmers must be equipped with—

First—The breed of fowls which will give him the eggs in winter and the rapid-growing chicks.

Second—He must house, feed and properly handle the birds so as to get the eggs in winter.

Third—He must properly care for and feed the chickens from the time of hatching until the salable age, particularly during the first five weeks of the chicken's life, during which critical period the future fowl is either made or marred.

Why? Because during that period there is a drain on the system for not only rapidly growing bone sinew and muscle, but also for the rapidly growing feathers. We never see a hen wean her chickens until they are fully feathered and able to fight the battle of chicken life.

Having chosen a breed, how can the farmer get eggs in winter? He must observe certain conditions. First, the hens must not be older than two years of age, and so managed as to be over their molt by the middle of October. It is an easy matter to keep the fowls of the proper age, and if the hens lay well in winter, they are likely to more easily molt early. An early molt may be secured if the hens are confined to runs by removing, at the beginning of July, the male birds to a separate building, and then allowing the hens to run in a field or part of a field where they can find grass and clover. At the same time their winter rations should be reduced one-half in quantity and so fed for two weeks.

The effect of this will probably be to stop egg-production, which is desirable. At the end of two weeks the ordinary rations should be resumed. The response to this, in due course, should be the shedding of the old feathers and the appearance of the new feather sheaves and by the end of September or beginning of October, very likely sooner, the hens should be over their molt

and ready to begin egg-laying by the end of October or beginning of November, when eggs are becoming higher in price. For November eggs I have been offered 40 cents per dozen by Mr. H. Gatehouse, the well-known game and poultry dealer, of Dorchester Street, Montreal. All this necessitates some trouble on the part of the farmer, and so does the proper management of any department of his farm, which he is desirous to make a revenue producer. As managed in too many cases at present, the farmer's hens are over two years of age and his pullets are much too young. As a result their old hens molt during late fall or the winter season, and consequently do not lay, for the molting season is really one of non-production. The young pullets do not mature in the cold weather, and do not lay until probably the following spring.

Egg Producing Rations.

Having a fairly comfortable house, hens of proper age and over their molt by the end of October, the following rations, such as used by ourselves and farmers, will be found effective in the production of eggs in winter. I give first the rations fed to our poultry during the past winter, which are as follows:

To 110 hens, one to two years old—

In the morning, 8 pounds of wheat.

Noon, 5 pounds ground grain (measured dry), made into mash.

Afternoon, 8 pounds wheat or buckwheat.

Three times per week, 8 pounds of cut bone were given in lieu of the mash. Mangels, pure water, grit and ground oyster shells were in abundant supply. Sometimes steamed lawn clippings took the place of the mangels. The ground grains for the mash, were two pounds of coarse ground oats, two pounds of corn meal, one pound of shorts.

The reason for feeding the whole grain in the morning was that scattered in litter on the floors of the pens, the hens started at once to search for it, and exercise was so induced. The whole grain in he afternoon was calculated to send the fowls to roost with their crops fairly well filled. This grain was also scattered in the litter on the floor.

To 150 pullets of different ages—

For morning ration, 10 pounds of grain, principally wheat.

Noon, 10 pounds of mash.

Afternoon, 10 pounds of grain.

Three times per week, 10 pounds of cut green bones, in place of the mash. The ground grains composing the mash were: Corn meal, 5 pounds; coarsely ground oats, 3 pounds; shorts, 2 pounds. The essentials, such as roots, grit, oyster shells and pure water, were in regular supply. The reason for adopting the above method of feeding the pullets was the same as in the case of the hens.

Calculating at least fall values the price of the rations is placed as follows:

Rations for 110 hens four times a week:

Sixteen pounds wheat at 75 cents per bushel	.20
Five pounds ground grains for mash	.06
Lime, grit and mangels, etc	.03
Total	.29

Other days:

Sixteen pounds of wheat	.20
Eight pounds cut green bone at 1 cent	.08
Lime, grit and mangels	.03
Total	.31

Rations for 150 pullets four times per week:

Twenty pounds wheat	.25
Ten pounds mash	.12
Lime, grit, mangels, etc	.03
Total	.40

When the mash was not fed it was replaced by ten pounds cut green bone at one cent per pound.

The output of eggs during December, January and February, varied from four to five dozen per day. Sometimes in the latter part of January, or beginning with February, six dozen per day. These eggs were sold at 40 cents per dozen, and we could not supply nearly enough, giving a revenue per day of from $1.60 to $2 and $2.40, at a cost of 65 to 70 cents, leaving a fair margin of profit, during the months mentioned, from eggs alone. And it is to be remembered that the cost of rations included the hens which were non-productive during the winter season.

But it may be said that it is easy for a government experimental farm to secure such results. Well, let us see what a farmer has accomplished. Some time last summer I received a letter from Mr. William Moe, a farmer in Quebec, saying that he had made $219 from 80 fowls in a year. I wrote him for particulars as to sort of rations fed and their cost, and received the following in reply:

"The cost of keeping the 80 fowls, out of which I made $219 in one year, was for one year, $69.35, which deducted from $219, leaves a net balance of $149.65. This is not counting the eggs or dressed poultry used in our house.

