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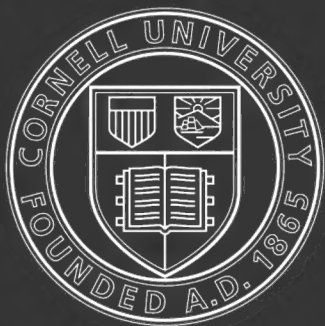
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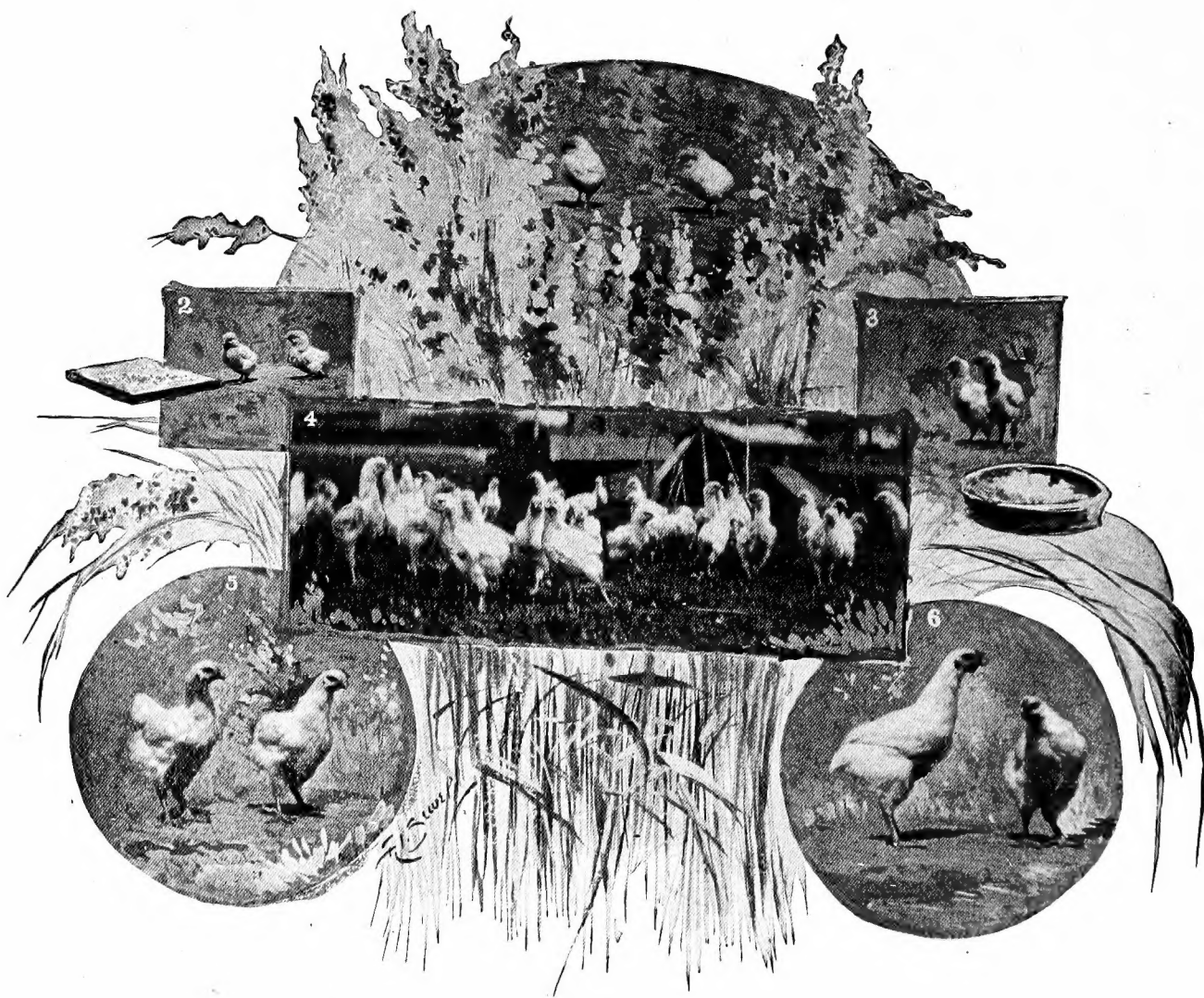
An illustration of a hen and her chicks in a landscape. The hen is in the center, facing right, with two chicks on either side of her. In the background, there are trees and a fence. The entire scene is framed by a thick, dark border.

THE CHICK BOOK



RELIABLE POULTRY JOURNAL
PUBLISHING COMPANY
QUINCY-ILL-USA

1903



A SUGGESTION OF PLEASURE AND PROFIT

THE CHICK BOOK

FROM THE BREEDING PEN THROUGH THE
SHELL TO MATURITY

Contains the Experience of the World's Leading Poultry-
men and All the Latest and Most Trustworthy
Information About Hatching, Rearing, Fat-
tening and Marketing Chickens with
Special Articles on the Shipping of
Newly Hatched Chicks

PRICE, FIFTY CENTS

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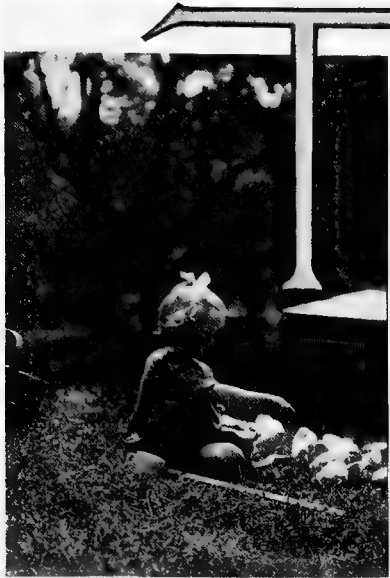
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Introductory



THE poultryman's profit depends in a great measure upon his success in rearing the chicks. Success is attained only by intelligent use of correct methods. If the incubation, growth and development of the chick are not attended by such conditions as produce and maintain the good health necessary for building a vigorous body and strong constitution, the grown bird does not have the power to produce, or earn, more than a nominal profit for its owner, however well it is housed and cared for. Nor does the negative effect stop at the profit of the first year; the progeny of such birds

is not only weak and unremunerative, but if raised under like conditions will be less valuable than the parents and such rapid deterioration will render the flock absolutely unprofitable in two generations. On the other hand, chicks well hatched, from good eggs, if given intelligent care and surrounded with the essentials required for proper growth and robust development, will mature into fowls which are capable of returning to their owner the last cent in payment for the food and accommodations provided. Such methods increase the productive efficiency of succeeding generations and the road to a competence is auspiciously opened.

If the chicks in hand are to be marketed as squab broilers, broilers or roasters, the problem of improving them for stock purposes is eliminated; but the necessity for painstaking effort is not lessened, if indeed it is not increased.

The chick, destined for the market must make a very rapid growth; not so much of bone and muscle, as of flesh and fat, and to do this in the least time assures the greatest profit. Conditions, too, at the time when such chicks must be grown to command the top price must be largely artificial. Natural conditions must be approximated as closely as may be, or the young birds cannot stand the heavy feeding necessary to produce the results that count. To one whose heart is in the work, it is as interesting as it is important and offers opportunity for the full exercise of both his mental and physical faculties.

That a large per cent of all strong chicks hatched can be raised to the age for marketing, or to maturity, is not disputed. The present-day appliances greatly facilitate the work, and prepared foods, selling at reasonable prices, simplify the problems of feeding. Establishments properly equipped and handled are raising chicks in numbers that were scarcely dreamed of two decades ago, and by placing them on the market in good condition at a time when the majority of producers have nothing to offer, they obtain extreme prices. Later in the season when the market is filled with chickens from farmers and less energetic and less up-to-date poultrymen, the large raisers, with their better

equipment and thorough knowledge of the business, are able to place their goods on sale in more attractive condition and at a lower cost of production than their competitors, securing a better price and larger profit.

This is not intended to indicate that large plants are the only ones that can and do accomplish satisfactory results. Small plants are doing good and remunerative work on a smaller scale; some are growing chicks for market, and others for stock purposes; some are doing the work by artificial methods, while not a few hold to the motherly hen of thirteen eggs capacity.

After giving due credit to the appliances and improved foods, for the part they play in producing good chickens, the major share is left to be distributed between hard, conscientious work and well grounded knowledge of the business. Of all these factors knowledge is the greatest and the one most difficult to secure. When it is found it commands its own price.

How Knowledge is Obtained

There are two ways of acquiring this knowledge: By years of costly experience and by careful study of the best poultry literature, supplemented and verified by practical experience. The former, although good, and enduring as the hills, places a man too near the far end of life's journey when it graduates him and burns up money which ought to be saved and invested in the business. The latter is the shorter road and enables one, by taking advantage of the experience of others and avoiding their mistakes, to cut cross lots to success with money in his pocket.

The printed wisdom of poultry culture is as far ahead of that of ten years ago as can be imagined. In gathering the material for this book the same sources of information have been drawn upon that furnished the matter for the other popular books published by this company; that is, the poultrymen and women who have made a substantial success in the business and who are specially fitted to write upon the subjects assigned them.

Such information, though difficult and expensive to obtain, is valuable almost beyond estimating. It consists not in dry rules and dogmatically expressed theories, but in the live experience of men in the field, with the whys and wherefores for every step and dependable guidance at every turn. It is information that can be trusted to the letter. By following it the mistakes of the novice can be avoided and the methods of the more experienced may be improved.

This is not a one-man book, but a broad-gauge one, holding out to the reader several courses which have proved successful so that he may choose from them whatever seems best adapted to his requirements.

Condition of the Breeding Stock

Securing good condition in breeding birds is not difficult. Any poultryman worthy the name selects each season birds having the development and style that denote vigor and constitution while selecting the shape required for the variety at hand. It is a fact that birds of standard size and shape are not produced year after year by any but healthy, vigorous stock. Constitutional vigor is the source of strong procreative power and is built up only by careful breeding for a term of years.

With this characteristic well established, it remains only to maintain good health and normal condition of flesh to produce eggs that will bring forth chicks that live, thrive and make a profit. In this connection it is safe to remember that appearance, although a good indicator of health, is not infallible, for a bird may seem to be in the best of condition, when it is unable to produce a fertile egg. Supply the food and conditions required and trust to nothing less, whatever the appearances, to bring about the desired results.

Every effort should be made to conserve the energy and maintain the strength during the winter, when conditions are largely artificial. This does not mean that all profit from the birds in a practical way must be lost or that hens may not lay well during the winter and produce fertile eggs in the spring. The best rule to follow is this: Provide as nearly as possible the exercise, fresh air and foods that the hen would get if allowed her freedom on a grass range in summer.

We cannot lay down a rule for feeding. What will produce good results in one yard will not always do so in another, because of different conditions. Sufficient information upon the feeding values of all commercial foods and their effects upon birds under various conditions is available, so that a little experience and intelligent observation will enable any one to compound the ration best adapted to the needs of his flock.

Incubating the Eggs

That the up-to-date hatchers can be depended upon to do their full share toward making the poultryman independent requires no argument. Good eggs and proper handling by the operator will assure good hatches of vigorous chicks. An understanding of the machine and how to control it, with some knowledge of how to treat eggs during the period of incubation and of the essentials of correct environment, constitutes the wisdom required for successful hatching.

We find incubators operating in dark cellars, where there is no light except that of burning kerosene; where good air enters by chance and not from intention, and the atmosphere is damp and laden with germs of decay and disease. Again we find them located in rooms above ground, in houses built for the purpose, in dwellings and in rooms partitioned off in the barn, poultry house and shed where the air, though dry, is seldom renewed and light from the sun is rigidly excluded that a more even temperature may be maintained.

A strong man could not stay in one of these places an hour and the flame that heats the incubator frequently has difficulty in collecting enough oxygen for perfect combustion. To expect to develop so delicate an organism as an embryo chick under such conditions, is nothing less than folly; yet some people attempt it and, failing, denounce the machine and artificial incubation. How to provide the proper environment and successfully operate the machines is plainly told in succeeding pages.

Brooding the Chicks

There are good brooders and brooding systems, and good foods ready to feed. These ready made factors in success are easily obtained, but for their efficiency they depend upon the discriminating mind of one skilled in the work. In no other branch of the business is the effect of level thinking and

well directed effort more noticeable. Five minutes in a brooding house will frequently enable the intelligent observer to estimate correctly the ability of the man in charge; for the appearance of the chicks is the best possible evidence and no flock of chicks is healthy and vigorous that does not look so.

It is of primary importance that every aid to good health be supplied, for enfeebled constitutions are as frequently caused by bad housing, brooding and care as by improper feeding. Cleanliness, good ventilation and exercise exert more influence than the novice is prone to believe. As the blacksmith's arm grows strong by constant use, the physical structure of the chicks grows strong and is kept in trim by running about and scratching in clean quarters, where fresh air supplies the material for myriads of life-giving blood corpuscles and the digestive organs are made capable of converting to the body's use all the nutriment the food contains.

Hatching and Raising With Hens

The usefulness of the broody hen is by no means a thing of the past. The breeder with a sitting of eggs from a favorite hen to be hatched and the chicks reared by themselves, the owner of the farm yard flock and the village poultryman with a dozen hens find biddy up-to-date and sufficient for their needs.

So much latter-day intelligence has been applied to chicken culture that sometimes it becomes too great a burden and the hen is divested alike of her natural responsibilities and of her opportunities. Our fore fathers allowed the old hen to have pretty much her own way and she, taking advantage of the good things that nature provides, not alone hatched and raised the chicks at less cost, but presented better chicks. Nature's ways are more resultful than the made-to-order methods sometimes recommended. The hen that is allowed to run with her chicks in the daytime, searching for the nutritious worm and balancing the supplied ration by the food selected from field and swamp, will raise a brood that is a credit to the breeder and that will stand him in good stead the following winter. The successful raisers approximate these conditions as closely as the circumstances permit.

Maturing the Flock

A chick well started is half raised; but it must be well cared for, or it will not win in the show room, or command a premium in the market. Good care does not mean that manner of feeding and housing which pampers the birds, but the care that supplies them with plenty of good food and an environment conducive to their physical welfare. The plan of colonizing the youngsters in roomy, open front roosting coops, works wonders toward the production of sturdy stock and hopper feeding not alone reduces the labor involved, but in many cases seems to hasten growth faster than the time honored system of three meals a day.

The Value of Common Sense

This is an age of practical things in poultry culture and the application of common sense to all its problems is fast clearing it of much of the theory which has been "thrust upon" it. It is the person who goes at the work with sleeves rolled up whose success can be counted in big round dollars and whose advice is worth all it costs to every earnest worker.

The experience of such men, and women, too, is given in detail in this book.

CHAPTER I

CONSTITUTIONAL VIGOR

WEAK FOWLS SHOULD NOT BE USED FOR BREEDING PURPOSES—BREEDING FOR HEALTH AND VIGOR—SELECTION OF BREEDING STOCK—PRACTICAL NOTES ON THE CORNELL BULLETIN

P. T. WOODS, M. D.



CONSTITUTIONAL Vigor—Active strength in the make-up of, and in all parts of the body.

Vitality—The power to live.

We build today, not for ourselves alone, but for future generations. Consciously or unconsciously this must be so whether we wish it or not. It is the Law that may not be broken and is as old as Time. Reader, are you building well and wisely, or are you building carelessly in your poultry work? Through the breeding stock we build either for strength or weakness in the progeny, and in their

chicks for generations. Why not strive for Health and Strength?

In building up a strain of fowls there is something even more important than breeding for Standard points, for prolific egg production, for meat, and that something is breeding for health and constitutional vigor. How many poultrymen do this? Comparatively few; they are successful men, in the business on a large scale most of them, who have learned by experience that it pays to breed for vigor and vitality.

The natural method of breeding is "the survival of the fittest." In wild life only those possessed of an abundance of vigor and vitality, and the ability to fight their way, live to successfully reproduce their kind. The male must win his mates through physical prowess and usually keeps them only so long as he is able to whip all other aspirants for favor. His sturdy mate or mates must possess sufficient constitutional vigor to win through the breeding and laying season, to hatch, brood, and care for the young, until they are able to shift for themselves. The female must produce eggs which will contain all the elements needed to develop, nourish and perfect the embryo chick and insure the possession of vitality, the power to live.

We need to take some of this "back to Nature" doctrine into the poultry yard, and to begin now to breed for constitutional vigor, not alone in this season's chicks, but season after season for all future generations of chicks. Inherited faults or weaknesses are often faithfully transmitted to the offspring for several generations with the tendency to increase the fault rather than to lessen it. Start with a foundation of health and build on it making still better health, vigor and vitality, and more of it. Every breeder knows that inside values count in breeding. If it isn't in the blood it cannot be depended upon to come out in the chick. Strong blood lines are the fancier's foundation in breeding exhibition quality Standard-bred stock. In mating two birds one $\frac{3}{4}$ and the other $\frac{1}{4}$ pure blood of the line he is almost sure of what results will be in the progeny—as sure as we can be of anything in this world where nothing is absolutely certain but "death and taxes."

Breed for Inside Values

He knows the inside values and he uses that knowledge in breeding. Why not apply the same knowledge to breeding for health? It can be done! Breed only birds rich in strong blood lines of robust health and constitutional vigor. Select every specimen intended for the breeding pen, first for health, vigor and vitality and then for desired qualifications in other desired points. Choose only the best to breed from and so mate them that similar physical defects will not be found in both males and females. The defects are pretty certain to be there for we are too many generations removed from natural living to hope to find complete physical perfection. Try to offset defects in one parent by breeding to it a specimen that is strong where the other shows weakness.

When the choice is made and the fowls well mated, then house, manage and feed them sensibly with a view to have and hold the maximum constitutional vigor. When in doubt study the fowl; often its natural instinct, given it for self-preservation, will be a better guide to follow than some "expert's" wonderfully devised "system" or theoretical method.

Elaborate houses, elaborate rations and "scientific" systems are often a delusion and a snare for the unwary. The needs of the fowls are of the simplest; comfortable shelter to use when needed, a fair variety of wholesome food, (mineral, animal, and vegetable) pure water to drink and an abundance of pure, open-air to breathe at all times. The more simple and less costly the buildings the better.

It is not sufficient to exercise this care with the breeding stock alone. The care and management of the eggs between laying and hatching, during the hatch, and of the chicks to maturity or breeding age is of equal importance. It is upon the common sense application of these truths that the success of poultry culture in the future depends. We should begin now, before it is too late, to work for improvement in constitutional vigor, for health and vitality in the flocks, not only for our own benefit but for the good of the future of the great poultry industry.

Year after year we have heard complaints of lowered vitality in flocks, of greater difficulty in obtaining a good percentage of fertile eggs, of poor hatches, and of chicks that, though a fair percentage hatched, did not thrive. Isn't it fair to assume that this diminished vitality (the power to live and reproduce) is due in part, if not wholly to impaired constitutional vigor, to breeding, housing, hatching, rearing and feeding without due regard to reproducing inside values in health, vigor and vitality?

The Cornell Bulletin

The recent bulletin of the New York State College of Agriculture, Cornell University, by Prof. James E. Rice and C. A. Rogers on the "Importance of Constitutional Vigor in the Breeding of Poultry" has attracted wide spread attention and it should be read by all who are interested in the future of poultry keeping for profit or pleasure.

The statements made in this bulletin are sensible and conservative but leave one with a desire for more data and more complete information. It states that: "We must breed for constitutional vigor" because "the most important problem before poultrymen is to maintain and increase the constitutional vigor of the flock. This is because we are asking more of the modern hen in proportion to her live weight than we are expecting of any other class of domestic animals."

"A good hen is expected to lay in a year about five times her weight in eggs. This means a reproductive process on an average, at least every third day during the year, or perhaps, in rare instances, every other day."

We quote from Prof. Rice's Cornell bulletin the following contributory causes to loss of physical vigor, which the bulletin cites, with some personal comment:

"(1) Increased productiveness. Modern poultry husbandry makes larger and larger demands on the strength of the fowl. The wild jungle fowl, from which our domestic fowls have come, is reported to lay less than one dozen eggs a year. The modern fowl, under good care, is expected to lay 125 to 150 or more eggs per year, and at the same time to produce eggs that will yield chickens having as strong vitality as the parent. It must be evident that with any increase in the average production of a fowl there must be a proportionate increase in the physical strength of the fowl to enable her to thrive under the larger consumption of food and heavier production of eggs."

It may be (undoubtedly is) true that in some cases prolific laying is a cause or a contributory cause of the loss of constitutional vigor, but we are inclined to believe that in many cases the danger from this source is overestimated. We know of a good many poultry farms that have been in successful operation for a dozen or fifteen years, where the habit has been to breed from vigorous, well-matured pullets, that were prolific egg producers, and were out of heavy laying stock. On these same plants they continue to get, year after year, strong, vigorous chicks that live and thrive. There are other matters to be taken into consideration besides the mere fact of heavy egg production.



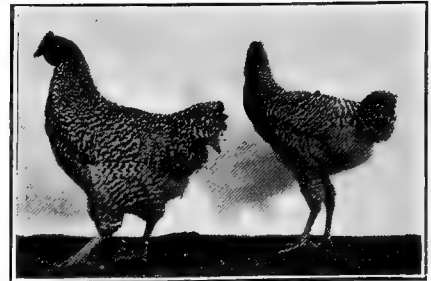
Reproduced from Cornell Reading Course Bulletin No. 45. Pullets in group A averaged in weight over $\frac{1}{2}$ pound more than those in group B. All were hatched at the same time, in the same machine, leg-banded, and brooded, fed and allowed to run together on free range during the summer. Observe the differences in type of body, size of comb, etc.

Where fully-developed, well-grown healthy vigorous pullets are used, there is little danger of lessening vitality during the first season. These same birds, if carried over to be used as yearlings or two-year-olds—that is, a second or third breeding season—might, and probably would, show considerable loss of bodily vigor. Heavy layers are prone to develop during the latter part of their first year of laying, some weakness or degeneration of the egg laying organs.

When this occurs, the bird ceases to be of value as a breeder and is useful only as an egg-laying machine until she reaches the end of her scope. For this reason extreme care should be exercised in the selection of yearlings and two-year-old hens for breeding purposes.

"(2) In-and-in-breeding without regard to vigor.

This practice is frequently resorted to in order to emphasize and develop high production, or exhibition or other qualities. Close breeding can be followed with success only when the first consideration is given to mating strong individuals. Too many times the breeder has not had the courage to sacrifice a weak individual because of its other desirable qualities."



Reproduced from Cornell Reading Course Bulletin No. 45. Showing contrast in constitutional vigor in Barred Plymouth Rock cockerels. Strong specimen at left, weak at right.

There can be no doubt that in-and-in breeding, even when great care is taken to select sound, vigorous specimens, is always a menace to constitutional vigor.

Breeding from Pullets

"(3) The use of pullets instead of hens for breeding. By breeding from pullets the breeder is undertaking to reproduce from fowls that have not yet reached maturity, and that, presumably because of their well-known qualities of heavy fall and winter laying, may have lowered their vitality before the breeding season. It appears reasonable, therefore, that the continued breeding, generation after generation, from pullets instead of hens, may have a tendency to shorten the normal length of life of the race of fowls, and, at the same time, to lower its native vigor, while the breeding from mature fowls, two or more years of age and still vigorous, should tend toward longevity and a consequent increase in vitality."

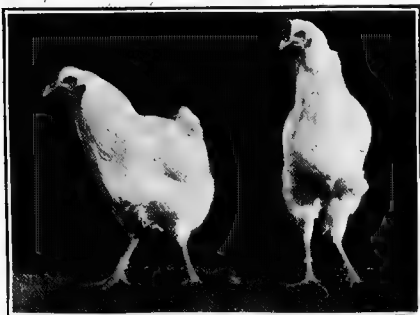
We cannot wholly agree with the statements made in the paragraph quoted above. Pullets are generally spoken of as such until they have completed their first year of laying, and in most varieties early hatched pullets are ready and safe to breed from in March and April at which time they should be from eleven to twelve months old. It is never safe to breed from undeveloped, immature pullets, but fully-developed, well-matured specimens, well established in laying, make excellent breeders if carefully selected for health and vigor.

The practical profit-value age of the fowl is comparatively short, most practical plants preferring pullets and yearlings, with only a very limited number of two-year-olds, the object being to get the greatest possible production during the first two seasons of laying, and dispose of the bird as market poultry before the muscles are sufficiently aged and hardened to injure the sale of the fowl as prime market poultry. The length of life of a fowl is not of the same importance as with other farm animals. Under favorable conditions fowls may live until from nine to twelve years old, but they are seldom profitable after the third laying season.

"(4) Heavy feeding to induce large egg yield during fall and winter, the unnatural season for egg production. The trouble here arises from the attempt to do, at the same time, two things which are more or less antagonistic; namely, to force a fowl to her highest digestive power by feeding her rich, appetizing foods to increase production when prices are high, and to expect her to produce eggs for hatching that are normal in their supply of nourishment and fully imbued with that mysterious something called life. Under normal conditions in nature a fowl is allowed to devote the larger part of the year to storing up energy in order to reproduce in the normal manner. A fowl to be used for breeding should be selected far in advance of the breeding season,

fed and housed with special regard to the laying of a large number of hatchable eggs during the natural mating season, instead of being forced to heavy production for commercial purposes during fall and winter."

Heavy feeding and underfeeding are both sources of impaired physical vigor. Where they are dry fed and given an opportunity to exercise there is little danger of overfeeding pullets. For several seasons we have been interested in the work of successive flocks of pullets housed in open-air houses and fed liberally by the dry method, food always before them. Five generations of pullets have yielded a plentiful supply of fall, winter and spring eggs,



Reproduced from Cornell Reading Course Bulletin No. 45. Showing contrast in constitutional vigor in White Plymouth Rock cockerels. Strong specimen at left, weak at right.

showing in the spring exceptionally good fertility and good hatches of chicks that live and thrive. We have failed to note in these birds any lessening of constitutional vigor.

Male birds were not introduced into the above mentioned flocks until two weeks before eggs were wanted for hatching and this we think is an important factor in securing vigorous chicks. There is no need of worrying the pullets with the attentions of an active and masterful "lord of the harem" until his services are needed.

Fresh Air an Important Asset

The bulletin fails to cite one of the chief factors contributory to loss of physical vigor, that of housing birds in poorly ventilated quarters. Fresh air is one of the most important assets which we have for building up and maintaining bodily vigor. To get best results the birds should be housed in open-air buildings.

"(5) Congestion and crowding of the breeding stock by keeping large numbers on limited areas. Without doubt, this is one of the most serious causes of loss of vitality. The modern system of handling fowls in large numbers must be on extensive farms rather than on congested plants. The land thus occupied should be used for growing fruit, grain and grass crops, its use by the hens being only incidental. This avoids soil contamination and gives the fowls the natural free-range conditions necessary; that is, opportunity and incentive to forage. In any event, rigid grading as to size and vigor should be practiced in order to avoid the unequal contest between the physically unlike."

Paragraph numbered "5" is one that should be carefully considered by every poultryman. It does not mean that intensive poultry farming cannot be successfully conducted, but it does mean that such methods are always practiced at a risk of loss of vigor and vitality. Poultry keepers who find it necessary to have large flocks on limited areas should pay particular attention to keeping the soil purified by frequent cultivation and the poultry quarters disinfected regularly. They should introduce new blood frequently and obtain supplies of farm-grown young stock often. Intensive poultry farming calls for strict attention to selecting breeding stock for health and vigor.

"(6) Lack of exercise for the breeding stock. This is a necessary consequence of congestion, and a common accompaniment of over-feeding. Too much to eat and too little to do appears to be one of the most potent sources of difficulty in securing fertile eggs with strong hatching power, capable of producing vigorous chickens. The dangers of over-feeding may be greatly reduced and health promoted by furnishing for the breeding flocks a deep litter of straw or other scratching material, by feeding all whole grain in

the litter and by providing a large range to encourage exercise in the fresh air the year round.

"(7) Carelessness in methods of keeping eggs for hatching. It is apparent, from experiments made at Cornell that the fertility and hatching power of eggs can be impaired, or entirely lost, by wrong methods of holding eggs for incubation. Presumably, loss of vitality in the egg may affect a chicken through life. Ordinarily, eggs held for incubation should be turned each day, kept in a cool place, 45 to 55 degrees, and should not be incubated when over one, or, at most, two weeks old."

Carelessness in keeping and handling hatching eggs is, we believe, one of the most common and dangerous contributory causes of loss of physical vigor. Probably more chicks are found dead in the shell or die soon after hatching every year from this cause than from any other. It has always been a mystery to us how anyone could expect to get a good hatch from eggs which had been kept in a warm room for two or three weeks, or which had been exposed to frequent extreme change of temperature.

We do not believe in turning eggs every day. It is a good deal better to let them alone. Gather the eggs frequently, place them in a clean receptacle, cover to prevent evaporation of contents through drafts of air, and keep them in a cool room where the temperature does not go below 40 or above 60 degrees F. Whenever possible, they should be used for incubation before they are a week old. Incubation of a fertile egg begins before the egg is laid. Exposure of the egg to a temperature of 70 to 80 degrees, results in quickening. Prolonged exposure to above 80 degrees or frequent warming or cooling while keeping for hatching may kill the germ and will surely result in loss of vitality.

"(8) Improper systems of incubation. Apparently, faulty incubation is accountable for much of the loss of vitality in chicks. This may apply to both the natural and the artificial systems, although more frequently the latter is at fault. This is because so many things that will injure the chicks may happen with good machines in the hands of poor operators, with poor machines and good operators, or with poor machines and poor operators. Since so many of these combinations of unfavorable conditions exist, it appears that much injury to the health of the flocks may result. It should be said, in justice to the most modern systems of artificial incubation, that good incubators in the hands of good operators have caused no apparent loss of vitality even when artificial incubation has been practiced continuously for many years.



Reproduced from Cornell Reading Course Bulletin No. 45. Four chickens of the same variety, age and method of rearing. Two in center of group show faulty development and lack of constitutional vigor. The difference in size and strength apparently due to inherited weakness.

"(9) Brooding and rearing chickens under crowded conditions with a general violation of the principles of sanitation. However important it may be that mature fowls be kept in healthful environment, it is equally important that the chickens be raised naturally and rapidly on the best rations under free-range conditions. Too rapid forcing on rich, easily assimilated food with lack of exercise, results in leg weakness and faulty digestion. Feeding too large a proportion of coarse feed with much fibre, making it slow of assimilation, results in stunted growth and the trouble known as 'long wings.'"

"(10) Failure to select breeding stock of recognized superior physical vigor. The most vigorous breeding stock is necessary if we are to maintain or increase the physical vigor of our fowls. This selection is possible if the breeder has a clear understanding of the physical differences between the constitutionally strong and the constitutionally weak fowls. Such differences exist and can be quickly recognized by any one who will take the trouble to study the various types of fowls."

Conclusions

"From the experiments we must conclude that there is a relation between the physical characters of fowls and their constitutional vigor, which will enable a careful observer to select the weak from the strong, and also that these qualities are transmissible from parent to offspring; we may also as-

sume that, other conditions being equal, weak parents are more likely to produce infertile or less hatchable eggs, which will give weaker chickens, than are strong parents.

"Should we not, in view of these facts, practice a system of rigid selection of the weak from the strong during all stages of the life of the flock, and from the strong select only a few of the strongest for breeding in order that we may keep only the most vigorous fowls, with the object of securing larger production with less mortality and greater net profit, and at the same time of insuring stronger stock each succeeding generation?"

"If we are to succeed permanently we must so hatch, rear, feed, house and breed our poultry that they will keep in perfect health. Good health in the fowls is the foundation of successful poultry husbandry."

SELECTION OF BREEDERS AND LAYERS

ELEMENTARY RULES OF HYGIENE MUST BE STRICTLY OBSERVED—STUNTED CHICKENS SHOULD NEVER BE KEPT FOR LAYING OR BREEDING PURPOSES—CULL THE CHICKENS THREE TIMES—WEAKLINGS ARE ALWAYS UNPROFITABLE—LATE CHICKS NOT FIRST CLASS LAYERS

VICTOR FORTIER

(Poultry Division of the Experimental Farm, Ottawa, Can.)

IN ORDER to insure the rapid growth of chickens, proper nourishment must be given from the start and until the chickens are full grown. It is necessary to observe strictly the elementary rules of hygiene at all times and everywhere. Should these fundamental principles be disregarded, growth is considerably arrested and a noticeable proportion of the chickens remain stunted. These should never be kept either for laying or breeding purposes. No one can ever expect to get profitable returns from such fowls, no matter how good the breed he has on hand.

Chickens intended to be kept for laying or breeding purposes should be carefully selected quite young, the first selection being made to the best advantage when they are about eight weeks old. Those which have been kept back by ailments, such as white diarrhoea (chalky diarrhoea), bilious diarrhoea, leg weakness, or through any other causes, should then be separated from the more robust ones and placed in a separate pen, where they can be fed and prepared for the market as soon as possible.

The selected chickens on reaching the age of four months should be re-selected and the weaklings removed. A third and final selection should be made in the fall of the year, just prior to placing the fowls in their respective winter quarters. There should be no reluctance on the part of the owner to sacrifice all the weaker birds and use them for table purposes, because such birds will always eat more than the profit they will give.

Weaklings are Unprofitable

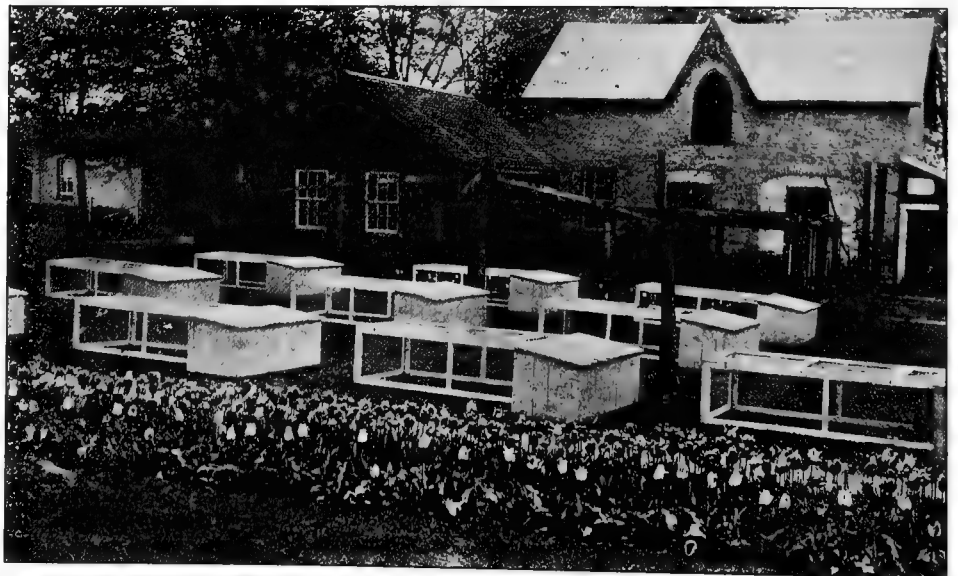
Careful experiments have most positively demonstrated the fact that weaklings of the same brood, of the same strain and of the same age do not lay as many eggs the first year, or, in fact, during the following years as those which have rapidly and healthily developed.

Unfortunately it has been too often the practice to pay

little attention to the wise selection of birds which are intended for egg laying. The farmer and amateur poultry raiser are often heard complaining of the unproductive birds in their possession, and they are unable to account for this lack of production, but we are quite convinced it is due to the fact that a proper and timely selection of chickens has been neglected.

Our remarks regarding weaklings, puny looking and abnormally developed birds, although hatched in good season, also apply to other birds that have hatched too late, after the 15th of June or at the beginning of July. The latter are scarcely worth more as egg producers than the former; in both cases the egg production will be very scant.

In support of this theory, let us take, for example, two broods of Barred Plymouth Rocks, all of the same strain, of which a certain number were hatched about the 5th of May and the remaining portion about the 15th of June, or say six



SOME SATISFACTORY BROOD COOPS.

These coops are in use on a Canadian poultry farm. The owner says he finds they have solved the cat question and are rat proof at night.

weeks later, and let us winter them in poultry houses identically the same, giving them the same kind of food. The first lot will invariably commence to lay during the months.

of November or December, the latter will continue to develop and probably take on flesh, but will not commence to lay before February or March and will give from 40 to 60 eggs less than the first ones, though they may continue to lay a little longer in summer.

Undesirable as Layers

We give here the result of some interesting experiments:

One group of twenty-two Barred Plymouth Rock pullets, which were hatched in May and wintered in a cold cotton-front poultry house, each laid an average of $68\frac{1}{2}$ eggs. A like number of White Wyandottes which hatched during the same month and wintered under like conditions each laid an average of $76\frac{1}{2}$ eggs.

In another case, six pullets, three Barred Plymouth Rocks and three White Wyandottes, all hatched in May,

fed in the very same manner as in the first case, but placed in a warm hen house, (both kinds had been slow in growth and had reached their full development during October, November and December) had a record of an average of only $15\frac{1}{2}$ eggs for each bird. Six other pullets of the same stock similarly treated and fed as the former but which had hatched about the end of June, laid an average of 23 eggs only.

As a result of these experiments and the conclusions arrived at, we with certainty say to all who are interested in poultry keeping, that if they rid their yards of all unhealthy puny-looking and abnormally developed birds which threaten the ruin of poultry raisers, the success in this branch of agriculture would be enhanced in a few years by one hundred per cent in the production of eggs, while the table would likewise be furnished with a fowl of far superior quality.

LINE BREEDING

A VETERAN POULTRYMAN TELLS HIS FELLOW BREEDERS HOW TO PRODUCE THOUSANDS OF CHICKS AND THREE STRAINS OF BLOOD FROM A SINGLE PAIR—THESE BIRDS WILL IMPROVE IN SHAPE AND COLOR WHILE RETAINING THE VIGOR OF THE ORIGINAL PAIR

I. K. FELCH

LINE breeding is very simple when the rules that govern it are strictly followed. The trouble is that we all grow careless and a little carelessness often destroys all our previous work and throws the whole scheme or plan out of order.

Intense in-breeding often results in a sterile flock. The secret of success, if secret it be, is to breed so as to preserve the line within our own strain and yet have each mating—each pair—show a difference in blood. For instance, we all know that the chickens of any pair of birds inherit half the blood of each parent. If two of these chicks are mated the proportion of the blood of the sire and dam remains the same, but if the pullets of the second generation are mated to the old cock of the first generation, there is a material change in the third generation as these birds have three-fourths of the blood of the cock and only one-fourth of the blood of the dam. In the accompanying chart, which I originated a number of years ago, the female line is indicated by the dotted lines and the male line by the solid lines.

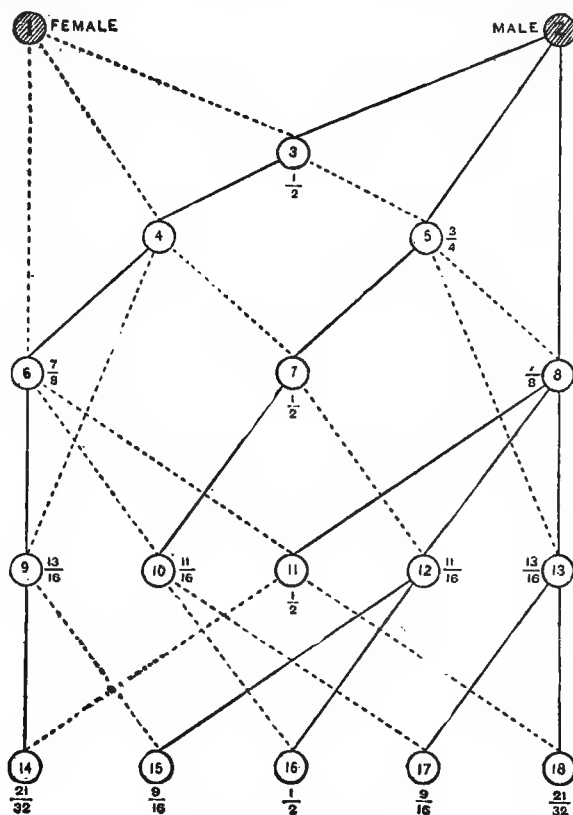
You will note that 1, the female, and 2, the male, mated together produce group 3 and that pullets from group 3 mated to 2, which represents the male of the first generation—produce group 5, or the third generation, to which we have just referred. Now if a cockerel from group 3 is mated to hen 1 we shall get group 4, having three-fourths of the blood of the original hen and only one-fourth of the original male.

We are now in position to mate again, using birds from group 4 and 5 and the result is that in group 7 we have a flock identically the same in blood as group 3, though they did not come directly from the same birds, 1 and 2.

By mating birds from 6 and 8 we obtain group 11, having the same proportion of blood as group 3, unless we wish to admit that these matings have exhausted the blood of the original pair that founded the strain.

Arithmetic teaches us that the percentage of blood in groups 3, 7 and 11 is the same, though to a casual observer the chart would seem to lie, as 10 and 12 and 4 and 5 apparently are not alike, though they are actually, because members from groups 10 and 12 mated will produce birds that have half of the blood of the original pair.

It is an old English rule that when we reach birds with seven-eighths of the blood of a given pair of ancestors we have exhausted the eighth of foreign blood that was used to invigorate the strain. Under that rule 6 and 8 become practically 1 and 2, because breeding birds from these two groups will produce group 11, which has the same blood proportion as groups 3 and 7. But while the birds in 9 and 13 have recovered the eighth blood lost in 10 and 12, because their dams come from their own strain, yet, had 9 and 13 been mated, their progeny would have been the same in blood as groups 3, 7, 11 and 16. In 15 and 17 we have a little better than half of the blood of the



FELCH'S BREEDING CHART

Showing how thousands of chickens and three strains of blood can be produced from a single pair, in the vigor, size and color of the original pair.

male and the female strains we are endeavoring to establish.

Let us suppose the following case: A breeder may have followed the chart to the end and have fine birds. Thinking that he has five groups he sells all his old stock and mates 14 and 18 and 15 and 17. In reality the chickens he gets are all half-breeds like 3, 7, 11 and 16. Every one of them would be exactly of the same blood as group 3, and he would mate these last pullets to his male in group 18 and the cockerels to the hens in group 14.

It is intensely interesting for those who like to experiment to study this chart. By careful line breeding a breeder is in a position to produce at any time birds having half the blood of his original flock and he is safer to breed his own birds than to go out of his flock to get a hen to introduce to his own strain. It is more safe to breed a thousand chickens from a single pair than to keep crossing strange hens into one's flock. With the occasional crosses like 5 and 8 and 4 and 6 we regain any seeming loss. Had not these two crosses been made the chart would have seemed to have verged into half-breeds in time. But these two crosses more firmly establish the two strains.

Condensed Description of Chart

Remember in studying the chart that the solid lines show the male birds and the dotted lines the female. Each circle represents the progeny.

Female No. 1 mated to male No. 2 will produce group No. 3, which is half the blood of the sire, and half that of the dam. Females from group No. 3 mated back to their own sire, No. 2, produce No. 5, which is three-fourths the blood of the sire.

Select a cockerel from group No. 5 and a pullet from group No. 4, or vice versa, which will produce group No. 7, which is mathematically half the blood of each of the original pair, Nos. 1 and 2. This is the second step toward producing a new strain.

Females from No. 5 mated back to the original male, No. 2, produce group 8, that are seven-eighths the blood of No. 2. A cockerel from No. 4, mated back to the original dam, No. 1, produces group No. 6, which is seven-eighths

the blood of the original dam and only one-eighth the blood of the original sire, giving us a flock of birds that have practically the same blood as the original dam, because the blood of the original sire is almost eliminated.

Select a male from No. 8 and females from No. 6, and for a third time produce chicks (in group No. 11) that are half the blood of the original pair. This is the third step and the ninth mating in the breeding of a new strain. In all this, the line of sires has not been broken, for every one has come from a group in which the preponderance of blood was that of the original sire. Nos. 2, 8 and 13 are virtually the blood of No. 2; in effect they are the same, for the blood of No. 1 is exhausted. A point is now reached where we can establish a male line whose blood is virtually that of the original dam. If now a male is selected from No. 6 and mated with a female from No. 4, group No. 9 will be produced, which is 13-16ths the blood of the original dam (No. 1) and 3-16ths the blood of the original sire (No. 2).

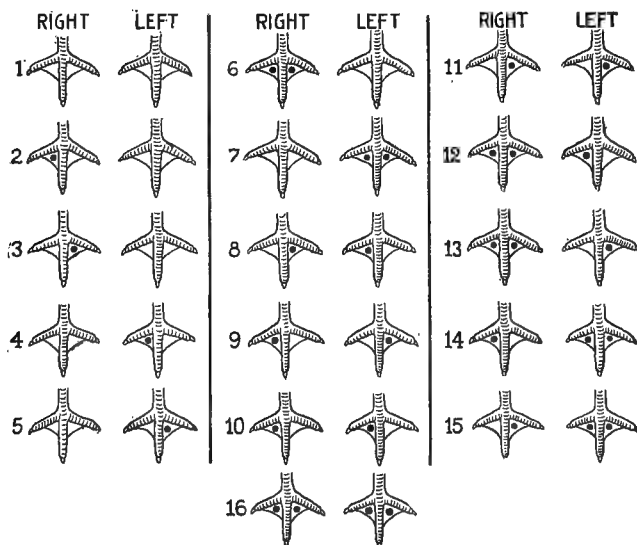
Select a male from No. 9, and a female of the new strain (No. 11), and produce group No. 14, which has 21-32ds of the blood of the original dam, thus preserving her strain of blood.

A male from No. 13 which is 13-16ths the blood of the original sire (No. 2) mated to females from No. 10, which are 5-16ths the blood of the original sire (No. 2) gives group No. 17, which is 9-16ths the blood of said sire and virtually is a group of the middle line or new strain, for we no longer call these birds half-bloods of Nos. 1 and 2.

In No. 16 we have the new strain and in No. 18 the strain of our original sire, No. 2. We have three distinct strains, Nos. 14, 16 and 18, and with systematic care we can go on breeding for all time to come.

I call this "Arithmetic in Poultry Culture." It is pretty hard to get along without arithmetic in any calling and in this case it lends absorbing interest to our breeding.

I am pleased to present my original breeding chart to your readers. The edition I had printed is exhausted and I do not intend to print another. I bequeath it to you.



MARK THE CHICKS FOR IDENTIFICATION

The above diagram shows method of marking chicks so that sixteen different flocks, ages, or families may be identified by absence of punch marks as in No. 1, and by punch marks as shown Nos. 2 to sixteen. A good chick-size poultry punch may be had at a small expense. Newly hatched chicks should always be punch-marked and a record kept of the date on which they were hatched, later the marks can be supplemented by leg banding, making it possible to positively identify many ages, flocks or families. Chicks should be punch-marked soon after hatching. Keep a record of your chicks this season.

THE IMPORTANCE OF STRONG-GERMED EGGS

WEAK GERMS ARE THE RESULT OF A LACK OF VITALITY IN THE BREEDING STOCK, IN THE EGGS OR IN THE INCUBATION—HEALTHY, VIGOROUS BREEDING STOCK FOR GENERATIONS IS NECESSARY TO PRODUCE STRONG-GERMED EGGS FOR HATCHING—HOW TO CHOOSE BREEDERS—FIVE ESSENTIALS IN MAINTAINING HEALTH AND VIGOR

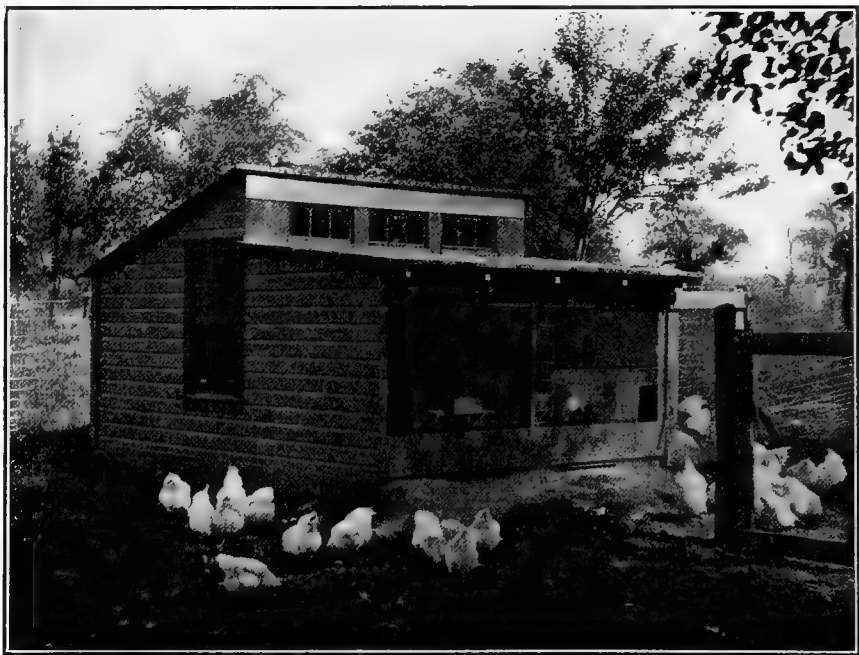
P. T. WOODS, M. D

EVERY year at hatching time we hear the same complaints—the same old story. The eggs either run too low in fertility or they do not hatch well, or perhaps they show fair fertility—hatch reasonably well, but the chicks do not make a good live of it. We are asked why is there so large a percentage of infertile eggs? Why is it that more of the fertile eggs do not hatch? Why do fully formed chicks die in the shell? Why do so many chicks die between the third and the tenth days after hatching and so many others when three or more weeks old? Reasons and explanations without number have been given—some reasons that are not reasonable and explanations which do not explain. Yet the real answer is comparatively simple—the breeding stock, the germs in the eggs, the newly-hatched chicks—one, any, or all, are lacking in vitality.

Vitality, the dictionary tells us, is “vital force,” “animation,” “the principle of life,” “the quality or state of being vital,” and to be vital, in brief, means “to be capable of living.” In the egg we have a storehouse of wonderful energy in the form of potential vital force, the existing possibility and power to create within itself a fully endowed living chick, provided the conditions are reasonably favorable and the stock back of that egg possessed a sufficient amount of vitality to pass on to the embryo an abundance of vital force or power to live and thrive.

We must begin somewhere, and for poultrymen the only possible and logical way to make a beginning is to start with the breeding stock. Every breeder knows that it takes several generations to fix feather, shape, type or other desired points, and that it takes several generations of careful breeding to get rid of certain undesirable qualities or faults when breeding to standard. But many breeders forget or fail to apply the same line of reasoning when seeking to fix vitality, if they do seek it at all, in their flock. Vitality or vital force must, like all other desirable qualities, be bred for and fixed by generations of careful breeding, and at the same time lack of vitality must be bred out. It takes time and requires attention, as does everything else that is worth having. On the farm range, where natural conditions alone prevail, where the chicks are all hen hatched, where the stock ranges throughout the year and where only the fittest survive to breed in the normal breeding season, and where also the cock that rules the barnyard has the most progeny, perhaps the rule is proved also by the exceptions. In the average breeding yard or run, however, the rule applies with greatest force. Here we find many breeding birds lacking in

condition or stamina; such can not be expected to transmit vitality when their own vital force is only a little more than equal to their own immediate needs. The majority of eggs from such stock are sure to be lacking in vitality or “weak-germed.” Begin now and keep at it year after year, to cull out all specimens that are not in the pink of condition. Refuse to breed from any bird that has ever had serious illness no matter if it is otherwise a “good specimen” and appears to have been “cured.” There is no known way, with a living dumb animal, to tell just how complete the cure may be and it is the wisest course to take no chances where health and vitality in breeding stock are concerned. Breed only from the best specimens of physical excellence as well as you can judge it, select your breeders for health, vigor, strong perfect shape, perfect condition and freedom from deformities.



A P. T. WOODS OPEN-FRONT BREEDING HOUSE SLIGHTLY MODIFIED
(This house is fully described and plans are published in our book entitled “Poultry Houses and Fixtures.”)

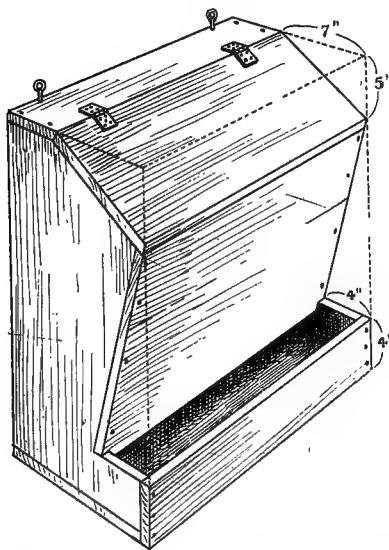
Do this every season and you will have a good start on the right road toward increased vitality but it is not the whole secret, only the beginning.

Given healthy vigorous stock to start with you have only begun to fight. You must keep them sound, healthy and vigorous by good common-sense care and management. They must be at all times, in so far as may be possible, capable of transmitting to their progeny through the eggs a sufficient supply of vitality, “the principle of life,” to render them “capable of living.” This is not half so difficult a matter as some pseudo-scientists of the poultry world try to make us believe. It is the natural tendency of all young

animals, when reasonably well born, to live, it is part and parcel of that same "vitality." Healthy breeding stock, when given a reasonable chance, are prone to remain healthy. In maintaining health and vigor there are only five real essentials and these are: 1—Comfortable housing and yarding without crowding; 2—An abundance of fresh air to breathe both day and night; 3—Plenty of wholesome food in variety; 4—Ample exercise in the open air and sunshine, and 5—Pure water to drink. Supplying these essentials is what we mean by giving breeding stock "a reasonable chance" to remain healthy.

Selecting the Breeding Stock

For the beginner's sake let's go into details a bit assuming that we intend to breed only from vigorous stock that we know has never been seriously sick. First make sure that the birds which we intend to use for breeders are all well matured specimens and if possible that they are neither exceptionally early or rather late matured birds. Too early maturity is just about as bad as very late maturity if the birds are intended for breeders and a medium average time in reaching adult size and plumage gives the best breeder. Have the specimens of both sexes large, well formed, alert



AURORA LEGHORN FARM'S DRY-FEED HOPPER

Made from a Kirkman's borax soap box. The dotted lines show the original box lines. Capacity, twenty-five to thirty quarts. The opening is four inches deep and four inches wide and we have found these to admit of little or no waste of the feed. The hopper is hung up so that the bottom is six inches from the floor. —R. P. Ellis.

and active. The bird should carry its body with an alert, active air, the eye should be bright and the pupil neither too large nor too small in a medium light. Beware of a bird with a dull eye or with an irregular pupil or one that changes almost constantly in size without any apparent change in the light to which it is exposed. The eye is a good index to condition and health if you will take the trouble to study it. Insist on having clear, bright, clean, normal appearing eyes when selecting breeding birds. The comb and face should be a good, clean, bright, healthy red and free from abnormal lumps and bunches. Don't use a bird for breeding that has a pale or dark face and comb. If the face or comb of the bird turns either pale or dark when the bird is excited or has been exercising freely better discard that bird for a more promising specimen. Try the temperature of the bird's legs with your hand, they should be cool. If the legs seem quite hot to the touch, place the bird in some quiet pen for observation. It is out of condition and probably unfit to breed from. Observe the plumage, it should be clean and bring in appearance and fairly "close" for the variety. Loose, mussed appearing plumage indicates that the bird is out of condition. See that the body is well formed and free from deformities. Do not breed birds with crooked backs or breasts.

Give the male bird ample time and attention for remember that so far as the progeny are concerned he is "half your flock." Try him for a day or two with a few hens and

see if he serves them properly and completely. He should be attentive without being too rough and clumsy. Watch him closely for a few days and if he does not seem all right try another male. After he has been with the hens a week or ten days try a few eggs in the incubator or under a hen and test them out in five days to see how they run for fertility. If one male will not give you fertile eggs in sufficient numbers, try another or try the same male with other hens if he is a particularly promising bird. If you have an exceptionally fine male do not let him wear himself out for want of good care. Sometimes a particularly fine cock will almost starve himself while seeking to be agreeable and attentive to his mates. If you find this to be the case take the male apart from the flock frequently and feed some delicacies like fresh meat scraps, fresh green stuff and some mixed grain. Keep his toe nails blunt on sides and points and blunt the spurs—a little care will prevent torn backs in the females and save the loss of some valuable breeding birds. Don't breed a male that is under one year old or over four years old.

In selecting the hens be sure that they are in the habit of laying normal eggs in size, shape and contents. Trap-nest them if necessary to make sure of this detail. It is important for you cannot get normal, healthy chicks out of abnormal eggs. Some hens are liable to show a considerable percentage of infertility in their eggs, the trap-nest will show you which ones are off in this respect if you mark and test the eggs. Sometimes mating with another male will correct this fault if the hen is a good vigorous specimen. Watch the droppings of your breeding stock of both sexes. The droppings should not be either too soft or too hard, but should be well formed and normal in color. Avoid birds that commonly void green droppings. A bird that habitually voids deep blue green droppings is on the way down and out.

Importance of Fresh Air

In order to keep fowls healthy and vigorous, full of vitality, and that means the power to produce strong-germed eggs, they must have an abundance of pure, fresh air to breathe both day and night. In former articles on fresh-air housing we have explained how this may be accomplished. Do not forget that your birds need to breathe fresh air twenty-four hours each day in order to do their best and this fresh air must be supplied in such a way that you avoid drafts about the sleeping birds when they are upon the roosts at night. This matter of fresh air is one of vital importance. This rule applies the year round, in winter and in summer.

Exercise in the open air and sunshine whenever weather permits is essential to health and the production of strong germed eggs, eggs that contain potential vitality,—the power to live when properly quickened. We let our breeding stock, housed in fresh-air buildings, run out of doors at will in all sorts of weather, summer and winter. They are used to it and do not expose themselves unduly in stormy weather. They can always get in out of the storm if they wish, for the door to the run is never closed. Fowls that are not accustomed to this treatment should be given an outdoor run on fair days but should not be allowed out in severe winds, now or rain storms in winter. Where the birds are confined, keep plenty of clean, bright straw litter on the floors of their open sheds or pens for them to work in on stormy days but do not shut out the fresh air for fear of a little rain or snow. Better remove the litter material when wet or damp and replace with dry straw. You cannot have health and vigor without some exercise but do not make them work for all the food they get. The food in the litter should be merely an incentive to exercise, not for the purpose of compelling it.

Feeding the Breeding Birds

There are almost as many good methods of feeding breeding stock as there are men who make poultry keeping a business. The most important thing about feeding, in spite of what the chemists and "scientific feeding experts" tell us, is to supply a variety of wholesome food; i. e., some grains or grain mixtures, green food and vegetables, the fresher the better, and some good pure meat food. In addition to these, grit, oyster shell, charcoal and pure water should be supplied.

Of grains, corn, wheat, oats and barley are the staples, and we consider them all essentials. Personally we prefer to feed only dry grain mixtures of whole and cracked grains chiefly because it is more convenient for us to do so and the results are entirely satisfactory. We buy or make up a scratching grain mixture and feed it from a hopper. One of the best mixtures we have used is a combination of two-thirds cracked yellow corn (clean and free from mould or must) and one-third either hard red or amber wheat for winter feeding. In summer the corn is reduced to about forty or fifty per cent and the wheat increased. When good heavy clipped white oats can be had cheap enough they are often substituted for wheat and sometimes barley and oats are used. The parts are by measure, not weight. Scratch grain mixtures used when they can be had cheaply and conveniently are usually about the following composition: Whole corn, 20 lbs; cracked corn (yellow), 40 lbs; wheat, 20 lbs; oats and barley (one or both mixed) 12 lbs; kaffir corn, 5 lbs; sunflower seed, 3 lbs. This hard, dry grain is kept always on hand in the food hopper where the birds can eat it at will. In bad weather a little is sometimes scattered in the litter to encourage the birds that scratch. In another hopper or compartment there is always a good supply of pure, sweet, wholesome beef scrap. Grit, shell and charcoal they always have before them and plenty of water.

Green food and vegetables are supplied daily if possible, in a wire pocket tacked on the side of the pen. Give as much as experience teaches that the birds will clean up in one day. We use whatever is available, refuse cabbage, cut green rye, clover, split turnips and beets, apple and potato parings, etc. Table scraps fed at noon help out the ration of small flocks.

For those who like a moist mash the following ration is a good one: Equal parts by measure of wheat bran, wheat middlings, corn meal, yellow gluten meal and ground oats or oat feed with ten per cent cut clover (scalded and salted first) and six per cent beef scrap (scalded). Mix all ground grain stuff dry, then add to water containing scalded clover and scrap and mix into crumbly mash. Feed all the birds will clean up in twenty minutes at noon or an hour before roosting time as convenient five days a week. Give some

hard whole grain to finish off on if mash is fed at night. For morning feeding give a handful of scratch grain per bird in litter. Night feed of hard grain should be given in trough or feed box where the birds can quickly get all that they want. On days when no mash is fed give cut green bone at noon, all that the flock will clean up quickly in about fifteen minutes. Cooked or fine cut raw vegetables may be used in the mash, or feed vegetable and green food as advised in dry ration.

We make no claims that these rations are better than a thousand or more others that are in general use today. They have given us good results and we have had good fertility and good vitality. The other essentials, not forgetting to breed only from healthy, vigorous stock, are all quite as important as the method of feeding. You cannot get good results and half starve your birds at the same time. The most important part of feeding fowls is to supply plenty of wholesome food and a sufficient variety to keep the appetite from failing.

Pure water for drinking purposes we named as the fifth essential in maintaining health and vigor. Too many otherwise careful poultrymen neglect this important item of poultry necessities. The fowl's body and her eggs are made up very largely of water, approximately 75 per cent, and we cannot be too careful to see that the supply is pure. Let the drinking water be fresh and clean and from a source that you would not hesitate to drink from yourself. Foul drinking water will cause disease; and barnyard seepage, sewage, sink-drain waste and the wash of hog pens, poultry yards and other filth will contaminate and produce foul water, rendering it a dangerous and virulent poison. Get clean pure water for your birds and keep it clean if you want to keep them healthy and have them yield you the maximum number of good strong-germed eggs for hatching. There is only one safe substitute for water for stock birds and that is new, clean, recently fallen snow and only in the open country, remote from railroads, trolley lines and well travelled highways. Town and city lot fanciers cannot safely use snow as a substitute for drinking water for their flocks.

If the reader will study and apply the information given in this article he can secure a good percentage of fertility from his flock and count on good strong germed eggs for hatching, but if his birds are even in a small degree lacking in vitality it may take three or more seasons of careful work to get the best results. It will often take three to five generations of careful breeding to repair faults and deficient vitality induced by one season of carelessness. It is always easier to make a mistake than to remedy the results of an error. The only real and sure way to prevent trouble is to avoid it.



A FINE BROOD

Rare Oriental Bantam Chicks bred from birds recently brought from Nagasaki, Japan. These little oriental game Bantams are as plump as quail and not unlike wild game in their habits. These particular chicks were hatched under perfectly natural conditions by the mother bird stealing her nest under a cedar tree.—F. L. Sewell.

CHAPTER II

INCUBATION AND INCUBATORS

NATURAL AND ARTIFICIAL HATCHING DISCUSSED—HOW TO SET A HEN—HOW TO USE AN INCUBATOR—EGGS FOR HATCHING AND THEIR PROPER CARE

P. T. WOODS, M. D.



IT IS conceded to day that the incubator is a necessary part of the equipment of all up-to-date poultry plants. They are ready to set at any season, take care of a liberal quota of eggs and, when properly handled, are reliable hatchers. In February and March when broody hens are scarce, the incubator must be relied upon to produce chicks in sufficient numbers to economize on the labor of rearing them.

It may seem trite to the experienced poultryman to be told how to set a hen but, judging from our correspondence, there are still a number who want to be told the best way. One of the first things to learn is the wisdom of the old saying, "Don't count your chickens before they are hatched." This applies to both natural and artificial hatching. One hundred per cent hatches are exceptions, not the rule. A veteran poultry keeper in Lynn, Massachusetts, once told the writer that he had set many hundreds of hens and had kept a record year after year. He found that without the record he always remembered the hatches that gave him fifteen chicks from fifteen eggs, but failed to recall the many times that hens hatched half or less than half of the eggs given to them. He told us that his records showed that six or eight chicks from thirteen eggs could be considered good average hatching; this with eggs under hens and good healthy vigorous breeding stock producing the eggs for hatching.

How To Set a Hen

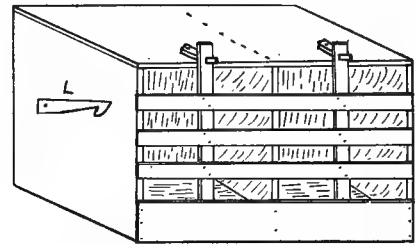
In choosing a broody hen select one with a quiet disposition that clings closely to the nest. Nervous, flighty birds that sit standing are not only a nuisance but they often break or spoil the eggs and lose the entire clutch. Let the broody hen occupy the nest of her own selection for two or three days, until you are satisfied that she is fixed in her determination to sit.

It is always well to set two, four or more hens at one time. Make the hatching boxes to accommodate two to four hens. A very satisfactory nest box is shown in the accompanying illustration. Such nests can be readily made from waste lumber or packing boxes. When made in units of two nests, of about the same dimensions, they are convenient to handle and can be arranged in tiers along the walls of the rooms or building used for sitters. Inside measurements of each nest should be 12 inches wide, 14 inches deep and 14 inches high. The front is boarded up 4 inches from the bottom to keep in nesting material. Wooden locks like the one marked "L" in the illustration are used to hold the slatted front locked in position.

We prefer the nests filled in the bottom with a little moist loam or an inverted sod. Pack the earth into the corners of the nest and dish out the center a little to make the nest a shallow concave, but do not dish out too much as the eggs are liable to roll to the center and be broken by the

hen. The concave of a nest should be just sufficient to keep the eggs from rolling out from under the hen. On the moist earth scatter a little tobacco dust or some tobacco stems, then add a thin layer of soft hay or cut straw. Soft "cow" hay or oat straw makes the best and most lasting nests. Put in a few china nest eggs to try out the hen. Go over her thoroughly dusting with Persian insect powder (pyrethrum) working the powder well into the feathers, being particular to give the rump, wings and head a liberal dusting.

Place the hen on her new nest at night, allow her to remain undisturbed until just before dark the next day, then



Double nest box for sitting hens. "L" indicates detail of wooden latches which are used on top of box to hold slatted front in position. It is shown on end of box for convenience only.

take her off for food and water and give her an opportunity to go back to the nest of her own accord. Repeat this the next day and until she shows a disposition to stick. Then give her the eggs allowing no more than she can cover comfortably. The usual number of eggs to a clutch are eleven, thirteen and fifteen according to the size of the hen and the season of the year. A good mother will usually be ready for the eggs the first or second night after being placed on the nest. Always set the hens in pairs, two, four, six, or more at one time and at the end of seven days test out the infertile eggs. If the fertility should run low, leaving only a few eggs under each hen, divide the fertile eggs into clutches of eleven or thirteen eggs each under one hen and re-set the others. When a hen is set with two or more others, coming off at the same time, the broods can be doubled up and the odd hens re-set; it will not hurt them to spend six or seven weeks incubating.

Choosing an Incubator

In choosing an incubator be sure to get a machine of sufficient capacity to meet your requirements. It is much better to be obliged to set 50 eggs in a 100 egg machine than to have 100 eggs you want to hatch and only a 50-egg machine to put them in.

In deciding what incubator to buy, try to get the fair and unbiased opinion of a man who is a successful incubator operator; find out what kind of machines other successful breeders use and learn the results obtained by them; study carefully the testimonials of people who have successfully used the machine. If you do this, and are guided by your own best judgment you cannot go wrong.

When you receive your incubator study carefully the printed instructions which come with it. Before you start the machine, be sure that you have mastered the instructions and that you know thoroughly what the manufacturer considers best as to method of running and location of machine.

The most important things to consider in selecting the location for machine are freedom from excessive vibration, air free from coal gas or decaying vegetable matter and a solid, level floor on which to set the machine. It is very important that the body of the incubator be level, otherwise the egg chamber will not heat evenly.

After studying your instructions carefully and setting the machine in a well ventilated place, but not in a draft, run it empty for a few days until you become thoroughly familiar with every detail, and have the regulating device properly adjusted so as to maintain an even temperature of 102½ to 103 degrees in the egg chamber.

After you understand the operation of the machine and can maintain the desired temperature in the empty incubator, the eggs may be put in.

Eggs for Hatching and Their Care

The eggs for hatching in an incubator should be just as carefully selected as those for hatching under a hen. They should be from healthy, vigorous breeding stock, of medium size for the variety of fowl producing them, and should be fresh, the fresher the better and should not have been kept for a longer period than two weeks. While saving eggs keep them in a temperature of from 40 to 60 degrees.

Do not attempt to double up the capacity of the machine by placing eggs on top of a full tray; use only as many as will go in easily. Having the machine running smoothly at the temperature recommended in the manufacturer's directions, place the eggs in it and leave them alone for several hours to warm up, being careful that the temperature does not run above 103 degrees. Follow closely the instructions of the incubator manufacturer as to ventilation, running the lamp with a moderately high flame at the start, and gradually reducing it until, at hatching time you are running the minimum height flame necessary.

Beginning on the second day the eggs should be turned twice daily; these turnings should be as nearly twelve hours

apart as possible. The most approved way of turning eggs is to remove them from the center of the tray to the ends and, with the flat of the hand, roll the balance inward toward the center of the tray. At the morning turning, the position of trays should be changed from side to side, and at the night turning, from end to end, so evening up any inequalities of temperature and giving all the eggs an even chance of hatching well.

Except in extremely warm weather, airing or cooling of the eggs is unnecessary. In very hot weather, when the temperature of the incubator room runs high, the eggs may be cooled from five to fifteen minutes once each day, but we believe it would be better to turn them three times a day in hot weather and give only such cooling and airing as they get while being turned. If the temperature of the egg chamber runs above 104 degrees at any time, it is sometimes well to cool the eggs from five to fifteen minutes. Under ordinary conditions, the eggs are aired and cooled sufficiently to give best results while they are being turned.

Eggs should be tested twice during the hatch, the first test being made on from the 6th to the 10th day, the second on the 14th or 18th day. At the first test remove from the trays all infertile eggs and dead germs. Mark those which are doubtful and let them remain in the machine until the second test; if they do not develop before that time they should be removed as well as all other dead germs.

Stop turning the eggs as soon as the chicks begin to break the shells, push the tray back as far as it will go, or if there are two trays, push one back and draw the other forward leaving a space for the chicks to fall into the nursery below.

Close the machine and let it alone until the hatch is over. If it has been regulating properly it is perfectly safe to leave it and it will do no harm if the temperature runs to 105 degrees when the chicks are hatching, but it should not go higher.

When all the chicks have hatched, the ventilators should be thrown wide open, egg trays and shells removed from the machine and the door left open a little about the width of a common match. Allow the chicks to remain in the machine from 24 to 36 hours after hatching, then remove to the brooder which should be running properly before they are placed in it.

THE ENVIRONMENT FOR INCUBATORS

FRESH AIR AND SUNLIGHT ARE AS ESSENTIAL FOR THE PROGRESSES OF INCUBATION AS THE CORRECT DEGREE OF HEAT

H. A. NOURSE

THERE is no question but we have good incubators—machines that will do their part if the operator will provide proper environment, give them necessary care and furnish good eggs. The fact that any hatch at all is secured where the operators are careless of everything but the machine itself, is a telling recommendation of the present day hatchers.

Aside from the proper control of heat in the machine, nothing is of greater importance than a favorable condition of the surrounding air. Oxygen is a necessary factor in success and must be provided. To shut an incubator in a small, dark room where to confine the heat every door and window is shut tightly, or to place it in a dark, musty cellar, where but little fresh air enters from autumn to spring, is to deprive yourself of its benefits.

Sunlight is one of the best air purifiers and germ destroyers, but should not be allowed to shine through the glass doors of the machine. For this reason few cellars are

fit for incubator rooms; yet, when one has ventilation sufficient to keep the air pure at all times and windows above ground through which the sunlight may shine, it is the very best location for a machine, because the temperature will be less variable than in a room or building that is wholly above ground. In the absence of these conditions an ordinary room in a dwelling, without heat, will be found best adapted to the requirements of those who do not need or cannot afford a building especially for this purpose.

Ventilation may be secured and controlled by dropping the windows at the top and raising them at the bottom, preventing a draft in severe or rough weather by inserting cloth-covered frames in the open spaces. By having these frames in two or three sizes and one or more windows the situation may be thoroughly mastered.

It is a fact that small buildings designed for the purpose do not, as a rule, provide the favorable conditions described, therefore are not very satisfactory. Of those above



Two Incubator Houses in Use on an English Poultry Farm

ground few are well enough built to protect the machines in severe weather without closing every source of fresh air, in which case that confined in the building, usually of small contents, is soon impoverished by the lamps, which abstract the oxygen, leaving unhealthy gases in its place. Houses partly or wholly below ground to the eaves almost invariably lack sufficient ventilation, because it is more difficult to introduce fresh air. The best room of this kind is one having a building above to temper the heat in summer and the cold in winter; walls extending five feet below the ground, and two feet above; one-fifth of this exposed area of walls being of glass. Good ventilation necessitates a constant changing of the air by bringing in fresh air from without the building and removing the air which has become laden with impurities. To accomplish this, fresh air must be introduced near the ceiling of the room, preferably through a cloth diaphragm, and the foul air drawn out from near the floor by means of tubes extending from within one foot thereof, up through the highest point in the roof of the building. In this manner the room may be freed from all gases without the aid of direct drafts and the chicks will be strong and healthy, if other conditions are favorable.

ARTIFICIAL INCUBATION

A CANADIAN GOVERNMENT EXPERT GIVES PRACTICAL POINTS ON THE USE OF INCUBATORS AND SELECTION OF EGGS FOR HATCHING—RULES FOR RUNNING A MACHINE—ADVANTAGES OF INCUBATORS

VICTOR FORTIER

EARLY spring is the time the beginner with the incubator is apt to be sadly disappointed if he starts out with the notion that he is going to have one of those ninety-eight per cent hatches that the catalogues of some manufacturers tell about.

Eggs for incubation should always be carefully selected. The fresher they are the better as the hatch will be greater and the chicks will be stronger. The little germ or seed of life gradually grows weaker and weaker and at last has not the strength to develop into a fine healthy chick and may die in the shell if the egg is kept too long. It is better not to have them older than ten days or two weeks.

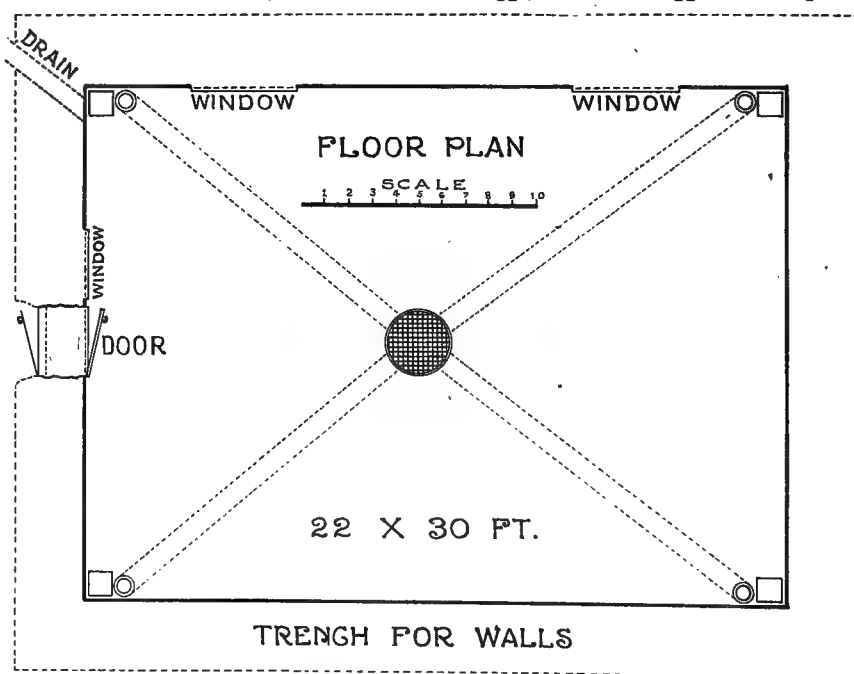
Eggs with imperfect shells should be rejected, also those with rough or chalky shells, with thin spots, or that are badly formed. These rarely hatch to advantage and should be used in the kitchen.

The eggs should come from vigorous, healthy and well-fed stock. Much depends on the feeding of the breeders, especially of the male bird. They should have plenty of vegetables and green food as well as animal food and those grains that contain the bone and muscle forming elements.

The eggs should be of medium size, neither too large nor too small. The small eggs generally denote inferiority and are either pullet eggs or eggs from fat hens or eggs that are laid by hens exhausted from having laid a long time.

The eggs should be of one breed or class. The American

classes can be hatched at the same time; that is, the Rocks, Wyandottes and R. I. Reds may be put into the same incubator at the same time, but they should not be mixed with the Asiatics and Mediterraneans. It takes twenty-one days to hatch all hen eggs, but if the eggs from Leghorns



GROUND PLAN OF TOLMAN INCUBATOR CELLAR

The walls of the cellar are 8 feet 6 inches high, which affords plenty of air space. The dimensions of cellar inside are 22x30 feet. The walls at bottom are 3 feet thick, at the top 18 inches thick, with a solid or what the masons call a "wet wall" extending down 3 feet from top; which makes it frost-proof. 4 feet from floor up the wall is left open and by so doing a great deal more moisture is gained by taking it into the cellar from the banks through the walls. The cellar is drained by a trench under the walls, 3 feet wide and 1 foot deep, filled with small stones.

are placed in the same machine as the Brahmas or Rocks, the Leghorns will hatch a few hours earlier than the others,

to the great detriment of the other chicks. The temperature of the machine at the time of hatching is very difficult to regulate, and this is due to the amount of heat generated by the chicks at that critical moment. The rise of temperature may not injure the chicks that are already hatched, but may greatly injure the heavier breeds which have not as yet broken the shell.

The eggs should be clean. Dirt or grease on an egg prevents the free circulation of air and may be the cause of death by suffocation of the delicate life germ or embryo in the egg.

Running the Machines

There are no infallible rules for the running of an incubator. The amount of moisture and ventilation required, the manner of turning the eggs and cooling, and the many details of the operation cannot be indicated in a definite and decisive manner for every machine, and are subject to variation according to the make, the system of the machine, and the external conditions under which we are working.

I give here only a few very general rules to be observed. The manufacturer sends with the machines the necessary instructions. Different machines differ in important essentials, but the breeder will have to discover by practical experience many details of the operation which the manufacturer cannot supply and which differ according to the outward circumstances and the individual conditions in which one may be placed.

The temperature is a matter of utmost importance, as it forms the essence itself of incubation. As the embryo or life germ is brought to actual life through the agency of heat, it will be seen readily how very important it is that the temperature should receive our most careful attention. I think the temperature should be kept as near as possible at 103 degrees Fahrenheit. One should be careful about the thermometer being correct before placing the eggs in the machine. It occasionally happens that there is some little defect and considerable trouble is caused.

The embryo chicks generate animal heat as soon as they commence to make growth and the volume of heat increases

steadily toward the latter part of the hatch. This is the reason why it is usually necessary to re-adjust the regulator during the last week or ten days of the hatch.

The amateur breeder who is using an incubator for the first time will naturally be tempted to look too often into the interior of the machine in order to see how things are progressing. It is very imprudent to open the door of the incubator often. Keep the door closed as much as possible and you will find it to your great advantage. This applies specially to the time of actual hatching. If your neighbor or friend wishes to see how things work tell him to come round some other time when there are no eggs in the machine, and then examine it as much as he may desire. Offer to give him all the verbal explanation he may wish, but do not risk losing a hatch to oblige him by actually showing him the interior arrangement while eggs are being hatched.

Generally it is best not to open the egg chamber after the chicks begin to break the shell until the hatch is quite finished. A chick that is not strong enough to make its way out of the shell is generally not worth helping, while frequent opening of the doors may result in the complete loss of a valuable hatch of eggs.

There may be times when it is absolutely necessary to open the machine, even while the chicks are hatching. A chick may have hatched but may be caught in an unnatural position by the empty shells, or partly smothered by these shells, but if it is necessary that the incubator should be opened, special attention should be given that no drafts or currents of cold or foul air enter the machine from the outside and the door should be kept open just long enough to perform the necessary operation.

If the eggs are fresh laid and of strong vitality, and the incubator properly attended to, the chicks should begin to break the shells on the twentieth day and the hatch should be completed the twenty-first day.

Chicks that hatch out too early or too late and specially the latter, are always weak and should they happen to survive the first stage of life, they seldom develop properly and very rarely grow into fine or normally developed birds.



VIEW OF TOLMAN FRESH-AIR INCUBATOR CELLAR

There are four ventilating shafts, which can be seen in the photograph, extending to within a foot of the cellar floor. These are 12 inches square, and are always open. The radiator shown in ground plan, (see page 18) is to remove the impure air from the center. Seven-inch tiling is run from this radiator to each corner of the cellar, about 4 inches under the floor, carrying the impure air directly out of the building. The two large windows in the south side and the transom windows over the door allow plenty of fresh air to enter.

VENTILATION AND MOISTURE IN INCUBATORS

THE GREATEST PROBLEM IN SUCCESSFUL ARTIFICIAL INCUBATION IS IN VENTILATION AND MOISTURE—THE EGG CONTAINS A PROPER PROPORTION OF ELEMENTS TO BUILD UP THE EMBRYONIC STRUCTURE—DEATH OF THE EMBRYO FOLLOWS ABUSE OF NATURE'S LAWS

H. E. MOSS

ONE of the anomalies in the incubator business of to-day is the diversity of treatment to which eggs are required to be subjected under the instructions of the makers of the various machines now on the market and their ability to furnish pages of testimonials in support of their claims of the merits of their particular machine. There can be but one correct process or method of incubation, and that is nature's method. If we would duplicate nature we must conform to her method. I have before me thirty catalogues from as many different incubator manufacturers. I have been examining these books and comparing the claims and theories of the different makers so far as they pertain to the essential requirements of a successful hatcher. There is but one point upon which they all agree, and that is the proper incubating temperature. The ease with which this fact can be determined accounts for this, but there are other conditions besides temperature upon which successful hatching depends, and in these they not only advance contrary theories, but in some instances proclaim them as self-evident truths. Turning and cooling the eggs are provided for in various ways, some even going so far as to furnish a cooling schedule for each day of the hatch, each one differing from the other. It is not with this question, however, that I propose to deal at this time, but the one embraced in ventilation and moisture.

We are told very emphatically by some that at the end of a certain day the egg must show an air space to correspond with a given diagram, and at the end of certain other days it must show certain other fixed lines of air space, and that if the eggs are placed in warm water on a certain day and they float with an exposed surface equal to a silver quarter in size, the evaporation is right. Now this may all be approximately correct and agree with normal conditions, but they go further and say that if they are found deficient the ventilation must be increased and if excessive it must be diminished and moisture introduced.

This sounds very plausible to the unthinking or those who jump at conclusions. That all eggs lose a certain amount of moisture during incubation is very apparent, but the question is how do they lose it? From the rules they lay down for the purpose of increasing or diminishing the air space, we must assume their hypothesis to be that there is a certain amount of water created in the egg that does not belong there and that the Creator made the incubating body a party to the reproductive process, and did not create a perfect egg in a perfect condition

to reproduce the species without the intervention of this outside agency to rearrange, as it were, its contents.

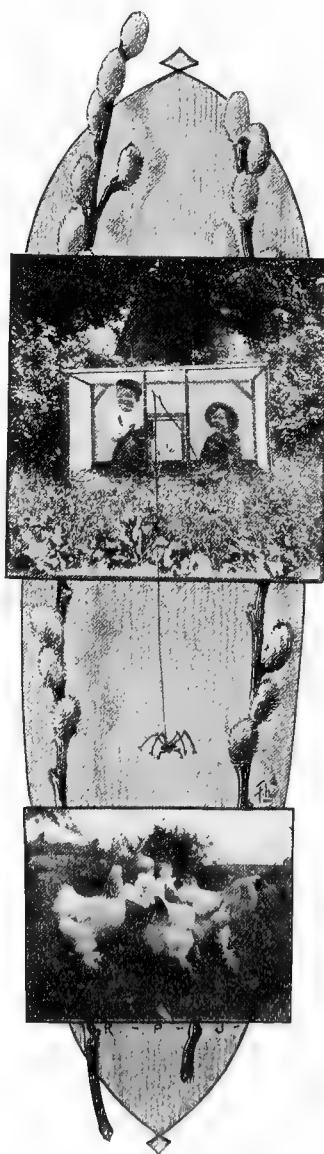
The absurdity of such a hypothesis is apparent.

Can we imagine for one moment that in His infinite wisdom He would establish any incomplete or imperfect thing, or law, as must be inferred in this case, whereby some species are taught to deposit their eggs in suitable locations and never see them afterward, and that such eggs should not contain the proper proportions of all the elements necessary to build up the embryonic structure? No, we cannot conceive of any such condition. We must assume that whatever is placed within the egg is necessary to the perfect development of its germ, and that if we wish to incubate it successfully we must not rob it of any one element or any part of one, and that if we do it suffers in consequence and in proportion to the degree of abuse to which we subject it.

It has taken a number of years for incubator makers and operators to correct their ventilation. Carbon dioxide has been a bugbear. They find they need no longer fear this. They now unintentionally cease robbing the egg of its moisture and realize the fact that under the new conditions the hatches approximate natural methods. The moisture pan is now a back number. The only benefit it ever worked was to partially equalize the aqueous tension between the inner and outer air, a condition which need not exist in a modern incubator. A current of cold air drawn in through the ventilating flues increases its capacity for moisture in proportion to the increase in its temperature. Its relative humidity being lower than the outer air, it gathers moisture from the eggs in sufficient quantity to restore the equilibrium. The allantois is robbed of its fluid and the membrane becomes dry, destroying its function as a respiratory organ, and death of the embryo follows. The greatest mortality from this cause occurs during the third week.

The ventilating flues and forced drafts with which many machines of to-day are equipped are wrong in principle, although it is possible to operate fairly well with them, provided the apertures are reduced to the minimum and employed solely for the purpose of maintaining the air pure in the egg chamber. Natural variations in the atmospheric humidity exert no influence, provided the aqueous tension is held the same within the egg chamber as without, and this is attainable in very few machines.

From the hour the egg reaches the incubating temperature there is a condition present within it which I have



never seen noticed or described by any investigator. It is what might be termed a partial vacuum, a tension, or a tendency to shrinkage or contraction, which would naturally cause the absorption of oxygen to be more rapid than if it were compelled to depend upon diffusion only. This tension is more apparent on about the fourteenth day than at any other period. It seems to be rhythmic or intermittent and is suggestive of the process of breathing as we perform it, except that its operation is so slight as to be imperceptible except under certain conditions.

Every atom of water contained in the egg is intended to pass through the circulation of the embryo in combination with the other elements, and is absolutely essential to the perfecting of the structure, and after having been so utilized it is, as with any other elements that have been chemically transformed and served their purpose, thrown off as waste matter in the form of gases or urates. A weak germ, and by that I mean one that has not had a strong vitality, or life principle or impulse, implanted in it by the parent, or that has been reduced to this state by abuse, is retarded in its development. The impulse has either been checked or was weak to begin with. The normal diminution of the contents is checked or cease entirely. The operator is told that he is using too much moisture and not ventilating enough, so out come the water pans and open go the slides, and at the same time an examination of all the eggs would perhaps show many at the normal stage. A strong current of air is now driven through the machine under the delusion that all that is necessary to make these weak germs hatch is by some means to extract the surplus moisture they seem to contain and increase the air space, and I have no doubt but some would be tempted to draw it out with a hypodermic syringe if it were contained in a pocket in the

egg and they were not convinced by actual experience that a rupture of the membranes would be fatal.

I would suggest to any who have doubts on this question to select a tray or a machine full of eggs showing small air spaces, say about the tenth to the fourteenth day, place them in a machine by themselves, take out all the water pans, open wide all ventilators, force all the air you can through the machine, and if you wish drive a warm blast through it by a fan motor, and see how many of them will come to exclusion. You can evaporate them fast enough and the faster, the quicker and surer the death.

There are some things about incubation we can never know. The life principle or impulse is beyond the grasp of finite minds. Starting with germs that in every living thing are identical in structure and appearance, and developing them from one plane to another until they reach the limit to which their impulse carries them, they become men, birds or fish, and thus perpetuate their species, the fittest always surviving. We mortals may speculate and theorize upon it, but we cannot fathom it.

Our hypothesis is that the Creator placed in the normal egg just what is needed there—no more, no less—and that if we can duplicate natural conditions we can successfully incubate them artificially, presuming that the parent bird in the incubating process contributes nothing but heat. If we can do this, and at the same time furnish oxygen sufficient to sustain the process we will succeed, but it must be just enough—no more, no less. The right amount to gauge the machines for, varies with the outer temperature, the stage of hatch and the machine used, as all vary in their power to induce currents—some are forced, others are natural. All these points must be taken into consideration.

THE NATURAL METHOD IS SATISFACTORY

HOW AN EXPERT HATCHED AND REARED WINNERS FOR THE LARGEST SHOWS—
MAKING THE NESTS—SETTING THE HENS—COOPING AND FEEDING THE CHICKS

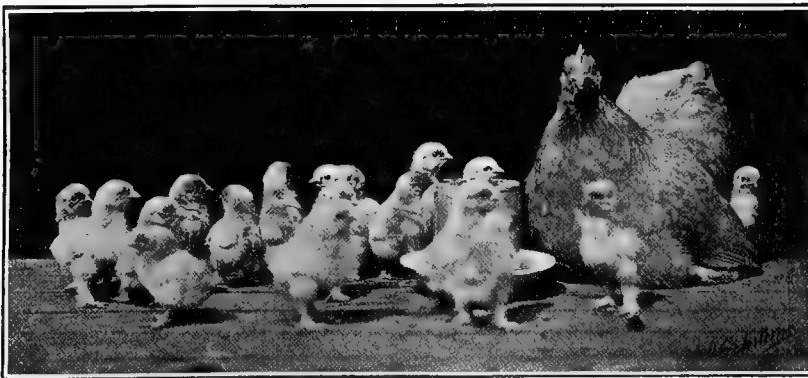
M. S. GARDNER

SO MANY writers of late have told us how to hatch chickens in incubators, and raise them in brooders, that little remains to be said upon that subject. Very little has been written, however, in regard to the other and older method of letting the hen rear her own brood. While I use incubators for hatching my earlier chickens, I still hatch the greater part of the May and June chicks under hens, and for two reasons: First, because I believe it gives

the hen a rest from laying that is beneficial to her, and second, because I find that chickens hatched and reared by hens prove better foragers and grow faster for me than those grown in brooders.

To raise chickens with hens successfully, several things are absolutely necessary. First, strongly fertilized eggs from perfectly healthy and vigorous breeding stock. Second, quiet, medium sized hens, and properly constructed nests.

Third, a man to care for the hens who will exercise eternal vigilance, and who can control his temper under most trying circumstances. Doubtless every man who raises chickens has a way of his own. I do not claim that my way is the only one, or even that it is the best, but simply this, that I have been raising thoroughbred chickens for more than twenty-five years, and with success, by the method I shall describe. During the season of 1902 I raised more than five hundred chickens under hens. Although May and June were the wettest months ever known in this state, my loss from all causes did not exceed five per cent of the chickens hatched.



A LARGE FAMILY

Cochin Bantam hens are considered the best of mothers and one hen can take care of two families, if she is allowed to do so. The setting of three or more hens at one time and doubling up the chicks is a very economic and labor-saving practice.—A. O. SCHILLING.

Setting the Hens

As March is a cold month in northern

New York, we do not attempt to set any hens until April. When the weather moderates so that we feel sure the eggs will not chill, we prepare to set our first hens. Several pens are reserved for our sitters, from four to ten hens being placed in each pen, depending upon the size of pen and also upon how much room we can spare for this purpose. The nests are made on the floor of straw or swale hay which is held in place by two by fours placed upon the floor or else by narrow strips of board nailed to the floor and not more than four inches high. It is desirable that the hens be able to walk onto the nests, and not be compelled or allowed to fly into them. Sometimes if crowded for room these nests are not more than three feet apart. We usually set several hens at one time. When we have the required number of broody hens we take them carefully from their nests after dark at night and place them in their new quarters, having previously prepared the nests in the manner I have described. In each of these nests we have placed one or two glass eggs or possibly cheap hens' eggs. By the side of each nest is a potato crate or a frame covered with wire netting. Each hen is carefully set on the glass eggs and a potato crate placed over her. A hen that has been broody for several days and is of the proper disposition to make a good mother will at once settle down upon her new nest and go to sleep. Occasionally one will resent such treatment and proceed to kick up a rumpus. Such hens should be removed at once, as they disturb the quieter ones and seldom prove successful mothers. I do not find more than one in ten that will refuse to sit in a nest of this kind. The first day we keep the room darkened and do not let the hens come off to eat. The morning of the second day the crates are removed and sufficient light let in to enable the hens to see the corn, grit and water that have been previously placed there. A large dust box is also provided for them. Sometimes two hens will fight when first let off the nests, if taken from different pens in the breeding houses, but this seldom proves a serious affair, as they are usually too hungry to waste any time in this manner. After eating and drinking four out of every five will go back to the nest in which we placed them. Some few will exchange nests, but it is very seldom a hen refuses to go back to one of the nests. As all of the eggs are in plain view from all parts of the pen, two hens seldom try to occupy the same nest.