"The feed we gave the fowls was as follows:

"Morning—Mash, composed of cut clover, potatoes or turnips, all boiled together, and rounded up firm with ground wheat or other ground grain. This was fed warm in winter.

"Noon—Grain thrown in the litter on the floor of the scratching sheds. We have the scratching shed plan of house. We threw the grain in the litter to make the hens exercise in scratching for it.

"Afternoon—A good feed of grain so as to send the birds to roost with their crops full.

"We had green food in the shape of small apples and turnips. We had also grit, lime and pure water, before the layers all the time. We paid strict attention to the details, and kept strict account of expenses and receipts. We sold our eggs in Montreal during the winter, at 40 to 45 cents per dozen, and in summer at 15 cents per dozen. Chickens at 58 to 64 cents per pair. Our fowls are pure-bred. I do not believe in mongrels, for they do not make good winter layers. Much of this success is due to the help I received from my wife."

The object of the scratching shed is to allow the fowls to get out for air and exercise during the winter months. If necessary, it is possible to have a curtain in the front, which can be pulled down in stormy weather. Our experimental work leads to the conclusion that the outdoor air and exercise tend to increase the strength of the germ in the eggs which are laid during the winter.

The forcgoing letter as coming from a farmer I consider valuable, and for that reason I bring it before your committee. If Mr. Moe can succeed so well with careful management another farmer ought surely to do the same. A little calculation will show that Mr. Moe made his poultry pay very nearly $2 per head over cost of food; no mean margin of profit.

The following form of mash as used by a farmer in the vicinity of Brockville and described by him may be useful:

Morning ration for 250 hens and pullets: One and a quarter bushels of roots, pulped and made crumbly with provender. When provender alone is used, boiled meat is used."

POULTRY AND EGGS FOR MARKET.

An Article Conveying as Much Valuable Information as Can Well be Given in the Space Occupied—Housing and Feeding—Farming and Fertility—$100 From a Berry Patch and as Much More Added to Value of Fowls That Ranged Beneath the Bushes.

By H. J. BLANCHARD.

"It will certainly pay well to raise poultry for eggs and market only and pay no attention to the fancy, as eggs and meat are the prime objects of poultry keeping. My own poultry business was started and well under way on this basis alone."—H. J. BLANCHARD.

IT WILL certainly pay well to raise poultry for eggs and market only and pay no attention to the fancy, as eggs and meat are the prime objects of poultry keeping. My own poultry business was started and well under way on this basis alone.

In most markets fine fresh eggs pay much better than broilers or roasters, and the money comes in steadily the greater part of the year.

It is well to start with only what fowls can be properly housed and cared for, and increase the number as experience and judgment prompt. A few fowls well kept will pay better than many when crowded and neglected. The ideal way to keep a large number of fowls is to treat each flock as if it were the only flock you possess.

Eggs can be produced at a good profit in spring and summer because even though the price is then low, the cost of production corresponds. Winter egg production is highly profitable if properly managed. The requisites are warm, dry, ventilated houses, well selected food including succulent green stuff, and judicious exercise. Fancy new laid eggs usually sell best in a large city, and it would be well to locate within twelve hours' shipping distance of the market. Such a distance from the city would enable one to secure a suitable piece of land cheaply. The soil should be well drained naturally. Rough land will do just as well for the range, although some of the place should be good, tillable soil to enable the poultryman to raise a part at least of the food for the birds.

For best results I favor the colony house, free range plan. Be sure to have houses far enough apart so that each flock gets plenty of range. This will make you more work in caring for the poultry, but you will be well paid for it. Feed just as well as you would if the birds were yarded and you will get better results.

In my opinion, the best grain to grow on a poultry farm is corn. Plow under a liberal coating of manure from the hen houses or stable and give the crop thorough cultivation while it is young. Set your outdoor brooders near the corn field and let the young chicks have free range through it. This will afford them shade, and protection from hawks and crows, besides being a grand foraging ground for them. The birds also help to keep up the fertility of the soil. We think corn one of the very best foods for poultry, especially when fed in connection with wheat. A blackberry patch is also a grand place for chickens to run in. It affords shade and protection all the season and in it the birds find a great many bugs and worms. The poultry also help to keep down the weeds. They seldom eat many of the berries, as they grow too high. All of our cull hens as well as one line of our breeders are yarded, and in most of the yards we have Snyder blackberries growing. How the hens do enjoy wallowing in the shade of these bushes, and what fine berries we get! Our half-acre blackberry patch this year netted us over $160 and I believe was worth nearly as much to the chicks. Another very important crop is mangel wurzels. We formerly used cabbages for winter green food, but found them very difficult to keep late in the winter. Select a smooth, fairly level piece of ground, free from large stones, and early in the spring plow under a heavy coating of the cleanings from the hen houses. Harrow thoroughly until fine and mellow. Mark rows three feet apart, using a light marker. Then scatter a liberal amount of commercial fertilizer in the mark and mix with the soil by dragging a stick back and forth. Then sow the seed liberally and evenly as possible by hand in the mark left by the stick and cover about an inch with hoe or rake. We formerly used a seed drill for sowing our mangels, but found the hand method far more reliable.