In making the nests we use great care in preparing the bottoms so that the eggs will not come in contact with the floor. We also make them rather flat and large enough in diameter so that the eggs can roll from under the hens' feet as they step into the nests. My reason for making the nests upon the floor is this: Under natural conditions all fowls no doubt built upon the ground, as partridges do. When a hen can walk onto her nest she does it very carefully and seldom breaks an egg. If compelled to fly or jump up she usually succeeds in falling into the nest and breaking one or more eggs. Another advantage in placing the nest upon the floor is that the eggs do not dry out as badly as when placed farther from the ground.

The Eggs Require Attention

Now to return to the sitting hens. We have them fed and watered and back on their nests. If one fails to go back the room is darkened, the hen is carefully caught and placed upon her nest, and the potato crate dropped over her. If at this time all remain quiet the eggs for hatching are brought and placed under them. From ten to fifteen are given to a hen, the number depending upon the weather and the size of the hen. In very early spring not more than ten eggs are placed under each hen, as the outer ones may become chilled or at least get cold if more are used, then as the hen rolls them over the chilled eggs are pushed further under her and others are rolled to the outside to be spoiled during the next cold night. I am satisfied that many poor hatches in early spring are due to the fact that too many eggs are placed under the hens.

We now have our hens properly started on their three weeks' task and have only to watch them carefully and see that they have fresh water every day, with an abundant supply of grit and corn. A lousy hen never should be set. We keep a good supply of fine dry dirt for dust bath before our fowls at all times, so we have no trouble with lice. By the second day we usually remove the potato crates from over the hens and thereafter they are at liberty to come off to eat or roll in the dust bath as often as they desire. Every day when they are off each nest is inspected and if any eggs are broken the others are carefully washed, but we seldom have any trouble of this kind. I have no use for a ten pound hen as a sitter or anywhere else. For hatching purposes I

prefer one weighing not more than six or seven pounds. Where it is possible to do so we set all the hens in one pen at the same time. Where some are put in later they usually disturb those that have been sitting, then when the first chicks begin to hatch it makes those set later discontented. If the weather is very hot and dry and the eggs are drying down too much, we sprinkle the nests with warm water once or twice during the last two weeks.

When the chicks begin to hatch we disturb the hens as little as possible. Sometimes if they are very quiet I run my hand very carefully under them and remove all the empty shells so they will not slip over the unhatched eggs and smother the chickens.

Cooing and Feeding

Nearly all our chicken coops are dry goods boxes covered with tar paper, to keep the rain out. These are boarded up



CHICKEN COOPS UNDER APPLE TREES

The young birds soon learned to fly up into the lower branches where they were allowed to roost until winter, on the plant of Mr. M. S. Gardner.

tight about half way across the front, and slatted the rest of the distance, so the chickens can run out and in, but the hen cannot. Into these coops the hens and chickens are removed when the chickens are about twenty-four hours old, a little bran, chaff or dry sand having previously been sprinkled upon the floor. Not more than a dozen chickens are given to one hen and we often give them only seven or eight chicks each. The coops are scattered out through the corn-fields and in other protected places so that each breed has a fresh run and plenty of grass. When the chicks are placed in the coops they are fed dry oatmeal and hard boiled egg chopped up very fine. They are also given some fine grit and a cup of water, which is refilled as often as necessary and not allowed to sit in the sun where it will become warm. The second day they are fed on cooked food. Three parts cornmeal and one part "red dog" flour or wheat middlings are mixed with skim milk and a sufficient amount of baking

soda to make it light. It is then baked until well done. This is softened with milk or water and fed five times a day for the first ten days. At the end of ten days if the weather is suitable the hen is let out of her coop and allowed to go where she pleases. After this they are fed but three times per day. At six weeks or before we begin to feed cracked corn and wheat. Occasionally a hen fails to return to her coop the first night and we must find her and drive her in, but usually they come back without trouble.

As each brood of chickens is placed in the coops they are punch marked and examined for head lice. If any are found their heads are greased with pure lard, which usually answers the purpose and a second application is seldom necessary. Each night every coop is shut up to keep out the rats and skunks which abound in northern New York. For this purpose a frame covered with a fine wire screen is used. This admits plenty of fresh air, which is absolutely essential to growing chickens.

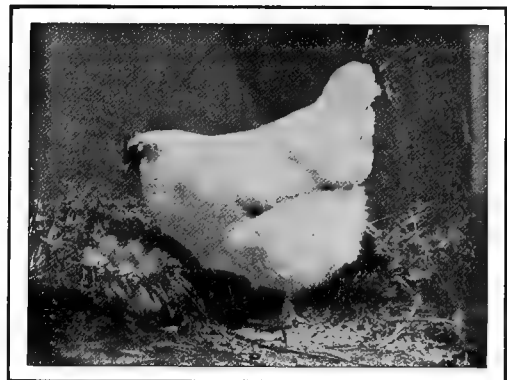
HOW TO SET A HEN

THE HATCH DEPENDS GREATLY ON THE MANNER IN WHICH THE HEN IS SET—IMITATE THE CONDITIONS THAT EXIST WHEN A HEN STEALS HER NEST—HOW TO BUILD NESTS—NEST MATERIAL—CARE OF SITTING HENS—CARE OF THE EGGS DURING INCUBATION

J. W. PARKS

I DOUBT if I could have selected a subject that, at first thought, seems more simple and less necessary to write about than the above. The majority of readers will say at once, "I know how, where and when to set a hen. I learned that back on the farm." If you really do, well and good. The object of this article is to help the ones who do not know, and, judging from my observations among my neighbors, I am led to believe that it is in this matter that a great many fail.

There is nothing that pleases a breeder better than to receive a good report from eggs he has sold. It is a splendid advertisement for some customer to hatch thirteen or fourteen chicks from fifteen eggs, as he will tell his friends and neighbors and they will send orders. On the other hand, let him have a poor hatch and he is not slow in advertising it among his friends and, perhaps, he kills quite a bit of trade that would otherwise have come to the breeder. Probably the poor result was entirely the fault of the customer, who did not know how to properly care for the eggs. We have established a new rule, which we believe will be profitable. It is to send instructions to each customer how to



"COUNTING HER CHICKS"

care for the hen and eggs to get best results. Seedmen send their instructions with their seeds. Why should not we also?

There is little doubt that a large percentage of persons who buy eggs are as little versed in setting a hen as I was in growing asparagus. I sent to a Philadelphia seed house for one hundred roots three years ago. They came and I planted them as I thought they should be planted, had the ground worked well and took great pride in them, planning to have all the asparagus that we could use and some to sell. I cared for that bed and manured it for two years and did not get a good mess, then I wrote to the seed house for a leaflet on growing asparagus and learned that instead of planting the roots deep enough to have them just covered with dirt, they should have been set five to seven inches below the surface of the ground.

Locating the Sitters

Let us get back to our subject. In the first place, to get good results one must, of course, have fresh eggs from strong, vigorous, healthy stock. If you decide to send to a distant breeder for eggs, you will have to send the price of the eggs, or, at least a deposit on them, and have him book your order and ship when you send him word to do so. As soon as you notice that your hen or hens are becoming broody,



A NEST OF HER OWN SELECTION

drop a card to the breeder and have him ship the eggs in a day or two, or let you know when he can ship them.

You have noticed, no doubt, that usually a hen who steals her nest hunts up a quiet, dark, moist place, where no other hens can bother her. This is the first step you must take—to hunt up a nice, cool, moist place, where you can set the hens and they will be undisturbed. If you are bothered with rats, see that the nests are placed where the rats cannot disturb the eggs, as nothing will discourage a hen like rats. I have heard that rats sometimes steal all the eggs from under sitting hens.

If you have no place that will compare with under the barn, for instance, where the hen likely would go, you must do the next best thing and make a suitable place.

I hatched some seven hundred chicks last year with hens and had quite a number of hens bring out every egg, and I will tell you exactly how I had my hatching pen fixed. We took one of the open front scratching shed houses that was empty and made a platform two feet wide to run the whole length of each section. This platform was about fifteen inches from the floor and was placed against the back of the coop, being separated into fifteen inch spaces with temporary partitions fifteen inches square. A five-inch strip was then nailed along the front of these partitions to hold them in place and to keep in the nest material. A couple of boards are then nailed on the top to form a sort of roof or top to the nests.

The partitions are a little shorter in front than at the back, so that these boards slant, which prevents the hens getting on top and sitting there. The top does not go back against the wall, as we prefer to leave an inch or so space for ventilation. A board the full length of the nests and about seven inches wide is then fastened to the front top board by old pieces of leather, which serve as hinges. This board can be laid back on top when we wish the hens to be at liberty. This door will be found necessary if a great many hens are to be set in the same building. In our case, a number of hens are taken from other coops, and, being in a strange place, do not sit quietly at first. If there was no door, they would be liable to jump off the nests when you enter the room. The nests being constructed, the next step is to select the material to use in them. Our hatching house has a double board floor, is off the ground about a foot and the front is practically open, therefore, there is very little moisture. To imitate the conditions of the place that the hen in her free state on the farm would choose we must supply moisture in some way. A sod the size of the bottom of the nest is cut two or three inches thick and placed in each nest with the grass side down. If the weather is very warm this sod is thoroughly wet, then straw is placed on top of it and the nest shaped, being careful not to have the nests so deep that the hen has to step down into it nor so shallow that the eggs will roll out. We aim to make it just deep enough to hold the eggs together. In the center there should be about an inch of straw on top of the sod. After the straw is placed in the nest a couple of handfuls of chaff is scattered over it to make it more compact and solid—then the nest is ready.

If the hen is broody and you have to wait for the eggs give her a thorough dusting with a good commercial lice

powder and put her on the nest, using a couple of china eggs. Move them just after dark, then they will have the whole night in which to become accustomed to their nests. They generally are all right by morning, but should have the door shut down on them.

The next morning take a peep at them, but go gently into the pen, as they are very easily frightened at this time and may change their minds about hatching in a second. Slip in quietly and see if they have all settled down, or if they are standing up. Sometimes you will find one that is determined to get out. In that case you would better select another hen. We will suppose that you found your hens willing to sit and that the eggs have arrived. The first care you owe them is to unpack them carefully and stand them in a cool, dark place for about twenty-four hours to allow the small fibres that hold the germ in place to return to their normal position after being jarred for a day or more on the road. After the eggs have stood twenty-four hours the hen should be taken off the nest and given a good feed of corn with grit and fresh water, and a place must be provided in which she can dust herself. The dusting box should be in the hatching coop. Then she should be placed back on the nest and the eggs slipped under her.

Do not bother her then for two days. After that open the door and if she does not wish to get off take her off and shut the door so that she must remain off the nest for fifteen minutes. The length of time that she is allowed to remain off the nest depends of course on the weather. In the warm summer days she can be off an hour and do no harm.

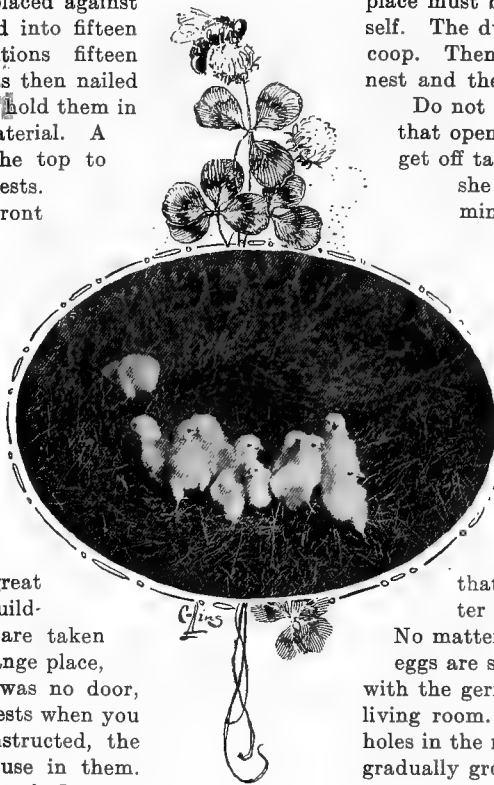
Keep the Eggs Clean

If you have set a number of hens you will be safe to take with you a little warm water, for invariably you will find that some hen has broken an egg or two or soiled her nest. You will have to remove the nest material and wash the eggs that are soiled. To neglect in this matter may be traced many a poor hatch. No matter how faithful a sitter a hen is if the eggs are smeared she cannot hatch them. It is with the germ in the egg as it is with you in your living room. If someone were to cork up all the holes in the room so no air could get in you would gradually grow weaker as the oxygen in the air becomes exhausted. The pores in the egg shell are for the purpose of supplying oxygen to help develop the little chick and when these pores are closed the development of course stops.

After the nests are all cleaned and the hens have been off long enough to have a little exercise and enough to eat, open the door and let them go back. We always set a number of hens at the same time and let them off together. We believe it does not matter which nest they go on.

They are taken off the nest every day until it is time to hatch. On the tenth day they are given a good dusting with lice powder and again on the nineteenth day. The lice must be kept down if the hen is to have a good hatch, for a hen cannot attend to her work if she is bothered with lice.

During extremely dry weather, such as we had in our part of the country last year, water should be slopped around on the floor under the nests every other day, after the hens have returned to their nests.



Number of Eggs to Set

A common fault is to try to have the hen cover too many eggs. We have always advocated thirteen eggs and when we set choice eggs we always use that many. Almost any ordinary sized hen can cover fifteen eggs, but if the same hen is given only thirteen eggs I believe she will bring the chicks out closer together and the chicks will be stronger. A good deal depends on the weather. The colder the weather the fewer eggs a hen can cover successfully.

In case the eggs you have ordered arrive before the hen or hens are ready keep the eggs in a cool place and turn them half over every other day. If you do not keep them over ten days and the eggs were fresh when they were shipped you can still expect a good hatch. If you follow the above directions and do not get a fair hatch you are not to blame and should take the matter up with the one from whom you bought the eggs. We expect to set one hundred hens during the spring in this style of nest and feed and care for them in the manner described above. This is the strongest endorsement we can give our plan.

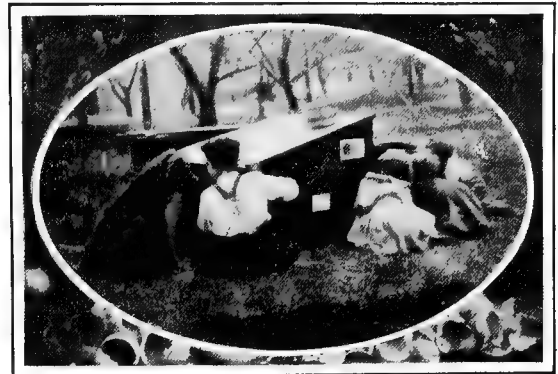
(NOTE:—A number of our readers may disagree with Mr. Parks that it is a wise plan to permit the sitting hens to return to any nest they choose. Quite a few breeders believe that a hen may be broody and yet not be in such condition that her body will give the requisite amount of heat to the eggs to produce a successful hatch. If such were the case with several hens in the same room, might they not ruin a number of sittings of eggs?)—ED.

CRITICISM OF MR. PARKS' METHODS

KNOWING that the method of setting a broody hen employed by many experienced poultry men is at variance with that described by Mr. Parks in the previous article we asked our readers to write us explaining their objection to his plan. The following by Mr. L. E. Smith, one of our Ohio patrons, will be read with interest:

"For the past three seasons I have followed Mr. Parks' plan with one exception. Instead of using one long board to shut the hens in on the nest I closed each one separately. This is done for the reason that you may have one or two vacant nests and some hens are very particular about always going on the same nest. If another hen happens to get her

nest and there is a vacant one beside it she is liable to go on this one, even though there are no eggs in it. This is

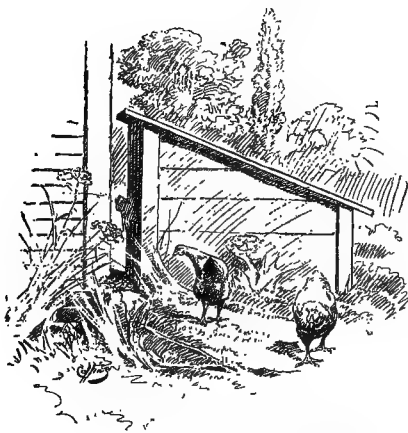


not liable to happen if you have the same number of nests open that you have sitting hens. The nests all look alike to them. After the first or second time you take them off to feed and water you will never have any trouble.

"I always use nest material as described by Mr. Parks and in this way have had the best results. I have watched the hens time and again to see if they went back on the nests from which they came, but never yet have seen all of them do so.

This is the way I hatch all my prize winning Partridge Wyandottes and I should be pleased if my customers also followed this plan. I find that the hens not only stay in the best of health, but that it is easier to keep them free from lice. We always test the eggs the 7th and 14th days and give the hens about ten eggs each, as that is about the average of fertility. I never set over thirteen eggs as I have learned by experience that more than that number is the cause of the hens breaking the eggs. In the long run one is not ahead, for a broken egg is liable to spoil the whole hatch. After the fourth or fifth day I always leave the nests open so that the hens can come and go at will, as I have found that they know more about when to get off the nest than I do. Give them fresh water every morning and mix their grain in the straw, also give them a dust bath and they will do the rest.

By following the above plan I am able almost to count the chicks by the 14th day and that is saying a good deal.



A COOP FOR BROODY HENS

HOW TO "BREAK UP" A BROODY HEN

BEGINNING now one is often exasperated by having a hen become broody and persist in obeying her motherly instinct when she could render much more valuable assistance by laying. I have a method which has been most successful. I make a coop like the one shown in the accompanying illustration that has a slat front. The hen is placed in the coop and then the coop is pushed up close to the wall of the hen house. (See illustration). The slat front being turned away from the yard the broody hen cannot see the rest of the birds but can easily hear them. She will immediately become worried and try to get out and join them, so in two or three days at the most she has forgotten that she ever wanted to become a mother. If the hen is well fed and provided with fresh water, the worrying will not hurt her at all.

CHAPTER III

REARING CHICKS NATURALLY AND ARTIFICIALLY

THE DIFFICULTIES AND HOW TO AVOID THEM—CONDITIONS THAT AFFECT THE HEALTH AND GROWTH OF YOUNG STOCK—HATCHING AND BROODING—FEEDING CHICKS WITH HENS AND IN BROODERS—SOFT FOOD BEST TO PRODUCE EARLY MATURITY

H. E. MOSS



IN WHAT other business is there such a multitude of "Don'ts" as are associated with the poultry business? To attempt to enumerate them would be an endless task. What is often called "horse sense," or good judgment, or brains, must determine between the right and the wrong; but many occasions will arise where experience is necessary upon which to base judgment and where the experience of others can be had and applied. It is equivalent to so much time and money saved, for without it we must test the question ourselves and if found to be a failure it is just so much paid for experience or paid up capital.

We shall, therefore endeavor to be as clear and explicit as possible, assuming that the large majority who will avail themselves of this advice are amateurs or beginners who are willing to profit by the experience of others, and to whom success or failure means much. We shall avoid the don'ts and write from the positive, not the negative viewpoint.

The rearing of domestic poultry should show a profit and will do so in proportion to the intelligence with which it is conducted precisely as in any other business; but where the highest order of talent is employed, the profits on the capital invested will far exceed those in any other legitimate business.

Start With the Chick

We will start with the chick as it emerges from the shell. If the eggs begin to pip in the evening they should all be excluded by the next morning. In cool weather compel the hen to keep her nest for twenty-four hours longer; this will permit the chicks to sleep and gain strength, which they will do very rapidly, as the absorption of the yolk now begins and the new functions are fully established. Then remove her with the brood to the coop, but before doing so, dust her thoroughly with a good insect powder and apply a little grease or oil on top of the chicks' heads and under the wings. This will prevent much future trouble in fighting lice. This should be repeated once a week until they are past danger and can dust themselves in soft moist earth as their instinct teaches them.

Have Your Coops Ready

In severe cold weather they should be placed under shelter, but where they get as much direct sunshine as possible. An open shed facing south or east is preferable where the chicks can have a dry run when a late snow covers the ground. A gravel or sand floor is very desirable, and if dry, will be found very satisfactory. Your coop will require no bottom, but can be shifted its width every day, thereby insuring a clean floor. Otherwise a wooden floor is indispensable and should be covered with chaff, fine litter, ashes or any suitable material and renewed frequently.

Food and Warmth

Food and warmth are now the two factors upon which success depends. The latter need not be considered here, as the hen is to brood them, and she will take care of them; but in cold weather we render it more comfortable for them by placing the coop in a sheltered location, at the same time allowing the chicks liberty to run in the sunshine during the middle of the day. Should the snow be deep, clear a place for them. They thrive better, grow faster and make stronger, hardier fowls than the later hatches that have the extreme heat of summer to contend with before they are half grown. A long protracted hot spell checks their growth in a very marked degree. Cold does less harm than heat, provided they can run under the hen and get warm whenever they are so inclined, and if the hen or the warmth is always to be found when they want it, there is little danger of them becoming chilled. The best results will usually be had where the hen is kept in her coop until the chicks are weaned, thereby compelling her to hover the chicks whenever they demand it and avoiding the enforced excessive exercise she would often subject them to, tiring them out and making them leg weary. Scatter a shovel of sand in front of the coop, which will serve as their first grit. Have a feeding board or trough ready; also drinking fountain, which wash out daily and keep filled with pure water. After your chicks have been out of the shell thirty-six hours, give them a feed of stale bread crumbs soaked in milk and squeezed almost dry. They will eat sparingly at first, as they should. They have been nourished by the yolk which was taken into the abdominal cavity just before hatching and they would not suffer from the lack of food for three days. The bread and milk does not overtax the delicate digestive organs, which as yet have been unemployed, and it cleanses the crop, gizzard, and intestinal tract and prepares them for their functions. Feed every two hours for the first three days, but only what they will eat up clean each time. Little and often is the rule for little chicks up to ten days old, then the capacity of the crop increases and the intervals can be lengthened.

Foods To Be Avoided

We have seen so much of the hard boiled egg nonsense and the fatality from it that it is surprising that any one should recommend it. Others will advise corn meal, johnny cake, meat stew, hash—anything. Now, it would be just as consistent to feed these things to a new born babe as to a chick. It has been done and no doubt some survived, but only because green food happened to be accessible, and the chick after eating the poison, found the antidote. A dog can eat Rough on Rats and then drink a pan of milk and suffer no injury, but that does not justify me in advising it as a steady diet for dogs. Those who prefer the dry grain ration should after the third day use pinhead oat meal and a little millet seed until they can eat cracked wheat, finely chopped corn, and hulled oats, which latter should constitute

the main food for a growing chick. Add to this a little millet or chopped sunflower seed with a little (very little) cut green bone or lean meat daily after they are ten days old, the amount depending on the season and the number of insects and worms obtainable on range. Green food or bulky vegetable food should be fed daily and as regularly as a horse or cow is fed hay. It is just as essential and serves the same purpose in the digestive process in one case as in the other. Accustom them to eat whole wheat, buckwheat and cracked corn as soon as possible.

A Preference for Soft Food

Our preference and that of many others, especially where the chicks are raised for market, is soft food, for two reasons: First, because we can combine all the necessary elements and secure the proper ration of food constituents at each feeding. They cannot select certain seeds or particles which they prefer and waste the remainder, as they will in dry feed. They usually hunt out all the millet seed first, as this is "candy" to the little chicks and a luxury even to old hens. Bury a handful under a haystack and they will leave no straw unturned until they find it. No matter how accurately we figure out our dry feed ration, we can't force them to eat the less palatable after they have filled up on "candy" and our calculations are knocked out. Second, because a soft, properly compounded food needs no accessories except green food, which is imperative in either case, and it saves much energy which would be expended by the chicks in grinding it. Bear in mind, we are raising these chicks for profit and not as pets. We must, therefore, force them to the limit of their ability to eat, digest, assimilate and grow. Quick maturity is what we desire. In order to achieve this we must meet all the demands made by the growing powers for material to grow on. You can't deceive nature. If it calls for nitrogen, carbon will not answer; if it calls for water, nitrogen will not serve; and any ration that is not balanced as it should be feeds one side and starves the other. If any system of feeding could be devised whereby we could mature a chick in four weeks, we should all quickly adopt it, and if we were raising chicks exclusively for market we should not depart from it. Again, a ration may be balanced and its ration of protein (albuminoids) to carbohydrates, free fat, and mineral salts properly determined and yet fail, as it surely will if the protein is derived exclusively from vegetable or grain sources. The experiment stations have lately proved this fact, which some of us discovered long ago by costly experience, at that time our only teacher. A ration bearing precisely the same nutritive ratio but with a certain percentage of animal protein will be highly successful, but if lacking it they famish and die from starvation in the midst of apparent plenty. A chick properly fed will be very eager for the next feed. When they are not there is danger ahead. Never feed all they will eat up by lingering over the feed trough. They will overload their

crops if permitted and where dry food is given, especially rolled oats, the swelling takes place in the crop faster than the food is passed into the gizzard and often proves fatal. An excess of bran is also dangerous. A little is necessary in some cases and desirable in others, as the husk or shell acts as a stimulant to intestinal action, but an excess causes irritation and bowel trouble.

Artificial Brooding

The above is comparatively an easy matter to follow, for when natural brooding is employed more than half of our anxiety is removed, and when the business is to be conducted on a small scale this method will answer, but where large numbers are to be hatched and grown, any but the artificial system would be entirely too laborious and out of the question. The above being fully understood, the only change to be considered is artificial brooding.

Unless we can furnish a uniform and constant supply of heat of the right temperature trouble begins, and once begun there seems to be no end. Get this one fact clearly in your mind, that warmth is more essential than food in handling an incubator brood. They will manage to live on almost any kind of food even if they do not grow and thrive, but variable heat in the brooder is fatal. The chemical and nutritive changes that food must undergo in the digestive process can only be carried on at a high temperature. This is the vital temperature; below it the process ceases. This at once



PROFITABLE PETS

The above thrifty flock of Barred Plymouth Rock chicks tells plainer than words where the boys helps to profit the farm. On this farm the brooders were placed in the orchard where the chicks were sheltered from the sun and stormy weather besides being protected to an extent from hawks and other enemies.—F. L. Sewell.

checks nutrition. Doctors describe health as the perfect harmony of nutritious changes, or physiological ease. If the temperature of the body falls below the vital point, nutrition is disturbed and disease follows. If the chick is chilled before the yolk is fully absorbed, nothing will save it. The nutritive process has been checked. What food is taken afterward passes wholly or partly undigested and death soon follows. Fatal as cold is when prolonged to discomfort, it is necessary after the chick has learned where to run to hover and get warm, to allow them a little exercise in an outside run in moderately cold weather when they can take

in the sunshine. If left to their choice, they will seek the warmth before they become chilled to the danger point, provided they know where to find it. Here is where the artificial brooder is better than many old hens, that often keep going, no matter how cold it is, while the chicks cry and beg for the warmth that is denied them. Their plaintive peep is sure sign of discomfort, and whenever it is heard it is high time they were looked after. Where chicks are to be raised by the thousands for market, artificial incubating and brooding must be adopted, as it would require too much help at too great an outlay to make it profitable with hens under the natural method. Three sitting hens would cause me more trouble and annoyance than one incubator, and with their broods would require as much attention as a brooder house holding several thousand.

The Brooder House

The brooder house must be warm and dry. There are many good plans published. One that will be found very satisfactory is sixteen feet wide, four feet high in front, and six in the rear with the hip of the roof plumb with the face of the hover so as to allow head room in the passage. Divide your space into three feet at the rear for a walk; two feet for width of hover and eleven feet for pen. This building can be extended any length desired. Don't attempt to heat the hovers with lamps in any latitude north of Birmingham, Ala., or you will fail. You might be able to get the temperature under the hover high enough, but the pens would be chilly and there is where they must spend the greater part of the day if they are to thrive. Use a water jacket stove and double loop of inch and a half pipe in the hover and a single loop under the windows, of which there should be one in each pen, raised twelve inches from the floor. Make the pens four feet wide, this with eleven feet in length outside the hover is sufficient to start one hundred chicks in, but they must be thinned out as they grow older. A movable lid over the pipes is all the hover consists of. They will be contented and scratch and exercise all day long and run under the pipes when they wish extra warmth. No curtains are required when the building is heated as we describe. They are undesirable at best. When the hover is curtained off it often is allowed to become filthy, and impure air and ammonia fumes are held there for the chicks to breathe. If the hover registers too high a temperature and the pens too low, lift or lap the covers so the heat from the pipes can rise more readily.

Crowding works much mischief. Outdoor and indoor brooders heated by lamps are frequently rated at too high a capacity. If one-half the chicks were assigned to them there would be less loss and better chicks. The action of the chicks is a perfect indication of their feelings. Whenever they stand around humped up and chirping, they are in danger and are losing ground instead of gaining. In ordinary winter weather they should be given access to the outside runs for a few hours when the sun is bright. They are better for it and will run in and get warm when they feel inclined.

Keep your supply of coarse sand and fine grit and clean drinking water constantly before them. After they are ten days old they are quite hardy and practically safe; and if properly fed and of breeds suitable for broilers they can be made to weigh one pound in forty days, one and a half pounds in fifty-five days and roasters five pounds each at four months. When reared with small yards for exercising they move about much less than when on free range, and while they have sufficient exercise to maintain good health, they have not sufficient to waste energy or flesh or toughen their muscles. They gain in weight more rapidly and make heavier, plumper broilers in a given time.

Feeding Brooder Chicks

I use three distinct mixtures of food between hatching and marketing time. The first ten days I take special care of their digestive organs and prepare them for the active work demanded from the eleventh day until two weeks before marketing. I feed a narrow ration, the basis being oats in some form. I then hasten the finishing with the best possible material, adding more corn, and aim to add flesh faster than frame or feathers and to distribute what fat is deposited in globules throughout the meat, making it tender and juicy instead of accumulating layers of internal fat or patches under the skin, all of which is wasted and lost in cooking and serving the fowl. A properly fattened fowl should not show any visible fat when dressed, but not one in a thousand poultry raisers knows how to put meat on a growing chick, and the only way they can turn out what might pass for a plump broiler or roaster is to work on such breeds as develop the quickest and then cover them with as much fat as possible in addition to the meat. This is all wrong. Soft, tender, juicy meat and a round, plump breast are what is wanted and the fatty delusion must stand aside. No one grain has so great a tendency to deposit internal fat as corn, and this is the very last source we should go to for flesh forming food. I believe that in the near future our best markets will demand machine crammed or crate fattened poultry. They have for many years demanded crammed ducklings. The only reason they have not been known by this name is because no machine is necessary to cram a duckling—he will stuff himself if given the food.

The rations fed for any specific purpose may vary greatly as to material, and in different localities will naturally be compounded of the most available material if suitable, but for a growing chick they should always consist of oats (minus the hulls) in some form as the base, and this forms one-half the ration. Other grains can be varied, whether cracked or ground but five per cent of the bulk must consist of meat or ground bone in some form after they are ten days

old as well as an abundant daily supply of succulent green food or steamed clover. If you omit the meat or green food trouble begins and shows in weak legs, naked bodies, stunted and uneven growth and blue, skinny carcasses when dressed.



EARLY COMPANIONS

Children always enjoy feeding and caring for fowls and never tire of watching the little chicks and on many poultry farms the children learn valuable lessons in industry and responsibility through being given charge over a small flock.

The hen and chicks above are from a stock of Oriental Bantams, brought recently by an officer in the U. S. Army from Nagasaki, Japan.—F. L. Sewell.

BROODING--NATURAL AND ARTIFICIAL

THE BROOD HEN AND HER FLOCK—BROOD COOPS AND RUNS—BROODERS, AND CHICK SHELTERS—CARE AND MANAGEMENT OF BROODER CHICKS

P. T. WOODS, M. D.

THE essentials for successful brooding by the natural method are comparatively few:

A reasonably quiet, motherly hen to brood the chicks.

Any box, barrel or coop sufficiently roomy to comfortably confine the mother hen, and made water-tight as to roof, will serve for a brood coop.

A chick shelter of slats or wire netting, provided with a light weight tent fly or a wooden roof to provide shade and to keep out the wet. We prefer the tent fly as it admits more light.

Given these, a fair sized range, and a variety of wholesome food, and rearing a flock of sturdy, healthy chicks is a simple matter.

The Brood Hen and Her Flock

When the little chicks hatch on the 21st day, if two or more hens are coming off at one time, the hen which has proved the most tractable while sitting, the one that shows the most good hen-sense should be chosen as the mother, and she may be given as many chicks as she can cover comfortably.

The number allotted to one hen will vary according to the season of the year, but almost any fair-sized hen will be able to care for from fifteen to thirty chicks with ease, and in summer weather we have seen one hen

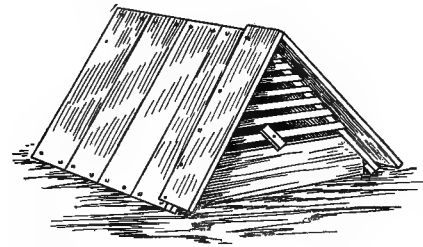


Fig. 1—A practical brood coop for a mother hen with chicks. Illustration shows the coop closed.

with a flock of fifty and all doing well. Small flocks are preferable, however, as each chick has a better chance. There is safety in small flocks.

Not every hen that brings off a good hatch will prove a good mother. Some of them show a disposition to kill the chicks almost as soon as they are hatched, and must be carefully watched so that the chicks can be taken away before they are injured. Others are clumsy and awkward and trample the chicks. Where there is any opportunity for choice in the matter, give the brood to the quiet, motherly hen.

As soon as the little chicks begin to dry after hatching, place the hen, selected for a mother, in a box containing a clean bed of dry straw. Put the chicks under her and darken the box by covering it with a piece of coarse burlap. Do not cover it too closely; remember that they require an abundance of pure air. If the hen was well dusted with pure fresh ground Persian insect powder (pyrethrum) two or three days before hatching time there will be no need to worry about lice.

This plan of moving hen and chicks to new quarters rather than letting them remain in the hatching nest is not absolutely necessary, but frequently saves losses from chicks being crushed or trampled in a crowded nest. The hens which are not to be allowed to raise chicks can safely be depended upon to take care of any eggs which were late in hatching.

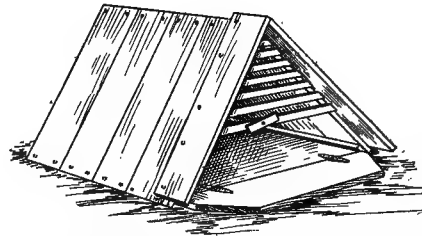


Fig. 2—Practical brood coop with board door open forming an extension of the floor. Illustration clearly shows construction.

Feed and water the hen when you move her. All that her brood requires, for the first twenty-four hours after hatching, is rest and quiet, and this is best secured in darkened quarters.

Brood Coops and Runs

While almost any box or barrel coop can be made to serve as a home for the new brood, the "A" coop shown in the illustrations herewith is one of the best and has the advantage of being convenient, comfortable, inexpensive and easily portable.

Such coops and shelters can be easily and cheaply built from packing cases or waste lumber of any sort. Matched stock is preferred, but common boards with the cracks batten down will answer equally well. The dimensions may vary according to the lumber available. A comfortable size is 2½ ft. from floor to peak, with a base or floor 2½ by 3 ft. or 2½ ft. square, according to sizes of available material. The slatted "A" shaped chick shelter may be made of common lath nailed to 1 inch square framing material. Make these the same width as the brood coop, to fit under the "hood" and have it the full length of the laths.

The simple construction of the "A" coop is clearly shown in the accompanying illustrations. Roof, back and slatted front are made in one piece, the boards being held together by cleats. The floor is made separate and to the front is hinged the board or door used to close in the front. This board door when closed, is held in place with a wooden button. See Fig. 1, showing the brood coop closed. The hood in front is made simply of two boards, as shown, and provides additional protection for the front of the coop from rain and also serves to engage and hold in place the slatted chick shelter. Fig. 2 shows the brood coop with board door open. Fig. 3 shows the roof raised leaving the floor free for cleaning. In Fig. 4 the slatted chick shelter is shown in position ready for use.

Fig. 5 shows brood coop with lath chick shelter engaged and with tent fly in position. The tent fly is made of heavy

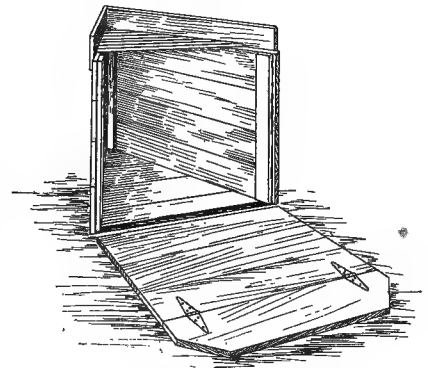


Fig. 3—Practical brood coop with roof raised for cleaning.

unbleached muslin or light weight duck. It may be waterproofed by giving it a coat of linseed oil. The tent fly is an essential and a great convenience. It affords protection for the flock in wet stormy weather and provides shade when the sun is hot.

Keep the coops clean, move them frequently to fresh ground or else spade up the earth beneath the lath shelter and rake in wheat or oats. The grain when sprouted will form tid-bits for the mother hen and her brood.

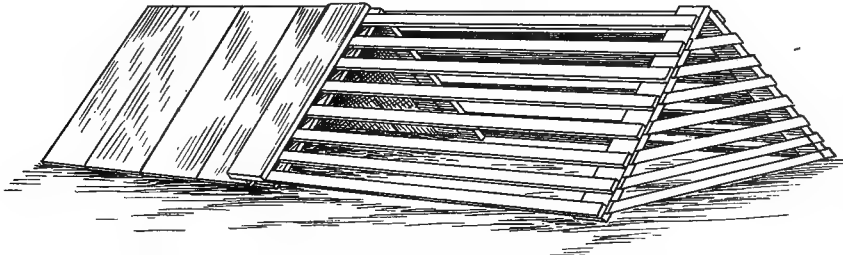


Fig. 4—Slatted chick shelter in use with the practical brood coop.

Keep the brood hen confined to the coop and chick shelter and let the chicks run. For the first few days, feed the chicks inside the shelter, afterward feed them outside out of reach of the mother hen, thus saving the more expensive chick food for the brood. Keep an abundant supply of wheat, corn, charcoal, grit, granulated bone, and pure, fresh, drinking water where the hen can have free access to them. Rations for the chicks same as for brooder flocks.

Choice of a Brooder

Notwithstanding the statement often made, that brooders have not reached the same perfection that is found in incubators, the facts are quite the opposite; there are plenty of good, practical brooders and artificial brooding has been successfully practiced for many centuries. Fireless brooders made of mud or adobe were used by the Egyptians, to rear broods from their great district incubatories or hatching ovens, and that these were in successful use many years B. C., we learn from the books of some of the earliest writers on agricultural pursuits.

While lampless and fireless brooders have come more into the "lime light" during the past few years, they were successfully used on New England farms many years ago. We recall that in 1885 there were, in the vicinity of East Foxboro, Mass., and also in Essex County, Mass., and in the vicinity of Andover, N. H., (all of which sections we visited), a number of poultry keepers who were then raising chickens in common boxes provided with hovers made with strips of woolen blanket and in two cases sheep skins (with the curl clipped from the wool) were used to keep the chicks warm. No artificial heat was supplied. It was considered more satisfactory to raise the chicks in this way than to let them run with the hens, although all were hen hatched. On other farms we visited, we found the farmer's wife raising a brood in a soap box, one end covered in with a strip of blanket. At night additional heat was supplied by a jug of hot water wrapped in flannel.

Although such methods have long been successful, success depends in a large measure upon care and vigilance on the part of the attendant. Chicks in fireless brooders, as a

rule, require more attention than those in heated ones, and a few hours neglect may mean wholesale losses in climates where sudden weather changes are common. In mild weather in the late spring and in early summer, we have often used the fireless plan of brooding with success, but in cold weather or early in the spring when weather and temperature changes are sudden and severe, we prefer the heated brooder. Of these there are several satisfactory types.

For large plants where chicks must be handled in considerable numbers the open-hover,

coal-heated hot-water pipe system of brooding is preferable to all others, and is the most economical and satisfactory. Where only a few hundreds of chicks are to be grown each season, we prefer the lamp-heated individual brooder of three apartment pattern, one that supplies hot air heat, furnace system of ventilation, directly beneath the hover. Such a brooder provides a choice of three temperatures, the

warmest beneath the hover. The chicks are given the opportunity to select the temperature which best suits their needs and can always warm up quickly when under the hover.

Care of Brooder Chicks

Newly hatched chicks need rest and warmth for the first twenty-four to thirty-six hours after hatching. They need time to rest from the work of pipping the shell and finishing exelusion. They also need time to continue digestion of egg yolk remnant which is taken into their bodies just prior to hatching. They need no other food during this time.

The brooder should be ready, thoroughly warmed up and running in good order. Litter the floor of the hover chamber with cut clover in which is sprinkled a little chick size grit or sharp sand. In one corner of the hover chamber place a small galvanized iron fountain containing pure fresh water. In two or more corners of the brooder, on the litter, place a little pile of commercial chick food and one of mixed meals and beef scrap; (beef scrap must be pure and sweet, poor scrap will cause diarrhoeal troubles).

In cold weather the temperature under hovers should be from 95 to 100 degrees and in warm weather from 90 to 95 degrees temperature taken with hover empty. When the

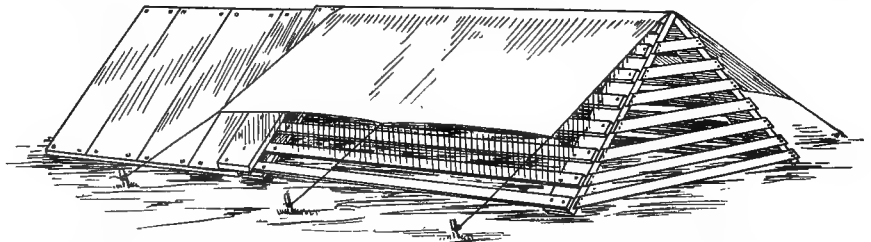


Fig. 5—Tent fly used to protect flock from storms and provide shade. The use of a tent fly on an "A" shaped lathed or slatted chick shelter is one of the most satisfactory methods of providing protection from hot sun and storms. The tent fly may be made of heavy unbleached muslin or light weight duck, and can be waterproof if desired.

chicks are put inside, which should be in the afternoon when they are ready for their first meal, the temperature may run up several degrees according to the number of chicks inside the hover. With a properly constructed brooder, this need occasion no alarm as with a circular hover, chicks have an opportunity to get away from the heat on all sides if it is warmer than they find comfortable. Surplus heat is necessary so that they can warm up quickly even if there are only

one or two chicks under hover.

After the chicks are started in brooder, maintain a hover temperature that will keep chicks comfortable. Be guided more by the comfort of the chicks than by the temperature indicated by the thermometer. As long as the chicks seem active and happy you can be certain that they are plenty warm enough. At night maintain sufficient heat under the hover so that chicks will be found ranged around the outer edge with their heads peeping out from beneath the table of felt. If the chicks huddle, or crowd and keep in out of sight, the brooder is not warm enough. At night there should always be a sufficient surplus of heat to allow for sudden weather changes. With ample space outside the hover freely accessible, there is no danger of overheating. In cold weather we have frequently run the temperature as high as 110 and found this necessary to drive the chicks out from under the hover.

As the chicks increase in size, the heat may be lessened gradually until by the time they are well feathered out they are getting along without any artificial heat whatever.

In the matter of temperature broods will vary, some requiring more heat than others. In March, 1908, we had a brood, in an outdoor brooder, that required no lamp heat whatever after the first week although they started with a hover temperature of 110 degrees. Place the comfort of the chicks above everything else in the matter of temperature and you cannot go far wrong.

For the first two or three days, the chicks should be confined to the hover chamber, then they should be given an opportunity to use the cooler exercising apartment of the brooder. Let them out for a little while each time and drive them back again before they have an opportunity to become chilled. Handled in this manner they will quickly learn the way in and out and may soon be trusted to take care of themselves when in need of hovering.

Do not let them huddle in sunny places or anywhere in the corners of the brooder or run. If they show any disposition to crowd or huddle drive them under the hover to warm up.

After they are a week or ten days old they should be provided with an outdoor run, preferably on grass land, but, if too early in the season for this let them run on bare ground which has been cleared of snow. A good chick shelter is a desirable addition to the brooder equipment.

Rations for Small Chicks

In addition to commercial chick food we like to feed a dry mash as supplementary food. A very satisfactory one can be made by mixing equal parts, by measure, of best wheat bran, corn meal, leaves sifted from cut clover, and fancy wheat middlings. To each ten pounds of this mixture, add one-half pound fine ground best quality beef scrap. Be sure that scrap is pure and sweet. Cheap or poor scrap is dangerous to feed and may cause losses. If you cannot be sure of the quality of the scrap, omit it from the ration and feed instead, two or three times a week, a little fresh beef scraped from sweet, clean shin or chuck.

Keep a supply of grit, fine granulated raw bone (kiln dried), granulated charcoal and fresh water where the chicks can always have access to them. Keep dry mash always before them. In addition, feed chick food in litter of cut clover, feeding enough so that they will always be able to find a little by scratching for it.

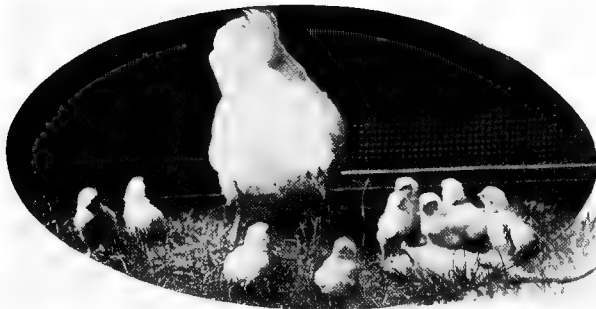
For the first three weeks, in addition to the chick food and dry mash, give supplementary feedings of boiled cracked rice and wheat. These should be thoroughly cooked until soft, and almost dry, and should be lightly seasoned with salt. Allow the cooked food to cool before feeding and sprinkle with a little fine ground raw bone. Also give chunks of raw potato for the little birds to pick at and furnish green food like grass, grain sprouts, cut cabbage, etc., giving them a daily supply, all they will clean up readily from the time they are a few days old until they are grown.

Plenty of green food is necessary and heavy grain feeding cannot be successfully conducted without it. Unless chicks have free range on a grass run, an abundance of fresh, succulent green food must be supplied.

We like to keep food before young chicks all the time. After they are three weeks old, they may be given the same rations used for laying fowls.

Keep the brooders and brood coops in clean and sanitary condition. Renew the litter material frequently. Either move the coops to new ground often or keep the ground sweet by frequent stirring or occasional planting of wheat or oats.

Chicks can be successfully grown in limited quarters, but under such conditions require more care. For best results in growing birds for laying or breeding stock, liberal range on grass land should be provided.



A promising brood of White Wyandotte Chicks. Not many brooding hens are so plucky as to tackle a full grown rat. Occasionally this occurs.
—F. L. Sewell.

ECONOMICAL BROODING OF CHICKS

AN EFFICIENT BROODING SYSTEM IS NECESSARY TO SUCCESS, AND MOST POULTRYMEN FEEL THE NEED OF FINDING A CHEAP AS WELL AS EFFICIENT MEANS OF MOTHERING THE CHICKS—THE PLAN ADOPTED BY THE AURORA SYSTEM OF BRANCH FARMS—UTILIZES THE LAYING HOUSES FOR BROODING PURPOSES DURING THE PROPER SEASON

R. P. ELLIS

I DO NOT know of a phase of poultry keeping that requires more thought than the proper selection of brooding equipment for young chicks. Of course if one is so situated that he occupies a permanent place, has had ample experience and is financially "easy," it is a simple matter to install an expensive "long" brooder house with pipe facilities, and so on. But the man who has arrived at this stage of his chicken raising, does not need very much advice, and is likely to accept less.

Every now and then someone complains that the poultry press is "run for the beginners." There is a lot of truth in that statement; but one might as well find fault because schools are run for the uneducated. They are the ones who need the help; and, what is more to the point, they are the ones who are most likely to profit by it. Of course, in all this is wrapped up the question, "Who are the beginners, and when does one cease to be a beginner?" For myself, I can say that I am still very much in the beginner's class, and when the time comes that I cease to be alive to new possibilities, then I shall know it is my cue to side-step into the leisure class of the retired.

With us—my branch associates and myself—it is always a matter of saving expense. We are running poultry farms to make money, and we are always keenly alive to the possibilities of saving money or time. The trouble with most brooding systems—in my opinion—is that they cost too much. When brooding equipment runs from forty cents to a dollar a chick it is getting too expensive for us. And since necessity is the mother of invention, the need of finding a cheap yet efficient means of mothering the thousands of chicks we are to raise this year, has become a matter of many dollars to us.

Heretofore, for the beginner, I have advocated the use of outdoor colony brooders, since they were easy to install, could be moved about and set on new soil frequently, etc. One of the greatest drawbacks to permanent "long" brooding houses is the difficulty of keeping the runs clean and in

green food. Another of its drawbacks is that the house with all its equipment can rarely be used for anything else besides brooding and is idle most of the year.

It was not until a large incubator company's adaptable hover was put upon the market that I found what seemed to me the solution of many problems in brooding. A few outdoor brooders are all right, but when it comes to attending to forty or fifty oil lamps and broods of chicks all in the open, one longs for something more labor saving and comfort giving.

On page 67 appears an illustration of our fourteen foot square laying house, with wire-screen doors covered with upper and lower sets of muslin frames. This has a floor space of 196 square feet. The house is four and one-half feet high (inside measurement). It is the lowest house I know of, and hence the air space is reduced to the minimum. This house we equip with six adaptable hovers, three on a side with a three to three and one-half foot center aisle. (See diagram presented herewith).

Each of the hovers is surrounded by a muslin frame, which we make ourselves. The frame is made of one by two inch furring strips and ordinary unbleached muslin is tacked on. The sides of the frame stand 18 inches high and as it rests on the floor it covers a floor space of 3 feet by 3 feet. The top of the frame is hinged so as to lift up and allow access to the hover. There is a door on one side of the frame to allow the chicks to enter and leave the hover. Over this opening hangs a curtain of felt—to conserve the heat.

Necessarily each hover is separated by a wire partition from the center aisle and from neighboring hovers. One inch mesh wire is used for this. A three foot high wire does for this purpose between hovers, though a four foot high wire is used to screen off the center aisle.

On the opposite page we show the house used for the hovers. These have to be set on a platform, running the length of the house, high enough to allow the lamps to rest

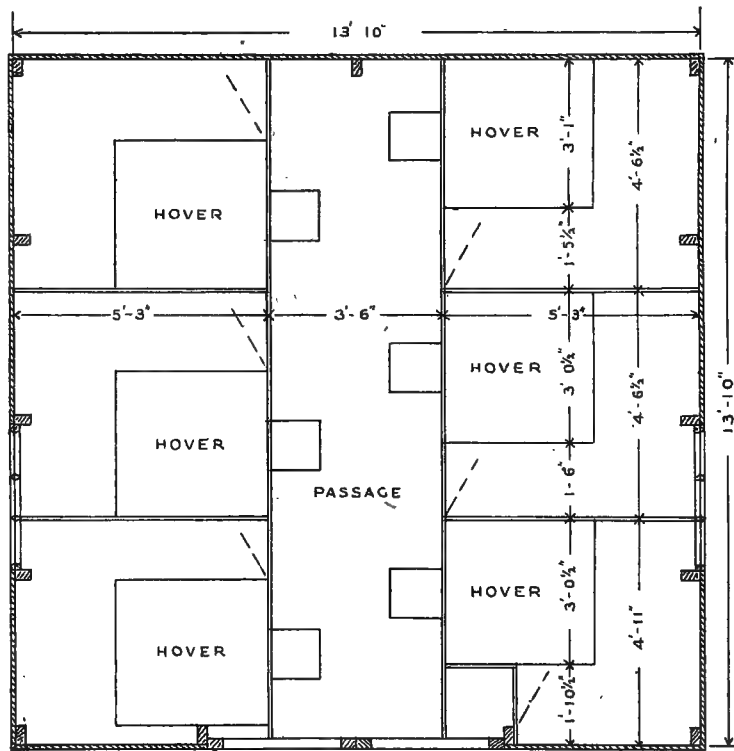


FIG. 1—FLOOR PLAN OF ELLIS TYPE COMBINATION LAYING AND BROODING HOUSE

Diagram shows arrangement of adaptable hovers in one of the ordinary laying houses in use on Aurora Leghorn Farm. The placing of these hovers in the house makes it serve two purposes, viz., as a brooding house during a part of the year and as a laying house during the balance, so that the house is never idle.

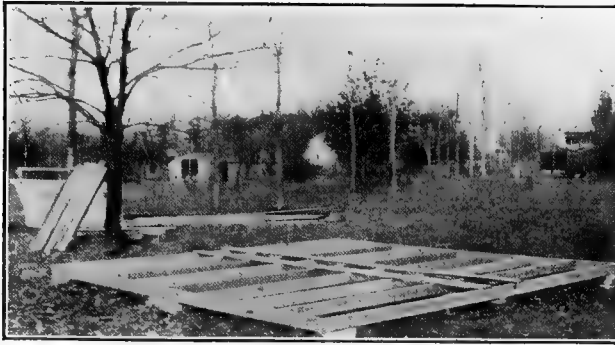


Fig. II—Ellis combination house in process of erection. The foundation.

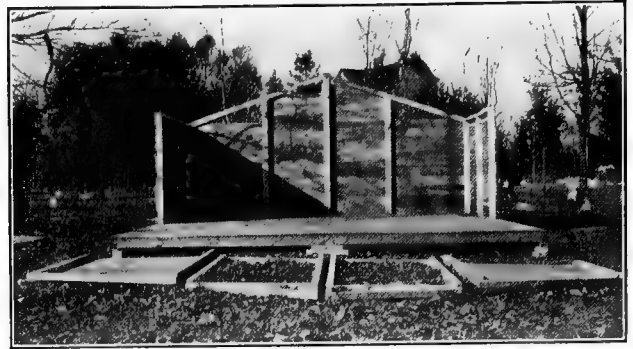


Fig. III—Shows floor in position. Rear and two sides up.

in the center aisle on the floor. We show here some cuts illustrating how this movable house is put together.

I am presenting also herewith a diagram illustrating the yarding plan. A study of this will show that each chick has from 8 to 10 square feet of yarding room outside the house, depending upon the number of chicks placed under one hover. I would advise that no more than fifty chicks be placed under any hover.

The same kind of wire is used to enclose the yards. Three feet is high enough for the partitions, whereas four feet is better for the outside fences. The work of removal will be facilitated if all wires are tacked on pointed stakes which can be pulled up when no longer needed and the wire rolled up.

After the Hovers are Removed

When the chicks no longer need artificial heat, the hovers and the platforms they rest on are removed. By this time all cockerels are removed, leaving from 125 to 150 pullets in the house. When these get of the colony house size, all wire partitions are removed and half of the pullets are taken to a new laying house (built for them) or else put around in cheap colony coops. In this way your brooding house is used straight through the year. The hovers can be installed in any laying house of our type on the plant. They do not have to be put back each year into the



Fig. IV—Shows the house ready for the roof, window and door.

same house. This solves the great question of how to provide fresh ground each year for the young stock. Most chicken plants increase, and each year a new house or two can be built and used that season for the brooding house. After two or three years it would be possible to return to the original house, since the grown fowls are confined all winter and the soil could be plowed up and a crop of oats or other quick sprouting grain started to sweeten the earth.

The advantages of this plan appeal to me. There is economy in the outlay for equipment—hovers cost half the price of brooders. There is durability—since these hovers are practically indestructible, being made of metal exclusively. I find my outdoor brooders a considerable item of expense each year for repairs, painting, glass, etc. Then there is the labor-saving feature—300 chicks under one roof. The comfort of the plan will be apparent to anyone who has attended to outdoor brooders and filled lamps in a driving storm. Last and most important of all, the chicks have about twice the floor space they would have in an outdoor brooder, and when the weather is bad they can be confined

to the house while they could scarcely be closed in a 3x6 brooder if three or more weeks old.

The cost of wiring is not more than the cost of the outdoor covered run which is necessary with each outdoor brooder.

While each one has interesting ways of getting results all must use those best suited to his own plant.

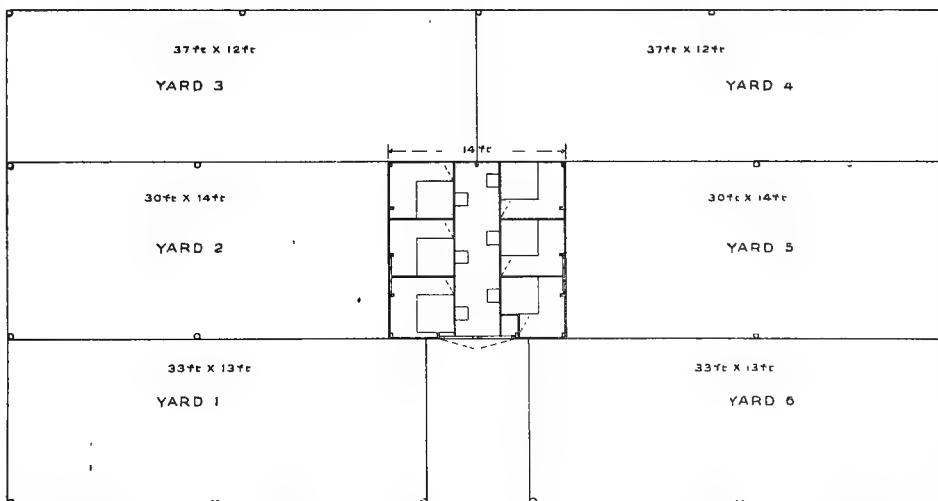


FIG. V—THE ELLIS COMBINATION HOUSE EQUIPPED WITH HOVERS AND CHICK RUNWAYS. Diagram showing the arrangement and size of the yards enclosed by temporary wire fences surrounding the laying house while it is being used as a brooding house by having adaptable hovers temporarily installed.

BROODING, COOPING AND FEEDING CHICKS

A WRITER WHO IS REGARDED AS AUTHORITY DISCUSSES BROODERS AND BROODING, FOODS AND FEEDING, AND DESCRIBES THE PROPER CARE FOR CHICKS OF DIFFERENT AGES

A. F. HUNTER

HATCHING the chicks is but half the battle, if, indeed, it is half the battle, as many a poultryman who has rejoiced in good hatches by either hens or incubator has afterwards learned to his sorrow. With incubator chicks raised in brooders elbow room seems to be a most important factor, and want of elbow room is one cause of great mortality in brooder chicks. It is quite natural to suppose that a brooder which is three feet square (giving nine square feet of floor space), is abundant room for seventy-five or one hundred chicks, and, indeed, it is for chicks as they come out of the incubator, and if we do not want our chicks to grow it is all right to crowd into a brooder twice as many as should be in it. A point that we should keep in mind, however, is that these chicks will be fully twice as large at three weeks old and probably four times as large at five weeks old, or by the time we move them from the brooder, and that factor we should have in mind in gauging the capacity of a brooder. I have come to believe that for good results fifty chickens are as many as should be put in any brooder; that to increase the number beyond that point is to induce crowding, which kills some and stunts others, and is extremely unfortunate if quick and profitable growth is our aim. If, as not infrequently happens, we find we have one hundred and fifty chickens in the incubator when we only expected about one hundred, and have but two brooders heated up to receive them, no harm will result in putting seventy-five chicks in each of the two brooders for a couple of days, but another brooder must be made ready at once and the one hundred and fifty chicks put into the three, which gives reasonably abundant room for all of them and they have a good chance to grow.

We raise chickens on our farm for two purposes, first for market, second for breeding stock. The chickens for market are hatched usually from about Christmas time to the middle of March. Those intended for breeding stock are hatched from about the middle of March to the middle

of May. To have chickens out by Christmas time we have an incubator started early in December, and at that time it is our custom to start one incubator a week, or, possibly, four incubators in three weeks, gradually increasing to two incubators a week through January and February, and so on. For these winter chicks we have a brooder house 130 feet long by ten feet wide, partitioned into sixteen pens eight feet by ten feet, each pen having a door and window in front which faces the south. This brooder-house is double walled, with a four-inch air space between the inner and outer walls (it would be better still if the wall and roof spaces were packed with straw or swale hay), and the only artificial heat used in this house is in the brooders themselves, excepting that in some severely cold weather we put a small oil stove in each pen to take the chill out of the air, in order that the chicks may be out in the pen. We use brooders which are three feet square, heated by an oil lamp with a one and one-half inch wick, the air which passes into the brooder being heated by passing over a sheet iron ceiling to the lamp chamber, and by this method of applying the heat indirectly a slight current of warmed fresh air is passing into the brooder all the time. Herein, we think, is one of the great faults with many brooders, as, for example the hot-water pipe brooders in use in many brooder houses. Those hot-water pipes simply heat the air already within the hovers, which air is practically confined to the hovers by the felt curtain in front, which is supposed to enclose the warmth within the hovers. It does that very well, but it likewise encloses the air, which the chicks have to breathe over and over again, and in that defect I think we find a clue to not a little of the mortality and consequent shrinking of profits on brooder house chicks. A current of warmed fresh air supplied to the hovers would overcome this serious difficulty, and would, in my judgment, materially reduce the mortality of brooder chicks.

The brooders are set in the ground to a depth of six or seven inches, which serves a twofold purpose. The lamp chamber is enclosed so as to cut off currents of air, and the chicks run out and in upon a level. For our winter chickens the brooders are set in the middle of the pens in the brooder houses, or, say, about four feet back from the window, and two pieces of board are fitted into slots at each front corner, extending to the side of the pen, so that the chicks are kept in that warm, sunny half of the pen until they are a week to ten days old. The first day after being removed from the incubator they are usually kept confined to the brooder, the food being put on small platters placed in the corners of the brooders for them. After they are old enough to be let out they are fed and watered outside, just in front of the brooders. These winter chickens will need the warmth of the brooders until they are seven or eight weeks old, but the



PART OF A LONG BROODER HOUSE

The Foreground Shows Brooders Out of Doors, Each Brooder Enclosed in a Pen 20 Feet Square, Made of 18-inch Netting.

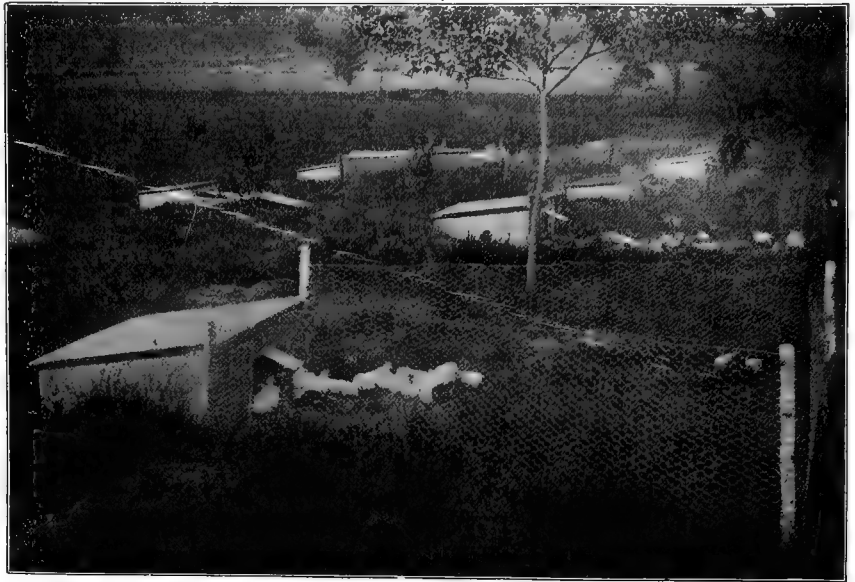
temperature of the hover is gradually reduced from 95 degrees at the beginning to 90 or thereabouts at the end of the second week, then to 85, then 80, then 75, and the last week or so that the chicks occupy the brooder the flame of the lamp is kept as low as it can be run, to give just the least amount of warmth, 65 to 70 degrees being sufficient.

The chickens that we raise for breeding stock are brooded out of doors (it being our custom to begin setting brooders out about April 1st, the brooders being set in the ground, just as formerly inside the brooder house, but as we have much rainy weather in April and May, we have "shelter boards" to serve as protection from the rain, set a little way in front of the brooders, and under which the chicks can take refuge from storms. The chicks put out of doors are kept within the brooder for about one day, then a little pen a yard square made of three pieces of board three feet long set up to the front of the brooder gives them a snug little enclosure for the few days of babyhood. Next we make a pen about twenty feet square of one-inch mesh wire netting tied to temporary stakes, and the chicks have the range of this pen until they are big enough to be weaned from the brooder, which, in May and June, is at about six weeks old. Then they are moved back to a grassy ridge bordering the pasture on one side and mowing field on the other. There they are colonized in "A" coops (as we call them) for five or six weeks, when it is time to separate the pullets from the cockerels, and put the pullets out in the grass fields, in roosting coops, in families of about twenty-five each, colonized about fifty yards apart. The cockerels intended to be raised for breeding are confined in pens about 50x100 feet, while the cockerels intended for market are taken back to the pens in the brooder house, which have small yards 10x20 outside, and there they are fed and grown for market.

The coops for these chickens play a not unimportant part in chicken raising, and a brief description of them may be interesting. The "A" coops are three feet six inches by two feet three inches on the ground and two feet high at the apex of the roof. They are built throughout of half-inch tongued and grooved pine and well painted. The front is all slats, as shown in the illustration, with a slatted gate sliding in grooves to close the front. We originally built "A" coops to slope down to the ground, but found it an improvement to have a square base four inches high, with the corners turned to an angle, to prevent the chicks from crowding back under the eaves and smothering one or two at a time. We find it a most decided advantage to have these well built coops always at hand, and as we have coops now in use which were built ten years ago, and are as good to-day as when made, the economy of well made coops will be apparent. When we say that the tongues and grooves of the roof pieces are painted before they are put together, the reader will realize that they are thoroughly well built.

The roosting coop, which is chiefly intended for raising the pullets in, is six feet long, three feet wide, two feet high at back and three feet high in front. The roof, ends and back side are all of half-inch tongued and grooved pine, the front being laths, set a lath width apart, except that a strip of board is nailed to each corner for stiffening. Two roosts

stiffen it. A coop like this will comfortably house twenty-five to thirty chickens until they are nearly grown; in fact, we sometimes have pullets to begin to lay before they are



BROODERS AS USED OUT OF DOORS
The One in Foreground has a Very Small Pen for Baby Chicks

brought in from these roosting coops. It is quite light and can be easily moved on a wheelbarrow, or moved its length and width to fresh ground, or it can be tipped up and drop-pings removed, and it is a perfect summer shelter. If they are to be used in the spring or fall, when the nights are cold, an improvement would be to make a front or half-inch boards, hinged at the top edge, so it could swing outward and upward and rest upon folding legs hinged at the bottom corners, which would become a roof to shelter the birds from rains. One disadvantage of this light coop is, that it may be easily tipped over by a high wind, especially when the chickens are all out of it, as during the day. To prevent it from so tipping over, a flat stone should be placed on each front corner of the roof.

The gate space in front of the coop gives access to the whole inside when the pullets are to be removed. The gate is made of laths nailed to two strips one inch square, the left hand ends of which are long enough to slip in behind the lath front, the right hand side being secured by one or two buttons. If one prefers, these gates can be hinged at one side or the other and secured by a hook or a button, but of two by three scantling, slightly rounded at top, run the whole length and are a foot apart, being securely nailed to a frame of furring (one by three stuff) nine inches from the ground. To this frame we nail the ends, back side and front corner boards and then fit in at the top a frame of inch-square stuff to nail the roof boards to and we have found it a convenience to have them wholly detachable, and so make them.

Shelter from rain and sun is of quite as much help as a good coop to sleep in. By experimenting in different ways we learn that it would pay as well to have "shelter boards" always ready, just as are the coops; hence we make them of the half-inch, tongued and grooved pine, taking five strips three feet long by six inches wide for each shelter board. These strips are securely nailed to pieces of inch-square spruce at top and bottom, and then the weather side is well painted. We make a light frame of the inch square spruce strips and laths to fit up to the "A" coops when we want

to put the shelter close to the coop, using one of the 2½x3-foot shelter boards, as shown in the illustrations. As the chicks get a little older we move the frame out a little, set athwart the front of coop, and put two shelter boards over it side by side, setting it so that it furnishes shade if the sun is shining, or protects from a driving rain, of course adapting it to the direction of the wind.

When we move the pullets out into the field and into the roosting coops we set upon stakes and a strip of furring, a shelving roof seven and a half feet long by three feet wide, slightly sloping to the south about eighteen inches high in front and a foot high at the back. By these devices we more than double the available shelter from rain and sun and correspondingly increase the comfort of the growing chicks. Obviously, if they have to be crowded into their narrow sleeping quarters on a long rainy day or to get away from the hot sun, they are not making good growth, and by so simple an expedient as we have here outlined we more than double the protection and by so much promote their comfort.

Foods and Feeding

As we stated at the beginning of this article, we raise two kinds of chicks, chickens for market and chickens for breeding stock. The food for the first month or six weeks is practically the same for each class, but at the end of six weeks we begin to feed the market chicks a richer and more fattening food, they of course being kept separate from the chicks intended for breeding stock.

Feed often and feed but a little at a time is the rule for young chicks. We feed five times a day until they are about six weeks old. It is important that no food be left standing for the chicks to trample dirt into or to get sour in the sun; if they have not eaten it all in twenty minutes to half an hour, remove it. Nothing causes more bowel looseness and dysentery than sour food. Our chief foods for the first six weeks are coarsest oatmeal, slightly moistened with sweet milk if we have it; if not, with water, and waste bread ground to rather coarse crumbs in a bone mill. This also is moistened with sweet milk or water,—slightly moistened so that it is still crumbly and not “pasty.” The oatmeal is just such as is cooked for a breakfast dish on our table; in other words, it is oat meats ground very coarse. This we buy of wholesale grocers, by the barrel, at a cost of about two cents a pound. The waste bread is the broken pieces, part-loaves, rolls, corn cakes, etc., from hotels and restaurants and costs about a cent and a half a pound. This bread we buy by the hundred weight and spread on the barn loft to dry; when thoroughly dry it is ground into coarse crumbs in a bone mill. The first food early in the morning is the bread crumbs, slightly moistened with sweet milk or water; the second, about nine o'clock in the morning, is oatmeal, slightly moistened a little before noon, bread crumbs again, about half past two oatmeal again and about 5 o'clock a little cracked wheat or finely cracked corn. Twice a week a little lean meat is boiled, chopped fine and mixed with one of the bread or oatmeal feeds, or the infertile eggs

(clear eggs) from the incubators are boiled hard, chopped fine, shells and all, and mixed with the bread crumbs or oatmeal.

It is very important that the chicks have grit to grind their food, and as baby chicks are hardly to be trusted to supply themselves with good grit, we sprinkle a pinch of fine grit (or coarse sand) upon the small tin plates once a day just before feeding, or, if preferred, it can be mixed into the food. Grit in the gizzard to grind the food is a most important factor in preventing indigestion and looseness of the bowels.

Green food is another important aid to good health. If the chicks are cooped upon fresh grass the problem is easily solved, because they will help themselves. Obviously, the January, February and March hatched chicks cannot have access to fresh grass, neither can the larger chickens shut up to be fatted for market, hence a supply of green food must be provided. Cabbages, onions, lettuce and onion tops all make a good green food supply, and the same can be said of weeds from the garden, which are easily obtained. It is a comparatively easy matter to supply the green food if one has the will.

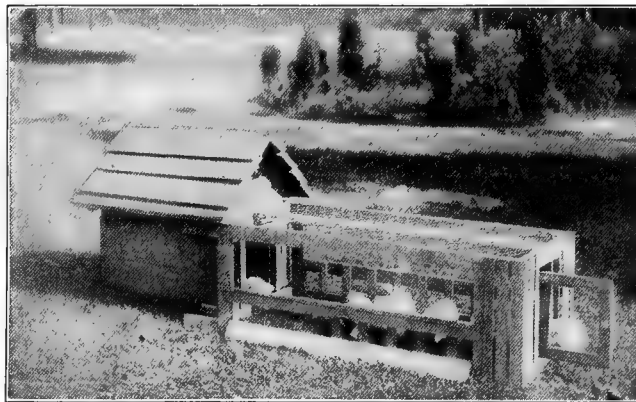
We are well aware that many readers cannot get waste bread from hotels and restaurants, and to such we recommend the making of “johnny cake” of mixed meals, baked very

thoroughly, and we will give also the rule for “Excelsior Meal bread” as recommended by Mr. I. K. Felch. “Grind into a fine meal in the following proportions: Twenty pounds corn, fifteen pounds oats, ten pounds barley, ten pounds wheat bran. Make the cakes by taking one quart sour milk (or buttermilk), adding a little salt and molasses, one quart of water in which a large heaping teaspoonful of saleratus has been dissolved. Then thicken all to a little stiffer batter than your wife makes for corn cakes.

Bake in shallow pens until thoroughly cooked. We believe a well appointed kitchen and brick oven pays, for in the baking of this food enough for a week can be cooked at a time.” It is very certain that a cooked food of this kind is a decided help to good growth in chicks, and as we on our farm want a good growth, we study to promote it by feeding a good food.

Not a few farmers and poultrymen think that oatmeal as a food for chicks is a luxury. Wright’s “Practical Poultry Keeper” says: “With regard to feeding, if the question be asked what is the best food for chickens, irrespective of price, the answer must decidedly be, ‘oatmeal.’ After the first meal of bread crumbs and egg no food is equal to it, if coarsely ground, and only moistened so much as to remain crumbly. The price of oatmeal is, however, so high as to forbid its use in general except for valuable birds; but we should still advise it for the first week in order to lay a good foundation.”

We are obliged to differ from Mr. Wright as to oatmeal being an expensive food for chicks. It may look expensive to pay \$4 a barrel (two cents a pound) for oatmeal for chicken food; but it goes so far we have found it a decidedly economical food. We use perhaps fifty dollars’ worth of oatmeal a year and it makes about one-fifth of our chicks’ food



Brood coop with runway for hen and chicks.

ration for the first three months of their life. Considered simply as a food ration it is economical, but when we consider that it is a good foundation for the future usefulness of the bird, and that a good foundation for chicks means eggs in the basket next fall and winter—then we realize that oatmeal is a cheap food in the best sense of the term.

By the time the chicks are six to eight weeks old the principal dangers of chickenhood are past and the two different methods of feeding are inaugurated. The chickens



As a Shelter from Sun.

intended to be raised for breeding stock are put out in the fields, where they have a grass run and a free range. The chickens intended for market are kept confined in the brooder house pens and yards and fed a slightly different grade of food. The principal difference is in increasing the amount of cracked corn and corn meal of the market chicks and cutting off the oatmeal, of course the green food being plentifully supplied and grit being constantly accessible. The chicks in the field intended for laying and breeding stock must have a liberal supply of nourishing, strengthening food, which will build up a strong, healthy and vigorous body, with stores of strength to lean upon when maturity shall come. The breakfast is bread crumbs, continued usually until the chicks are about ten weeks old, when they are graduated into a morning mash of cooked vegetables (which makes about one-third of the whole) and mixed meals, being equal parts by weight of corn meal, ground oats, fancy middlings and bran (or shorts); this is salted about as it would be if it were food for the table. The vegetables are potatoes, beets, turnips, carrots, onions—anything in the vegetable line, thoroughly cooked and mashed fine, the mixed meals being stirred in until it is stiff as a strong arm can make it. The breakfast in the morning is this mash; in the middle of the forenoon a light feed of coarse oatmeal, moistened; just after dinner a light feed of cracked wheat and about five o'clock whole wheat or cracked corn, one, one day the other the next. About twice a week we have fresh meat (butcher's trimmings), which are boiled and then chopped fine. This we mix with the oatmeal (about half and half) for the second feeding. We have also a bone cutter and twice a week the chicks have a good time wrestling and trampling over each other in their eagerness to get the fresh cut bone. Cut bone, if perfectly fresh and sweet, is one of the best animal food supplies that we have, but, if this is not available, meat meal or beef scraps should be mixed into the morning mash, about one-quarter ounce per bird per day, for young birds, increasing to about one-half ounce per day as they approach maturity.

We vary the food ration continually within the range here described. For instance, one day the food will be mash, bread crumbs, cracked wheat and cracked corn; next day, mash, oatmeal and chopped meat, cracked corn, and whole wheat; the next day bread crumbs, cut bone, oatmeal, cracked corn and so on. The intention is to feed only what the chicks will eat up clean and quickly; but we break the rule so far

as the last feed is concerned and the boy goes around a second time twenty or thirty minutes after feeding, and if the food is all eaten up clean three or four handfuls more are put down so that all shall have a chance to "fill up" for the night. If a handful is left uneaten it quickly disappears in the morning, and as it is always dry grain it does not sour and there is no danger from leaving it out.

We have said nothing about fresh water because it goes without saying that fresh, clean water must always be accessible to the chickens. We water them three times a day, morning, noon and late afternoon; some times going around between while if it is hot weather and the chickens are likely to drink a good deal. The water dishes are carefully rinsed once a day and water which is fresh and cool is always accessible to them. Grit to grind the food is another necessity, a pan of which is placed near each food trough out in the field, or a small box of it in each pen in the brooder house. We have personally noted that chickens when let out of the coops in the morning would go to the grit dish for two or three bits of grit before going to join their mates at the food trough.

Thus far we have been writing about chicks raised for breeding stock. When the market chicks are six to eight weeks old we cut off the oatmeal (or ground oats) from the food ration, double the quantity of corn meal and cracked corn, feeding also on wheat or barley, feeding them occasionally, say once a week, a feed of whole oats for a change. The corn meal and meat meal are gradually increased and a

week to ten days before the chickens are to be marketed a very little gluten meal is added to the ration and the meat meal practically doubled in quantity until we are feeding a full ounce per bird per day. With this decidedly fattening ration the birds should go to market in first-class condition and bring top prices for market chicks.

The chicks intended for breeding stock have free range and can roam over the fields at will in search of insects worms, etc., the exercise of ranging promoting growth and good health. We study to promote the comfort and well being of the chicks, believing that it pays to do so. The coops are kept scrupulously clean by being moved to fresh ground every other day, and every reasonable pains is taken to insure steady, continuous growth. It is the full egg basket in November, December and January, when eggs bring top prices and pay the creamy profits, that is being planned for and worked for in this good care and good feeding, and we have abundantly proved on our farm that this good care

and good feeding pay richly. We cannot get a valuable thing for nothing; the good things in this world come by working for them, and the good profits that are to be gained



As a Shelter from Rain.

in poultry raising have got to be worked for. With us the problem is early hatched pullets kept growing so that they shall come to laying maturity in October, and then kept laying. Our pullets are kept growing, and after they reach laying maturity are kept laying, by good care and good food.

REARING CHICKS IN BROODERS

AN ORIGINAL DESIGN FOR AN EASILY CONSTRUCTED, PORTABLE COLONY HOUSE—CARE OF BROODER CHICKS—THE QUESTION OF FEED

E. W. McBRIDE

TWENTY-FOUR hours after hatching the chicks are removed to the warm brooder. Not more than fifty chicks are placed in each and one brooder is placed in each colony house. The next thing is to instruct them in the ways of their new home. The little motherless chick must be taught everything, but it soon learns. Teach them first of all how to seek the warmth of the "hover." Watch carefully to see they do not remain outside huddling up against the exterior of the cloth instead of nestling snugly inside. For the first few days they must have constant attention. Show them where to find the water, and dip their bills into it so that they may know how to use it when found.

Some kind of litter such as clover leaves or chopped straw should be placed on the floor of the brooder as soon as the chicks are put into it, and in this chick feed and small grit should be scattered, so that they may learn early to scratch. At the end of a week they can be given a mash made of two parts corn meal and one part middlings. They can be allowed out of the brooder after two days to run about the colony house, but particular care should be taken to teach them how to go back by the passageway leading up from the ground.

Do not lift the stupid ones off the floor of the colony house, even though this may be an easier method, but make them go back the right way, so that they may know how to return to the brooder when they want the heat.

As soon as they have learned these lessons they may be allowed outside in the yard. This enclosure need not be more than 10 feet square, with 1-inch mesh wire netting a foot high. After they are ten days or two weeks old this pen may be removed and the chicks allowed to run at will, but for a few days they should be watched to see that they return properly to the brooder.

They should be taught a call the first day. An imitation of a hen's cluck is a good call for this purpose. As they grow older change this to tapping on the feed bucket, as this sound they can hear and distinguish a good distance away.

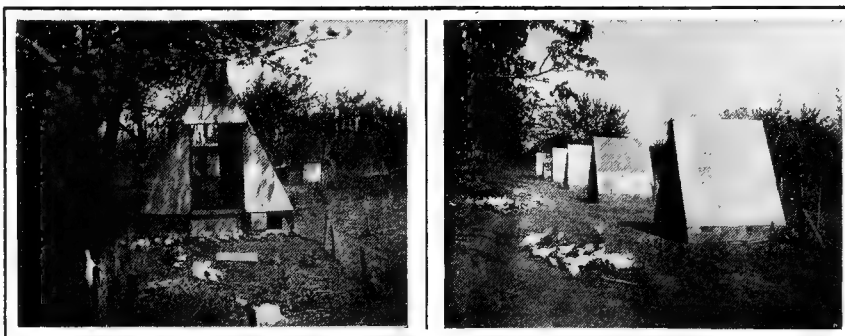
When they are about three weeks old give them larger

grain, such as wheat screenings, cracked corn and Kaffir corn. The manner of mixing the soft feed is important. Take two parts of corn meal and one of middlings and mix these together dry, thoroughly. Then pour boiling water on the mixture (the water must be boiling) and stir vigorously into a crummy state. This food is partly cooked, and is very wholesome and relished by the chicks.

The brooder should be kept closed at night for about a week or ten days until the chicks understand how to go in and out, and the lamp should be kept going for about four weeks, although it is needed only at night when the day is warm and the brooder is not used. After the chicks have gone, say, two weeks, without any artificial heat the brooder is taken out and used over again for younger chicks, and is replaced by a "cold" brooder, that is, a brooder without the "hover" or lamp, and having simply the inside diaphragm. This is used until they are large enough to roost.

Then the cold brooder is removed, and roosts are placed in the colony houses. The cockerels are finally removed to the fattening pen, and the pullets allowed to run loose until ready for laying.

The colony houses shown in the illustration which accompanies this article possess some novel fea-



A PORTABLE COLONY HOUSE

ures. They are 6 feet square at the base, and 7 feet high. The bottom is a soft pine board 1 by 12 inches. The corners are fastened with a piece set in so that they can not possibly pull apart. The framing of the upper part and doorways is made of Oregon pine, stripped and fenced to $\frac{3}{4}$ inch thick and 2 $\frac{1}{2}$ inches wide. All the joints are cleat nailed, thus preventing the wind from racking the frames in any way. The tent has a back entrance door and one chick door at the front left hand corner, as well as one front window opening which is provided with a duck canvas curtain, but in which glass can be set in cold weather if necessary. The four sides are of 12 inch Army duck canvas. Thorough ventilation is secured by 6 by 8 inch openings in the front and back, with roll-up canvas curtains adjustable at any point. These houses are serviceable, well ventilated, and portable; they are moreover built so that they can be taken apart and laid aside in the winter when not in use.

NO ARTIFICIAL HEAT

ABOUT FIVE HUNDRED CHICKS RAISED EACH SEASON WITH PRACTICALLY NO ARTIFICIAL HEAT AND COMPARATIVELY NO LOSS—IT SOUNDS EASY—BUSY FARMER'S WIVES WOULD DO WELL TO GIVE THIS METHOD A TRIAL

MRS. L. L. WHITE

IT IS really amusing to note how aptly illustrated is the old saying, "All roads lead to Rome" by the different methods given for feeding, either young or old fowls. Having been repeatedly asked for my way of feeding little chicks, shall begin at the very machine and tell how I handle the little tots to get them up out of the way so quickly.

About the time I think they will put in their appearance, I place my big "goods" boxes in sheltered, sunny spots, just where I intend to leave them as long as needed. Hay loft trash is scattered on the floor and little wire runs (made by using twenty feet of twenty-four inch wide, one inch mesh wire netting, tacked to old broom handles at each end) are placed in front of the boxes. One end of the broom is sharpened to a point so that it can be pushed or driven into the ground about six inches. The wire is stretched in a semi-circle from each side of the front of the boxes. Drive three or four stout sticks at different parts of the circle to hold the wire curved so that the wind will not move it. Then the future home of the chicks is ready and the only thing to do is to scatter food and place the water fountains.

While the chicks are small these water fountains are made from old baking powder cans with little holes punched

in the top edge about one-half inch deep, then the can is filled with water, inverted in a saucer, or can top, quite a bit larger than the water can, and these do very well indeed.

I raise five or six hundred chicks

each season in two hatches. I used to raise splendid droves of Mammoth Bronze Turkeys, but the dogs put me out of the business. I keep all my hatch in one of the incubators, putting in all the first hatched ones, as I exchange eggs for chicks from one machine to another. When ready to take the little fluff balls out of the machine I have my little heatless brooders that hold fifty chicks until a month old all bedded and ready; then open the machine, grab right and left all that are thoroughly dried and fluffed and drop into the brooder. I close the incubator again quickly and rush upstairs. My machines are all set in the cellar, which while not particularly damp yet contains sufficient moisture so that I never need water in any shape inside of the machines.

For best results never put the later hatched chicks in a brooder with a lot of first ones, for they will not stand much show, the first ones being so much lustier. However, the later ones grow up to be just as strong if given a chance by themselves, so put them all in one brooder together. These heatless brooders are boxes 12x20 feet, filled half full of fine blue grass hay. From two to four days I keep them in these boxes, merely covering the boxes at night with a woolen blanket turned back at each corner so as to give them air. For forty-eight hours they really need nothing but sleep. When from forty-eight to ninety-six hours old I take the

brooders out, place them in the back part of the large boxes, scatter a little fine grit around in the run, also a little common, bulk, rolled oats and crushed wheat, which I make myself by grinding through an old coffee mill. Then I fill the fountains and turn the "tigers" loose. Veritable little tigers they are, so hungry and thirsty and how they "hip-pity skip" all around their enclosures! These larger boxes have holes in the sides for fresh air and if the weather is extra cold I put a three gallon jug filled with hot water in the center of the big box just before I retire.

Cull at Eight Weeks

For the first three days, of course, they need watching to see that they learn to run back in the brooders when cold or sleepy. After that until eight weeks old they use the goods boxes and heatless brooders. At that age they are ready to be culled and you can sell for broilers all faulty-looking ones.

For feed the first three or four days they get what I first named, then I add fine granulated bone and meat scraps and I stop grinding the wheat. The rolled oats are almost "cut out." I lose almost none, except by accident or a too hungry cat. The chicks get no corn until they are at least six weeks old, then I keep chops, bran, bone and meat scraps, all mixed, in hoppers where they can get at it all the time. There is no danger of overfeeding young growing stock if

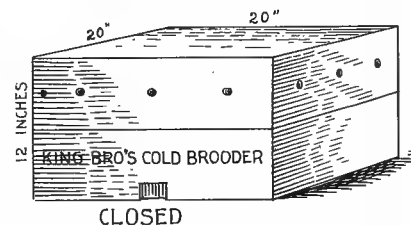
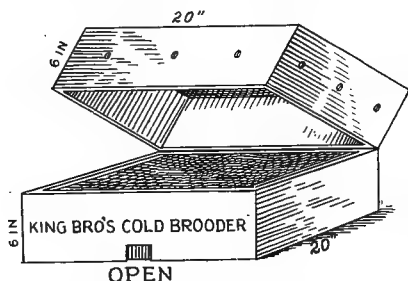
they have the range of a good sized yard. Of course they fly out of the little enclosures within about three weeks' time, so then I prop up two or three places so they may run under instead of climbing over.

In a week's time my little ones are really up and out of my way and cause me very little trouble. I aim to have all my chicks hatched by the 20th of April and the birds mature so that they begin to lay before winter sets in.

A COLD BROODER

ON THE plant of King Brothers in a Wisconsin city, we found this cold brooder being used for the chicks.

The upper floor of the 30x80 foot house is used for a brooding house, being heated with hot water, while the chicks are kept in cold hovers, which are boxes twenty inches square and twelve inches high (see illustration). The upper half of this box is arranged like a cover so that it can be opened wide and on each side of the cover is bored three one-half inch holes for ventilation. There is a frame that sets on cleats to which flannel is tacked so that it sags low enough to come in contact with the backs of the chicks. The room has windows reaching to the floor on the east and south sides so that the chicks get plenty of sunshine. Each little chick pen is 4x16 and the floor is first covered with glass sand and then with ground clover.



SUCCESSFUL CHICK RAISING

RAISING POULTRY HAS PROVED A PROFITABLE BUSINESS—GIVES DRY FEED
—PREFERS INCUBATORS FOR HATCHING—A PRACTICAL POULTRY HOUSE

MRS. EDITH M. HANDY

I HAVE kept hens more or less for a number of years, but did not make a regular business of it until about five years ago, when I decided to try poultry raising for profit. Being undecided which was the best breed to raise for market fowl, eggs and exhibition purposes, I tried several, but before long decided that the White Wyandotte was the variety for me.

I have found that dry feed gives better results and is much less work than when one feeds mash. Keep a dry mash before them all the time and throw dry mixed grain in the litter in the house at night. In summer feed plenty of green food when they cannot run at large and in the winter give them mangles and cabbages, also turnips, beets and potatoes.

The droppings boards are cleaned every morning and sprayed once a week with liquid lice killer. This course has relieved me of any trouble from lice and mites.

Prefers Incubators

I tried hens for hatching chickens when I started in business, but had such poor luck that I bought an incubator as an experiment. Having never run one before I was a little doubtful of the outcome, but soon decided that I had no use for sitting hens. Artificial incubation suited me much better.

All the chicks are raised in outdoor brooders and they

are allowed out on the ground as early as possible. The chicks are usually kept in the incubators for forty-eight hours after they are hatched and then are removed to the brooders, as I have found that chicks are much stronger and better after this rest in the incubator.

The little chicks are fed dry feed from the first with green food, charcoal and plenty of water. I have had good luck(?) with chickens and I am making a success of the poultry business and would advise any woman who likes poultry to try raising it for profit. It pays to be honest in this business, as in any other, and it is not difficult to satisfy all reasonable customers if you practice the golden rule.

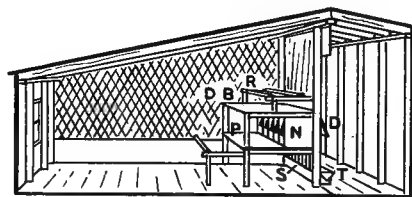
Our Poultry House

The accompanying drawings show our poultry house. It has given us very good satisfaction. You will note that we have one glass covered window and one that is muslin covered in each pen. All the fixtures are removable in order that the house may be thoroughly cleaned. Have found the hall way in the rear of the house a great convenience. You will note also by reference to the drawing of the interior that the nests are under the droppings board and that the eggs can be removed from the hall way and that the mash can be placed in the trough in the hall without entering the pens to disturb the birds.



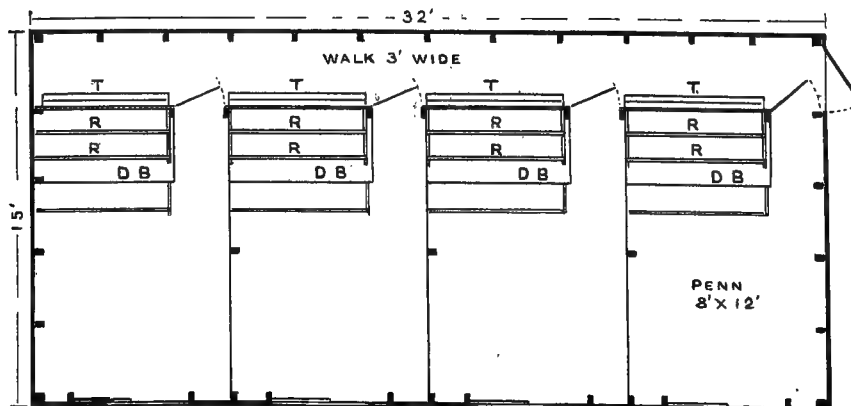
PERSPECTIVE.

Mrs. Edith M. Handy's Poultry House.



INTERIOR.

R—Roosts, DB—Droppings Board, N—Nest
P—Platform in front of nests, D—Hinged door
opening into walk through which eggs can be
removed from the nests, T—Feed Trough lo-
cated in the walk, S—Spindles through which
the hens feed.