We feed these beets to our poultry by simply cutting in

halves or large pieces with a shovel and placing on the floor. The birds love the sweet, juicy roots and will work at them until all is eaten but the skin and frequently they consume that. The mangels should be harvested early in October before heavy freezing by simply lifting from the ground with the hands and breaking (not cutting) off the top, drawing to a frost proof, well ventilated cellar, and piling in a corner or bin. We now have a pile seven feet deep in one of our cellars, and they will keep fresh, crisp and juicy until next summer.

Our breeding stock and the layers are all fed alike, corn, oats, buckwheat, and wheat, equal parts, being the morning and night food, with mash at noon, After over twenty years' experience in breeding and feeding White Leghorns we still believe in feeding them three times a day, with the mash at noon. White Leghorns are very active, and when fed judiciously three feeds a day are better than two. In the morning we give a very light ration of the mixed grains scattered in the litter on the floors. This keeps them busy for some time and gives them exercise. Next comes green food of some kind. Pure water is kept before them all day, and in cold weather the water is slightly warmed. Crushed oyster shell and grit in suitable places are accessible continually. At noon comes the mash, the most important feed of the day. The hens have been busy nearly all the forenoon scratching for grain in the litter, picking at mangel beets or cabbages and taking an occasional drink from the water pan, and are happy and hungry. In summer time the mash is moistened with skim milk, buttermilk, etc., and in winter with hot water. The mash is made of ground corn, oats, peas and barley, mixed with an equal bulk of wheat bran, and to this is added about one and one-half pounds of old-process oilmeal and three pounds of prepared meat for each hundred hens. The whole is then mixed thoroughly while dry. No condiments are fed except a little salt dissolved and added to the mash. The whole is then moistened and fed crumbly in troughs.

It is interesting to see the hens watch the doors and gates about feeding time, and when the mash is carried in they will fly into the pail and even on the one carrying it. We feed all they will clean up and the amount they will eat varies greatly. Close observation enables us to determine about how much to feed. When the hens are laying heavily they usually eat a great deal more than when molting. Toward night they are fed all the mixed grain they can eat, scattered in the straw, and take more exercise scratching for it. If the birds do not act very hungry their morning food is decreased until they show a proper appetite.

Colony Houses, Brooders, and Flocks that mean business on the Farm of H. J. Blanchard.

The houses are made with straw loft, and are warm and dry in winter, being well ventilated by sliding windows on every possible occasion. In summer the windows are all open and slatted doors used to give all the ventilation possible. Cleanliness, ventilation and kerosene keep these houses entirely free from lice. Some of the houses have a three-foot basement with ground floor, which is much appreciated by the hens, especially in hot weather. In winter each flock has a large box of fine road dust for bathing, which is often removed. The sanitation employed and the conditions surrounding these fowls, together with the method of feeding, render them very strong and vigorous. This, coupled with our method of selection in breeding, gives us typical laying stock. They have vigor and stamina to resist the usual diseases of poultry, and a good constitution to transmit to their offspring.

Our incubators are started about the middle of March and brooder houses and brooders are put in shape for the chicks. When a hatch is off they are put in a warm brooder so arranged that they can get just the amount of heat they need. The first few days they are fed oatmeal and grit with water slightly warmed and are kept in the brooder. In a few days they are given a room 16x20 to run in, the floor being covered with chaff or other litter. The chicks are

gradually led on to a diet of johnnycake made of ground corn, oats and wheat, oat hulls sifted out. The chicks are soon given a little whole wheat scattered in the litter on the floor of the brooder house. Soon as the weather permits the chicks are let out into the yards, which are long and grassy. After the chicks are done with the brooders and have learned to roost, they are given free range, and the pullets separated from cockerels. The chicks are now fed a mash with a very little meat in it and quantity of meat is very gradually increased until the pullets begin laying, at about five months of age. During the fall the old stock is gradually sold for breeders and layers, and then the earliest pullets are put into the laying yards to take their places and supply our city market with eggs. We ship our eggs three times a week in summer and twice in winter, guaranteeing every egg to be new-laid.

The poultryman is well equipped for keeping up soil fertility on his farm. The chicks and fowls on free range contribute greatly to this end, and the manure from the roosts, houses, brooders and coops if properly applied will keep his farm very fertile.

Hen manure should never be stored, as it is bound to lose a large amount of the free nitrogen, besides being a difficult, laborious job. We always draw it direct to the fields and spread thinly on meadow or pasture, according to season, or spread on the land intended for corn or root crops, to be turned under in spring by the plow.

H. J. BLANCHARD.

[Mr. H. J. Blanchard, writer of the above article, is fully competent to write with authority on the subject of Poultry and Eggs for Market. He is now, and has been for some years, conducting one of the most successful poultry plants in the country—catering to the egg trade, but doing so with standard-bred White Leghorns; indeed so careful has he been to keep up the grade of his stock that many an exhibitor owes his start to H. J. Blanchard.—Ed.]