GROUND PLAN.

Ground Floor Plan of Mrs. Edith M. Handy's Poultry House.

HOW TO RAISE BROODER CHICKS SUCCESSFULLY

PARENT STOCK OF FIRST IMPORTANCE—SINGLE BROODERS PREFERRED TO PIPE SYSTEM—WHAT AND HOW TO FEED

EDGAR BRIGGS

ONE of the first things to be considered in raising brooder chicks successfully is the parent stock, which must be in perfect health, properly fed and given abundant exercise to insure fertile eggs and strong chicks. A first-class incubator must be selected, one that will hatch from 75 to 90 per cent of fertile eggs, and when you get such hatches you will get strong chicks that will live if properly cared for. The next thing to be selected is a brooder, and this is equally if not more important than the incubator. You must get a brooder that imitates a hen as closely as possible; one that will let in any amount of fresh air; one that has a round cylinder with no corners for chicks to crowd in, and one easily heated with a lamp that will not blow out nor smoke. I prefer the single brooders to the pipe system. In winter heat your house to 60 and 70 degrees and keep your brooders 90 degrees at the start, gradually lowering the temperature after twelve days. Do not let the chicks get chilled at any time nor allow them to crowd, for if you do bowel trouble will be the result, which will take off a large per cent in a short time. Too much heat will weaken them and cause many to die, so you must be very careful, especially at night, about obtaining the right temperature, as it often grows very cool the latter part of the night, so a little extra flame should be left on in cool nights.

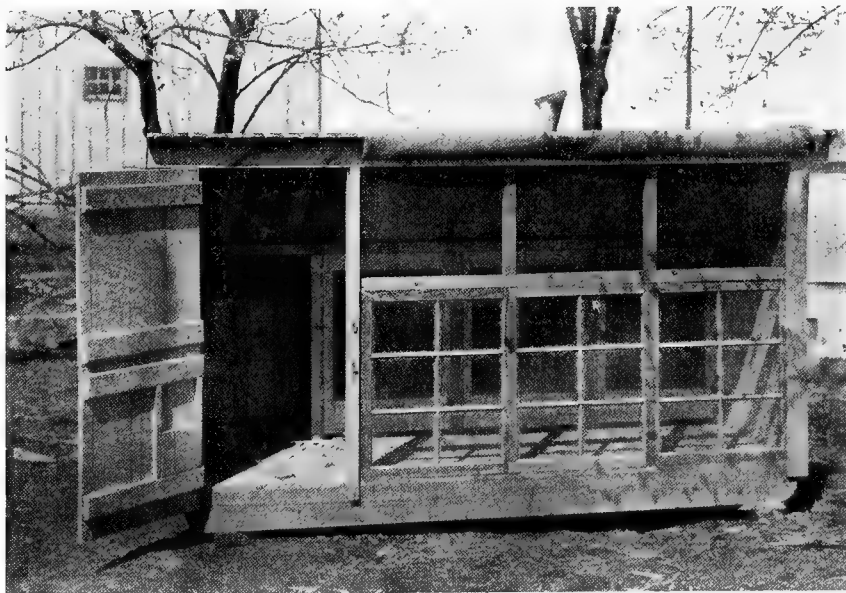
I use runs five feet wide, ten feet long inside of house, and outside runs fifty feet long well shaded in summer.

The next and most important of all is food. I wish to say right here that overfeeding for the first four weeks of a chick's life has put more people out of the business than all other things combined. You can hardly feed too little. We feed four times a day for the first five weeks. The first three weeks we use principally dry food and make them

scratch for every meal but that given at night. We feed prepared dry chick food morning and night. At ten and two o'clock we feed millet seed, pinhead oatmeal and cracked wheat. We keep them well bedded with cut clover two or three inches deep, and throw all their food in this. They also eat much of the clover. We feed very sparingly at first. Keep them hungry at all times. Much depends on keeping them at work; it assists in keeping them in good health. We keep grit and charcoal before them all the time, and fresh water is always before them. Care must be taken to keep their drinking dishes free from slime; they should be washed daily. Clean your brooder every other day if you bed with cut hay, and every day if you use sand or bran.

After three weeks, your chicks will begin to tire of this feed, then we give two meals a day of soft food composed of one part stale bread soaked in water, or better, milk, one part bran, one part hominy meal, ten per cent finely ground meat. The same mash with ten per cent good beef scraps is a grand growing food and much more easily prepared, but more expensive. We continue feeding chick feed once a day for two weeks longer, giving mash morning and night, using cracked corn and wheat once a day. If running for broilers make your mash one-half cornmeal. We run but fifty to sixty chicks in one lot, as this is enough for any single brooder if you want them to live.

After they are old enough to leave the brooder and you cannot give free range make yards twenty feet wide by one hundred feet long and put sixty to seventy-five in a flock on grass yards with plenty of shade, dividing the pullets from the cockerels. Keep them free from lice and you will have birds of fine quality for breeders.



BROOD HOUSE ON THE R. I. RED PLANT OF D. W. RICH

Note the three inside brood coops in which hens are confined, each caring for her share of 50 chicks. Note also the heavy curtain which can be pulled down in case of storms.

CHAPTER IV

THE FEEDING AND CARE OF YOUNG CHICKS

PRACTICAL, SUGGESTIONS FOR ALL WHO RAISE CHICKS EITHER BY NATURAL OR ARTIFICIAL METHODS—DRY FEED BEST BECAUSE MOST ECONOMICAL AND LABOR-
SAVING—SOME HELPFUL POINTERS ON CHICK GROWING FROM SHELL TO WEANING TIME

P. T. WOODS, M. D.



NOT all poultrymen agree on the best methods of feeding and caring for young chicks, but it is a subject that interests all growers of poultry. While, in this article, we practically confine ourselves to one method of feeding, it is only fair to state that there are many plans of chick feeding that prove successful and give entirely satisfactory results. It would be unwise, however, to incorporate too many methods in a brief article intended more especially for beginners, for fear of confusing the reader and rendering him unable to decide which course is the wisest for him to follow.

Undoubtedly the dry method of feeding, or feeding chicks on a dry grain mixture of chick food, is the easiest, safest and also most economical method of feeding small chicks for the beginner with poultry. Feeding mashies or moist dough to either young or old stock always has an element of danger, the liability of throwing the digestive organs out of condition and so ruining the chances of the flock. Skillful feeders meet with remarkable success when feeding either raw or cooked moist mashies and so-called johnnycake, but the wisest course for the beginner will be to confine himself strictly to the dry method, using a carefully prepared chick food made from sound, sweet grains. The farm wife, whose rugged little broods are usually hatched out under hens in the spring of the year when the grass is green and all things favorable for chick growing, often is successful in growing her brood on corn meal dough with an occasional feeding of bread crumbs and curds, but where this method has been attempted by others, who either do not or are unable to give the chicks the same tender care and motherly attention, the results are far from satisfactory.

Vitality Must Be Inherited

Chick rearing under what may be termed normal and natural conditions should be a comparatively easy matter, though oftentimes even the most careful managers meet unexpected reverses and serious losses. A fact often lost sight of is that everything does not depend upon the food and care. It is a matter of great importance that the chick should be well born, should be normally hatched from an egg that is out of healthy, sound, vigorous breeding stock capable of imparting an ample supply of vitality to their progeny. Vitality in the chick, meaning that it possesses vital force, the power which renders it capable of living, is the very foundation of our chick growing. To get this vitality we must begin with the breeding stock and even generations back, breeding each year from only the best, healthy, hardy and most vigorous specimens that we can obtain. This sturdy, healthy breeding stock must be kept healthy by good care and management. The vitality which they impart to the eggs must be preserved by careful treatment of the eggs while saving them for incubating purposes. It is a matter of importance that the eggs should be handled as little as possible while saving them for hatching. The

daily turning of eggs so frequently recommended by some authorities on artificial incubation is in our opinion a serious error. The less handling the eggs receive, the better. While being saved for hatching, the eggs must not be exposed for too long a time to a warm temperature or to a very cold one. The safest temperature for keeping eggs is a fairly uniform one between 40° and 60° F. Prolonged exposure of the eggs to a temperature above 70° or 80°, or frequent warming and cooling of the eggs, is almost certain to impair the vitality of the germ so that when such eggs are hatched the chicks are weaklings.

Another matter of great importance in preserving the vitality handed down by healthy breeding stock is that the eggs shall be properly incubated. Where eggs are incubated under hens there is little or no danger from this source. Where the eggs are incubated in machines there is danger from the use of poorly constructed incubators, from too great variations in temperature during hatching, from overheating the eggs or too long exposure to high temperatures above 104°, from prolonged and frequent cooling, and sometimes chilling. All of these things impair the vital force of the little chick and render it less capable of living.

The normal chick, when properly hatched from eggs that are out of sound, healthy, vigorous breeding stock, comes into the world with a strong, rugged constitution and the maximum vitality. It's natural tendency is to live and thrive, and such chicks if given a reasonably fair chance will live and thrive. Where losses do occur they are usually directly the result of careless brooding or of indigestion from indifferent feeding.

Management of Hen-Hatched Chicks

When the little brood hatched under a hen is from 36 to 48 hours old, having had ample time to dry off and to get digestion of the yolk remnant (which they have brought into the world with them) fairly started they are ready to go to their brooding quarters for their first food. The brooding quarters may be a box or barrel with a slatted front, made comfortable by littering with chaff, cut clover or similar material. In cold weather it should not be too large because of the difficulty of keeping the mother hen warm and comfortable. You do not want to oblige her to waste too much of her own heat on keeping herself warm in a large cold box. She needs all the heat she can spare for the comfort of her brood. An ordinary flour barrel, well littered and covered with canvass or some waterproof material to keep out the rain, makes an admirable home for the new brood, or packing boxes that are about 2 or 2½ feet cube prove a very satisfactory home.

For the first two or three days the little brood should be kept confined quite close to the mother hen. After this confine the hen and let the chicks run. Keep pure, fresh water in a clean drinking fountain close to the slatted front of the coop so that the hen can readily reach it. Keep a dish of cracked corn and wheat also within reach of the mother hen. Feed the little chicks a more expensive ration just out of reach of the hen mother so that the little birds will have it always before them, but the mother hen cannot reach it to

scratch it about and waste it. Where chick food costs \$2.50 per hundred pounds and over, it is much wiser to pursue this course and let the mother hen live on less expensive food. Keep the little chicks supplied with chick food, chick-size grit, granulated bone, charcoal, and pure, wholesome beef scrap always before them in a wooden or galvanized iron feed box or hopper. Protect this food from the weather by a single board roof or shelter sufficiently large to cover it and raised about one foot off the ground. We much prefer keeping food before the chicks all the time but same must be protected and kept dry, as otherwise in wet, stormy weather it will become sour or moldy and unfit to eat.

Some poultrymen use lemon, orange and cracker boxes for brood coops for confining the mother hen. These make much smaller quarters than we have recommended in a preceding paragraph, but proved very satisfactory, especially when used under shelter. Where an orange or lemon box is used one front is slatted perpendicularly with the slats just far enough for the hen to get her head out, and for the chicks to freely run in and out. The rear portion of the box retains the thin horizontal boarding with the exception of about one inch from the floor, which space is left open. The top of the box is slatted so that the hen can get her head up through to stretch herself. In such boxes the hen mothers scratch and cluck vigorously, and by their activity keep the litter and dirt moving from front to back and out of the opening in the rear, so that these brood boxes may really be termed self-cleaning.

With two mother hens confined thus close together it is necessary to keep the broods separate for several days until they become accustomed to their respective mothers, and it is advisable to have the chicks in both broods all the same color, otherwise some of the little fellows may be injured by getting into the compartment with the wrong mother hen. There is a great difference in hen mothers in this regard, some of them being always willing to add a new chick to the flock, while others are intolerant of strangers and seem bound to kill them if they can possibly do so.

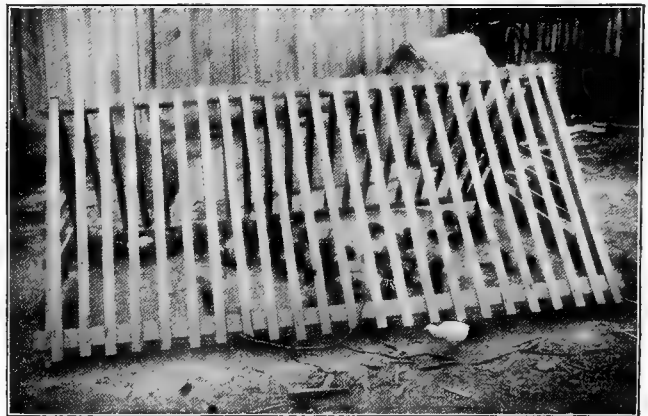
The chicks are kept in these brooding quarters until they are ready to be weaned. Where convenient to do so, the hen is given a little run with the chicks once a day, but frequently hens which are so kept in confinement for five weeks or longer, often begin to lay in the brooding boxes, so that they apparently experience no discomfort from this close confinement while mothering a brood. After the first week or ten days the chicks will begin to eat a considerable proportion of fine cracked corn and wheat, which maybe gradually substituted for the more expensive chick food. Always give them if possible a grass run, and where this cannot be had, feed cut clover or fresh green stuff daily. If cut clover is used it may be fed either dry or barely moist after scalding.

Brooder Chicks

In artificial brooding the chief requisites are to keep the chicks comfortably, warm, provide them with an abundance of pure, fresh air and give them an opportunity to exercise in quarters that are not too cramped or crowded. Not more than fifty chicks should be placed in one flock in any brooder. This we consider the maximum limit of safety. Care must be taken to keep the chicks warm and comfortable at all times. The operator should be guided more by the apparent comfort of his chicks than by the temperature as indicated by the thermometer. Run the brooder not by the thermometer but by the chicks. Keep them warm, happy and contented at all times, and see that they are always supplied with an abundance of pure, fresh air to breathe. Sun and air the brooders daily. Teach the chicks to use the space underneath the hover for the purpose of keeping warm,

and train them so that they will know the way in and out of the machine. Do not give up your efforts in this direction until you are sure that the chicks have learned what is required of them in taking care of themselves in the brooder.

Their first food should preferably be given by placing little piles of chick food and beef scrap where they can have free access to them. Afterwards keep the food before them all the time in a food box or hopper. Dry grain chick food, beef scrap, charcoal granulated bone, grit and pure water are necessary at all times. Give them chaff or cut clover to scratch in. As the chicks grow older gradually accustom them to a larger range or run, and have same on grass land if possible. At the end of the first week or ten days begin substituting fine, sifted cracked corn or corn grits and small kernels of hard, sound wheat for a portion of the dry grain chick food. Gradually increase the quantity of this grain and reduce the amount of chick food fed. If the beef scrap which you obtain is coarse, sift out the finer particles and feed these at first and feed the coarser particles of the scrap after the chicks have become large enough to eat them readily.



A Feeding Coop for Chicks

A Home-Made Chick Food

A number of years ago when commercial chick food was not as easily obtainable as it is now, we began the dry method of feeding small chicks. By good luck we were able to buy at a small cost of a junk dealer a second-hand, large-sized coffee mill such as are used in grocery stores. This mill we fitted up in our barn so that the balance wheel was at convenient height for running the mill. From the spout or outlet of the mill we ran at a sharp angle a long piece of wire mosquito netting bent into broad, shallow trough shape and tacked on a wooden frame. At the bottom of this screen we placed an ordinary wooden bushel box, and beneath the screen put an old piece of sail cloth. By adjusting the mill we were able to crush grain to a size acceptable by newly hatched chicks. The hopper not being large enough to suit our convenience, we built a box-like arrangement above the hopper and fitted into same a box-like addition that would hold about half a bushel of grain. Into this we fed a mixture of one-half (by measure) whole corn; one-fourth whole wheat; one-eighth hulled oats; one-eighth barley with the hulls on. These whole grains were thoroughly mixed together before feeding into the hopper. By the exercise of a little muscle or "elbow grease" we were able to get a very acceptable chick food by grinding this grain mixture. The meal sifted through the mosquito netting screen into the sailcloth and all the coarser particles of the cracked grain ran down the screen into the bushel box at the bottom. The flour or meal was used in soft mashies fed to the breeding

and laying stock, as at that time we were feeding mash several days a week.

The first season we used this home-made chick food our little flock did so well that soon some of our neighbors began making inquiries as to the cause, with the result that thereafter we were not obliged to do our own grinding. For the privilege of using our mill to grind their own chick food, the neighbors ground ours for us. Perhaps some of our readers who find it difficult to obtain good, clean, bright and new commercial chick food, will find our old-time home-made substitute a valuable one for feeding their little flocks.

Other Chick Foods

As a rule the beginner will find that it pays best to buy a good commercial chick food rather than to attempt to manufacture his own. Generally, manufacturers who produce chick food in large quantities are able to buy a much better grade of grain, and by means of perfected milling apparatus are able to turn out a cleaner and much more wholesome article than that which is prepared on the home plant.

A first class chick food should be free from all mustiness or stale odors. It should be clean and entirely free from dust. It should present a clean, bright, wholesome appearance, and on holding a sample to the nose you should not be able to detect any musty or moldy odor. Many samples of commercial chick food that we have seen contain altogether too much millet. An excess of millet is undesirable and is

a little at first until they become accustomed to this raw vegetable food, then in a few days give them all that they will clean up daily. Raw vegetable food or green stuff of some sort is absolutely necessary to properly balance the supply of dry grain and beef scrap, which is kept always before the little chicks.

In addition to the green stuff or vegetables it is well to supply some supplementary food to stimulate the appetite and prevent the chicks from getting off their feed. For such purpose there is nothing better than thoroughly cooked wheat or cracked rice. Cracked rice of good quality can usually be had cheaply. Wheat used for this purpose should be sound, clean, and of the best quality obtainable. The grain should be boiled thoroughly, first seasoning the water lightly with salt. Boil until the grains are very soft and almost all of the water has been evaporated. Do not stir any more than is absolutely necessary while cooking, as it is desired to have the grains remain as nearly whole as possible. This cooked food should be allowed to thoroughly cool before feeding. When ready to feed remove the amount you intend to give the flock and sprinkle over it a little raw bone meal. Give as much of this food as the chicks will clean up in from fifteen to twenty minutes. Feed on clean boards and spread out sufficiently to give all chicks free access to it without the necessity of tramping all over the food. Feed this supplementary food two or three times a week.

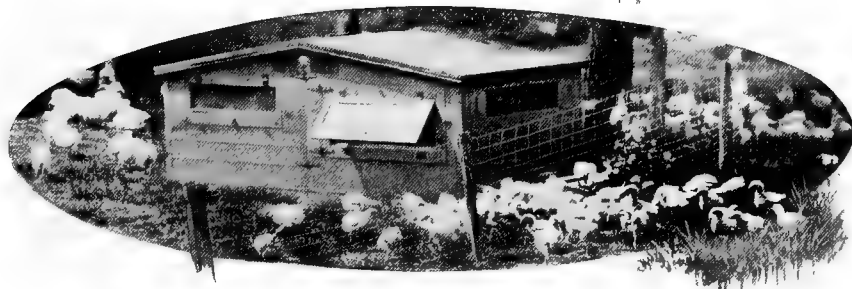
From the time the chicks are a few days old until they are three weeks old, as a supplementary ration it will often be beneficial to feed thoroughly hard boiled infertile eggs that have been tested out from the incubator. These may be given two or three times a week, gradually reducing the frequency of feeding as the chicks become older. We simply cut the hard boiled egg in halves and let the little chicks have it to pick at shell and all, or the egg may be crushed and fed on the feed-board if desired. For chicks three or four days old one egg to each twenty-five chicks is sufficient. After that give them at one feed what they will clean up eagerly in from fifteen to twenty minutes.

Do not forget that it is necessary to keep pure, fresh water before the chicks all the time, and keep the drinking vessels clean. Filthy drinking water will quickly get the little birds out of condition.

Give your flock plenty of wholesome food. You cannot grow them successfully on a starvation diet, and there is practically no danger when feeding dry food of overfeeding healthy, vigorous growing chicks. Be sure to supplement their dry grain with variety food of some sort, as advised above, to stimulate their appetites and keep them in good condition.

Weaning the Chicks

Begin early to wean the chicks from chick food, usually not later than the 10th day or the end of the second week. With chicks that are fed on prepared chick food begin to give a little sifted fine cracked corn or corn grits, and a little small hard red wheat, to take the place of a portion of the chick food. Gradually increase the proportions of cracked corn and wheat and decrease the quantity of chick food as the little birds become accustomed to the new ration until you are feeding them almost exclusively on cracked corn, whole wheat, beef scrap and the usual allowance of vegetable food or green stuff, with an occasional feeding of cooked grain or rice. Feed the cooked food less often as the chicks



BROODER AND WHITE PLYMOUTH ROCK CHICKS ON THE FARM OF U. R. FISHEL

On the farm where this view was taken thousands of White Plymouth Rock chicks are hatched in incubators from early in January until June. They are reared in brooding houses with adaptable hovers afterward being removed to out-of-door brooders similar to this one later going into the fields where they occupy colony coops until they are finally moved to winter quarters.—F. L. Sewell.

liable to cause digestive disturbance in the little chicks. In post mortem examinations of hundreds of little chicks fed on dry grain chick food, those that died of indigestion almost invariably showed considerable quantities of undigested millet seed in their little crops and gizzards.

An excellent chick food can be made from the following formula: Sifted corn grits or fine cracked corn with the meal and coarser particles sifted out (use only the best, hard, yellow corn), 50 lbs.; cracked or steel cut amber or red wheat (the best, hard, sound grain obtainable), 30 lbs.; cracked barley with hulls sifted out, 10 lbs.; steel cut oats or C grade oat meal, 8 lbs.; golden millet, 1 lb.; granulated raw bone, 1 lb.

Supplementary Foods and Green Food

In addition to the dry grain food and beef scrap kept always before the chicks, they require some supplementary food for variety and to keep their digestive organs in good working order. Where a liberal grass range can be obtained the supply of vegetable food is close at hand prepared by nature, and it is not necessary to give anything in the vegetable line in addition to the fresh green grass easily obtainable by the chicks. Where chicks are confined we advise beginning on the second day to feed raw potatoes or raw beets cut in large pieces for the chicks to pick at. Give only

grow older until you feed it only about once a week.

The simple methods herein outlined can be depended

upon to give satisfactory results, provided the chicks are given reasonably good care and are kept comfortably warm.



ROSE COMB WHITE LEGHORNS

Part of a flock of Rose Comb White Leghorn Chicks. Early April hatched Leghorn chicks will be nearly grown by July and August and appear at three to four months as in the above picture. Many White Leghorn farms supply ten to twelve weeks old chicks to the highest priced trade for choice broilers.—F. L. SEWELL.

FEEDING YOUNG CHICKS

IT IS MANAGEMENT FROM FIRST TO LAST THAT COUNTS MORE THAN THE PARTICULAR FEED USED

H. J. BLANCHARD

SUCCESSFUL feeding of young chicks is not the intricate problem some poultry writers would have us believe.

It is wonderful only in its simplicity. Almost any sweet, clean, dry feed given them very sparingly, five or six times daily for the first ten days and then four times until the chicks are six or eight weeks old, is all they require in the way of food. Clean water and sharp grit should be before them from the first, but not very cold water for the first two weeks. We feed nothing the first two days, then give water and a little sharp grit and a very little dry bread crumbs or any good wholesome food.

Last season we raised some broods of our best chicks on dry ground grains—dry mash—from the first, and they are still eating it. After they were about eight weeks old we began feeding them wheat and cracked corn once a day in connection with the dry mash.

We fed this dry mash in open troughs, but now that these chicks are well-grown this dry mash is put in self-feeding hoppers so arranged that they can be closed at will.

We believe it is best to close the hoppers at night and in the morning feed a light ration of whole mixed grains

scattered in litter on the floor. Then water the birds and feed mangel wurzels cut in halves and placed on the floor. About noon another light ration of whole mixed grains is scattered in the litter and the dry mash hoppers thrown open, from which they eat at will until night.

With our houses well ventilated day and night and therefore dry, our birds are healthy, active and vigorous. In connection with our well known straw loft system of ventilation, we now use muslin covered frames that are the same size as the sliding windows, one or two to each room according to its size. At night these muslin covered frames are drawn over the openings in place of the glass windows which slide back out of the way, and on mild nights a crack is left in the openings also. In the morning the muslin frames are pushed back and the glass windows drawn over the openings to let in the light and sunshine, and unless very cold the windows are left open more or less, according to the weather.

After all, it is management from first to last that counts more than what particular feed we use.

CARE AND FEEDING OF CHICKS

PRACTICAL ADVICE ON CARE AND MANAGEMENT OF YOUNG CHICKENS IN MAY, JUNE AND JULY—HATCHING AND REARING WITH HENS—FOOD AND FEEDING—BROOD COOPS. RUNS AND SHELTERS—IMPORTANCE OF SHADE IN HOT WEATHER—GREEN FOOD— PREVENTING LOSSES FROM CATS, ETC.

P. T. WOODS, M. D.

IN CLIMATES where the apple trees do not bloom until late in May chicks may be hatched as late as July first with the chances good for successful rearing. It is a good plan to stop hatching for the summer within a month or six weeks after apple blossom time as chicks brought out in extreme hot weather are always difficult to rear. Chickens that do not get a fair start before the advent of the blackberry season are seldom worth having. Hatching may be safely begun again after the close of dog days. Some poultrymen are successful in hatching the year 'round, but unless there is a cool, shady orchard available for use during the hot season it is wiser not to try to hatch summer chicks.

Nest Boxes and Sitting Hens

Broody hens are generally plentiful in May and it is a good time to make use of them. Breeding birds which you intend to hold over another season will go through the summer in better shape if permitted to hatch and rear a brood. Although the care of sitting hens is a very simple matter, some poultrymen appear to have difficulty in getting good results. On page 16 appears a description of nest boxes and how to set a hen.

Keep sitting hens confined on the nest and allow off for food, water and exercise at a regular hour once each day. Let off two, four or six at one time and watch them to prevent fights and to see that they return to the proper nests. Provide a box of moist sandy loam for a dust bath, plenty of pure fresh water and a supply of whole and cracked corn, grit and shell where hens can have access to it when off the nest. Chicks will be due in twenty-one days after eggs are set and on eighteenth day the hen should have another dusting with insect powder to insure freedom from lice. Let the hen alone at hatching time. If infertile eggs and dead germs have been removed the chicks will have room enough in the nest. Those who use incubators for hatching will find less labor in handling a large number of eggs than where "natural methods" are employed, but they should always be sure to learn and follow the manufacturer's directions supplied with the machines. There is ample time for two good

incubator hatches before hot weather and at this season the eggs generally hatch well.

Brooding Coops and Brooding Hens

Any good sized packing box can be converted into a satisfactory brood coop and a fair sized wooden cracker box makes a good brood box when provided with a slat front. Fig. 1 (on this page) is diagram showing front view of

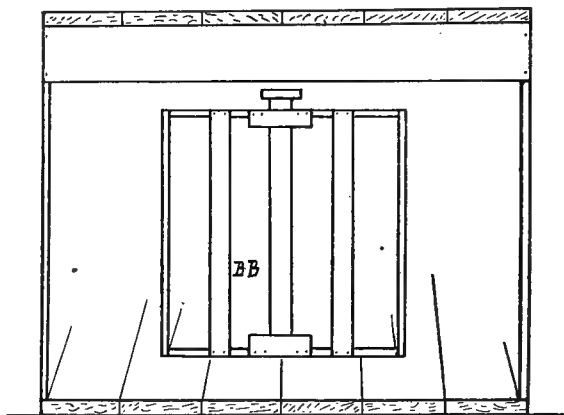


Fig. 1—Diagram view of front of Brood-coop with front of brood box shown sitting on floor inside. Brood coop is 3ft. x 3ft., 2ft. 6 in. high in front and 22 in. high in rear. It is shed roofed. Brood-box has slat front as shown and is 18in. wide by 18 in. high by 22 in. deep. Center slat is removable to admit hen. "BB" is Brood-box.

an excellent brood coop containing a brood box. The hen mother is confined in "brood box" and chicks have the run of the coop.

Fig. 2 (on this page) shows side section view of brood coop and box with front of coop used as an awning. "A" is lower half of hinged front of coop and is made of wire netting (fine mesh) stretched on a light wooden frame. "AA" is upper half of hinged front and is made of muslin stretched on wooden frame. This front is hooked or hinged to board at top of brood coop and can be lowered at night to close brood coop, confine chicks and keep out marauding vermin. If muslin is also protected by wire screen it gives a rat-proof coop. "S" is stake or support used to hold up hinged front. "BB" is brood box in which hen mother is confined.

Usual dimensions of brood coop are 3ft. wide by 3 ft. deep by 2 ft. 6 in. high in front and 22 in. high in rear. Make it with tight board floor and a tight shed roof. Brood box used in coop may be made 18 inches wide by 18 in. high by 22 in. deep and should have a slatted front. One slat should be removable and slats should be about three inches apart, just enough to confine the hen and give the chicks free passage in and out.

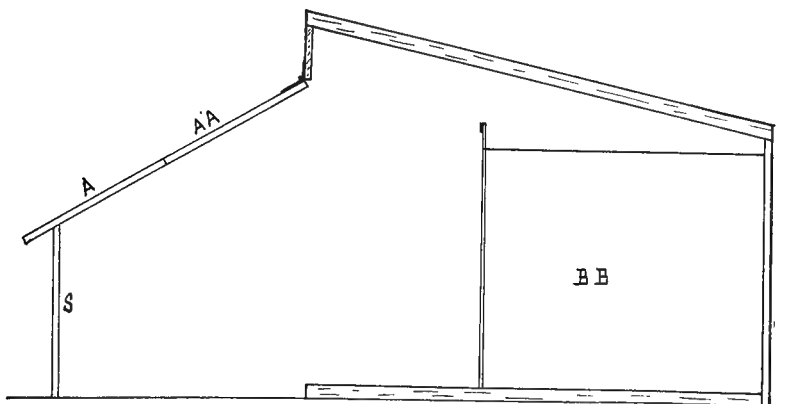


Fig. 2—Side View Diagram Plan of Brood-Coop and Brood Box. Dimensions given in article. "A" Lower half of hinged front to brood-coop, it is made of fine mesh wire netting on wooden frame. "AA" Upper half of hinged front; it is made of fine mesh wire netting covered with muslin on wooden frame. "S" stake or support used to hold up hinged front when same is used as shelter or awning. "BB" Brood Box.

Locate these brood coops on grass land or in the orchard. Keep the hens confined and let the chicks have the run of the coop for the first week, then begin to give them an outdoor run, gradually increasing the range as they become used to it. They can have free range by the time they are two weeks old. If wire enclosed runs are used to protect chicks from cats change coops to new ground frequently or keep earth well scraped and spaded.

Brooders of the outdoor pattern with chick shelters attached make ideal homes for flocks of twenty-five to fifty incubator chicks particularly where space is limited and where there is danger from cats or other four-footed pests.

Care of Newly Hatched Chicks

Newly hatched chicks need rest and warmth for the first thirty-six hours after hatching. They need time to begin digestion of the egg yolk remnant which was taken into the body just prior to hatching and they do not need other food. Clean out the egg shells and dead eggs and then let the little fellows alone, taking care that they do not fall out of the nest; a strip of burlap will keep them in.

When thirty-six hours old they are ready for their first food which for hen hatched chicks should be given in the brood coop. Litter the brood box well with hay or straw, mow chaff or cut clover and place it in the brood coop. Keep the hen confined and supply just outside of the slatted front a little heap of commercial chick food and a box containing ground grain mixture made as follows: Equal parts by measure best wheat bran, corn meal, leaves sifted from cut clover and fancy wheat middlings; to each ten pounds of this ground grain mixture add one-half pound of best fine-ground beef scrap. Be sure that beef scrap is pure and sweet. Cheap or poor beef scrap is dangerous and may cause losses. If not sure of the scrap omit it and feed instead, two or three times a week, a little fresh beef scraped from sweet, clean shin or chuck. Supply sand or other grit, granulated bone, charcoal and pure fresh water just outside of brood box where hen and chicks can have free access to them.

After the third day keep a supply of chick food just out of reach of the hen mother and supply her with cracked corn and a little wheat. There is no need to feed the hen on the more expensive chick food. The dry mash should be kept where they can have access to it at all hours of the day, but the chick food may be given in regular feedings four times daily if desired. A supply of pure fresh water in a clean galvanized iron drinking fountain is of the greatest importance. Begin by the close of the third week to substitute cracked corn and small wheat for a part of the chick food. The close confinement in brood box will not hurt the hen

mother and often she will begin to lay within two weeks after she is put out with her brood. She will usually wean her brood by the time they are five to seven weeks old. If the



Outdoor Brooder with Chick shelter attached in use on lawn at Dr. Woods' Home.

nights are cold they may be allowed to use the brood box for a bed room until they are well feathered, it saves them from dangers of chilling at this time. When they are well feathered remove the brood box and let them occupy the brood coop until ready to roost. Clean the coops and boxes often and renew the litter. In warm weather sand will serve for bedding material. Dust hen and chicks with Persian insect powder when flock is ten days old.

Brooder Chicks

Brooder chicks require a little more care at first than flocks with hens but after they learn to care for themselves they thrive as well or better than "natural" broods and become wonderfully independent little fellows well able to look out for themselves if given a fair chance. We like individual out-door brooders with chick shelters attached and on a grass lot they are easy to care for. Flocks of from twenty-five to fifty chicks yield best results; it is never wise to put more than fifty chicks in any brooder.

The brooder should be warmed to 90 degrees under the hover and waiting for the chicks, having been run long enough to get warmed throughout and regulating properly. Litter the floor well with cut clover and a little chick size grit or clean sand. Place a little pile of dry mash and commercial chick food side by side in the litter in hover apartment and provide a galvanized iron fountain containing pure fresh water. Place chicks in brooder when twenty-four to thirty-six hours old in time to have their first meal before dark in the afternoon.

Keep the hover space always warm enough to have the chicks comfortable at all times. Always be guided more by the comfort of the chicks than by the temperature as indicated by the thermometer. Remember that brooder chicks only know what you teach them and exercise a little patience in teaching these motherless little fellows how to use the hover to warm up, and how to find food and water. Keep them confined to hover apartment for first two days, then teach them to go back and forth to exercise room. By the time they are a week old get them outside brooder for an outdoor run and get them gradually accustomed to more run until they have freedom of chick shelter and know enough to go back and forth. Don't let them huddle in sunny places or anywhere in corners of brooder or run, drive them under the hover to warm up. Clean brooder frequently and change run to fresh, clean ground often. Remove hover



How canvas and awning cloth combined with "A" coops will supply shade and shelter.

often to sun and air brooding apartment. Dry mash used for brooder chicks should be same as recommended for hen chicks and may be kept before them all the time. After second week the heat of brooder can usually be gradually reduced. Read and follow manufacturers' directions. According to season chicks can generally be weaned when six to eight weeks old but if weather is cold it is best to supply heat at night until they are well feathered.

Feeding Growing Chicks

Chicks three weeks old, whether brooded by hen or artificially, will take about the same ration. It is well to keep before them all the time a dry mash like that advised under heading "Care of Newly Hatched Chicks" and they may have this mash until full grown.

For first three weeks supplement their chick food ration with feedings of boiled cracked rice or wheat. This should be thoroughly cooked until soft and almost dry and should be lightly seasoned with salt while cooking. They should also have raw potato cut in chunks for them to pick at. Fresh green food, cut cabbage, grass, clover, grain sprouts, etc., should be supplied freely every day after the first few days until they are grown. Plenty of green food is necessary and heavy grain feeding cannot be safely conducted without it. Unless chicks have run where they can get plenty of grass, green food must be supplied regularly.

Keep the dry mash, grit, granulated raw bone (dry), granulated charcoal and pure water always before them, in covered food troughs or hoppers. Supply the food and water in a shady place. Change water often in hot weather. When chicks are three weeks old begin to replace a part of the chick food with cracked corn and small wheat. Increase the amount of grain so fed until by the time they are two months old the chick food has been discontinued. At this age they should be fed three times daily until maturity and allowed liberal range. They can have the same ration as the laying hens from now on and an excellent dry mash for chicks eight weeks old and older may be made as follows:

Coarse wheat bran.....	200 pounds
Fancy wheat middlings.....	100 pounds
Best dry cut clover.....	200 pounds
Yellow gluten feed.....	100 pounds
Yellow corn meal.....	100 pounds
Linseed meal (old process).....	50 pounds
Best fine-ground beef scrap.....	100 pounds

Directions: Dump all of above on clean board floor and thoroughly mix with scoop shovel. Keep in sacks or bins and feed in food hopper to growing stock or laying hens. Fig. 3, (on next page) shows a simple and convenient covered food trough for feeding dry mash or other food to growing chicks. Dimensions may be made to suit available lumber. Trough proper should be made by nailing together a 3 in. and 4 in. strip.

Importance of Shade

While sunshine in wholesome quantities is good for chickens of all ages some provision must be made to supply shade in hot weather to prevent losses from sunstroke. Berry bushes supply admirable shade. Grow-

ing corn or other grain gives grateful shelter in hot, sunny weather. Canvas and board shelters should be supplied when stock cannot have shelter or bushes, shrubbery, trees or growing grain. An orchard makes an ideal summer run for growing chicks.

Canvas or awning cloth tents or shelters stretched over common slatted "A" coops afford excellent shelter in exposed locations and can be easily arranged (illustration page 47). Even weeds may be made to serve for shelter from the hot sun. Whatever you do don't fail to provide shade of some sort.

When the chicks begin to show a disposition to go to roost at night provide open-front roosting coops made from packing boxes, piano boxes or supply the portable coops which may be obtained of any poultry supply depot. Don't be afraid that roosting young will cause crooked breasts. Crooked breast bones are the result of faulty nutrition and insufficient mineral food and not of early roosting. Supply plenty of green food and an abundance of dry granulated raw bone, (oyster shells also after the first month) and you need not fear crooked breasts. Proper food, green food and plenty of mineral food in shape of bone and shell will also prevent leg weakness.

Hawks, Neighbors' Cats and Other Vermin

Hawks and crows often make life a burden to the poultryman in chick time where the growing chicks range. It is a good plan to erect poles about the chicken range and run wire or strong twine zig-zag from these, high enough to allow head room. From these lines suspend at frequent intervals strips of white and colored cloth, bright bits of tin and pieces of bright glass. This is the most effective crow and hawk scare we know of and it is well worth the expense and labor. Crows often become so bold that no other scare-crow will keep them from stealing young chicks. If bits of bright tin and glass are so hung that they will strike and jingle in the breeze the "scare" will be still more effective.

Hawks generally come at a regular hour every day and may be watched for or followed to their nests and killed with their broods. They can also be trapped by setting steel traps on tops of high poles on which they alight. Crows are so uncertain and crafty that they will often steal chicks before your eyes and get away.

Chicken-stealing cats (the neighbors' pets) are often a prolific source of trouble. If warning the neighbor does not keep the cat at home, keeping the cat away from your chicks, you are justified in shooting or killing that cat in any way you can. In congested settled districts shooting is dangerous and forbidden by ordinances and your angry neighbor may cause you trouble by complaint that the shooting breaks town law on account of the nearness to buildings, so don't be in a hurry to use a gun. There is an easier and more quiet way.

A good strong box-trap, big enough to catch a big cat, baited with a bag of catnip tied to the spindle, if set in the chicken yard, will soon catch the chicken thief. The trap should have a "V" shaped opening in one side large enough to let the cat put its head out and this



Flock of ten weeks old White Wyandottes feeding in front of packing box colony house.

should be covered with a stout slide. When you catch the thief raise the slide and as soon as head pops out push slide down and hold it fast, a sharp blow with an axe or hardwood billy will quietly put an end to the thief and he can be planted to enrich the grape vine while you are sure that no more chicks go that way. We knew one cat to take forty chicks in one day, then the box trap was used and the losses ceased.

Where there is plenty of yard room combination fencing will protect against cats and also give the chicks a good run. Use one roll of one-inch mesh chick wire 18 inches high to stake out a circular corral or enclosure for chicks. Outside this fence stake up with thin plastering lath a flimsy fence of one roll of two-inch mesh wire netting two to three feet outside of low netting. Stake loosely by weaving lath in netting and driving into earth on alternate sides of wire. Use enough lath to hold fence erect but not to make it stiff. This gives a wire fence too high to jump and with no posts that can be climbed, for the lath is too flimsy and will bend when cat tries it. Fence is moved when necessary. We have used this successfully but some cats will dig under and must be trapped.

Rats cause losses and will frequently kill and hide a large number of chicks in a single night. Make the coops rat proof. Raise coops and boxes often and kill any rats found underneath. A good rat dog is a great help. Traps are seldom effective and poison is not safe in chicken time.

Lice and mites are best fought by free use of a good insect powder. Dust hen and chicks whenever lice are found. Keep the coops clean. If mites get into woodwork use a strong creolin solution to wash the woodwork and get it well into cracks. Kerosene may be applied to coops and boxes to kill mites but if used the coops must be well sunned and dried before the chicks are again allowed to use them.

Diarrhoea and the Remedy

Pure food, plenty of green food, pure water in clean vessels, cleanliness and clean runs with comfortable quarters are with fresh air and sunshine the best disease preventives for young chicks. With common sense management if you

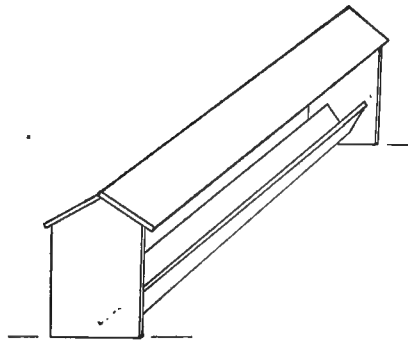


Fig. 3—Covered food trough for young chicks

provide the foregoing you need not fear disease. In hot weather diarrhoea may put in an appearance, but by prompt measures it may be quickly checked. Usually sour food, sour runs or filthy drinking water or indigestion from careless feeding is the starting point of the trouble. Remove the cause or avoid it by good management and the trouble will no longer worry you. Plenty of charcoal is one of the best preventives.

Hot days and cold nights may start up diarrhoea when all ordinary precautions seem to have been taken.

Look around for the cause and remove it if you can find it. Get the flock on to fresh, clean ground. Scald the drinking fountains. Be sure that the drinking water is fresh and pure. If in doubt look up the source. It won't do to give drinking water fouled with the wash of a barn yard or chicken runs. Don't allow the stock to drink from filthy surface puddles. Be sure that they have shady shelters in which to get away from the glare of the hot summer sun.

If charcoal and the addition of middlings to mash food won't stop the diarrhoea, try five drops of creolin in a pint of drinking water. If that fails withhold all food. Inspect the beef scrap used. It may be the cause of the trouble. Boil a little white flour for four or five hours. Use this to thicken some scalded milk until same is thickness of thin cream. Give this to chicks to drink and allow no other food for twenty-four hours. Return to regular ration gradually and do not feed beef scrap for one week. Flour thickened milk should be lightly seasoned with salt, nutmeg and ginger. Should trouble persist after trying home remedy call in an experienced poultryman to help locate the trouble and advise you.

Sore eyes and slight colds may be prevented by housing stock in fresh-air quarters and keeping coops clean and free from dust. The use of air-slaked lime on floors of coops is dangerous and should not be practiced; it is liable to cause catarrhal troubles through the inhalation of the irritating dust.

Vaseline rubbed into cleft in roof of mouth and under lids of eyes will stop catarrhal colds if taken in time. The cause must be sought, found and removed. Overcrowding in close coops is a common cause of trouble.

CARE OF YOUNG POULTRY

ONE SHOULD NEITHER OVERFEED NOR STARVE GROWING CHICKS—
CORN IS GOOD FOOD IF PROPERLY FED—ONLY ONE GENERAL RULE

MRS. B. F. HISLOP

IN CARING for young growing chicks, many persons overfeed, giving them an unbalanced ration, while others actually starve the growing birds. If the chicks are permitted free range on the farm, one need not go to the expense or bother of supplying them with all the extras, such as meat meal, vegetables, etc., as the city or town breeder must do. The farmer's wife only needs to see that the growing birds have good water, grit and shelter, though they should be fed three times a day while young with some good chick food mash mixed with sweet milk, which with the insects they pick up supply meat enough for them.

One can easily mix suitable chick feed at home, if he wishes, using equal or nearly equal parts of corn meal and middlings, with a small per cent of bran. Mix this with sweet milk, or even with sour milk if it is not too stale, though

we prefer sweet milk. This food will furnish the chicks with all the elements needed for their growth. As they grow older, of course, they should be supplied with some coarser grain. There has been so much said, condemning corn as a chick food, that we have been almost afraid to feed it, but every farmer's wife (they are the ones who supply the chicken meat) knows that corn is all right and that it is the grain that puts the meat on the chickens. Of course no one would expect to feed corn exclusively, but it is our opinion that more chicks have died on account of the lack of corn than from too much of it where it was fed to them in right proportions.

Vary the Food

There is no one food that is so good that it can be fed exclusively. Growing chicks permitted to range with the

mother hen can do well with the food that would not be adapted to the needs of the brooder chick. Remember in the latter case the breeder must assume the care usually given by the hen. We have reared brooder chicks successfully, but for the past two years have rather fallen back on biddy.

After the Fourth of July all our chicks are fed but twice a day, night and morning, because as the weather is warm they do not require food so often. Brooder chicks require

food four or five times a day when small, a little at a time, and some dry food should be thrown in the scratching litter to keep them busy. The chick that is out with its mother gets enough exercise running after her.

In the case of young or old stock one must use his good judgment as there is no cut and dried rule for raising birds, because they have different environment. There is one general rule that everyone should follow and that is to keep the birds free from lice. If you do not, they cannot thrive.

MORE ABOUT THE FEEDING PROBLEM

SUCCESSFUL HOPPER RATION HALF A CENTURY OLD—SOME CRITICISMS ANSWERED—OPINIONS BASED ON NEARLY THIRTY YEARS OF OBSERVATION, INVESTIGATION AND EXPERIMENTS IN THE FIELD OF POULTRY WORK—MUCH ABUSED CORN THE LEADING STAPLE GRAIN FOOD AND ONE THAT POULTRYMEN COULD LEAST AFFORD TO DO WITHOUT IN THE RATION

P. T. WOODS, M. D.

FROM time to time during the past twenty years we have written many articles concerning the feeding of poultry, giving the result of our observation of the experience of others as well as our own practical experiments along this line. In a recent issue of a poultry journal we find an article on "The Feeding Problem" by Mr. Alvin L. Dudley of South Lincoln, Mass. Apparently Mr. Dudley has been reading one of our numerous articles on poultry feeding, we haven't the slightest idea which one; and he finds our suggestions "so singular" and "out of the ordinary" that he feels compelled to discuss the matter at length. We are glad to find that he has discovered a difference of opinion existing between us, particularly as it has resulted in inspiring his excellent and interesting article. His chief objection to recommendations made by us appears to be that he does not believe that a hopper-fed ration consisting largely of

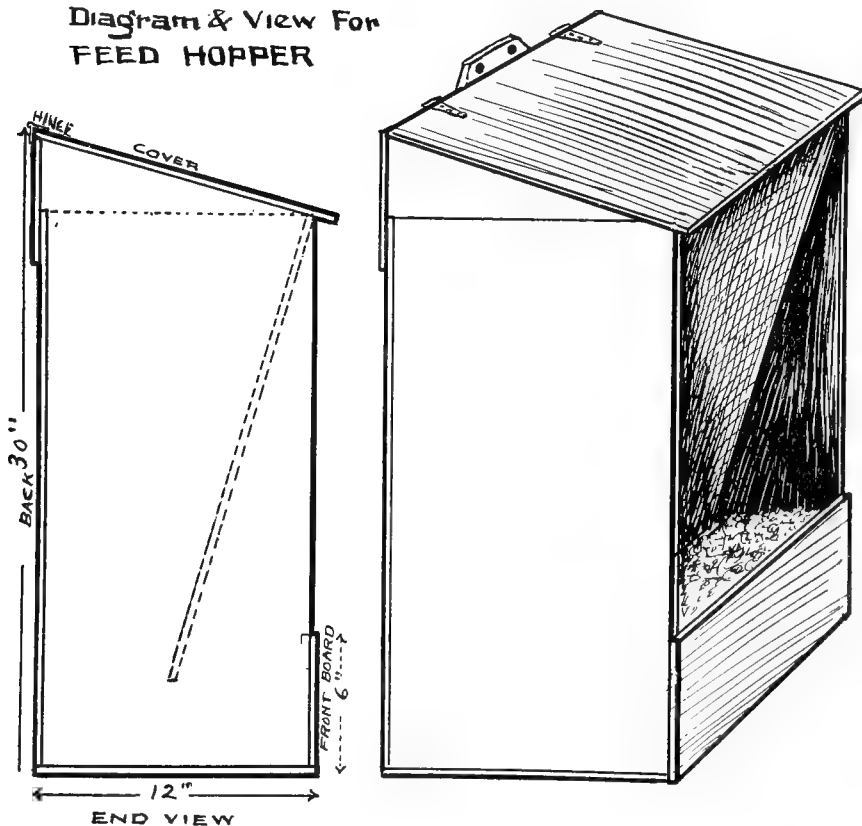
corn, either cracked or whole, is either safe or satisfactory in feeding fowls of the American and Asiatic varieties. Well, that is an honest difference of opinion at most. It isn't serious and if he will view a larger and broader field of poultry work throughout the country we feel sure that he will find that Indian corn (maize) is a good, safe, honest food, the first and foremost staple poultry food, and the grain that poultrymen all over this broad land could least afford to do without.

He says in part that: "Throughout the section wherein the writer lives and among the poultry keepers of his acquaintance, a diet of two-thirds corn and one-third wheat or oats fed ad libitum from a hopper has not given satisfactory results." We cannot agree with him here either for we find corn freely and heavily fed both by hopper and in litter on a great number of successful practical poultry plants in eastern Massachusetts. These plants carry American and Asiatic breeds almost exclusively. Of all varieties the Barred Plymouth Rock is the most susceptible to laying on internal fat or fat about the viscera. In many cases they will not stand more than one season of heavy feeding or forcing on any ration. Notwithstanding this, many Barred Rocks, and grade flocks of the variety, are to be found that are doing good work on a heavy corn ration, box or hopper fed.

Further, if Mr. Dudley is correct in his statement that poultrymen of his acquaintance in his section have not found this hopper-fed diet satisfactory, we do not see how it is that he finds our recommendation of this ration "so singular" and "out of the ordinary." The two statements conflict. If the ration as recommended is "out of the ordinary," then certainly he and his friends, being unfamiliar with it, can scarcely have tested the ration.

Mr. Dudley also says: "Another thing the Doctor seems to consider that wheat and oats each fills a similar place in the ration and if one is left out and the other substituted the average results would be the same. Now, we haven't found it so, and don't

Diagram & View For
FEED HOPPER



MR. ALVIN L. DUDLEY'S, FOOD HOOPER

believe that many poultry keepers have. Further than that we don't believe corn, wheat and beef scraps, or corn, oats and beef scraps form a properly balanced and satisfactory entire ration for laying, breeding stock (green stuff in addition being included, of course). We have found that we obtained a much more satisfactory egg yield and better general conditions on a much wider ration, including among the grains barley, buckwheat, kaffir corn and sunflower seed, in varying quantities according to season and price, in addition to the corn, wheat and oats diet mentioned by the Doctor."

We are inclined to believe and also regret that Mr. Dudley has not read our writings on feeding poultry with much care. In the first place, we have repeatedly stated that there are many satisfactory rations for feeding poultry, almost as many as there are poultry feeders. So far as we know there is no one best ration. The corn, wheat and oats mixture recommended by us in several articles, and from time to time for a number of years in answers to correspondents, was not original with us and is a ration that has been used by practical poultry keepers in New England for more than half a century with entirely satisfactory results so far as the production of market poultry and eggs is concerned. It has stood the test of time, and practical men would not continue to use it if it did not give good results. Being old in use and in publicity, it surely is neither "so singular" or "out of the ordinary."

To the best of our knowledge and belief we have never recommended this two and three-grain mixture to the exclusion of all other grains, with the possible exception of some answer to a correspondent where it was advised as a change or substitute ration where elaborate mixtures had caused trouble. In almost every instance we believe we have stated that we recommend for variety, adding to the ration from time to time, such other grains and seeds as may be available at a fair and economical price, including among these barley, buckwheat, kaffir corn and sunflower seed, which are mentioned by Mr. Dudley.

Corn, Wheat and Oats the Leading Staple Feeding Grains

In considering feeding problems and writing on the subject of poultry feeding we must take a broader view of the subject than that which applies only to one small section of this vast country. Our readers are located all over the world, and even in our own great United States the conditions vary widely in different parts of the country. With the exception of some of the northern-most sections, corn is the most generally used and the most easily obtainable grain at a fair price. Wheat and oats are also generally available. Other grains and seeds are some times difficult to obtain at a price which will permit using them for poultry food. We think all authorities on the subject of feeding poultry will agree that corn, wheat and oats are, as we have frequently stated, the three leading staple grains for poultry feeding.

We do not know what our critic found in any writing of ours to lead him to believe that we consider that wheat and oats take practically the same place in the fowl's diet. We are quite familiar with the chemical composition of the several feeding grains, but do not believe that it is necessary for the poultry keeper to concern himself to any extent with chemical

analyses of foodstuffs or with scientifically balanced rations. The more he dallies with so-called scientifically balanced foods the more liable he is to go astray. The many analyses made by the United States government have shown that various samples of the same kind of grain vary considerably in their chemical make-up, in all probability dependent upon the character of the soil in which the grain was grown, the season and the climate. With the fact known that there is such a wide variation in the chemical composition of grains, we can only base our estimates upon the average chemical content as estimated from the many analyses made. One of the leading writers on poultry topics told us some time ago that he wished he had left out of one of his books the chapter on analyses of food stuffs and science in poultry feeding, particularly that part pertaining to so-called scientifically balanced rations. He did not believe that it had done any good to publish it and did believe that the element of mystery connected with the "scientific balance" had tempted many would-be scientific feeders into deep water where, failing to realize that they were beyond their depth, they made a decided failure of their poultry feeding experiments. No



Growing crops in small poultry yards to provide shade and green food, and to purify the soil is good practice. Note the luxuriant growth of corn shown in the above illustration.

truer words were ever spoken than the old familiar quotation, "A little knowledge is a dangerous thing;" also "Fools rush in where angels fear to tread." It is a good deal better for the average poultry keeper to leave "scientific" poultry keeping and the "scientific balance" of rations entirely in the hands of the capable investigators in our government experiment stations, and to give themselves no further concern in the "science" of poultry keeping than to supply their fowls with good, sound, wholesome grain in variety; a liberal supply of succulent green food and vegetable matter; good, pure beef scrap and the usual supply of pure water, chacoal, grit and shell. With regard to wheat and oats, both of these grains contain very nearly the same percentage of protein or nitrogenous matter, so far as these elements are concerned undoubtedly they may be satisfactorily substituted for one another, but oats contain considerably less non-nitrogenous matter and much more fibre than wheat, while the fat content of oats is more than double that of wheat. So far as practical feeding and my recommendations for the substitution of these grains one for the other are concerned, I did not advise using them interchangeably on account of their chemical characteristics. They were recommended to be fed interchangeably or together for the sake of varying

the monotony of a heavy corn ration and to give a wider range of food material.

We do not know whether or not Mr. Dudley has made any extensive investigations throughout the poultry keeping section of New England, but it is apparent from his statement that he has not visited many of the plants supplying the larger portion of the best table poultry and best table eggs to Boston, Providence and New York markets. These practical plants feed corn, cracked corn, oats and beef scraps very heavily, and feed a comparatively small amount of wheat, chiefly on account of the high price of good, sound feeding wheat. Some of the plants we have visited feed wheat screenings heavily when they can be obtained at a sufficiently low price, but in the main throughout New England (and this is true of the larger part of the United States also), yellow corn has been and still is the leading staple grain for feeding layers and market poultry. If we were obliged to confine ourselves to one grain we would take good, sound yellow corn. Fortunately this state of things has never been forced upon us.

The conditions of the grain market in New England vary greatly in different towns, even at a short distance removed from one another. Early in the summer season of 1908 it was almost impossible for us to buy of grain dealers in our nearest large towns corn and oats that were fit to feed, while the price for a few weeks was so high as to be almost prohibitive. With corn, wheat and oats at practically the same price per hundred pounds, and the corn and oats of inferior quality, wheat of course was the cheapest grain to buy. At the same time in a town 50 miles removed from us the conditions were very different; poultry keepers in that section were buying oats of exceptionally fine quality at a reasonable price, and plenty of good corn was to be had at 25 cents less per hundred pounds than we were asked to pay for a very inferior article. These conditions in greater or less degree exist all over our country, and every poultry feeder must be governed by the local conditions.

The Much Discussed Ration

The criticised ration under discussion is in all probability our repeated recommendation of a main or staple ration made up for hopper feeding practically as follows: Winter feeding—two-thirds corn or a mixture of cracked corn and whole corn, with one-third either wheat or oats, or a mixture of wheat and oats. Summer feeding—two-thirds wheat or oats, or a mixture of wheat and oats, and one-third corn. Either amber or hard red wheat recommended, and for oats the best heavy clipped white oats running 38 to 40 lbs per bushel. Corn preferred, sound hard yellow grain, or mixed yellow and white. White may be substituted for yellow in sections where yellow corn is not available. These mixtures are hopper-fed in addition to either free range on grass land or a liberal allowance of green and vegetable food. Beef scraps, charcoal, oyster shell and a good grade of grit containing an abundance of lime and silica to be kept before the birds all the time. Pure water to be supplied constantly. Occasional variation of this ration with feedings of buckwheat in fall and winter, and from one to three per cent sunflower seed during fall molting season, also kaffir corn and barley when available at a sufficiently low price at any season.

Great care must always be taken in purchasing oats not to obtain a light-weight oat that is practically all hull and waste, or oats that have been spoiled in curing or otherwise damaged. We have frequently found poultry keepers trying to feed their birds on light-weight or an inferior black damaged oat, at the same time expressing the opinion that oats were not good food and that their fowls did not take kindly to them. The purchase of such poor grain is only money thrown away. Again, we have found musty corn, and corn

green with mold, in use, and the poultryman condemning corn rather than his own judgment in purchasing an inferior article simply because it was obtainable at a low price.

Our critic referred to above finds that where oats, wheat and corn are used together that his birds "hoe out" the greater part of the corn and oats from the hopper in order to get at the wheat. It is not probable that this condition prevails at all seasons of the year. We have met a number of poultrymen and poultrywomen who claim that their fowls are given certain peculiarities in regard to diet, and it is evident from the evidence submitted that they pamper their fowls and encourage these notions by their feeding methods. One woman told us that her fowls would never eat oats or barley, could not be induced to. Another that she could not make her hens eat wheat; a poultryman that his fowls would not eat raw potatoes or parings of same, as we said ours did. We had occasion to purchase fowls from these flocks and after they had been in our yards for a few days we did not notice that they exhibited any peculiarities so far as food preferences were concerned. They ate the same food given the other members of the flock and seemed glad to get it. Frequently when fowls have not had a certain kind of grain or other food for a long time they will be a little shy of it for the first few feedings. This is particularly true of grains having a coarse fibrous hull like oats, barley and buckwheat.

Experiment Stations Found Corn Good

From time to time our experiment stations have attempted to demonstrate the difference in feeding value between corn and wheat, and a dozen or more years ago many poultry writers were exceedingly active in condemning corn. This prejudice against corn has not entirely died out, and not long ago one of our leading poultry journals made the statement:

"What a blessing it would be if the price of corn would remain so high for a term of years that poultry feeders could not reach an ear of it during that time! The fowls would be able in three years to build up some bone and muscle and thus increase their ability to produce eggs. The constant feeding of corn is doing a great injury to the fowls of the United States."

With all deference to the writer of the above, that statement is a manifest absurdity and we believe born of ignorance of practical poultry feeding. Several investigators at experiment stations in poultry feeding experiments to determine the relative feeding value of wheat and corn, were much surprised to find, when their annual summary was made, that the heavily corn-fed hens laid not only a greater number of eggs than those fed heavily on wheat, but that the eggs were larger and heavier and the fowls were in much better condition at the end of the test. This experiment has been repeated many times, but the experiment was not needed to prove to practical men that corn, meaning good, sound, hard yellow Indian corn, is a particularly valuable feeding grain for fowls. As we stated earlier in this article, the best eggs and poultry in our eastern markets are corn fed. The fancy South Shore chickens which bring upwards from 40 cents per pound in Boston market during the months of June and July are raised on an almost exclusive diet of cracked yellow corn, beef scrap and green food.

During the last two seasons one grower tried to get away from feeding corn because of the increasing price and the difficulty then experienced of obtaining good yellow corn, and in comment on the product of this plant a prominent marketman said to us, "———'s chickens are not nearly as good as they were when he raised them on corn and beef scrap, and this season he can't touch the top price. His stuff isn't up to it."

So far as practical results go, leading producers of market eggs and table poultry have demonstrated that a large percentage of corn in the diet of the fowls is necessary and desirable in producing a healthy, plump, meaty bird and good, large, heavy, yellow-yolked eggs. The heavily wheat-fed egg is usually pale and not pleasant to look at when served for table use. Heavily wheat-fed fowls become hard meat and get out of condition easily and quickly. You can feed wheat too freely and so make your fowls sick. There is less danger in corn, but it must be well supplemented with green or vegetable food.

It would not be fair to say, however, that the experiments conducted thus far by experiment stations are conclusive in demonstrating the superiority of either corn or wheat rations, but they have proved that rations containing a high percentage of corn are more generally satisfactory to date than those containing a high percentage of wheat.

The points in favor of a heavy corn diet are: A greater number of eggs, a lower food cost per egg, better and heavier eggs, fowls in better condition and of higher average weight at the close of the season, and an earlier and better molt for

heavily corn-fed fowls than those receiving a high percentage of wheat.

It is a well-known fact with practical poultry feeders that you can "stall" fowls, that is, get them off their feed or suffering from indigestion more quickly by heavy wheat feeding than you can by heavy feeding of corn. It is only during the season of extremely hot weather, particularly when fowls are confined in runs where there is very little shade, that the birds suffer any apparent injury from heavy corn feeding, and at such times they will usually do better with a heavy feeding of oats than a heavy feeding of wheat, in spite of the fact that oats contain more than twice as much fat as wheat and practically the same percentage of fat as field corn, the difference in the heating character of field corn and oats lying apparently in the lower percentage of contained carbohydrates of the latter grain.

In Canada, in England and in Europe oats are fed heavily, particularly in the ground form, for the purpose of fattening fowls for market, the oat-fed product possessing the light-colored or so-called "white fat" preferred by English and foreign markets, instead of the yellow corn-fed fat so popular in most of our own American markets.

FEEDING CHICKENS BALANCED RATIONS

FROM HATCHING TIME TO MATURITY—SUITABLE FOODS AND QUANTITIES FOR THE DIFFERENT PERIODS OF GROWTH—FEEDING THE NEWLY HATCHED CHICK—BALANCING THE RATIIONS—RATION FOR GROWTHY YOUNGSTERS—FORCING LATE HATCHED CHICKS FOR SHOW—ANALYSIS OF FOOD IN COMMON USE BY POULTRYMEN

ROBERT H. ESSEX

CHICKENS need a far narrower ration than do matured fowls—a ration containing considerable animal food, and this is one of the points I wish to impress upon readers. Experience has caused me to realize its importance. In the early days of Buff Plymouth Rocks, their combs were too large, and knowing that meat, even in small quantities, tended to increase the size of the combs, I avoided its use as much as possible. By this course the size of the combs was governed to a certain extent, but what a difference was visible in the growth of the young birds which were supplied with animal food and those which were deprived of it. We all like to experiment, and it took me a few years to find out that not only do chicks need animal food, but they need it in liberal quantities. It has long been demonstrated that some meat is necessary, but in the case of young chicks it is not generally fed in sufficient quantities.

Feeding the Newly Hatched Chicks

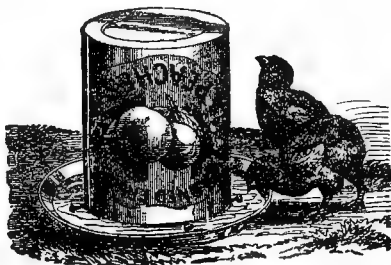
Study nature. Wild birds in feeding their young have preferences, even in the selection of vegetable foods. Some prefer weed seeds, others the young buds of trees; many are partial to fruit and other vegetables, but a very large majority gather in the flies, bugs, beetles and worms that venture within their range, and upon these the young warblers thrive, grow fat and feathers, and are in a very short time in show condition. Have you ever noticed the quills on the nestlings? How fast they grow. Seldom do we see a chick feather so fast. The food that produces feather rapidly is the best food for chickens, and they should be well supplied with it, at least until they are through their first molt. Such food will be chiefly animal food and will compose a very narrow ration.

It is well known that the yolk of the egg is absorbed by the chick before and after hatching. That is nature's food and must be good. Is it a wide or narrow ration? It is extremely narrow. One part protein to three parts fat is considered very narrow, but this first food of a chicken is even more so. It is composed of one part protein to about two parts fat (15.7:33.3), and please remember it is about one-half water—one-half water. Milk is another natural food for the young, and just as good for chickens as for babes. How is it proportioned—3.3 protein to 4 fat. Add the starchy contents, and approximately it reaches the proportion of 1:2. Quite narrow, is it not? Yet the young live and thrive upon it.

Nature teaches us, therefore, that the food of young chickens should contain about one part protein to two parts carbohydrates and fat. This is from two to three parts narrower than is generally advocated, but it has given better results than any other I have tried and my experiments have been not a few. Then, too, as we have shown nature upholds it.

Do not feed hard boiled eggs in large quantities. Such food may be balanced correctly, but it is indigestible for the very young chicks, and remember that of all foods only the portion digested provides nutriment. If you must feed

it, let it be well broken. Let the particles be thoroughly separated by the use of stale bread crumbs, then nearly the whole of it will be digested. It is far better, however, to use uncooked eggs. Mix them with bread crumbs, shorts, cornmeal or all of these, so that the food shall not be sticky or pasty. Use some bran if you choose, but not too much, and if you are tempted to add a little clear sand, don't be timid about it. The shorts or middlings may be found too

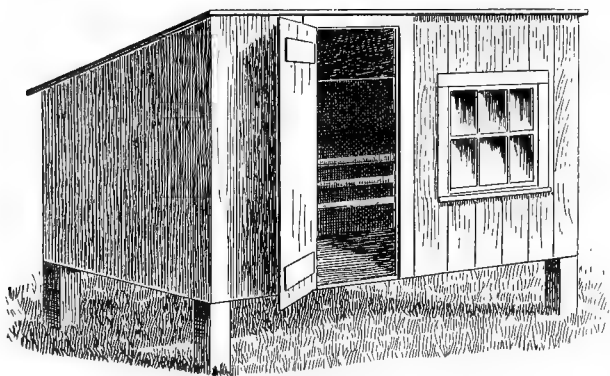


Home made drinking fountain for little chicks

sticky; bread crumbs are best for the purpose and if you have only a few chicks it will be well to separate the yolk from the white of egg, using only the former and so avoid mixing too much at a time. This refers, of course, to the first week. After that the chicks will take care of it all. Steel cut or granulated oats make a good food for the second week, also millet seed.

As the chicks become older—say from two weeks of age, beef scraps, dried blood, animal meal or fine ground green bone may be used with benefit. These foods contain in large proportion the protein we want, and their use enables the feeder to make a ration suitable for chicks. Care must be taken that too much of this is not fed at first. Some of these foods are too strong for young chicks, and I use them at this age only when I can't get fresh meat—liver, etc., etc.

Without the aid of beef scraps or one of the other animal foods mentioned the eastern duck growers would never have been able to place ducklings upon the market in such desirable condition as they do. Their growth would not be so fast, their flesh would be less tender and the ducklings less plump. This means that demand would decrease and prices would be lower. Just so with young chickens. If intended



A Closed Roosting Coop for Cold Weather.

for market as broilers they must have animal food to hasten growth and keep them in health. The forcing to which they are subject would run them off their legs in a short time if their food consisted exclusively of grain either whole or ground. A most desirable feature of these animal foods is that their protein contents produce flesh without an excess of fat. The breeder of exhibition stock will appreciate the importance of this fact, especially if the cockerels which he has been forcing for early fall shows give signs of leg weakness. The food they have been getting has produced too much fat and not enough muscle and flesh. A change of food—the addition of animal protein to the ration—goes to the root of the trouble and in a short time the birds are again “on their feet.”

Animal protein works wonders with fowls, and while it is so plentiful in green bone, dried blood, animal meal and beef scrap, etc., and considering that these foods are so easily obtainable, no breeder of fowls can afford to be without a supply. In animal meal and beef scraps there is nearly as much protein as there are carbohydrates and fat. In green bone there is about half as much, and in dried blood there is little else than protein.

How chickens delight in a little crisp lettuce, grass or clover. Provide it if possible; otherwise cook some carrots, cabbage, turnips, beets or mangels for them, or let them pick away at the raw roots, or a few raw potatoes. Clover is now sold in such convenient forms (both cut and ground) that no breeder should be without it if he has any difficulty in providing green food. Lettuce and clover contain a large proportion of protein.

Let your chicks have enough food, but do not stuff them. Little chicks will begin to cry for you when they discover that you are their attendant, and if you are at all soft hearted it will be hard to refuse the continued stuffing they cry for. Feed little and often. Chicks are never so happy as when scratching in shallow litter for little crumbs or seeds. Will they do this if overfed? No. Limit the food and keep them singing, but let them have enough to repay them for their work.

Some breeders keep one variety of food continually before their chicks and a number of them are successful poultry raisers. This seems contradictory following immediately after the suggestion to feed little and often, but it is not so strange as it appears at first glance. If one kind of food is kept continually before them, the chicks partake of it only occasionally as they need it. If they have been fed on the plan first suggested—little and often, it is likely they will gorge themselves when first allowed access to large quantities of food, but if they have been used to it, they simply nibble and run, and although their crops are never empty, neither are they overloaded. If such a method be adopted the food to be kept before them must always be of the same variety. Cracked corn is generally used. A change from corn to wheat would be an inducement to overfeed. It would tempt their appetites and induce them to overload their crops. We do not advocate this method of feeding, but if it is adopted, as it sometimes is for a time-saver, the other food supply should be made up largely of protein.

Balancing the Rations for Chicks

The reader has now been duly impressed with the value of protein and its use in the ration, and we will give an example of balancing the ration so that anybody with any foods will know how to go about it.

Following along the lines of our argument the ration shall possess about one part protein to two parts carbohydrates and fat, and is intended for newly hatched chicks.

Our first chick food is egg, both white and yolk well beaten. In this the proportion of protein and carbohydrates is about equal.

This we mix with bread so as to render it comparatively dry. We will assume that we have a flock of chicks that require about a pound of dry matter each meal. Dry matter is the total bulk of food less water or moisture. In one pound of eggs, that is the edible portion, there is twenty-seven per cent of dry matter that is made up of thirteen per cent protein and twelve per cent fat, in addition to ash, etc. In a pound of bread crumbs we find eighty-eight per cent of dry matter made up of eleven per cent protein, seventy-five per cent fat, etc. If we add the total amount of protein and fat contained in the eggs and bread, we find we have twenty-four parts protein and eighty-seven parts fat; that is, about three and a half times as much fat as protein, the actual figures being 3:6. The nutritive ratio of this mixture would be 1:3.6. To make the ration narrower we might reduce the bread crumbs to three-quarters of a pound, but that would make the mixture too “pasty.” We will therefore leave it as before and instead of securing the narrower ration by that means we feed in addition a little meat. Take beef scraps for instance. These on an average contain about ninety-three per cent dry matter, of which forty-five per cent is protein and forty-seven per cent is carbohydrates. The protein and carbohydrates being about equal it will need only a little beef scraps to bring the nutritive ratio down to 1:2, the ration we have suggested before as being a desirable one for chicks.

We do not advise the use of beef scraps at this early age, but having the analysis before us, we used it as an example.

Fresh meat will analyze much the same, so far as protein contents are concerned, and should be used in preference. If a little more bread is necessary to mix with the egg, it may be used.

After the chickens are one or two weeks old the egg food will become scarcer or perhaps too expensive and it becomes necessary to have a substitute. We wish to make the change of food without making too great a change in the ratio. In looking around for a suitable food we think of cracked wheat. One pound of cracked wheat contains about eighty-nine per cent dry matter, of which .075 is protein and .700 carbohydrates. Once more we take beef scraps to be fed in conjunction with it. We have given the amount of protein and carbohydrates in beef scraps. Now add the total to that contained in wheat and we have .525 protein and 1.170 carbohydrates and fats. Dividing the latter by the former gives us a ration of 1:2.2.

Finely cracked corn may be substituted for the wheat. In which case the following result would be attained:

	Dry Matter	Protein	Carbohydrates
One pound corn.....	.89	.062	.752
One pound beef scraps.....	.93	.45	.47
		.512	1.222

Nutritive ratio.....1:2.4.

By the time the chickens have been fed this way for another week we reduce the proportion of beef scraps to one-half, which, in connection with cracked wheat, gives us a nutritive ratio of 1:3.2. This is a very satisfactory ration until the chickens are three weeks old.

As far back as we can remember we have known eggs and bread crumbs to be a first food for cage birds and for chicks, and now having examined the composition of these articles of food, what does it prove? Simply that the "old woman's nonsense" of eggs and bread crumbs is scientifically and naturally correct and that, knowingly or unknowingly, our grandmothers have been following nature's way as closely as possible.

If it is not desirable to go to the trouble of figuring out a ration, the easier way is to choose from the list such a variety of foods as will give a ration near enough for general purposes. It should be remembered that the larger the proportion of carbohydrates and fat, the wider the ration. If you wish to make the ration narrower take a food that possesses little carbohydrates and fat; bran, for instance, is one of the best of foods, but too bulky and indigestible for use except with a more concentrated food.

In this connection we must warn the reader to use very little, if any, cottonseed meal. We have before informed readers that it is very indigestible. Linseed meal is more easily digested, but it, too, should be used sparingly.

Remember to give the chickens all the green food they need. There is nothing better for them than clover, lettuce or cabbage.

From the age of three weeks or a month to the age of two months, nearly any grain may be fed that is suitable in size; that is, anything except whole corn. I generally feed hulled oats, finely cracked corn, millet and wheat, the greater the variety the better. If the fowls are on a good sized range they will provide themselves with nearly enough animal food. At this period the basis of the ration is wheat. I feed as much wheat as all the other grains combined.

Ration for Growthy Youngsters

Early hatched birds cause little worry, little trouble, and it is a pleasure to see them grow.

An extensive run where shade is available is desirable. A grass run, an alfalfa patch, a clover or cornfield are alike ideal poultry runs and provide an abundance of insects that coax the rangy youngsters to exercise while furnishing them

with a substitute for meat. Chickens from two to five months old gain size and health under such conditions. If they are on a farm where range is unlimited they need only a little additional food morning and evening, the variety depending upon what the fields afford. Where the range is less extensive it provides fewer insects and little or no grain.

We will assume that green food is plentiful.

Of what then shall the ration consist? Such foods as promote the formation of muscle and bone,—that means size; flesh and fat—that means vigor.

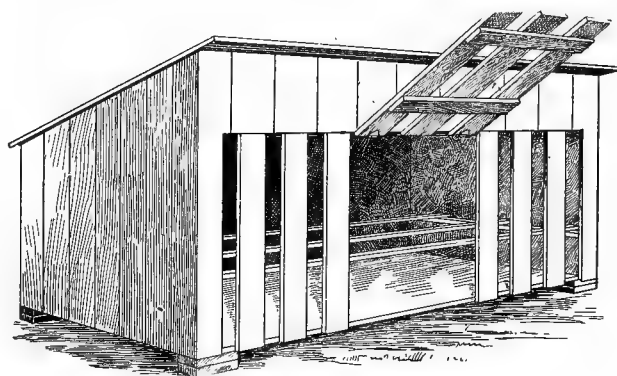
What shall the foundation of the ration be now?

Oats.

"But oats are so seldom fed," you say, "particularly in sections where corn is plentifully grown."

Where oats have been tried they are seldom discarded. They are the best grain I know to put size on a fowl, and they have formed the foundation of my ration for growing stock for many years, and my strain is noted for its size.

To form feathers which are continually being renewed in fowls of this age we require more animal matter than can be secured on the range. It is better to give more rather than less at such a stage and a ration of about one part protein to four parts carbohydrates is none too narrow. It may



An Open Roosting Coop for Warm Weather.

be composed of the following each day: One feed of oats, one feed of wheat and one of meat or cut bone and corn. For the purpose of forming the ration we will take one pound of each with exception of meat and corn, of which we give half pound each. More or less than these quantities may be used, depending upon the number of fowls to be fed, but the proportion will be the same.

Upon examination of the list of foods given herewith we find that in a pound of oats there is .092 protein and .532 carbohydrates and fat; in a pound of wheat .075 and .700 respectively; in a half pound of corn .035 and .392, and in a half pound of beef scraps .225 and .235 respectively. To illustrate, we will add these quantities:

	Protein	Carbohydrates and Fats
One pound oats.....	.092	.532
One pound wheat.....	.075	.700
One-half pound corn.....	.035	.392
One-half pound beef scraps.....	.225	.235
	.427	1.859

Upon dividing the carbohydrates and fat by the protein we find the proportion of these important constituents to be one part protein to 4.35 parts carbohydrates and fat. This is a little wider than we intended, but it is near enough for all practical purposes, even if we did not consider the green food and insects secured in the run during the day. The addition of these will bring the ration down to the desired point.

The foods composing the ration will be changed frequently with the exception of the oats. We will use oats

every day. Sometimes we may substitute buckwheat for wheat or corn, at other times barley, etc., etc. Occasionally we fed a mash in which we use considerable bran. This will assist in keeping the daily ration narrow even though we may feel it wise to give a feed of peas or barley or an extra supply of corn (these grains containing large proportions of carbohydrates and fat).

With the example and analysis of foods here given there will be no difficulty forming a ration from such foods as are plentiful. Prices vary, as we have said, and the variation should be accepted as a hint to change the food. The fowls will not object.

During the month immediately preceding a show the birds may be fed as suggested for late hatched chickens, but unless they are under weight there will be no necessity for feeding them after the usual evening meal, which is given before sundown.

Forcing Late Hatched Chicks for Show

Both the fancier and the breeder of poultry for market are well on the way to successful feeding when they have realized that different foods produce different conditions and have decided to select such foods as will aid them in securing the condition desired. It is clear that a change of food is necessary when the chick merges from its babyhood, takes on a new suit of feathers and becomes a full-fledged youngster. Every poultryman we believe sees the necessity for a change of food at that period, but the majority are governed simply by the knowledge that the chicken is then equipped with better means of digestion and can do with less costly and more bulky food. True it is that in most cases the breeder desires rapid growth and generally provides, or at least intends to provide, that which will induce it. Is it not in addition necessary to consider what requirement the fowl is intended to fulfill? Take the exhibitor, for instance. His fowls are destined for the show room, yet this does not mean that they shall all be fed alike or in equal quantities. Some must be prepared for the early fall and winter shows; others for the later winter shows. If the exhibitor is blessed with incubators to hatch early chicks, brooders to accommodate them, and experience that enables him to carry them healthily through the early spring when conditions are unnatural, then indeed he will feed his fall exhibits as he will his later show birds, because there is little or no necessity for forcing them; but if his chicks are late hatched, he must adopt heroic measures to "bring them along" if he would gain a place among the successful exhibitors. These late hatched, forced youngsters seldom attain the size of those which are fed for growth and vigor and allowed to develop size before putting on the gloss and finish for the show room.

What method of feeding is practiced to hurry these young candidates along?

A ration composed of animal matter supplemented by fat forming foods; and during the closing stage the addition of foods known to contain considerable oil. The first is intended to hasten maturity; the second to put on weight, and the third to put on the finishing touches—the gloss to the feathers. Bulky vegetable food is added to keep the digestive organs in good working order, and frequently condiments are given to coax the fowl to eat more and more of the concentrated food. Frequent change of food is necessary so that the fowl shall not go "off its feed." Few foods are too expensive to be procured at this season, for winning in the fall means sales for the winter shows.

In the days when the writer was exhibiting—where the winters stole well into the spring and the big fall show seemed to advance to meet the summer—the principal event being held in August—many were the rations tried, and feeding sometimes extended well into the evening hours. "Little and often" was found to be a good motto, and only

at the last meal (about 9 p. m.) were the fowls coaxed to eat more than they wanted, then they got the tempting tit-bits which had been saved for the last moment—scraps of meat green cut bone, bits of bread, oatmeal porridge (well sugared), cooked rice, cooked potatoes—fed by lamplight.

Result: Winners at the fall shows; delicate birds later on.

These fowls were not allowed extensive range. They were confined in yards about eight by fifty feet, in flocks of eight or ten. Their roosting pens were kept scrupulously clean; wooden floors well sprinkled with sand every week, and droppings raked every day. They were confined to the house during inclement weather.

Tame? Sure! A little training in good sized coops built upon the walls above the roosts—handling every day—induced a confidence in their attendants that made all the difference during show week.

The daily food during these forcing days consisted of mash early in the morning (a small amount), wheat, oats or barley or buckwheat in litter at about ten a. m. and two p. m. and corn at six p. m. Sunflower seeds were frequently given in place of the barley, wheat or oats, and during the two weeks preceding the show, hemp seed was provided, or linseed meal mixed with the mash. Cabbage was hung in the pens continually; grit of course always before them—sometimes put in their mash; and they had all the milk they could drink.

We are enabled to present analyses of foods that have been made by experiment stations throughout the country. First it must be understood that analyses differ slightly because the foods analyzed differ in composition. It would be extremely difficult to procure two samples of wheat that contain exactly equal proportions of protein, carbohydrates and fat; similarly with regard to other vegetable formation. This applies also to animal matter. The quantities given therefore are usually average quantities, yet are sufficiently exact for practical purposes.

Proportion of Protein and Carbohydrates and Fat in Foods Used by Poultrymen

(Parentheses are used where the digestibility is estimated from that of other similar feeding stuffs).	Digestible Matter in One Pound.				
	Total Dry Matter in lb.	Protein	Carbohydrates & Fat	Total	Nutritive Ratio
GRAINS					
Wheat.....	.896	(.075)	(.700)	.775	(1:9.3)
Corn.....	.912	.070	.784	.854	1:11.2
Oats.....	.890	.092	.532	.624	1:5.8
Barley.....	.891	.087	.962	.779	1:8.0
Buckwheat.....	.874	(.078)	(.548)	(.626)	(1:7.0)
Rye.....	.884	(.064)	(.703)	(.767)	(1:11.0)
Peas.....	.856	.188	.535	.723	1:2.8
Sorghum Seed.....	.873	(.054)	(.668)	(.722)	(1:13.3)
BRANS, MIDDINGS AND MEALS					
Bran (wheat).....	.881	.120	.454	.574	1:3.8
Bran (rye).....	.884	(.115)	(.488)	(.603)	(1:4.2)
Middlings (wheat).....	.879	.128	.609	.737	1:4.5
Middlings (buckwheat).....	.868	(.237)	(.505)	(.742)	(1:2.1)
Shorts (wheat).....	.892	.122	.586	.708	1:4.8
Corn Meal.....	.850	.055	.711	.766	1:12.9
Corn and Cob Meal.....	.849	.044	.665	.709	1:15.1
Barley Meal.....	.881	.074	.668	.762	1:9.5
Pea Meal.....	.095	.168	.531	.699	1:3.2
Linseed Meal.....	.899	.289	.449	.738	1:1.6
Cotton Seed Meal.....	.918	.372	.437	.809	1:1.2
MANUFACTURED FEEDS					
Gluten Feed.....	.917	.194	.633	.827	1:3.3
Gluten Meal.....	.922	.323	.725	1.048	1:2.2
Hominy Chop.....	.889	(.071)	(.795)	(.866)	(1:11.2)
Brewers' Grains (dried).....	.917	.168	.471	.639	1:2.5
Brewers' Grains (wet).....	.243	.043	.128	.171	1:3.0
Malt Sprouts.....	.898	.186	.403	.589	1:2.2
BULKY VEGETABLE FOODS					
Potatoes.....	.211	.009	.157	.166	1:17.4
Carrots.....	.114	(.008)	(.089)	(.098)	1:9.9
Beets (Sugar).....	.135	.016	.109	.125	1:6.3
Mangel-Wurzels.....	.091	.011	.054	.065	1:4.9
Rutabagas.....	.114	.010	.085	.095	1:8.5
Turnips.....	.095	.010	.077	.087	1:7.7
Red Clover.....	.280	(.028)	(.153)	(.181)	(1:5.5)
Alfalfa.....	.916	.104	.430	.534	1:4.1
DAIRY PRODUCTS					
Buttermilk.....	.082	.028	.050	.078	1:1.8
Milk.....	.127	.031	.137	.168	1:4.4
Skim Milk.....	.095	.035	.057	.092	1:1.6
Whey.....	.070	.008	.059	.067	1:7.4

ADVOCATES HOPPER FEEDING

RECOMMENDS FEEDING YOUNG, OLD AND LAYING STOCK BY MEANS OF HOPPER, AS HE BELIEVES IT TO BE THE CHEAPEST, CLEANEST, EASIEST AND BEST WAY TO FEED POULTRY—DIRECTIONS FOR BUILDING HOPPER

CHARLES WALKER

IF I were to enumerate the many advantages of feeding with hoppers it would take more time and space than I intend this article to occupy. Having read so much about hopper feeding, I came to the conclusion that I should try it for myself and I may say, right now, that I have changed into a hopper feeding advocate.

The first thing to do is to get a good hopper, which is not so easy a thing as some would have you believe. I saw some hoppers that they use in the east and read about others, but I could not find any that just met my requirements. I wanted a hopper that you could leave inside or out of doors if one wanted to do so, therefore, I made one which, to my notion, just about filled the bill. It is rain, dirt and waste proof.

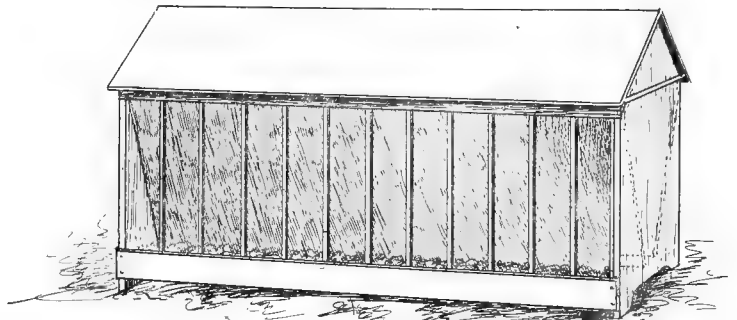
In using hoppers you save time in feeding. All you have to do is to fill up your hopper once a week or so, according to the size of the flock which is feeding from one hopper. It is a money saver because there is no possible chance for the grain to be wasted, nor can the chickens walk and jump around on the food as they now do when the grain or mash is fed on the ground or in troughs. This is quite an item as most poultrymen buy their grain and grain costs money.

A hopper is always clean and on the job and you can sleep longer in the morning and feel assured that your chickens are having their food. They do not have to wait for you to feed them as in the old way. You keep water before them constantly and they drink only what they need. Why should we not keep food before them all the time? It seems to me that with hopper feeding the chicks do not eat so much as in the old way, because now every kernel of grain is used (eaten) and there is no waste.

How to Make a Hopper

To make the hopper take three boards eight or nine inches wide and thirty inches long, one-half inch thick, and two boards ten inches long, same width as the thirty inch boards, and one inch thick, as these two must stand the most strain. Saw to a point on one end to make the roof

fit. To support the floor of hopper take two strips, same width, about 1 by 1 by 8 and nail one inch from the straight end of the boards which you have cut to a point. Take one of the large boards and nail it on the strips you nailed to the end boards. You now have the floor of the hopper, also roof ends.

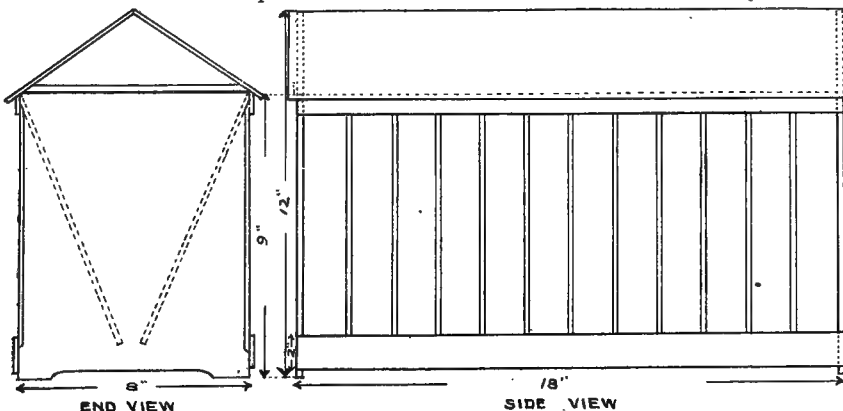


FEED HOPPER READY FOR USE.

TO FILL, LIFT ROOF WHICH IS DETACHABLE.

View 1—The hopper as it appears when completed and filled with grain or any other food which is to be fed dry.

Take the two remaining thirty inch boards and nail together, forming a half square, which is your roof. Now take four strips two inches wide and thirty inches long and nail two to the top just under the roof and two even with the floor of the hopper. This will keep the grain from falling out and also gives something to which to fasten the up and down strips, through which the chickens stick their heads to eat. You can nail strips as close or as far apart as you wish. I nail mine three-fourths of an inch apart, which seems about the right size for small chicks, and one and one-fourth inches for older stock. Your hopper is about ready except the inside boards or self-feeder. By studying view No. 2 you can nail in two boards on a slant so they will reach to about three-fourths of an inch from the floor of the hopper and be about one-fourth inch apart at bottom, and your hopper is complete. Use only hardwood lumber if obtainable, as it is less liable to warp. By using a coat of paint the hopper will last for years.



View 2—The end view shows the feeding boards as they are in the hopper. Side view before the feeding boards are put in place.

The hopper will be so that the chickens can eat from either side if built according to directions and it will feed your flock until it is empty. You have no waste, no worry, no expenditure of time and the food is dry and clean all the time. This hopper may be left outside or anywhere you care to put it. I believe that the sooner you begin to use a hopper the better it will be for you and that you will never regret making the change. It goes without saying that you want the best, cheapest, cleanest and easiest way to feed. My advice to all is: Use hoppers in feeding your young, old and laying stock.

FORMULAS FOR DRY MASHES

We give below some of the best grain mixtures or dry mashes which have been used and found satisfactory by men of experience. These are to be fed in hoppers and the fowls should also be given grain thrown in the litter to be scratched for so as to induce exercise.

Dr. Woods' Mash for Leghorns

20 lbs. wheat bran
10 lbs. wheat middlings
10 lbs. corn meal
10 lbs. gluten feed
20 lbs. best cut clover
5 lbs. old process linseed meal
10 lbs. good beef scrap.

The A. F. Hunter Dry Mash for Rocks and Wyandottes

200 lbs. wheat bran
100 lbs. corn meal
100 lbs. wheat middlings
100 lbs. beef scrap
100 lbs. gluten meal.

Halbach Mash for White Rocks

50% corn meal
20% bran
20% middlings
10% beef scrap.

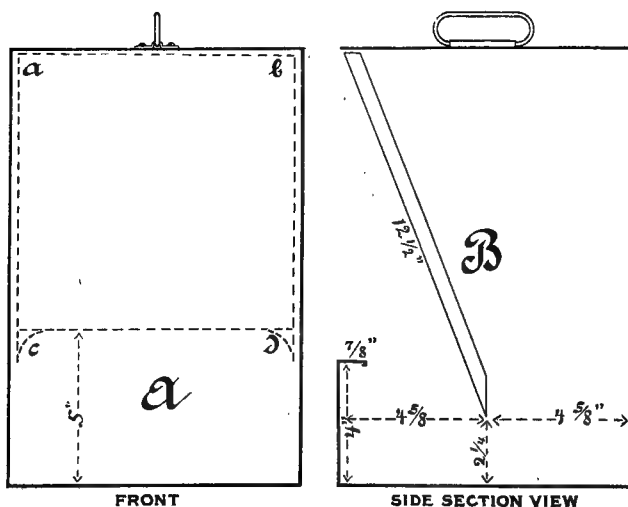


Diagram of Mr. H. Heidenhain's food hopper made from five gallon oil can.

Another Mash for American Varieties

15 lbs. corn meal
20 lbs. wheat bran
20 lbs. wheat middlings
10 lbs. good beef scrap
20 lbs. best cut clover or alfalfa meal
5 lbs. oil meal.

Dr. Woods Dry Mash for Chicks

Equal parts by measure of
Wheat bran
Corn meal
Leaves sifted from cut clover
Fancy wheat middlings.