AN IMMENSE EGG FARM.

Twenty-six Hundred Fowls Now Occupy Houses on the White Leghorn Poultry Yards, and Buildings are Being Erected to Accommodate Five Thousand Layers.

By THEO. HEWES, in the Reliable Poultry Journal.

IN ALL my travels I have never found a larger flock of strictly fancy Single Comb White Leghorns than was shown me by Mr. C. G. Brainard, proprietor of the White Leghorn Poultry Yards. I visited his plant October 4th and spent the entire day looking over the stock and the system of housing used on this, the greatest White Leghorn farm in America. Mr. Brainard has one of the finest poultry plants in this country and when completed we have no doubt it will be the largest of its kind in the world. Next to the big duck ranches located in the east, where ducks are grown by the thousands, this White Leghorn farm, with its present stock of twenty-six hundred birds, comes next in point of size and interest. But instead of the slow movements of ducks, here we find birds that are alert, active and wide awake all the time.

On the date of my visit several hundred head of the young stock, both male and female, were nearly matured, the pullets with combs and faces bright red and looking with keen eyes for secluded nests, while the cockerels, with their typical carriage, the embodiment of activity, their upright combs and brilliant white plumage, were a sight to do the fancier's heart good.

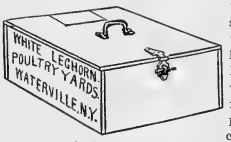


FIG. 1—Egg Case—Closed.

FIG. 2—Egg Case—Open.

It is seldom a breeder of any variety meets with the success in mating that Mr. Brainard did the past season with his Single Comb White Leghorns. Am free to say I never saw before so many good ones on one poultry farm. Here were to be seen literally in hundreds of specimens that long sought for combination that approaches perfection in this breed, namely, pure white plumage, with yellow legs, bay eyes and well shaped five-point combs. Both males and females stood well upon their legs, showing to good advantage the medium long bodies of the Leghorn egg types, with the tails of the males down at the proper angle and not carried high, as is often the case with this variety.

All the foregoing desirable points are strongly fixed in the White Leghorn Poultry Yard strain and it would have been hard to find a poor specimen in the entire lot.

While this plant is built and conducted mainly for the production of fancy or thoroughbred stock, the commercial side of the business has not been overlooked and every egg not used in hatching is sold on the market. A regular trade has been established and satisfactory prices are obtained. From September 1 to March 31, the regular price is 30 cents per dozen; from April 1st to

September 1, 20 cents per dozen. These prices are readily secured for all eggs that can be supplied, hence Mr. Brainard is planning additions to his plant, to be made during the next twelve months, that will give the White Leghorn Poultry Yard a capacity of 5,000 layers.

All eggs are shipped in special wooden boxes, with inside cases holding one dozen each. A wooden box holds six of these one dozen cases. Figure 1 shows a box ready for shipment. Figure 2 shows the same box with the lid open. All boxes have a return card on them, hence may be used any number of times.

Artificial Means Only.

All stock produced in the White Leghorn Poultry Yards is hatched and raised by artificial means. Eight to twelve popular-make incubators are operated during the season with satisfactory results. The hot water overhead pipe brooding system is used and meets the requirements. Among the illustrations shown herewith is one (see figure 3), presenting an interior view of what is probably one of the best equipped and most successful brooder houses in the country. There are four out-go and four return pipes that pass under the continuous brooder; also three larger pipes around the walls of the entire building. This insures a comfortable temperature at all times for the interior of the house, while under the hover the temperature can be regulated to suit. Mr. Brainard informed me that they did not lose to exceed six per cent of all the chicks hatched the past season. Two more large brooding houses will be completed by November 15th. The number of incubators in use will be about doubled. The same brooding system will be installed in the new houses

Figure 4 shows a partial view of the White Leghorn Poultry Yards, but neither this picture nor all that we show taken together, do justice by this plant.

Figure 5 shows a flock of Single Comb White Leghorns, mostly pullets. This view was taken from one end of a large breeding house.

Figure 6 shows an interior view of the pens. There is a solid partition from floor to ceiling between the hallway and pens and all outside walls are double boarded with building paper between. There are two double windows to each room. These houses are used for winter layers and house room will be completed by November 1st to accommodate 900 hens. Ten more houses of this size and style will be built as soon as the carpenters can get to it. This will make fourteen of these houses for laying hens, each 16x112 feet in dimensions, besides the many brood and laying houses on the farm.

An attractive and encouraging feature of this enterprise is that the past season shows a neat balance on the right side of the ledger. When the plant is stocked as Mr. Brainard proposes to stock it, eggs will be shipped literally by the wagon load. Exact methods are followed day by day in caring for the flocks, so that correct figures can be given as to the cost of food, cost of labor and the amount of cash received from each and every pen of fowls.