To this mixture, one-half pound fine ground best quality beef scrap. Be sure the scrap is pure and sweet. Cheap, poor scrap is dangerous and will cause bowel trouble. If

not sure it is fresh, omit it and feed two or three times a week, a little fresh beef scraped from bone. Keep the mash in front of them at all times and feed chick feed in litter. Also keep charcoal, grit and fresh water before them.

Dry Mash for Chicks Eight Weeks Old

200 lbs. coarse wheat bran
100 lbs. fancy wheat middlings
200 lbs. best dry cut clover
100 lbs. yellow gluten feed
100 lbs. yellow corn meal
50 lbs. linseed meal (old process)
100 lbs. best fine-ground beef scrap.

Dump all of above on clean board floor and thoroughly mix with scoop shovel. Keep in sacks or bins and feed in food hopper to growing stock or laying hens.

CORNELL FEEDING RATIONS AS GIVEN BY PROF. RICE

Grain Mixture for Laying Hens and Growing Pullets

100 lbs. oats
200 lbs. corn
200 lbs. wheat.

Fattening Mash

30 lbs. beef scrap
100 lbs. corn meal
100 lbs. oatmeal
100 lbs. ground buckwheat.

Dry Mash Mixture for Laying Hens and Growing Pullets

25 lbs. oil meal
125 lbs. beef scrap
150 lbs. wheat middlings
150 lbs. corn meal
75 lbs. bran.

Grain Mixture for Chicks

100 lbs. oatmeal
200 lbs. cracked corn (fine)
300 lbs. cracked wheat.

Dry Mash Mixture for Chicks

100 lbs. wheat middlings
100 lbs. corn meal
100 lbs. beef scrap
200 lbs. bran.

Prof. Rice claims that oyster shell is very essential for laying hens.

A PLAIN BALANCED FOOD

MANY POULTRY KEEPERS, VETERANS AS WELL AS NOVICES, WILL BE PLEASED TO READ "UNCLE IKE'S" PLAIN DIRECTIONS FOR PREPARING AND FEEDING BALANCED POULTRY RATION

I. K. FELCH

ALL statistics relating to grain are based on one hundred pounds, the per cent of ash, protein, carbohydrates and fat being computed on the one hundred pounds of grain.

Many hundreds of people who keep fowls do not understand what this means. What they want first to know is the proper kind of food to give the best result in egg production. A generous egg production is a sure sign that the fowls are in a most favorable and healthy condition. A balanced ration is one that contains one and one-half to two per cent of ash, which is the bone forming agent, twenty-one per cent protein, which is the muscle growing and egg producing agent, sixty per cent of carbohydrates and twenty per cent of fat, these last two being the material on which

the fowl lives while she produces the eggs, and the waste material.

We cannot manage to obtain this combination in grains alone, but have to feed meat and vegetable matter in conjunction with the grain to balance our ration.

How to do this with corn, wheat, oats and barley, with beef scrap, potatoes, cabbage and mangle wurzel beets, is what nine-tenths of those who are getting a living from hens care to know. Let me tell you in a nutshell how to do it.

A Morning Mash

Take twenty pounds of corn, twenty pounds of wheat bran, twenty pounds first-class oats and ten pounds of barley and have it ground into a fine meal. To this add twenty pounds of best ground beef scrap or dried blood. Mix the whole well and use it for the morning mash. Pour scalding water on it at night and keep it covered until morning. If it is then wet and soggy add wheat bran until it is a warm crumbly mash. Give to the birds what they will eat up clean. Its warming influence will send the females to the

nest and nine-tenths of the eggs will be secured before noon.

Hang cabbages and mangle wurzel beets up in the coops to provide the vegetable substance for the fowls and to give them something to work on during the day.

It is an excellent thing to throw a handful of millet seed into the scratching material in their open sheds to keep them busy until nearly 4 o'clock, then open your dry-mash feed boxes which should be filled with a mixture of cracked corn, oats and barley and let them fill their crops for the night. Keep before them all the time charcoal, grit and seashells so they may help themselves as they please.

In the absence of cabbage and beets in the winter time, give steamed alfalfa or clover meal; in the summer when the birds have the run of the fields they get all the vegetable matter they need and if there are not too many of them to the acre they get a large share of the necessary animal food, in the shape of worms and insects, and you can, therefore, feed less of the ground scraps.

Give the birds plenty of fresh air, free from direct drafts, and success will reward your labor and care.

THE REARING OF CHICKS IS CONSIDERED

BY PROF. BROWN IN THIS ARTICLE, GIVING AN ENGLISHMAN'S IMPRESSIONS OF AMERICAN AND CANADIAN POULTRY PLANTS AND POULTRY METHODS—PLANS OF BROODING, WITH SUGGESTIONS

EDWARD BROWN, F. L. S.

HON. SECRETARY OF THE NATIONAL POULTRY ORGANIZATION SOCIETY OF GREAT BRITAIN AND IRELAND, LECTURER ON AVICULTURE AT UNIVERSITY COLLEGE, READING, ENGLAND

[NOTE:—Prof. Brown visited the United States and Canada for the purpose of inspecting well known poultry plants and investigating American and Canadian poultry methods. In this article, written exclusively for the *Reliable Poultry Journal*, he tells of what he saw and learned and makes comparison with English or European methods employed in the successful production of poultry and eggs along practical lines.—Editor.]

THE method of rearing chickens by natural means is the same all the world over, and if we were content with that system, which probably would be the case if it were capable of meeting modern requirements, very little would need to be said. We could permit the hens to exercise their functions of hatching and rearing just as they thought fit, and would not need to take either the trouble or care involved when we introduce artificial methods. The fact is we cannot improve upon Nature, but unfortunately natural methods do not meet modern conditions.

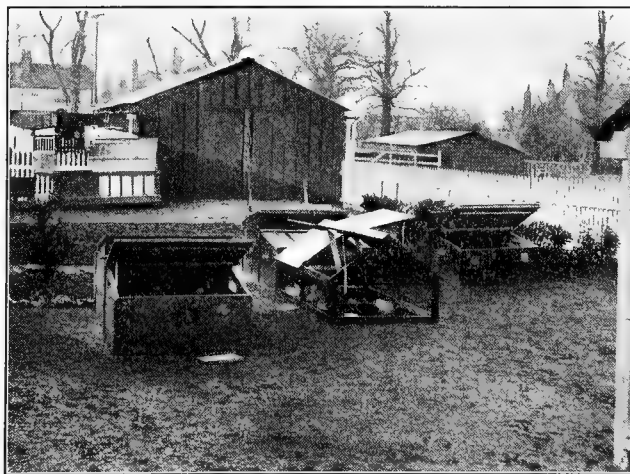
It is an arguable point whether we are altogether wise in making demands upon poultry which it was not intended they should meet, but there is the fact. So far as this aspect of the question is concerned I saw nothing in America which was at all new nor did I expect to see anything. Perhaps there were slight differences to be found here and there in the arrangements for rearing the chickens in the shape of coops and in the systems of feeding, but generally speaking there was nothing that we have not also followed in Europe, and tried with equal success.

It was pretty evident, however, that taking the country as a whole, probably the natural methods are less employed

in America than is the case in older countries. The spirit of Americans to which I have already referred is to try new methods, but even in the States I found that the old ways were still followed, and in the lower part of Rhode Island it was a revelation after all that had been said with regard to American poultry-keeping to find the farmers of that section depending almost entirely upon hens for hatching and rearing. So far as I could learn there are very few incubators or brooders employed there, and I think that they are scarcely needed. The race of fowls which they keep, the Rhode Island Red, is an excellent sitter and mother. Hatching is merely to secure perpetuation of the race of egg layers, and there is no need

to bring out the chickens very early. Hence the fowls kept serve all requirements, and when that is so there is no reason why the owners should alter their methods. Of course this system has its limitations.

I am inclined to think, and there was plenty of proof in America to justify me in the belief, that the experience which we have had is also duplicated on your side, namely, that increased fecundity of hens tends to the reduction of the maternal instinct. I was told that Rhode Island Reds do not average more than 100 eggs per annum. Probably it would be found



BROODER AT READING COLLEGE FARM, ENGLAND

that if the breeders of the Little Compton district by trap nesting or any other method increased the prolificacy of their hens by fifty per cent, they would be compelled to adopt artificial methods of hatching and rearing. So long as they do not interfere with things as they are they will probably have no need to purchase incubators and brooders.

Natural Methods Not Sufficient

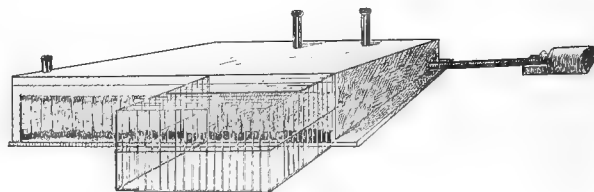
So much can be admitted, but we have now to face the question whether the system which is so successful in Rhode Island would meet the requirements for the supply of eggs and chickens. I venture to say that it would be an utter failure if we had to depend upon it entirely, in fact modern development in poultry keeping would have been impossible had we been restricted to natural methods. In the first place we should have been compelled to maintain breeds of fowls which would be unsuitable under many circumstances, and could not attempt to meet the requirements of the market at several seasons of the year. Whether we like it or not, here is the fact that artificial systems have come to stay, and our object is not to go back to the natural methods, but to make the artificial as perfect as possible, even thought supplementary to the other.

When incubators were first introduced into Britain there was a very common saying, namely, "Yes, you can hatch artificially, but can you rear?" and it is an undoubted fact that the artificial rearing of both chickens and ducklings was where the whole thing broke down in the early days. My own experience was that of many others. We might hatch a batch of chickens, but the number reared would be comparatively small. At one time it seemed as if this could not be overcome, and it took many years before it was accomplished.

The first brooder I worked was known as the old Cheshire, and that is now thirty years ago. I give here an illustration of it. It consisted of a low box sloping from front to back, about 3 ft. long and 21 in. wide. In this was inserted a tank 1 in. in thickness, in which was placed, 9 in. from each side—the tank being 18 in. wide—a strip of tin the full length with perforations at each end to allow a proper circulation of water. At the back the tank was dropped to 3 in. in thickness, and in this a tunnel was made

Such an appliance was only suitable for use under cover, and the trouble involved in preventing the lamp being blown out, in avoiding smoking, was very great indeed. Still it was a beginning, and in the first season when I used it I reared something like 90 per cent of chickens in it, but then I should hardly like to say how much trouble was involved. To the majority of poultry-keepers it was useless, as the labor was excessive for the results obtained.

After that a brooder was introduced in France which consisted of a large tank of water placed in a wooden box,



CHESHIRE FOSTER MOTHER

and the birds nestled in the compartment below. This was certainly better, but this again was only suitable for use under cover, and on a limited scale. The heat was maintained by drawing off a portion of the cooled water and replacing it by hot water afterwards. That was very interesting to those who only wanted to rear a few chickens, but useless for larger operations.

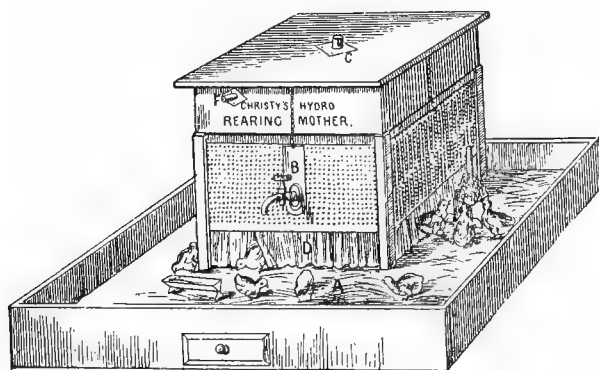
The next step was when what is called the "Westmeria" brooder was introduced. This consisted of what was practically a small house with wheels at one end and handles at the other. It was well built, had a sleeping compartment heated by a hurricane lamp, and a covered run, and it is not too much to say that the introduction of this machine solved the problem. The heat could be well maintained, and in spite of the fact that there was a certain amount of danger from fumes in the sleeping compartment, yet this was small when care was taken, and as it could be used in the open we then saw the possibilities of greater developments.

From this last described type there have evolved most of the different forms of brooders now in use of English make, notably the "Hearson" and others, which, whilst they may be an improvement in details are practically upon the same lines as the original "Westmeria." Until the American machine became known to us we had practically nothing new after the introduction of the "Hearson," but the "Cyphers" Style A brooders at once opened the way to a further development. Not that I think they were any better or in some cases as good as some of our English brooders, so far as the sleeping compartment was concerned, but there was a great advantage in the provision of a scratching section.

My object is not, however, to give a history of this question, but to indicate briefly the steps of evolution. It must be remembered that success in rearing at once placed artificial hatching upon a different plane. Until brooders could be made practical the demand for incubators was necessarily small. The moment the former proved a success, then the other followed as a matter of course. A further point is that the bringing of these appliances to a measure of perfection led to a demand in America for bigger things, and one of the points which I looked forward to with great interest was the opportunity of inspecting some of the plants upon which continuous brooders are in operation.

Individual Brooders a Success

Both in America and England individual brooders have proved a great success, but this was not accomplished without overcoming many difficulties. Below I say something as to comparisons between the two systems, but it must be realized that at any rate in Europe we had to face a very



FRENCH FOSTER MOTHER AND PARK

A—Park for chickens. B—Tap for emptying cistern. C—Tap for supplying water. D—Curtain to mother. F—Air hole.

with two chimneys, 12 and 24 in. from the end. The tank itself was built into a cover of woodwork, and embedded with non-conducting material to conserve the heat. To prevent the backs of the chickens going against the metal a wooden frame was made to slide under, on which was tacked strong canvas to which were stitched pieces of flannel cut to represent the feathers of a hen. The heat was obtained from a benzoline lamp which had a tube about 20 in. long, and this was inserted in the tunnel referred to above.

serious condition of things ere even individual brooders attained their present satisfactory condition. It was all right as long as only two or three were used, but the moment we came to handle the operations upon a large scale the whole aspect of affairs was altered.

I have practiced artificial rearing for more than thirty years, but until eight years ago upon a comparatively small scale. In the year 1898, when the College Poultry Farm was established at Theale, we commenced handling the work upon a larger basis, building a brooder house which, whilst very much smaller than those now employed, especially in America, was an advance on anything that had been done before. For the first three years the result was very unsatisfactory. We hatched a large number of chickens artificially, but the number which died was great indeed; in fact one year the loss during the first three weeks after hatching amounted to no less than 45 per cent.

At first it was assumed that this was due to neglect of even ordinary precautions, but after careful watching it was seen that such was not the case, and we could only come to the conclusion that the fault was in the system and not in its application. Foods of all kinds were tried, again without any improvement. On making inquiries elsewhere we found that our experience was by no means the worst, in fact in some cases the loss amounted to something like 75 per cent. So disastrous were these results that I was fast coming to the conclusion, in which others shared, that the artificial rearing of chickens on a large scale was a failure. Finally, however, as the result of very exhaustive observations and careful inquiry it was felt that the weakness of the whole system was not in the brooders themselves, but that the chickens raised by this method were too weak to withstand the changes of temperature which mark our English climate, and that this difficulty could only be overcome by compelling the birds to take more exercise and thus strengthen the organs and muscles of the body. The only way in which exercise could be secured was by compelling them to work for their food, which is the natural method.

Dry Feeding of Chicks Solved Problem

The chickens, it may be explained, generally appeared perfectly healthy until they were about ten days to a fortnight old, when bowel troubles supervened and they died very rapidly. In order to test the matter we absolutely abandoned the old system of feeding and went in for the dry feeding system, that is the use of the smaller grains, scattering these amongst the litter and making the birds from the very start work for their food. The result was startling; it solved the problem. During the first year in which we adopted this plan we lost only 5 per cent, which result has been abundantly supported by the experience of others, so much so that the dry feeding system has led to an enormous growth of artificial rearing in this country, and practically there is now no limit to its possibilities. It may be explained, however, that we find it necessary at the end of a month to give a proportion of moist food, otherwise the

birds do not make as much flesh as we require. I have given this short account because during my visit to America I found that it was supported by experience there.

The spirit which is manifested in America has led to the handling of artificial rearing on bigger lines. From time to time we have seen records of huge plants, some of which appeared perfect on paper, and if fowls were as amenable to control as minerals there ought to be no doubt as to their success. It was with a strong desire to see these personally that I visited America. It should be remembered that, as already seen, our system has been almost entirely in the use of individual brooders. The method of raising chickens by means of pipes, known as continuous brooders, is practically unknown on this side the Atlantic. Ideally such a system has many attractions, but what is the fact? We often find that theory and practice do not work together.

Under these circumstances one of the first points of interest was finding that some of the largest breeders have changed their opinion entirely with regard to continuous brooders. Amongst these Mr. Arthur Brown of Lakewood, New Jersey, is an example, but he is by no means isolated. Such opinion, however, was not that of all. On the Iona plant owned by Mr. L. H. Hallock, the continuous brooder

system is fully adopted, but his system is upon different lines from any I met with, in that by means of what is called the Davies & Rock system heated air, which can be controlled as to quantity is passed into the brooding chambers, and so far as it was possible to judge without actually operating such a system has distinct advantages over radiation by means of hot water or hot air pipes.

Mr. Hallock claims that the system referred to has worked perfectly in his hands, and that there is a much greater amount of elasticity than under the older methods. If this system fulfills all that is claimed for it, it may bring

back the continuous brooder system into favor. I gathered, however, that at the present time it is regarded as by no means satisfactory, in fact in some cases the pipe system has been given up entirely and individual brooders substituted, but in others the pipes have been removed to the back of the house so as to maintain a fairly equable temperature, and thus avoid throwing undue strain upon the individual brooders.

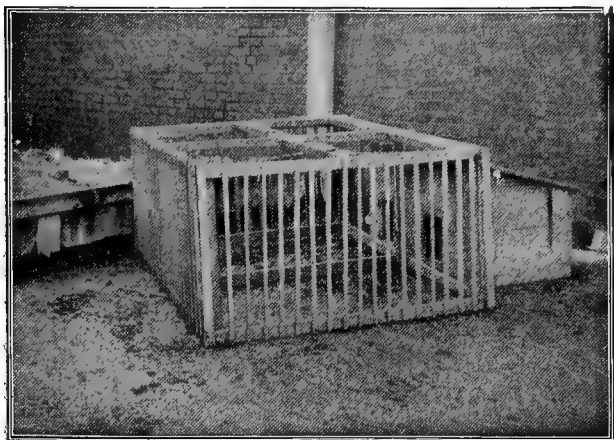
There can be no question that in theory the pipe system is very attractive, because it is supposed that the labor of attention is greatly simplified, and that instead of having a large number of separate lamps to fill and trim all that is requisite is the firing and regulation of one boiler. In practice, however, this is not so easy as might have been anticipated, and for that reason I think we on this side have been justified in regarding such a system with a considerable amount of suspicion. It must be remembered that the amount of heat required by birds when they are five to six weeks old is very much less than during, say, the first week, and the pipe system does not appear to allow for changes to that extent. On some of the plants I visited the pipes have been abandoned, and individual brooders are entirely



A Shelter That Can be Opened or Closed, as the Weather Requires

used, because by so doing each brooder can be modified in accordance with the age and requirements of the chickens therein. I am inclined to think that in the future, unless the Davies & Rock system proves as flexible as is suggested, the tendency towards individual brooders will be largely increased, in spite of the greater amount of attention required.

I was very glad indeed to see on some of the plants that attention is paid to the importance of fresh soil, and in several cases double yards are used. The latter appear to me to be almost essential. We must remember that it is not only requisite to get rid of the manurial influence, but also to restore to the land elements which are lost by the keeping of birds thereon, and which can only be accomplished by cultivation.



A FEEDING PEN FOR CHICKS

By the use of such a pen mature fowls or large chickens are prevented from eating special chick food. The slats are sufficiently far apart so that the young chicks can pass in and out of the pen.

Portable Houses With Individual Brooders

Some years ago I came across a portable poultry house in France which was very suggestive indeed. This consisted of an ordinary house upon wheels with a brooder fitting inside. That brooder could be removed when it was no longer required. This was an advance upon an older system where to one side of a fixed house was fitted a brooder, so that the birds could either sleep in the brooder or in the house, they having to pass through the house to reach the brooder. That system has been modified in accordance with our requirements, and it was therefore interesting to see at several of the plants visited—notably at Cornell, Elma, Storrs, the Tillinghast Farm, and amongst the South Shore roaster men—that this system is growing in favor. It is not at all necessary that I should go into details, because they have received attention from breeders through your pages or those of other papers.

One of the most interesting of these houses was the design of Professor Jas. E. Rice, of Cornell. Fixed at one end was a reservoir for gasoline, with a connecting pipe down to a burner in the brooder within the house, and it was claimed that the reservoir only needed refilling once in three weeks, and that it could be left a week without attention. I should have been glad to have seen it in operation, for that was practically the only new thing which I came across in this direction.

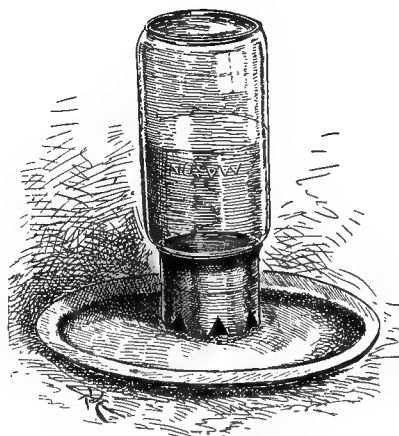
The great advantage of these portable houses with brooders is that the birds can be scattered over the land, thus securing absolutely fresh ground, and, moreover, the position can be changed in accordance with the season of the year. In my judgment the future of artificial rearing will be more and more in that direction. Moreover, there

is something to be said for the idea that chickens thrive better if they are not removed from their first house, and under these circumstances it is only necessary to take out the brooder after they have grown beyond the first stage. Of course in some cases portable or colony houses are provided so that the chickens when taken from the brooder houses can be scattered more widely over the land.

In conclusion a few suggestions may be of service. There is no doubt in my judgment that large houses on big plants are more convenient for the first few weeks of growth, but on smaller establishments where the houses can be moved about I think it would be more profitable if smaller houses were employed. In either case it is important that the birds shall be got out of these cramped conditions as speedily as possible so as to give them plenty of room to grow. For that reason the colony house system for growing chickens is very valuable.

I believe that it is important for chickens at different stages of development to have as much fresh air as possible, and I am glad to say that in the many houses I visited there appeared to be much more attention paid to this point than in the incubator cellars. Perhaps this is more due to chance than design, for the houses above ground lend themselves to ventilation to a greater extent than those underground. The weakness of the system, however, was in many cases a want of shade. I should have thought that in America, with its hot spring and summer, shade would have received much more attention than is the case. I was interested to note that on the Elma plant some thousands of fruit trees have been planted, but being small they were not of much service at the time of my visit.

We should never forget that heated ground checks growth, and if such ground receives the direct rays of the sun it is heated, and both day and night the birds are under conditions unfavorable to development. They require moist conditions for growth, and I venture to submit that in many cases better results would be achieved, both as to size and quality of flesh, if greater attention were given in this direction.



DRINKING FOUNTAIN

DRINKING FOUNTAIN FOR CHICKS

WARREN W. WOLFGANG

I TAKE a Mason fruit jar and punch a one and one-half inch hole in the jar top, then I solder a notched ring two inches wide to the top of the jar. The notched side of the ring is then soldered to a five-inch tin pie pan. The illustration makes the pan look too large; there should not be much room allowed. The jar can be filled with water and the lid screwed on and when the pan is set on the floor or ground it makes a very acceptable drinking fountain.

CHAPTER V

JUNE HATCHED CHICKS

MR. SEWELL RECALLS PROMINENT WINNERS THAT WERE HATCHED IN JUNE—TO PRODUCE THEM ONE MUST STUDY NATURE'S WHIMS AND PREPARE ALIKE FOR RAIN AND SHINE

F. L. SEWELL



WE BELIEVE chicks come into the world with the best conditions for rapid growth at the time of fruit blossoming. That is about the middle of May in this latitude—but in seasons as backward as some are, June is not a bad month in which to start.

Rearers of pheasants look to this month as their best season for hatching—when the season is well settled and rains are not too frequent. The haying season is the time when the quail hatches her first broods. The June hatched Mediterraneans, Games,

Hamburgs and some others will require no special urging to bring them into fine form and feather for the early winter shows. Our ambitious fanciers who are not content with any but the very large breeds, weighing eight to twelve pounds, must remember that they are handling races developed through artful selection and most advantageous environment.

The fancier who sets out to win in the present day competition at our best shows and reaps the high prices that are paid for the prize-takers will keep in mind that every day must bring gain in growth to his June chicks; he will see that they have everything that adds to their comfort and are well protected from all that retards their growth or spoils their general condition and plumage.

No doubt at the winter show you have stood admiring some splendid specimen in the American classes or even of the grand Asiatics and a proud owner assured you that the bird was "only a baby—a June hatched chick," and you wondered how he produced such freshness of feather—such perfection of bloom; and a question brought the reply, "Why he has not had time to lose it—he just seemed to grow every day from the time he was hatched until now." Therein lies success—not an hour's neglect when natural, healthful development could lag. Many of the finest show birds we have seen at the great eastern shows of New York and Boston we have known to be June hatched. It is an old saying among the fanciers that pullets appear at their finest just the few weeks prior to laying their first egg, and if the show birds can just reach maturity on show week they will appear in the pink of condition—with vigor at its height and the plumage at its finest.

We mentioned the settled condition of June weather as being favorable; however, a protracted dry season may be far from beneficial, when a liberal supply of green and insect food cannot be obtained. No birds can grow well without them. Between a season of continued droughts and excessive rains we would choose a season where the birds had proper protection—dry coops and covered runs attached for wet days. Between showers the birds will find abundance of green food, insects and worms, while in the season of drought they are apt to lack for both these. It is always a safe provision to have a patch of young clover or some good crop for green food. We know of nothing better than a small field of white clover that can be watered and kept

green (a part to be cut for winter use) for the birds to forage over. During continued dry weather when the surface of the soil seems to present no insects or worms a strip can be occasionally plowed up, giving a fair supply of worms and bugs. A pile of small chips and partially decayed leaves will afford excellent scratching, especially if partially in the shade. Insects are constantly gathering in such a place. The perfectly clean swept poultry yard may look to some eyes most tidy, but to the chicks that hanker for a hunting ground where they may stir up bugs or worms such a place without its rubbish pile is a mockery to their nature. A few wagonloads of old rotten wood and leaves from the forest present a constant picnic to the chicks in summer. Place the pile partly in the shade. The frequent visits to it by the chicks will prove their appreciation of it.

The exercise taken in scratching for the insects will induce thrift and add to the strength of the birds. Have you not frequently received among your purchases, birds seemingly lacking in all thrifty habits actually spoiled in their bringing up? Some breeds, notably those nearest the original type of the wild Bankiva fowl, hunt all day, turning over the leaves as they search about, while others seem to care for nothing beyond the dooryard and the granary. This disposition and habit can be largely due to the methods employed in feeding while the chicks are growing up. A certain amount of range, encouraging the chicks to hunt and scratch for at least a part of their food, will add value to the birds in healthy and thrifty foraging habits. These last remarks apply especially to chicks leaving the brooder or hen in a dry season when the natural food may be scarce and the temptation strongest to depend entirely upon the feed bucket.

We learned through sad experience not to allow chicks to nestle or roost upon the bare ground. There should always be a board platform raised a few inches above the earth, keeping the birds dry under foot at all seasons.

We note that small, movable coops for weaned chicks are rapidly growing popular, a number of very practical patterns now being made to take down and ship in a small space. We know that the value of these movable coops can hardly be estimated. With such well planned and convenient coops the chicks can be constantly on clean, fresh ground and with the movable covered runs attached the long rainy days are not nearly as much to be dreaded by those ambitious to see their birds growing every day. Much of the failure to succeed with young turkeys and pheasants during the last two seasons is due to the lack of this kind of protection. The fine young chicks can be weathered through many a wet week to our entire satisfaction and the coops made to pay their way many times over in the saving they will be to young stock, among which we look for our next winter's prize winners.

With vigorous parent stock we always expect to produce rapid growing chicks, and with constant attention to securing for them the best foods and giving them protection from vermin and ill weather we look for many of the most perfectly conditioned show birds to come out of these June hatched broods.

MID-SUMMER AND FALL WORK

CARE AND MANAGEMENT OF YOUNG AND OLD STOCK, IN AUGUST, SEPTEMBER AND OCTOBER—PREPARATION OF WINTER QUARTERS—THE MOST UP-TO-DATE AND EFFECTIVE METHOD OF FUMIGATING THE POULTRY HOUSES IN SUMMER

P. T. WOODS, M. D.

MIDSUMMER with its extreme hot weather is often a trying time for both young and old stock. It is of the utmost importance at this time to keep the house open and cool, all quarters and yards clean, and to supply an abundance of shade and shelter from sudden showers.

Overcrowding must be avoided, as crowding and filth in poorly ventilated coops or houses is always dangerous and almost certain to result in heavy losses. Diarrhoea is one of the most common hot weather troubles in poultry of all ages. When it first makes its appearance, charcoal freely fed may check or control the disorder. The diarrhoea may be due to food or drinking water being foul with droppings or other filth; to feeding impure, musty and mouldy food; to overheating; to feeding in dusty, musty or mouldy litter; to unclean quarters and dampness; to overfeeding on meat food or feeding spoiled meat; to eating poisonous substances or to indigestion from any cause.

The first thing to do when diarrhoea makes its appearance is to find the cause and remove it. Drinking from filthy pools in unclean runs after a sudden shower, or drinking barn-yard seepage is a common cause of diarrhoea ("bowel trouble") in hot weather. If after removing the cause, charcoal fails to remedy the trouble try the following treatment:

For Young Chicks

Withhold all food for twenty-four to forty-eight hours and give only scalded sweet milk thickened to the consistency

of cream with well-boiled bread flour. This is to be lightly seasoned with salt, ginger and nutmeg. Let them have all they will drink. Return to the regular ration gradually, making sure that the food given is pure and sweet. Provide if possible, a good, clean, bright, grass run.

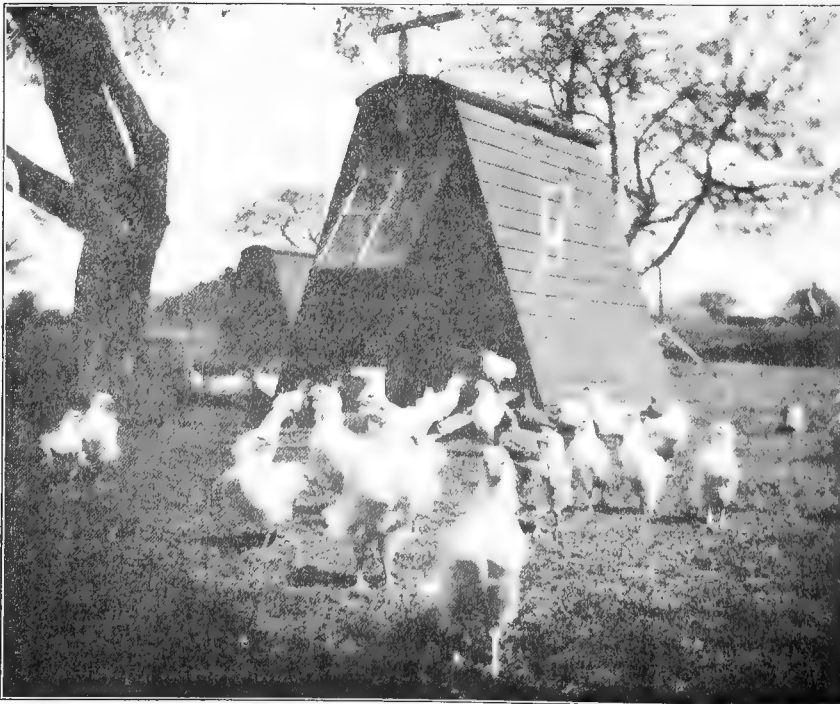
For Adult Stock

When diarrhoea makes its appearance in adult birds in warm weather remove the sick birds at once to hospital quarters. If any of them are passing a blue-grass-green discharge they should be given at once a one to three drop dose of creolin in a tablespoonful of water. Clean up and disinfect all droppings. Add five drops of creolin to each pint of drinking water allowed the sick birds. If the diarrhoea persists, and becomes greenish-yellow, yellowish or blood-streaked, obtain from the nearest homeopathic physician or pharmacy some trituration tablets of mercury bichlorid 1-1000 of a grain drug strength each (3x). In severe cases one of these tablets may be given to the sick bird morning and night. For flock treatment dissolve twelve of these tablets in a pint of drinking water and allow the sick birds no other drink. For the first few days while under treatment, feed only easily digested soft food. Fresh, bright, succulent green food should be fed freely. White of eggs may be given in severe cases, but meat should not be fed to fowls having diarrhoea.

Work With Adult Stock

If you have not already done so, it is time now to carefully cull your adult breeding stock. Females, which you intend to keep over another winter should be given open-air quarters with a good sized, well shaded, green grass range. Do not allow any male birds to run with them. They need a rest. Choose only the best year-old, and in some cases two-year-old, stock that is in good order—sound, healthy and vigorous. Male birds which you intend to keep over, you should give small colony coops and runs on grass land. Do not hold over any males unless you are sure that you wish to breed them another season. All adult stock which is culled out and which you do not intend to keep should be sold according to quality either as breeding stock or as market poultry, making sure to dispose of them before the birds begin to moult. Be sure the adult birds in summer quarters are not too heavily fed.

A light diet of the best heavy white oats, whole or cracked corn and wheat with a very little beef scrap and an abundance of green food usually makes the best ration. Pure clean water in a clean foun-



A desirable type of portable, apex, colony house, for growing chicks. It has a board floor and is admirably suited for moving about orchards.

tain (earthen ware or galvanized iron) should be supplied in a cool, shady place. Renew the water as often as convenient, daily, if the weather is very hot. Be sure that the poultry house is wide open, and keep the drop-boards clean. Filthy accumulations of droppings in hot weather are liable to cause trouble. There is less danger from this source if the birds have free range.

Care of the Growing Stock

Growing stock intended for breeders should have ample, well shaded, green grass range. An orchard makes an ideal summer run.

Care should be taken not to allow too many birds to run in one flock. They should be housed in small, open-air, colony coops, and must not be allowed to crowd at night. When it is possible to do so, separate the cockerels from the pullets and give them different runs. Usually twenty-five young birds is a sufficient number to feed in one flock, and often twelve or fifteen will do better than twenty-five. It is not necessary to yard in each colony house.

The colony houses should be located at convenient distances apart. When the young birds are first placed in them, they should be confined to the house by means of portable fencing, for a few days. Five or six days yarding in this manner will be sufficient to get them wonted to the new quarters. The yards may then be taken away and the young birds allowed free range.

If proper care is taken at first to accustom the birds to their new home the different flocks will give very little trouble by mixing up at night. It is always well to make the rounds of the chicken coops at night and make sure that none of the houses is crowded. Coops with board floors and no roosts in a dry location usually give the best results, if the fronts are not open at the floor level.

An apex house, such as is shown in the accompanying illustration, makes an admirable home for growing chicks. Where entirely open-front, colony houses are used, it is well to provide roosts in the rear part of the buildings. The same care should be taken to supply young birds with pure food, water, grit, shell, charcoal and green bone as is taken with adult stock.

Care of the Poultry Houses and Fixtures

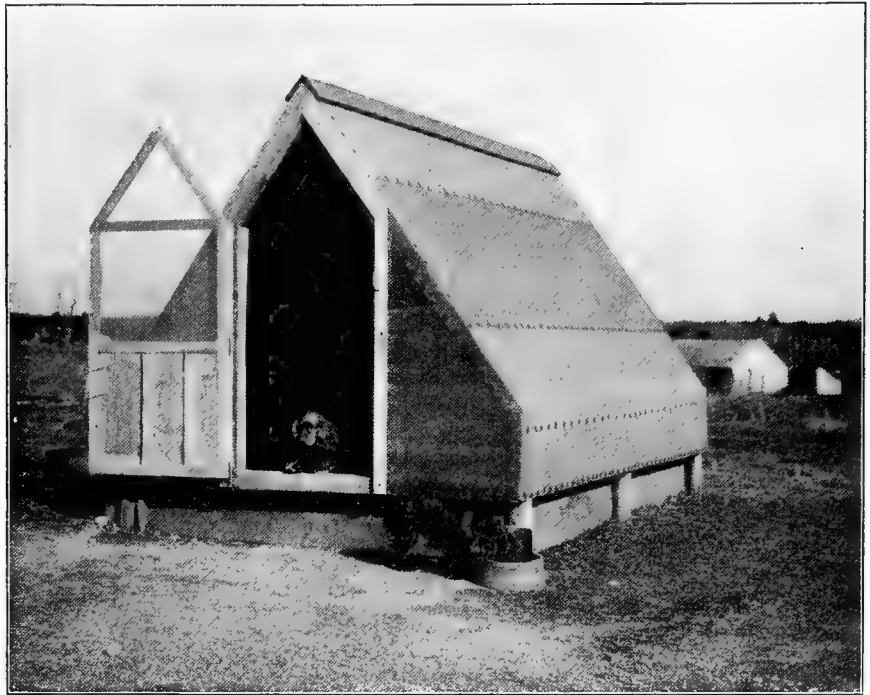
It is time now to clean up and disinfect and store away the sitters' nests, brood-coops, brooders and chick shelters used for the earlier flocks. Do it now!

Do not put them away dirty. Brooders should be cleaned with a strong solution of creolin, napcreol, carbonol, or sulphonaphthol. Use one gill of the disinfectant fluid mixed with one gallon soft water. After cleaning the brooder, brood box or coop, spray the interior with the disinfectant solution. Nest boxes or brood coops may be white-washed and then placed in the sun to dry. Store them where they will be convenient to get at when you want them next spring.

There is no time like the present for thoroughly renovating and disinfecting the breeding and laying quarters. If your houses have earth floors, six to ten inches of the top earth should be removed and replaced with clean gravel or

sand. All old litter should be removed and burned.

All nest boxes should be cleaned, and all old nesting material removed and burned. If the house has a wooden or cement floor it should be first scraped and swept, then sprinkled thoroughly with strong creolin disinfectant solution, mentioned above; scraped again and then white-washed. All dust and cobwebs ought to be swept out of the house be-



Apex colony house of fresh-air type as designed and used by Mr. J. H. Curtiss, Assinippi Mass. It has a board floor but no roosts and makes an excellent home for either young or old stock.

fore cleansing the floor. Clean the windows, too, while you are about it. Bear in mind that this is the annual house-cleaning. Take the nest boxes, food hoppers, or other furnishings out and give them a good coat of whitewash. The interior of the buildings may be whitewashed with the aid of an automatic spray pump, if so desired, and the house then fumigated while the whitewash is still wet. (See "Method of Fumigating," described on page 72.)

If the yards are small and bare, scrape them and remove the top crust to the manure pile or garden. Then spade them up or plow and stir the soil until it is well aired and pulverized. Oats or turnips make a good crop to sow in the poultry yard at this time and the fowls may be allowed to eat the shoots and young plants after they are a couple of inches high. Large runs should be plowed, well harrowed and sowed to some quick-growing crop or should be kept well stirred until late in August or the middle of September, and then sown with rye or wheat for winter growing; well sodded grass runs take care of themselves if they have sufficient slope to drain properly or if the soil is sufficiently porous.

September and October Work

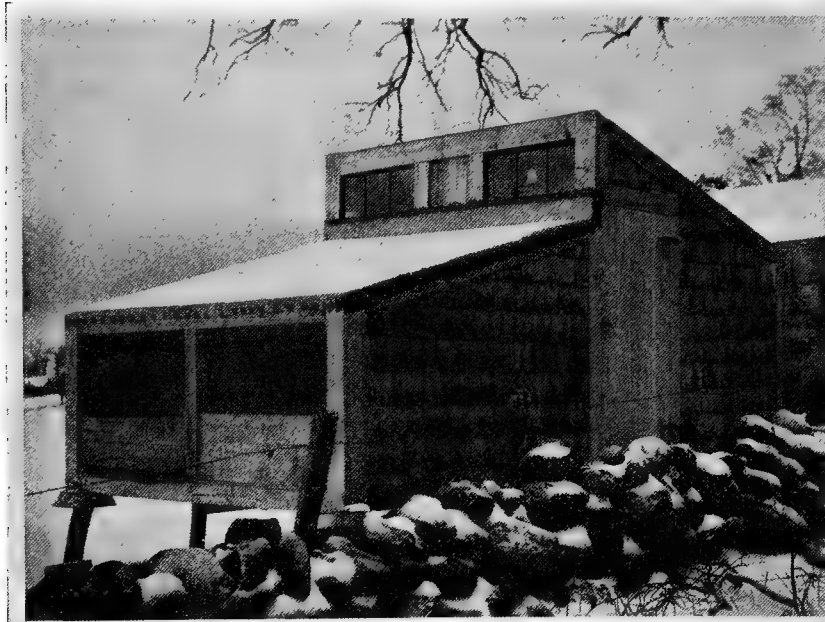
Young pullets intended for winter layers should be given, so far as possible, free use of a large grass range through the month of September, and should be fed liberally.

They may be fed on the same ration as that used for laying stock. They should remain in the colony house until the latter part of September, unless the nights are very cold. Usually by October 1st they should occupy their permanent winter quarters in the laying and breeding house. Where

open front quarters are used for housing breeders and layers, care must be taken to see that young pullets, when placed in them, use the roosts at night. If they are allowed to sleep on the floor they are very liable to contract catarrhal colds.

Young stock are much more susceptible to colds than adult birds. The adult fowls should go into winter quarters at about the same time, usually housing them by the middle of September or by the first of October. Open-air, open-front quarters are best. Do not put too many birds in a flock, try to avoid crowding on the roosts at night, and do not allow young and old birds to sleep on the floor at this time.

Bear in mind that where a large flock is taken from a small colony house and placed in good sized laying house you are subjecting the birds to a very considerable change.



WOODS' OPEN-AIR POULTRY HOUSE, EXPERIMENTAL BUILDING ON DWINELL FARM, TOPSFIELD, MASS.

Illustration shows east side and south front. This photograph was taken immediately after a heavy snow storm. It will be noted that very little snow remained on the south slope of the roof, and that is beginning to melt away in front of the windows. Plans and description of this house appear in our book "Poultry Houses & Fixtures".

Where they have been packed snugly and tightly in a small colony coop, they are often given roomy, airy quarters in the winter house, and colds result from the change. At other times they are packed too thickly into the laying house, through lack of sufficient housing capacity and are too tightly closed in, and colds result.

Try to lead up to fall and winter housing gradually by preventing crowding in colony coops through August and September, and then placing the birds in flocks of comfortable size in well aired or open-front permanent quarters. See that they have an abundance of pure, fresh air to breathe at night and that they are not exposed to drafts about the roosts. Remember that fresh open air, supplied in a common sense manner, is certain to give entirely satisfactory results. Sleeping in the trees exposed to the heavy rains or roosting in drafty buildings with leaky roofs is not sane or

sensible fresh-air poultry keeping, and is certain to produce disastrous results.

Both young and old stock ought to have the regular laying ration at least a month before housing. The early pullets should be laying by October 1st, and should be kept laying all winter. It is a common and satisfactory practice to mate up the breeding pens at the time when the birds are housed in winter quarters.

Treatment of Fall Colds

Catarrhal colds in the fall or winter will not cause any trouble if handled in a common sense manner. For best results the birds ought to be housed in open-air quarters. When the colds first make their appearance as first indicated by sneezing, running of a thin mucus from the nostrils, bubbles in the corners of the eyes, the following treatment will often prove all that is necessary.

Drop twenty drops of spirits of capmhor on a tablespoonful of sugar and dissolve the whole in a quart of drinking water, allowing the birds no other drink. When the birds go on the roost at night, rub a little vaseline into the eyes, nostrils, and press some in the cleft in the roof of the mouth. Often one treatment is all that is necessary. The vaseline treatment may be repeated as often as it is required. Should the colds persist, the following is a very satisfactory remedy:

Formula

Tincture of aconite, 10 drops; tincture of spongia, 10 drops; tincture of bryonia, 10 drops; alcohol sufficient to make one fluid ounce.

Mix and shake thoroughly.

Use a teaspoonful of this liquid in every quart of drinking water and allow the birds no other drink. Use also vaseline in the nostrils, eyes and cleft in the roof of the mouth.

Where the colds make themselves manifest by watery eyes and swelling or closing of one or both eyes, the following treatment will prove very effective. Obtain from your druggist a fresh 5 per cent solution of protargol and a small glass "eye-dropper." Cleanse the eyes carefully with a little lukewarm water and carefully drop a few drops of 5 per cent protargol into the affected eye, taking care not to touch the eye with the glass. Treatment should be given morning and night.

In the drinking water use ten drops of tincture of pulsatilla in each quart of water. Allow the birds no other drink. In simple cases, simply bathing the eyes once or twice daily and cleansing the mouth and eyes at the same time with 5 per cent solution of boric acid in water will prove effective.

PROFITABLE LATE HATCHES

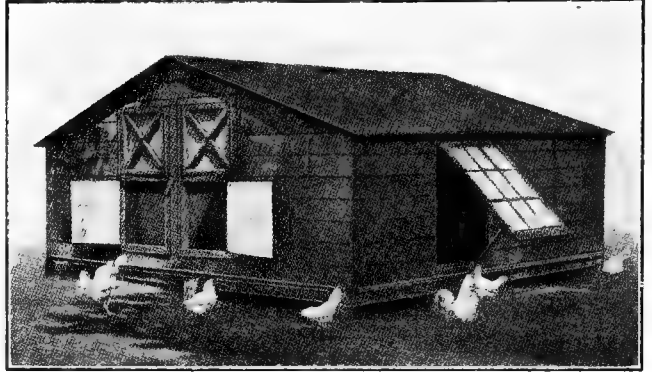
ADVANTAGES OF LATE OVER EARLY HATCHES—OLD HENS AS BREEDERS—SHOULD CAPONIZE THE SURPLUS COCKERELS—HIGH PRICES PAID FOR FEATHERS TO BE USED FOR THE DECORATION OF "MY LADY"

S. T. CAMPBELL

MID-SUMMER of the season of 1906 found the writer without a sufficient number of chicks, the early hatches not having been as successful as in previous years. We determined to try to obtain more chicks, late as it was, so we started our incubators and placed choice eggs under a few faithful hens, during July, August and September. The eggs proved to be more fertile than in the earlier part of the season and the chicks hatched were vigorous. This crop of youngsters was kept apart from the earlier ones and with the abundance of insects at this season, together with seeds and grains from the harvest field, these young chicks grew like weeds. At the age of three months the males and females were separated. Those not showing promise of maturing into good specimens quickly were sold on the market, though many of the cockerels were caponized. With good feed through the early winter, the pullets were brought into laying condition in January and by the middle of February ninety per cent were shelling out the eggs.