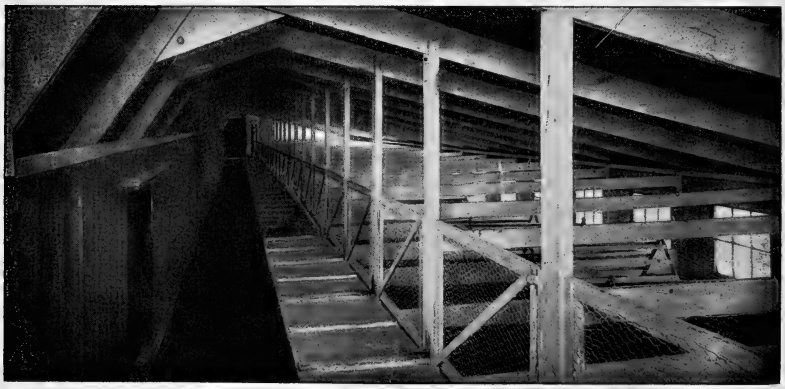


FIG. 3.—Interior View of Brooder House on White Leghorn Poultry Yards.

Feeding for Eggs and Marketing—How It Is Done on the White Leghorn Poultry Farm.

By L. A. PECK.

O PRODUCE eggs in quantity two things are necessary. First, a strain of fowls of the highest order as layers; second, scientific feeding and caring for the same in order to make them yield the largest possible quantity of eggs. When our egg farm was first started fowls of several standard breeds were secured, but it took only one season to demonstrate the superiority of the Single Comb White Leghorn as an egg producer. It was therefore decided to keep this breed exclusively. We venture to say that at the present writing the Single Comb White Leghorn is recognized as the superior of all other breeds where prolific

egg production is the sole or main requirement. The report of Cornell University Agricultural Experiment Station, issued July, 1902, is conclusive on this point. Out of twelve entries the first six pens, with one exception, in point of egg production and also in point of profit on eggs, were Single Comb White Leghorns. The one exception was a pen composed partly of pure-bred White Leghorns, partly of White Wyandottes, and the remainder of a cross between the White Leghorn and the White Wyandotte. This pen stood second in the competition.

Feeding for Eggs.

A statement of our method of feeding in detail may be of interest to the reader. In the first place, we use only first quality grain. We feed wheat, corn, buckwheat, barley and oats. Wheat, corn and oats make up the larger portion of grain food. The price of these grains must be considered, and where other grains are cheaper they may be substituted. We feed grain twice a day, morning and evening, and always scatter it in a litter. A mash is fed at noon. The mash which we are using at present is made up as follows: 100 pounds each wheat bran, wheat middlings, corn meal, ground oats and beef scraps; 25 pounds Old Process linseed meal. The composition of this mash is also varied according to the prices of grains entering into its composition. In the winter to this mixture should be added a small portion of cooked clover hay, potatoes or beets. It should be fed warm, but not hot. It should be mixed to a crumbly mash, but should not be sloppy. For green food we use in the winter cabbage, beets and steamed clover hay; in summer, clover, beets and lettuce. In addition to this the fowls have constant access to oyster shells and pure water. The water is given cold in the summer and warm in the winter. The feed, of course, is varied considerably in accordance with the different seasons. In the summer less corn is fed, and more green food, during molting, more meat and oil meal and other things which will produce growth in plumage.

Besides careful feeding much care has to be exercised in keeping the poultry houses well ventilated and perfectly clean. Fowls will not lay well unless properly cared for. Ventilation must be secured without direct drafts. Our system of houses and ventilation is described in the foregoing article.

So much for getting the eggs, but for a profitable poultry plant a second requirement is necessary, namely, proper marketing of the eggs produced.

Marketing the Eggs.

Successful marketing of poultry products depends upon the same principles as the marketing of any other product. To command high prices a superior article must be offered. Therefore, the first consideration in the marketing of our eggs is to be absolutely sure that nothing but fresh eggs are shipped out and that they are always shipped in good condition. One shipment of poor eggs would do more damage to our trade than we could repair in a year's time. By the careful watching of every package which leaves our yards we have built up our trade, which consists mostly of private customers in large cities who are willing to pay good prices for a good article. In the first place, we are careful to see that eggs are always clean before packed. In order to have eggs clean the houses must be clean. If eggs happen to be dirty they are washed before being marketed.

FIG. 4.—Birdseye View of a Portion of the White Leghorn Poultry Yards

The accompanying illustration shows our method of packing. Each dozen eggs is packed in a carton with our name upon it and these cartons packed in 3, 6, 12 or 24-dozen crates made so that the boxes will exactly fit. We find it is a great help to the marketing of our eggs to have them appear well and to have them packed in such a way that the purchaser will have little trouble in handling them.

In conclusion, we quote statistics from the Bulletin of Cornell University Agricultural Experiment Station referred to above. In this egg competition we entered 150 pullets, the competition lasting from December 1st through March 31st, the year 1901-2. The total number of eggs produced was 5,066. On an average these eggs, according to the market price of that season of the year, were worth $111.86. The market price ranged between twenty-two and twenty-eight cents. During that period the profit upon these eggs at market price was $65.35, but as a matter of fact these eggs were sold at forty cents per dozen; that is, an average of fifteen cents more than the figures given by the Cornell University Bulletin. Therefore, our profit on 150 birds for these four months was $120.65.

THE GREATEST EGG FARM IN THE WORLD.

The Story of Seven Thousand Hens in Six Hundred Houses—A History of the Plant and How It Is Operated—A Business That Has Doubled in Ten Years—Stock Changed from Free Range to the Confinement Plan.

By A. F. HUNTER, Associate Editor of the Reliable Poultry Journal.

SEVEN THOUSAND hens on one farm makes that certainly the largest egg farm in the world, and that it is purely and solely an egg farm is proved by the fact that no chickens are raised there; not any of the seven thousand layers being raised by Mr. Hayward himself—all are bought each year. It certainly is a remarkable story, and different from anything else, different from the story of every other poultry farm of which I have knowledge,—and I have visited a great many of them. This remarkable egg farm is owned and operated by Mr. C. E. L. Hayward and is located in a small town of New Hampshire, about sixty-two miles from Boston. There is a good deal of up and down hill to many New Hampshire towns, and the road to Mr. Hayward's farm has so much of the up and down to it that heavy loads must be difficult to draw and the three miles' haul over such a road must considerably increase the cost of the about a ton of grain per day fed to the flocks. I visited the farm in winter some ten years ago, and Mr. Hayward has not only more than doubled his poultry business, but has made one decided change in method. At that time the farm was run on the free-range plan, the birds being given free range after a few days' confinement had wonted them to their quarters; now they are kept in close confinement, the birds never going out of their houses (after being put in in the autumn) until they are sold off to market to make room for the succeeding flocks. One reservation should be permitted in this general statement. The brood-coops (for breaking up the broodies) sit on the ground outside and in front of each house, and persistently broody birds are put out in these coops for a few days, until broken of the desire to incubate, then returned to the house again; by so much they are not closely confined to the houses, but to all intents and purposes the general statement is correct.

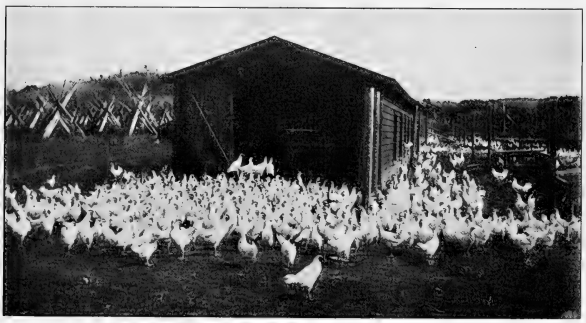


FIG. 5—Flock of Young Stock—Cockerels and Pullets on the White Leghorn Poultry Yards.

Another decidedly remarkable thing about Mr. Hayward's methods is that the houses are quite open to the weather, and are open just the same summer and winter. They have lots of snow in New Hampshire in winter; I have seen three feet depth of it! They sometimes have very cold weather in New Hampshire. I have seen it twenty-seven degrees below zero there, and yet—there is a great poultry farm, with the fowls kept for egg production, the fowls being housed in small flocks in houses the fronts of which are fully half open and the birds exposed to the rigors of a New Hampshire winter; we will describe the method first, however, and discuss it afterwards.

The houses are alike as to plan, being eight feet square on the ground and built exactly like the "A" tents that some of us slept in in 1861-65. The floor is of two thicknesses of boards laid so as to break joints, and there is no frame whatever. There is a square base some fifteen inches high made of two-inch thick planks, then the roof boards, cut eight feet long, nailed to the base and the inch-board ridge pole. The back (north) end is boarded up solid, while the front end is boarded up about fifteen to eighteen inches and down from the apex of the roof about eighteen inches (to give sufficient stiffness), and the balance is just sufficient boarding to make a door with a frame to hang and hasp it to; all the open space is covered with inch-mesh wire netting, which effectually excludes "varmints," but freely admits the air. The earlier houses were board roofs battened, then a hundred or two were built with roofs and backs covered with corrugated iron or some of the special roofing papers, but the latter were not satisfactorily durable and the corrugated iron drew the sun and made the houses uncomfortably hot in summer. In recent years the houses are being built with roofs and back walls shingled, and as the earlier roofs need repairs they are being shingled also, so that shingled roofs and back walls will soon be the rule; in a country where hemlock, spruce and second-growth pine shingles are so cheap as there in New Hampshire it is almost surprising that shingles were not adopted sooner.

The houses rest upon four small stones, one at each corner, to bring the floors up from the damp ground; in that country there is much frost, and the freezing-thawing of the ground causes these foundation stones to sink into the

ground, gradually. We found two of the men busy prying up some of the houses and adding bricks to the foundations, to lift them up again and prevent the floors rotting.

The inside furniture of these houses is of the simplest. At the back and about three feet above the floor two roost poles are set, about a foot space between them and the rear one about six inches out from the wall. There are two small nest boxes, one in each front corner; a small box (about ten inches square by six inches deep) for the food, another for crushed oyster shells and a dust box about two feet square by eight inches deep. The water pan is outside, at the back corner, with a small gutter to convey the drip from one eave to it in rainy weather, and an aperture 2x4 inches gives the fowls room to put the head out and drink. The pan is of cast iron, is about ten inches square by five inches deep and is emptied and carefully rinsed out once a week. This arrangement of water pan and gutter entirely avoids watering in rainy weather; and in winter, when there is snow on the ground, a shovelful of snow is put in each house for the fowls to eat. In answer to our exclamation of surprise, Mr. Hayward said the snow did not seem to hurt them any, that it was the simplest and easiest way to water (?) them, and that they would eat snow if running out of doors —this last point will be readily understood by those who have observed fowls when they get access to snow. The broody coops were about two feet square, with a board floor and roof and slat sides. A small pan of water and a dish of food is set on a board in front of each coop, and the prisoners reach their heads through the slats to eat and drink; these broody coops are set on the ground a little in front of each house.

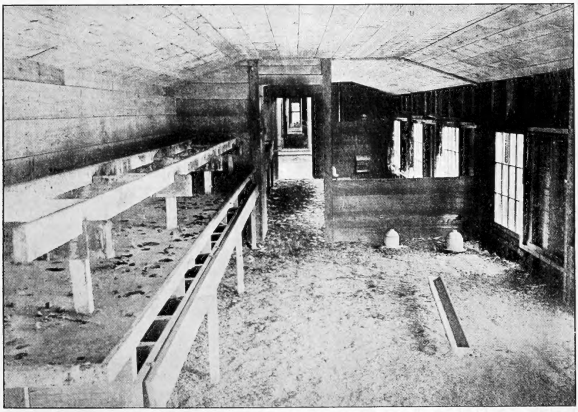


FIG. 6.—Interior View Stock and Laying House on White Leghorn Poultry Yards.

In the account which we wrote of our visit to Mr. Hayward's farm in '92 we gave the cost of these houses as eight dollars each. That, however, was before the roofs and back walls were shingled and we would estimate the cost of the present houses at ten dollars each. At the cost of lumber at the present time this may be a bit too low, but the poorer grades of lumber are cheap in New Hampshire. These houses are set about two rods apart and (where the ground favors) in rows, which are about four rods apart. Sometimes stones or trees interfere with exact distances, but these are approximately correct. With twelve birds in a house it takes nearly six hundred houses for the seven thousand birds. A pathway for wheelbarrow runs alongside each long row of houses and a road for a horse and wagon along the ends of the rows. The food is put upon a cart and hauled along the roadway, a stop at end of each row being made to load the wheelbarrow for one or two rows; there are eight to ten men employed, and each man has his group of houses to feed and water and take care of.

The fowls are fed twice a day, the morning feed being a mash, of which enough is fed to last for the birds to pick at till noon; the afternoon feed is usually wheat and occasionally corn. At time of my visit they were feeding scorched (or damaged) wheat, from a burned elevator. This scorched wheat cost only $15 a ton on the track, and Mr. Hayward said the fowls ate it well and he could not see but that they laid as well as if fed the best of wheat. The morning mash is made up of a mixture of five hundred pounds mixed feed (wheat middlings), two hundred pounds corn meal, two hundred pounds beef scraps, one hundred pounds meat meal (making half a ton), two bushels cut clover, four quarts salt. The meals, scrap, etc., are all mixed together and got ready the night before, the salt dissolved in water and cut clover put to soak in water; before feeding the mash is made up by mixing with water, warm in winter and cold in summer, until the mess is moistened and is "crumbly" but not wet enough to be sloppy, and it is not "cooked" nor even scalded. It is upon the meat element in the above mixture that Mr. Hayward relies for eggs, his expression being, "It's the meat that makes the eggs." That this is not the most completely "balanced" raion will be conceded, but its results are satisfactory to Mr. Hayward; the fact that he is still enlarging his plant and increasing his business is sufficient proof of that—he intends to increase to eight thousand birds next winter.

We mentioned that Mr. Hayward does not raise his laying stock. He has the pullets hatched and raised for him by arrangement with farmers in Vermont and New Hampshire, chiefly in Vermont we surmised. We recalled having seen his advertisements of "pullets wanted" a few years ago and he said he did not have to advertise now, that he could arrange beforehand and for all that he would need. He sells off the old birds in the fall of the year, selling them mostly to market, although he said he was having a considerable sale for these year-and-a-half old birds for layers; as he buys the nearly mature pullets at a per pound price and they increase in weight somewhat in the course of a year, he doubtless gets about as much as he paid for them. When asked if he averaged to make a dollar apiece profit, Mr. Hayward replied: "No, not quite so much as that," and in reply to questions about the health of the flocks that are kept in such close confinement, he said he never had a

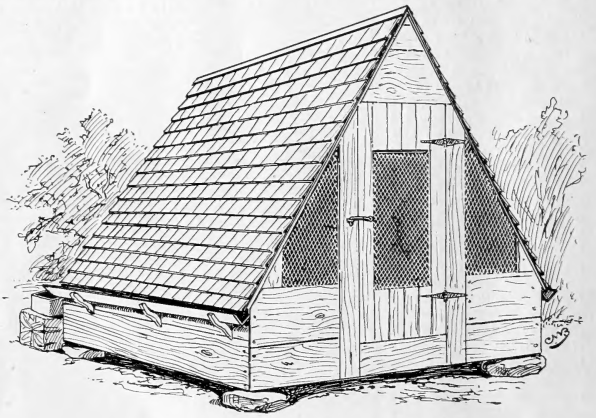
frosted comb, or any such trouble, that he lost now and then a bird (by death), perhaps ten to twelve per cent, but as that was a common experience to every one who kept fowls, he did not let that trouble him. This statement as to losses was corroborated by two of the men on the place with whom we talked. They said it was the practice to dig a pit in the fall at some convenient place in the woods, throw the dead hens in it along through the winter, and in the spring bury them with the earth that had been thrown out. A man who keeps a couple of dozen hens does not trouble himself much if two or three of them die at different times during the winter, and the loss of two or three out of two dozen is substantially the same proportion as the loss of seven hundred to nine hundred out of seven thousand. Such a mortality looks to be a tremendous loss when we go into the big figures; of course it is a heavy loss, say three or four hundred dollars' worth of poultry meat, but the per cent of deaths is the same as that of the man who has two or three die out of his flock of two dozen.

The droppings are cleaned out of the houses twice a year, fall and spring; once a week (or thereabouts) a shovelful of dry earth is scattered over the droppings in each house and the piles left to accumulate till the next cleaning. There was here and there a flock with some evidence of feather eating, but, as a whole the birds looked hearty and healthy; quite as much so as the average flocks one will see on farms where they have outside runs. It ought to be mentioned that two of the causes of the losses by death mentioned above were that sometimes three or four birds would pile on top of one that clung persistently to the nest and the one at the bottom would be smothered, and that now and then a bird would be pecked by its mates until the blood was started and then they would pitch upon it and peck it to death. We have known a flock of turkeys to set upon one of their number and peck and worry it to death, but think such "lynchings" are comparatively rare amongst chickens.

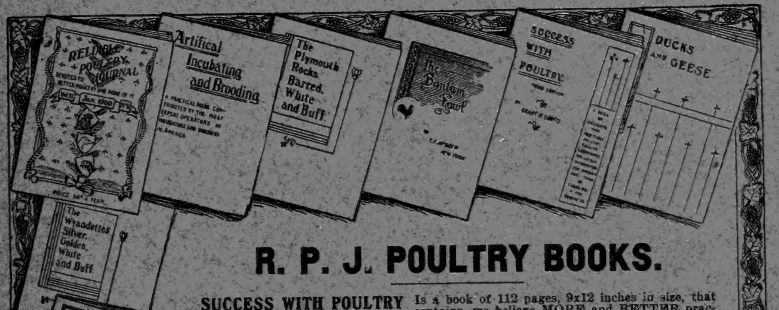
We asked some of the men if the egg-eating vice troubled them and could get no acknowledgment that it did, but as the houses are visited but twice a day and then but for a moment to each it is possible that quite a few eggs might disappear in that way without their knowledge. The fact that there was an egg lying out on the floor in each of four of the houses we looked into and two eggs outside the nest boxes in one house would make it easy to suspect egg-eating. Their accidentally stepping upon and breaking an egg on the hard floor of the pen would cause that egg to be eaten instantly and the step from accidentally breaking and eating to purposely breaking and eating is very easy.

As would be expected in such a case, the stock is mostly the common farm scrubs—or "dunghills," with a preponderance of Leghorn blood in it, but here and there in the houses we looked into, some fairish Barred Plymouth Rocks were to be seen; this fact is significant of the widespread popularity of that variety and bears out the claim of a well-known poultryman, that the Barred Rock is the most generally popular variety of fowls in America. If he had said "New England," he would probably have been right.

In such a hill country as New Hampshire the water problem is simple. Mr. Hayward has a reservoir built up between the hills and water is piped to house, barn, engine and cook room, and various parts of the poultry plant, where simply opening a cock gives abundant supply. A fifteen-horse power engine and boiler supply power for cutting clover and cutting up poor quality hay for the nests, for grinding grain or cracking corn, and for running the elevator which carries the grain up to the huge bins above the cook room. These bins hold five thousand bushels of grain. The teams drawing the grain from the cars drive into the barn alongside the chute which conveys the grain into a pit, from which the elevator lifts it to the bins; of these there are three, with spouts leading down to the hopper of the grinding mill or into the wagon which is to convey it to the feed bins distributed at convenient points for the men to get their supply. Turning a crank till the indicator points to 1, 2 or 3 opens the spout of bin 1, 2 or 3 and the driver does not have to stir from his tracks to load with the kind of grain he wants. The home farm is the one on which Mr. Hayward was born and has always lived, but he has added other farms to his holdings until he now owns some eight hundred acres of land, a considerable portion of which is in wood and timber, and quite a bit of it in orchard. Apples are an important crop in New Hampshire, and Mr. Hayward has about 7,000 apple trees on his farms, six thousand of which are Baldwins. He calls his business "Poultry and Fruit Farming," and that rocky-hilly land makes an excellent location for that excellent combination.



Style of Colony House in use on the Seven Thousand Hen Farm.



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