The following June these birds began to moult and this early moulting makes these late-hatched chicks profitable. By the last of August most of them were through moulting having put on their new dress without materially decreasing the egg production as they continued to lay while moulting. With their new plumage they were in readiness for the fall fairs and early shows. It is a well-known fact that there are but few fowls in good feather for the fairs. These late-

average of $3\frac{1}{2}$ eggs each per week or an egg every other day. Eighty-five per cent of the eggs were fertile and every fertile egg produced a strong, vigorous chick. These hens had



AURORA LEGHORN FARM FRESH-AIR HOUSE

Mr. R. P. Ellis, proprietor, states that he has never failed to get a forty per cent winter egg yield from the birds kept in these 14 x 14 laying and breeding houses. Note that the house is raised from the ground. Mr. Ellis thinks this is a decided advantage.

been tested for egg production in their pullet year and as hens had won many prizes in the show room. This proved conclusively to me that it is well to hold on to the tested hens and breed from them until they are at least six years old, in fact an extra good hen should not be disposed of, regardless of age.

Caponize the Cockerels

It is surprising that more breeders do not caponize their extra cockerels. There are so many advantages to be gained by adopting this method to make surplus males profitable that breeders generally should investigate the matter thoroughly. Capons are profitable. They can be made to weigh a third more than cockerels and they bring three and four times the price of the ordinary male bird for table use. Furthermore, there have never been capons enough to supply the demand.

A Profitable By-Product

One of the by-products of poultry that is receiving but a limited amount of attention is feathers. Few people realize that feathers when properly cured are a source of considerable profit. They bring as much as a dollar and a quarter a pound. The tail feathers of a male bird will frequently sell for \$1.50. These feathers are used by milliners in decorating hats and by manufacturers of feather boas for ladies; as much as twenty cents an ounce has been paid for choice feathers. Right here is where the Minorca fowl scores one hundred, for where in all poultrydom can be found plumage so attractive? The beautiful green sheen on the black feather requires no coloring to produce the desired result. Many times the feathers will bring double the price obtained for the fowl in the ordinary way. When the plumage is properly cured and sold to the proper parties, the meat of the bird furnishes a small part of the revenue from a flock of fowls.



General view of a row of open-front, fresh-air houses Twentieth Century Fresh-Air Poultry Plant, Joseph Tolman, Proprietor.

hatched birds resembled cockerels and pullets, though they were over twelve months old.

The following season this lot of fowls, then coming into the second adult year, again moulted in mid-summer and were again in readiness for exhibition. I have continued this process of hatching and maturing my stock with success never attained with the early hatches.

Breeding From Old Hens

Let me say a few words about breeding from old hens. This season I had a few choice hens that were five and six years old. In my opinion, they had outlived their usefulness and were placed on the pension roll, being cared for for the good they had done earlier in life. Desiring to make a test, I mated four hens, five and six years old, with a cockerel. They proved the wisdom of this venture by furnishing an

HINTS FOR NOVEMBER

TIMELY REMINDERS OF THINGS THAT SHOULD BE DONE DURING THIS COLD MONTH

M. S. GARDNER

IF YOUR young birds are still roosting out in small coops, it is high time to move them to more comfortable quarters in the winter houses. Prompt attention to this important work may save you the loss of some valuable birds by roup or colds before the month is over.

Do not let young stock sit on the ground these cold nights. It hinders growth and endangers the health of the flock.

If your poultry house has windows on two sides, this is the month to board up those on the north side. Do it today.

It is a good plan to separate the younger and smaller chicks from the main flock, if you have not already done so and coop them where they can have better care and feed. They will never develop properly where older birds are continually driving them away from the feed dish.

Look over your flock of old birds. Perhaps you will find a few hens that continued to lay after the others were

there is a good supply of grit and shell forming material accessible at all times.

As the cold weather has now shut off the supply of bugs and other forms of available animal food, fowls require more meat meal or beef scrap. Failure to provide it means slow moulting hens and few winter eggs.

Did you remember to lay by a good supply of dry loam or other dusting material for winter? Given a large dust box filled with dry loam hens will look after the lice problem in a satisfactory manner.

Do not teach your young birds to roost on the sharp edge of a narrow board unless you want crooked breast bones. It does not make so much difference with Leghorns and other small varieties, but Plymouth Rocks and birds of the other large breeds should have roosts three or four inches wide to sit on when the breast bones are tender and easily injured.

When moving the young stock into winter quarters, do not let forty or fifty pile up in one corner on the floor the first night. Nothing is more productive of colds and distemper. Teach them to fly onto the roost as soon as possible. There is less danger of crowding and consequent sickness when this rule is strictly enforced.

There is little or no danger of getting growing chicks too fat, so the youngsters should be fed all they will eat as this season of the year. A ration composed largely of corn can safely be fed to the half grown or not fully developed chicks at this season.

When the November storms compel us to house our flocks more closely, we are usually tempted to put more

birds into a given space than our best judgment tells us is advisable and safe. Do not yield to the temptation. Better send some of the poorer specimens to the butcher than to crowd the really valuable ones. Have all the birds in each pen as nearly of one size and age as possible. They not only look better in this way, but results are better. Pullets should never be wintered in the pen with old hens. Either the hens will get too fat or the pullets will be underfed.

Did you raise some cabbage of mangle-wurzels for winter feeding? If not, alfalfa cut very green and cured nicely, or second crop red clover, will answer the purpose very well. Perhaps you can buy it of some farmer. If not, clover meal sold by all poultry supply houses can be purchased at reasonable prices.

If you have painted the roosts every week during the summer with kerosene or some liquid lice killer, you probably have not been troubled with mites. If they have gained a foothold and you are having trouble to rid your house of them, try white wash. It can be applied either with a brush or compressed air sprayer. Fill all the cracks and crevices full and you will kill everyone the whitewash touches.

Perhaps you have not noticed whether there are mites in the houses or not. Look at the ends of the perches and in the cracks in the walls or platform. If the



Colony houses scattered through an orchard make desirable quarters for growing chicks.

moulting. These hens are now in full moult and nearly naked. They should be separated from the earlier moulting ones and given especial care for the next six weeks.

Do not make the mistake of shutting all the windows and doors in your poultry houses these nights simply because there may possibly be a frost. If there are cracks or loose boards on the north side, or east, or west end, nail on the boards and cover the cracks with building paper, but leave the windows on the south side open. You will be surprised at the amount of cold a hen can stand and be happy if she does not have to sit in a draft. A tightly closed poultry house is an unsanitary poultry house.

If you intend to exhibit those fine cockerels and pullets in December or January, they should be put in clean pens now and the pullets separated from the males and old hens. Never allow a prospective exhibition bird to become dirty or soiled in plumage or legs. You cannot wash a dirty bird so he will look as well as one that has always been kept clean.

Do not forget to provide nests for the early hatched pullets. If they are compelled to lay on the floor or roosts they may form the habit of eating eggs, and the habit once formed may keep you busy all winter. "An ounce of prevention is worth a pound of cure." Both the early moulting hens and the early pullets will be laying soon. See that

mites the boards will be covered with white specks and every crack will be full of the mites. These are white when first hatched but after filling themselves with blood from the hens they are red. The flock of hens sitting each night on a mite infested roost seldom lays enough eggs to pay the feed bill.

This is a good month in which to plan for next season's business. One of the first things to do is to learn to be systematic. Have a certain time to feed and water. Feed at the same hours every day. It makes little difference whether you feed mash at eight o'clock in the morning, noon or four o'clock in the afternoon, only feed it at the same hour every day. The fowls soon learn when to expect it. Do not feed mash one day in the morning and the next day

in the afternoon. A change of this kind from one style of feed to another often causes trouble and interferes with the egg yield.

Many men who give their cows and horses the best of care let the hens roost on the fence and dig their rations out of the straw stack or manure pile, or perhaps grudgingly throw them a few oats once a day. This class of men always say, "hens don't pay." Give the hens a chance. Put them on equal footing, as to care and housing, with your cows and other stock and the chances are they will pay you a larger percentage of profit than any other live-stock on the farm.



YARDS CONTAINING SMALL CHICKS AT FISHELTON

Note the grass runways and ample shade. Chicks never do well where vegetation does not thrive. Rich soil is as good for chicks as for vegetation.

CARE OF VALUABLE CHICKS IN BAD WEATHER

HOW CHICKS ARE MANAGED AND FED ON THE 120-ACRE POULTRY FARM OF U. R. FISHEL—SOME INTERESTING VIEWS OF THE OUTDOOR BROODERS BY MR. SEWELLA—SIMPLE METHOD OF HERDING THE CHICKS

G. M. CURTIS

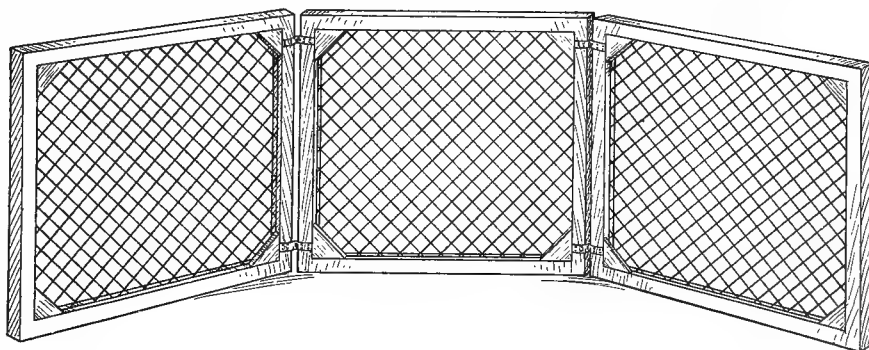
EARLY in June, Mr. Sewell, artist, made a trip to the Bluegrass section of Kentucky to investigate the method of raising turkeys for market and report same in these pages. Enroute home, about June 12th, he stopped at Fishelton, in Indiana, the home of Mr. U. R. Fishel, originator and extensive breeder of the "Best In the World" strain of White Plymouth Rocks. While there Mr. Sewell made several photographs of growing chicks and had intended to prepare an article entitled "Protective Development of Valuable White Plymouth Rock Chicks in a Rainy Season," but a sudden illness prevented him from completing the article. He had mounted and decorated the photographs of White

Rock chicks taken by him at Mr. Fishel's home and had started to amplify his notes. The photographs as decorated by Mr. Sewell are presented herewith.

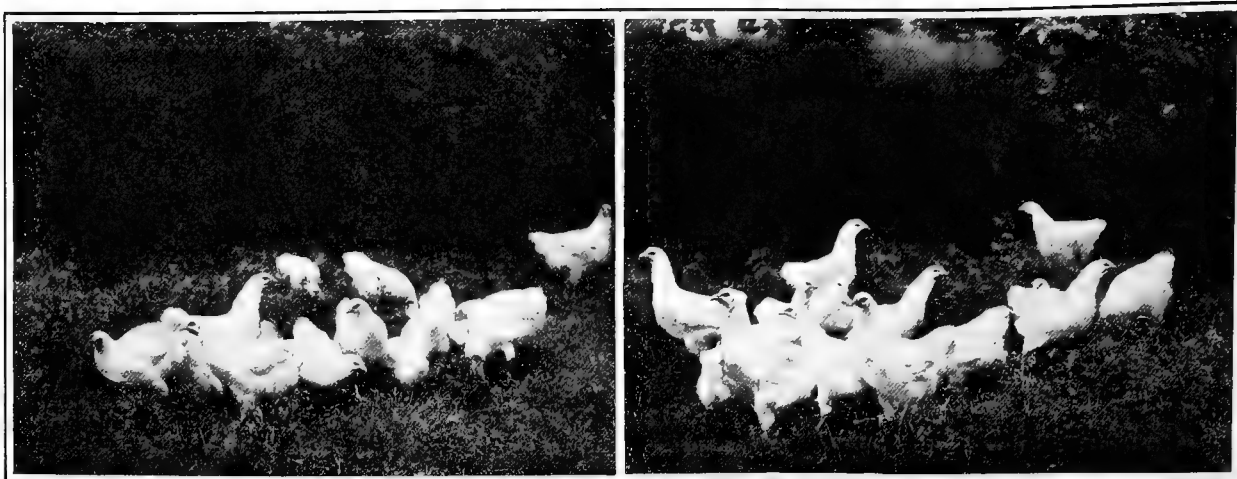
On finding that Mr. Sewell's notes were incomplete, we wrote Mr. Fishel and asked him to supply us, in writing, substantially the same data and ideas he had given Mr. Sewell verbally. Mr. Fishel promptly complied and the following paragraphs are from his letter:

Care of Chicks at Fishelton

"No doubt a large percent of the chicks hatched each spring are lost during stormy weather, therefore our method of caring for chicks in bad weather will perhaps interest and prove of benefit to your readers. That was Mr.



Folding device used by Mr. Fishel in herding small chicks.



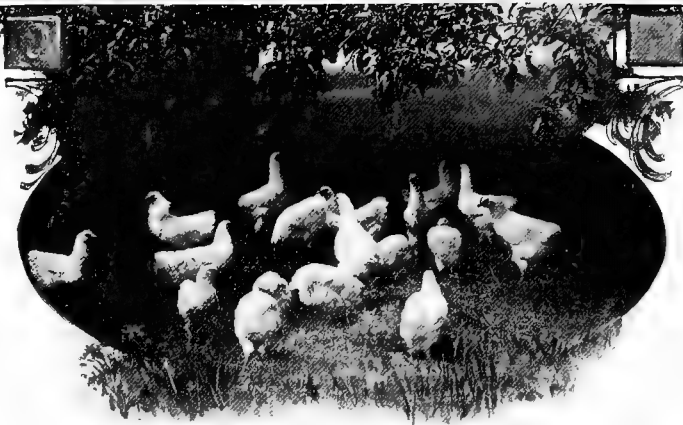
Sewell's idea in taking the pictures at Fishelton and in jotting down notes during our pleasant interview.

"With us the chicks are taken from the brooder house when they attain the age of from three to five weeks; they are then placed in outdoor brooders. These brooders, twenty one in number, are located in a yard fourteen rods long by seven rods wide. This yard or tract of land is enclosed by a 6½ foot wire fence. For the bottom of the fence we use one-inch wire netting, eighteen inches high. Above this we use five feet of two-inch wire mesh, thus giving us a fence through which small chicks cannot pass—that is, chicks three to five weeks old and older.

"The yard is well shaded during the warm weather of May and June. But little shade is needed during March and April as sunshine then is what the chicks need more than shade. Our main chick yard as here described is divided up into twenty-one small yards, the division fences being made of one-inch mesh two feet high. Each one of these twenty-one yards contains a Standard Outdoor Brooder. In each case the brooder is placed in one corner of the yard as shown in the photographs taken by Mr. Sewell.

"The idea of placing the brooder in one corner of the yard is so that by use of a little folding device that we have, the attendant can set this device in front of the brooder, extending over to the fence and then when caring for the chicks he can drive the entire brood belonging to that brooder in behind the brooder. The chicks will go between the brooder and the fence, also in front of the brooder next to the fence, and then the folding device is drawn up to the other side of the brooder, thus holding the chicks immediately in front of the brooder where they can be readily driven into it. By this means one man, when he sees a storm approaching, can easily get into the brooders one thousand to two thousand chicks without harming any of them. We know, because we often have done it. (See illustration).

"The folding device above mentioned is made of one



GRASS RANGE AND SHADE AT FISHELTON

It was such scenes as these that caught the eye of Mr. Sewell and suggested to him the idea of reproducing them in these pages. Compare this method of raising chicks with the effort to raise healthy, vigorous stock on bare ground, in close confinement. Constitutional vigor is of utmost importance in the successful rearing of poultry, both for market and for exhibition purposes.

inch square light lumber, making three frames each thirty inches long by two feet wide and covered with one-inch wire netting. The frames are attached together with heavy leather straps, which make it possible to fold the frames closely together. We find that this simple little device saves lots of work and it has been the means of saving many a valuable chick for us when our helpers have had to work quickly on account of a heavy storm coming up suddenly.

Often we have been compelled to put up our chicks, that is, drive them into the brooders, as many as twelve times in a single day.

"After awhile, as they grow older, the chicks learn to go into the brooders without being driven. As soon as they do this they are taken from the brooders and placed in small colony coops, located in an acre lot that adjoins the brooder lot. Mr. Sewell took a picture of two of these colony coops. They are well ventilated and the chicks are protected from night prowlers. Our chicks are permitted to remain in these coops until they are moved out on the farm range. On the farm range we keep them in large colony houses, many of which are made of piano boxes. We sometimes keep them in these well ventilated piano boxes, equipped with roosts, until they are selected, sold and shipped to all parts of the world. In this way all Fishelton White Rocks are farm reared, so to speak. From the age of three weeks up until the time they are sold our chicks have free range. They practically live out of doors. This means health, steady growth and constitutional vigor.

Feeding the Chicks

"After the chicks are placed in the small colony houses we begin hopper feeding, using a three-apartment hopper. In one apartment is a mixture of grit and oyster shell, in a second apartment is a mixed ration consisting of wheat bran, eight parts, charcoal, one part, meat meal, one part. In the third apartment is a mixed dry grain food of wheat, oats, corn, sorghum seed, sunflower seed, etc.

"Besides the hopper in each house we have located in various places on the farm large hoppers containing three apartments, one apartment filled with dry mash, another with the bran mixture and the third with the grain mixture above given. I find that these field hoppers are often visited by the chicks and more feed is eaten from them than from the house hoppers. The chicks seem to think that they are stealing this food, therefore they eat more of it.

"As the chicks increase in size, the feed is changed to whole wheat, corn and oats, these grains being soaked in warm water before feeding during the fall months.

"By the above simple methods we have no trouble in growing large-boned, strong, vigorous fowls—in fact, I claim that no variety possesses stronger vitality than Fishelton White Plymouth Rocks. My customers can testify as to this.

Keeping Things Clean

"All our brooders, colony coops and colony houses are

cleaned every day, without exception. I attach great importance to clean sleeping quarters for healthy chicks and to plenty of fresh air, but without drafts. Our chicks are regularly supplied with pure, fresh water. As the result of these methods our death loss is small indeed.

"We do not separate the sexes at all, so far as growing stock is concerned. When birds have unlimited free range it is not necessary to separate the sexes.

"The first of each month, beginning November 1st, our entire flock of from six to twelve thousand birds (depending on how many we have brought in from neighboring farms) is carefully gone over, and all birds not coming along well as to weight, vigor, etc., are culled out and sent to market. Only healthy, strong birds are retained in the flocks.

A weakly or a sick bird is a costly piece of property. We want nothing to do with them."

POULTRY PESTS

SIMPLE METHODS OF RIDDING FOWLS OF THE COMMON AND MOST ANNOYING INSECTS—HOW TO FUMIGATE THE POULTRY HOUSE

P. T. WOODS, M. D.

Lice and Mites

IN THE early spring is a good time to begin to fight lice and mites. A little thorough work at this season of the year will save a great deal of labor and many losses later. Lice and mites breed rapidly in the spring and make their appearance in great numbers long before the advent of warm, settled weather.

All kinds of poultry and birds have lice and are apt to be troubled with mites. Don't imagine for one moment that they are confined to fowls (hens and chickens) alone. Pigeons, ducks, geese, turkeys, pea fowl and guineas as well as all wild and domesticated birds have lice and mites. Prof. Theobald has named as affecting common fowl alone some seventeen varieties of mites, ten kinds of lice, three sorts of fleas, two parasitic flies and two dangerous predatory bugs. That makes a formidable and rapacious army of pests too dangerous to life and health of our flocks to be carelessly ignored.

Don't say "my fowls are not lousy." We don't believe it. We have never seen a fowl that was entirely free from insect pests, unless it had been very recently and thoroughly treated to get rid of them. Get busy and look for them. Examine all cracks and crevices about the poultry house, joints and rests of roosts, droppings-boards and nests for mites. Look over the fowls carefully, opening the feathers up down to the skin. There are some four varieties of body lice that may be found anywhere on the fowl running about on the skin; two kinds are common to the rump and wings and may be found on the skin or hiding in the soft feathers, lying low to escape notice; two more frequent the head and neck; these are a lazy sort and will be found feeding close to the feather barbs or lying close to feathers near the skin; two more make their home on the primary and secondary feathers; these are long, narrow gray fellows and not easily discovered except on spreading the wings and looking closely at the under sides of the feathers near the shafts; they are usually quiet but can move lively enough when they wish to. All of these are dangerous to the life and health of chickens and injurious to fowls.

Some people claim that "a reasonable amount of lice don't harm a fowl and that they help clean up the dead skin

and feathers." That may be true to a very limited extent, that is, a few lice may be present all the time on adult fowls without any injury being apparent. The lice are biting animals and are not equipped with sucking apparatus like the lice of humans. They feed on the scales of the skin and on the feathers, eating away the soft parts, and such fluids of the body as they may obtain they get through scratches or abrasions of the skin or feathers. They have sharp claws and cause intense irritation of the skin, by scratching and crawling, when present in large numbers. They make the feathers ragged and frayed by eating and chewing parts of them. They act as carriers of disease germs and the seed of intestinal parasites. You cannot hope to have healthy fowls or chicks if you permit them to remain lousy.

Some mites, notably the common red mite, are poultry bed-bugs. They can live a long time in cracks of woodwork and they prey on the fowls at night or when they are on the nests. They suck the blood of the fowls and have been known to kill sitting hens or to drive them from their nests. They cause sickness, debility and may carry disease germs. Other mites cause skin diseases, still others cause disease of the respiratory organs, and one of the most common sorts, next to the red mite, is a scab mite that causes "scaly leg;" another scab mite plays havoc with the plumage and is known as the depluming mite. It does not pay to raise and feed a big crop of lice and mites; it eats up your poultry profits. Comparative freedom from the pests may be had by the exercise of a little care and preventive treatment.

Some fowls harbor more of these unfriendly insect guests than others. Usually it is either an ill or lazy bird that is the most lousy member of the flock. Failure to use the dust bath freely is one of the most common causes in such cases and the fact that idle, sick or debilitated fowls are commonly very lousy leads to exaggerated statements of the ill effects of vermin. Then too, just as some fowls are more susceptible to certain diseases so some are more prone to be affected with insect pests. Lice breed on the fowl. Scab mites, tissue mites, air sac mites and their kind breed in or on the fowl. Red mites and other blood-sucking bugs breed in the cracks of the woodwork, in old straw and in dust and filth in dark corners.

To Get Rid of Lice

Pure, fresh-ground, Persian insect (flowers) powder, also known as Pyrethrum or unadulterated Dalmation powder, is the very best dusting powder to use in getting rid of all body and feather lice. It must be pure and fresh. If old and adulterated with flour, dust, etc., it is practically valueless. It ought to be made from the imported, partially-opened flower heads and some reputable importing druggists make a business of grinding it fresh in quantity. It costs from 25 to 35 cents a pound in from five to twenty-five pound lots and is well worth the price. This powder should be applied at night when the birds are quiet. It should be dusted and well worked into the feathers, down to the skin, in every part all over the bird. Begin at the tail and work all over the bird up to the last feather on the head and the last bit of down on the toes. Treat each fowl thoroughly and place it gently back on the roost so that most of the powder will be well retained in the feathers. One application properly made in the early spring will insure freedom from lice for many weeks. Often you will not need to treat them again for three months. Make a thorough job of it; it does not pay to slight the work. Don't be afraid to use plenty of the powder. Hold the fowl over a clean, paper-lined box while dusting to prevent waste of powder. Any that falls in the box may be used over again. Other insect powders cost less and may be used in the same manner, most of them are quite effective but they usually have to be used much oftener. Sitting hens should always be well dusted when set and again a day or two before the chicks hatch. Always have a dust bath for your fowls in a bright, sunny corner.

Nearly all liquid lice killers are more or less effective when applied to roosts and drop boards but they do not get rid of all the lice as the fumes do not penetrate to all parts of the plumage in sufficient strength to dislodge the lice. When they are depended upon and insect powder is not dusted into the plumage there are always enough lice left to work serious trouble. The best use for liquid lice killers is to get rid of mites, fleas and parasitic flies. For this purpose they are necessary and very effective. We have tried a considerable number of these liquid lice killers and have found all of them quite effective.

To get rid of red mites and other poultry bed bugs use kerosene or a good liquid lice killer freely about the roosts and dropboards about once a month or as often as you find any signs of mites. Use the liquid in the morning so that the roosts will be dry by roosting time. If you allow fowls to roost on perches wet with kerosene or other insecticide it may blister the soft parts or cause sore feet.

Fumigating

In old poultry houses where the wood is loaded with mites even out under the shingles, you will have to fumigate and then whitewash with a spray pump. Before fumigating get all live stock out of the house and shut it out. Provide material to stop up all openings where fumes can escape. Use sulphur candles or formaldehyde candles for fumigating and use enough to take care of all the space in the building. Always use a few more than the directions call for. Burn the candles in an old tin placed on a pan or wet ashes and so located that it cannot set fire to the building. After candles are well started burning, lock up the building for from twelve to twenty-four hours and keep all persons or fowls out of it. After that period let the building be thrown wide open for

at least twelve hours to air out before it is used for fowls.

One large size "Lister's" formaldehyde fumigating candle will serve for a poultry house 10 by 16 ft. and average six ft. stud. For the same size building burn not less than three pounds of sulphur and have the air of building moist. To moisten the air of the house and to render the sulphur fumigation more effective spray the whole interior of the building with a solution of chloride of lime. To make this solution, dissolve five ounces of chloride of lime in one gallon of water. Use in a spray pump, throwing a coarse spray.

Scab Mites and Scaly Legs

Scab or itch mites are common enemies but are easily gotten rid of with a little care. For those that attack the head and body, causing loss of feathers and accumulation of unsightly scales, use sulphur ointment well rubbed in. If a large area is affected do not cover too great an area of skin at one application. Divide up the territory and give several treatments a day apart. For scaly leg try "Hebra's itch ointment" recommended by Dr. Russman of Kentucky. Any druggist can prepare it for you. The formula is:

Precipitated Calcium carbonate, 10 parts.

Sublimed Sulphur, 15 parts.

Oil of Cade, 15 parts.

Soft Soap, 30 parts.

Lard, 30 parts.

Thoroughly mix.

Sig.—

Label "Scaly Leg Ointment."

Directions: Apply freely once a day or every other day for three or four applications. Rub well into the affected parts. After fourth application wash legs with warm water and soap. If any scales remain the ointment may be applied once or twice more to remove them.

To Get Rid of Fleas

Poultry fleas breed all the year around. Frequent use of whitewash, kerosene oil and liquid lice killers is an effective means of getting rid of them. Fumigation with sulphur is often a very satisfactory method of ridding a house of these pests. Persian insect powder will keep the nests free from them and will not injure or taint the eggs. When fleas are plenty the dark, sandy corners of houses and runs will be found to be loaded with flea maggots (larvae) and have their cocoons (pupae). Wetting down with thick, fresh whitewash or mixing plenty of fine powdered air slaked lime with the dirt is an effective means of destroying these pests. Sunshine in large quantities is also helpful. If let alone these flea maggots soon pass through the pupal stage and becomes full-fledged active little blood-sucking demons that are dangerous to the health and life of poultry of all ages. Poultry fleas are common in most climates in warm weather. We have seen some otherwise well kept poultry plants that were fairly alive with the little pests.

Where fleas abound "wood-wool," "excelsior" or shavings make better material for nests than hay or straw. For some reason this sort of nesting material seems objectionable to fleas and they usually keep away from it. Sawdust, soaked with a saturate solution of naphthalene in kerosene, placed in the bottom of nests underneath other nesting material is a simple method of keeping nests free from vermin. Only a small quantity should be used, as it is liable to "taste" the eggs unless well covered with nesting material.

THE DAY-OLD CHICK BUSINESS

ITS DEVELOPMENT—HOW TO SHIP CHICKS SUCCESSFULLY HUNDREDS OF MILES—MUCH DEPENDS ON VITALITY OF CHICKS WHICH IN TURN DEPENDS ON VIGOROUS BREEDING STOCK AND PROPER INCUBATION—STYLE OF BOX PREFERRED—CAUSES OF LOSSES EN ROUTE—NATURE PROVIDES THE NECESSARY HEAT AND FOOD—LESSONS LEARNED FROM SHIPPING DAY-OLD CHICKS—WILL INCREASE GREATLY BUT WILL NOT REVOLUTIONIZE THE POULTRY BUSINESS AT ALL—BIG SALE STILL FOR EGGS FOR HATCHING

F. W. BRIGGS



WHILE the development of the day-old chick business in this country has been very rapid during the past few years, there are still many people who are unfamiliar with the methods used and who are not very clear in their minds as to what is meant by the term or what purpose the business serves. Perhaps I can say something of interest and value from our experience.

The term "day-old chick business" is applied to the business of shipping newly hatched chicks direct from the incubator to parties at more or less remote distances. This trade was carried on successfully in England, I believe, for some years before it was attempted here. I do not know whether the idea originated in England or not, but I am certain it has remained for poultrymen in this country to develop it and extend it to wider fields, meaning by this to enlarge the radius to which it is known chicks can be shipped successfully. Experiments in long distance shipments and in the time chicks may be on the road have, of necessity, been limited in England owing to the natural geographical limits and it has been only during the past two or three years that knowledge of what can be done in this line has been acquired by the efforts of poultrymen in this country.

The layman or novice in the chicken business, is usually much surprised to learn that chicks can be handled commercially at all. That chicks may be shipped hundreds of miles, in fact many hundreds of miles, without artificial heat or food seems hardly credible to him and he is disinclined to believe it. As a matter of fact we have done many things successfully that we ourselves could not believe possible and our experiments have taught us many things that have been of benefit to us in other phases of the poultry business.

While the day-old chick business is in many ways simple to handle, and especially so when a thorough knowledge of incubating is possessed, still there are some "tricks" about the business and better results are usually obtained by buying of parties trained by study and experience to conduct it.

I will not enlarge on the importance of proper incubation in producing chicks that are endowed with good vitality to endure the hardships of travel and to live well, as the subject of incubating has been discussed very thoroughly in this book, and incubating with shipment in view is not different from what it should be in any other case. It will be realized, however, that successful shipments depend in a large measure on the care with which this work has been done, as regards proper temperature, ventilation, moisture, etc., and, back of this, on the care that has been exercised in selecting only good, healthy, vigorous birds for the breeding pens. Success with chicks cannot be obtained without attention to these things whether the chicks are to

be shipped or not, but success in shipping stands in especially close relation to these matters.

Given chicks that have been incubated properly, care must be taken to select those for shipment that have hatched among the earliest, that are thoroughly dried off and that seem strong and firm on their feet. The ones that do the best are those that are crowding close to the glass of the incubators, seeming full of an ambition to be up and doing and to take part in the world of activity. One can almost select the vigorous chicks by the sense of touch alone, by its struggles in one's hand and by its size, a good healthy chick being a plump handful.

Before attempting to remove the chicks from the incubator, especially in cold weather, it is imperative to have the shipping packages ready to receive them so they may be exposed to the chill of the air as little as possible. It must be kept in mind that they are to be removed from a draft-free compartment in which the temperature is running from 98 degrees to 103 degrees. To expose them for any length of time to a temperature 40 or 50 degrees lower than that, is to invite failure and so-called hard luck.

Boxes Used for Shipping Chicks

There are many forms of packages used for shipping chicks from the common shoe box, lined with flannel, with holes punched in it to admit air, such as is used by the farmer in transferring a few chicks from a neighbor's to his own place, to the modern chick box made of heavy corrugated pasteboard, divided into compartments holding 25 chicks each. The package that has been in the most common use, however, for the past few years is a small wooden box about eleven inches wide by 15 inches long and 5 inches deep, holding 50 chicks. This box is sometimes covered entirely with burlap which permits ventilation, and a small one inch square piece of wood is nailed across the top to prevent other packages being placed on top of it, thus shutting off the supply of air. Or the box is sometimes covered half with a wooden cover and half with burlap. On our plant I have used this form of package almost exclusively up to the present season, but, while we have had good, perhaps unusual success in this part of the business, I have not been entirely satisfied with this package and have adopted a new one for use this coming season, which I am confident will be much better.

Last season we shipped over 17,000 chicks to all parts of the country east of the Mississippi River, and one shipment at least beyond, and I do not think we lost over 175 chicks from faults of packing, or about one per cent. I feel satisfied, however, that there is no occasion for any loss at all, except from accident or extraordinary carelessness. I think our new package (described later) will cut down the mortality very materially.

The faults with the wooden box with burlap covering seem to be that the burlap will occasionally get torn, leaving an opening at some point and letting in more than the usual

amount of light, toward which all the chicks crowd, causing them to trample and cripple each other. This has been the cause of the greatest loss with us. The packages having all the burlap covering are much to be preferred to those having the half wooden and half burlap covering as in the latter package all the chicks crowd into the part with the burlap cover and cause congestion in that part. It seems to me that it is important to have conditions in all parts of the package uniform. The wooden box with all burlap covering fulfills all the requirements in this regard and would be a very acceptable package were it not for the liability of the burlap getting torn or displaced.

Many times we have had losses through the curiosity and sympathy of the public and express agents. A box of live baby chicks, with their plaintive chirruping, seems to be a matter of special interest to the curious public and often the most curious cannot refrain from lifting an edge of the burlap to get a look at the little fellows. Once disturbed the burlap rarely goes back to its original position, leaving an opening, which, though slight, is a source of danger, as it admits a shaft of direct light causing the crowding mentioned above.

Another cause of occasional loss to us is that express agents in handling the shipments will allow their sympathies to get the better of them. While we attempt to regulate all shipments so they will arrive at a convenient time for delivery to the consignee, sometimes connections are not made as we plan, and occasionally the consignee fails to do his part, and the chicks are obliged to remain in the express office for a day or so.

One case I have in mind was a shipment to a neighboring state which arrived at its destination on a Friday. The agent there immediately sent postal notice to the owner that the chicks had arrived, but either the postal was not delivered or the consignee did not respond as quickly as he should. In any case the chicks had to remain in the express office for some two or three days, over Sunday I think. The continual peeping of the chicks appealed to the agent's tender heart and it seemed to him no more than common humanity to remove the chicks from their comfortable box to the floor of the big drafty room and feed them. While his intentions were no doubt of the best, his judgment was in error and the result was a very heavy loss among the chicks almost immediately.

Probably the feed was not what it should have been for a first feed, but the main thing to keep in mind is that the chicks should not be removed from the warm box except to be placed in a good warm brooder, or under a hen, where they have access to the heat so essential to their welfare. Those who are acquainted with fireless brooders or who have it in mind that the chicks have been shipped in boxes unsupplied with heat may consider this inconsistent teaching, but such is not the case, as heat is supplied in the shipping boxes, as in fireless brooders, by the bodies of the chicks themselves. They are so crowded in the small quarters as to keep the heat as high as 95 degrees, which is the ordinary brooder heat.

Here lies the secret of chick shipping: Packing them so closely and confining them to such a limited amount of air that the proper temperature is maintained by the heat thrown off from the bodies. It seems hardly possible that

a thermometer will register 95 degrees in a box packed for shipment, but repeated experiments have proven this to be true and heat supplied in this way has the advantage of being constant and regular.

The matter of ventilation in the boxes must be carefully considered, but I think there is more danger of having too much than too little. The lung capacity of a day-old chick is, of course, small and it requires only a very small hole to furnish sufficient oxygen for 25 or 50 of them. If too much ventilation is supplied it will only reduce the temperature in the box and do injury to the chicks. It is necessary and in fact better to furnish only enough ventilation to keep the air from becoming vitiated.

As in the case of air so also with light; the amount should be limited. The darker the chick apartment is kept, the quieter will the chicks be and the less will be the likelihood of injury from jostling and trampling. A hole in the box large enough to admit the proper amount of air is quite sufficient for admitting light.

A Good Shipping Box

The package we have now adopted in view of past experiences is shown in the accompanying illustration and consists of a light but substantial box made of heavy corrugated card-board and is much like the boxes in which ladies get their suits or coats from dry goods stores in size and shape,



THE SEFTON LIVE CHICK BOX
This cut illustrates the style of box recommended by
F. W. Briggs for shipping day-old chicks.

except that it is much more substantial. It is reinforced with wire at the corners. Being lighter than the old wooden boxes, it will save express charges, and it is fully as secure. These boxes are made in 25, 50 and 100 chick sizes, the two larger sizes being divided into compartments holding 25 chicks each. This seems to be about the best number of chicks to place in one compartment as when 50 or 100 chicks are shipped in one compartment, whenever crowding occurs as in cases mentioned above, serious results are sure to follow for those unfortunate chicks that get

trampled. Holes are made in the sides of the boxes for furnishing sufficient air to each compartment, varying in size and number according to the outside temperature and the locality into which the chicks are to be shipped. Careful judgment has to be exercised in this regard.

The floor of the box is fitted with some material on which the chicks can get secure foot-hold to prevent them slipping around and this is covered with a half inch or so of cut clover, providing a comfortable, warm litter for them to lie in. The cover of the box is fitted down closely and the package securely tied up as in no case should it be opened and the chicks exposed until they reach their destination.

Chicks Need No Feed at First

Many people seem to feel that it is cruelty to animals to start chicks off on a long journey with no feed and to provide no arrangements for their being fed en route. The development of the day-old chick business has been instructive to poultrymen as it has shown them the wisdom of withholding feed from chicks quite a time after incubation. Reports I have received from chicks sent out seem to show me forcibly that the lack of food, for three or four days, is of benefit rather than of injury to the chicks, as lots that have been shipped long distances have almost invariably done well. The mortality for the first ten days appears to be less than

in many lots that are shipped shorter distances or in those lots that we have retained and fed immediately after incubation.

It is common knowledge that the chick when hatched has absorbed the yolk of the egg, or, in other words, it has enough food inside of it to keep a man alive. To immediately begin to overload the chick's digestive apparatus with other food would appear to be folly and cause enough for many of the ailments to which chicks seem to be prone. It is my idea that a great many of the troubles they have are directly or indirectly due to indigestion. I do not pretend to look at the matter from a scientific standpoint and know that many chicks die from other causes, but a little care and patience in not overloading the chick with food during the first few days of its life will help materially to give it strength to overcome other troubles. None of us would think of feeding new born babies as we have been feeding our chicks; colic and death would immediately ensue.

It has been said a chick will live a week without food and I have reason to believe that this is so. Last season we had the pleasure of shipping 50 chicks to Laramie, Wyoming, a distance of 2,600 miles, requiring 5 days and 5 nights, during which time the chicks had nothing at all to eat or drink. Of this lot 46 arrived in excellent condition, four being killed evidently by crowding, the fifty being in one compartment. Except for the loss of some thorough errors in feeding on the part of the purchaser (which were later overcome) the lot did well. This goes to show that the withholding of food for a few days is at least no injury to the chicks; it is the safest course not to hasten the first feed too much.

Do Not Crowd Baby Chicks

Another lesson learned from the handling of this business is the desirability of keeping the broods of young chicks limited in number as the crowding of chicks towards the heat in a brooder is similar to the crowding to the light in the shipping box and the results are the same, viz., many chicks that die from trampling and suffocation. While we do not know it to be so, we imagine that the development of the fireless brooder came from observations in the handling of the day-old chick business.

The hesitation that many people have in ordering day-old chicks from fear of loss of the chicks, either en route or afterwards from chilling received on their journey, is entirely unwarranted. We have letter after letter in our files telling the satisfaction that customers in all parts of the country have had with chicks we have shipped them and we presume other breeders have many similar letters. There is no reason why day-old chicks shipped properly may not be transported many hundreds of miles and do as well as chicks raised on the home place. The business has been developed to a point where most breeders, like ourselves, give evidence of their faith in their ability to deliver good livable chicks by guaranteeing safe delivery of the chicks to the customer. Of course the breeders' responsibility ceases on the delivery of the chicks as poor success with chicks often arises from improper feeding, irregular handling of the brooder, unsanitary surroundings, etc., over which they can have no control.

The baby chick business has come to stay and will continue to grow tremendously, and central hatching plants with mammoth incubators will undoubtedly spring up in great numbers; at the same time I do not believe it is going to revolutionize the poultry business entirely. Eggs for hatching will still be bought, as there is much fascination and interest in watching the processes of incubation. Large plants especially will buy eggs, as they can of course do so cheaper than they can buy chicks, for the producer of day-old chicks must of course allow a certain amount for contingent expenses, such as poor hatches, poor deliveries, etc., and this has to be figured in the cost of the chicks.

Day-old chicks are of particular interest to small poultry keepers, who do not keep enough poultry to warrant an incubator equipment; to those who hatch with hens but cannot find enough broody hens to hatch as many as they want when they want them; to those who have been disappointed in results and want chicks in a hurry; and they are of interest to plants of all sizes that do not have sufficient equipment to hatch as many chicks as they require. I do not believe that the business will interfere with the hatching egg trade as much as many people seem to fear, but I think, on the contrary, that the increase in the egg business as well as in the chick business, will be tremendous during the next few years.

SHIPPING DAY OLD CHICKS

THE PURCHASE OF DAY-OLD CHICKS AS A MEANS OF STARTING AND RENEWING STOCK GROWING IN POPULARITY—A SUITABLE CRATE FOR SHIPPING DESCRIBED

RUDOLPH P. ELLIS

ANYONE who contemplates starting in the poultry business is confronted by seven, well-defined problems, if not more, the successful solution of which is imperative. A failure anywhere along the line means disaster to the whole undertaking. These seven problems or duties that engage the poultryman's attention may be briefly outlined as follows:

1—The securing (by purchase or raising) and the care, especially over the winter season, of the female breeders.

2—The selection, raising and care of the male breeders, which must be kept separated from the females and also prevented from fighting among themselves—not always an easy matter.

3—The correct conditions and mating so as to secure fertile and strong-germed eggs, and the care in gathering and keeping same until set.

4—Incubation—artificial or natural.

5—Brooding and maturing the chicks.

6—Handling the layers—housing, feed and care.

7—Marketing the eggs at a high price—not wholesaling.

Solution of First Four Problems

I have presented these tasks in the order in which the would be poultryman has to face them. And right here I believe is the great difficulty; the novice is forced to undertake the very hardest parts of the business first. The first four enumerated above may be classed as the breeding end of the business, and they have always seemed to me the most difficult.

Few care to go to the expense (the many cannot) of purchasing a trap-nested, pedigreed hen with a record of 160 to 200 eggs per year, as such a hen is worth between five dollars and twenty dollars. The labor alone of trapping her for a whole year is no small part of the money value.

Similarly, pedigreeing your males on the performance of their dams and sire's dams involves great labor—and all this

takes time; and surely, to the poultryman, time means money.

If, therefore, any method can be devised whereby the beginner, or the man who wishes to work poultry as a side-line, can be saved the great labor incident to trap-nesting, breeding, incubating and all the other preliminary steps necessary to get bred-to-lay chicks in large numbers for commercial egg-forming, it would certainly seem to fill one of the greatest needs among the great class of people who wish to take up the commercial end of poultry.

So many have been thinking along these lines that within the last few years the day-old chick industry has grown amazingly. The purchase of day-old chicks as a means of starting and renewing stock is gaining in popularity so rapidly that it seems impossible to fill the demand for them.

It is no idle boast to say that this means of securing a number of thoroughbred chicks all of the same age is so vastly superior to all the worry, expense and labor of maintaining a breeding establishment of one's own, that it is certain to be the method of the future.

Breeders are fast being called upon to sell actual chicks rather than possibilities in the form of eggs. Purchasers get something definite and the usual disappointments and complaints, incident to the selling of eggs for hatching, are no more. It must be remembered that a chick will travel, just after being hatched, from sixty to seventy-two hours without food or water, and stand the journey many times better than an egg.

Some years back we began trap-nesting to ascertain the heavy egg-layers. The labor attached to this was so great that it seemed a pity to have done so much work merely to secure the few hundred chicks we could accommodate ourselves. So we purchased four large 390-egg incubators and began advertising our bred-to-lay Leghorn chicks at twelve cents each. The demand became so great that this year we shall hatch between eighteen and twenty thousand chicks.

The chicks are shipped in boxes 14 by 24 inches, outside measurement, and five inches high, divided into two compartments, each compartment holding twenty-five chicks. The top is covered with burlap and the floor of the box with bran or saw-dust.

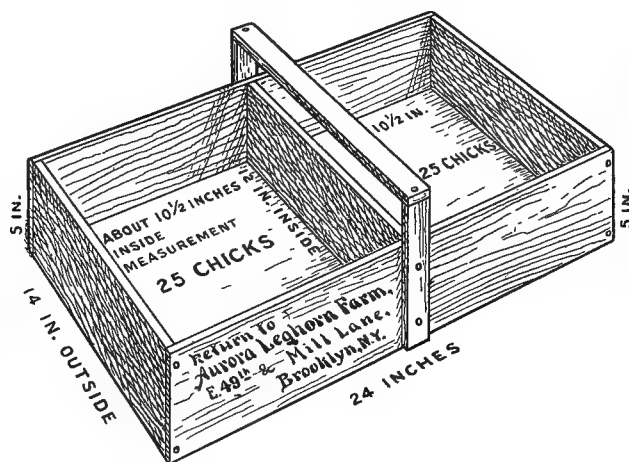
The express companies take the chicks at the regular express rates, and we guarantee safe arrival, replacing all dead or injured ones free of charge. We usually ship an extra one or two in each box so as to assure the full number arriving safely.

The chicks need no care en route other than protection from the weather. When they arrive they should be given a drink and placed in a brooder previously warmed to ninety-five degrees. They should then be fed on bread crumbs and hard-cooked eggs (boiled twenty minutes) chopped fine, and some grit should be supplied. Thereafter their treatment

should correspond with the usual way of rearing brooder chickens.

When once this method has been tried we believe no one will care to go back to the uncertain way of purchasing eggs for hatching. By the purchase of chicks no risk is run, no expense for incubators is incurred, no trying experience at hatching is necessary. A great part of the work is done for you and any conscientious person blessed with common sense and reasonable judgment can mature between seventy-five and ninety per cent of the chicks bought. The chicks do not suffer any loss of vitality in shipment, and as good a percentage of them can be raised as if they were hatched on the place.

When the great probability of the beginner not running the incubator just right is taken into consideration and his chances of producing chicks not strong in vitality is considered, it is fair to state that he runs far better chances of success in the purchase of day-old chicks from a nearby breeder of experience, than he would by any other method of starting his plant.



Aurora Leghorn Farm's Box for shipping Day-old Chicks. This box is made of $\frac{3}{4}$ inch pine. It is returnable by the Express Company for 15c. A four compartment, non-returnable box is sometimes made for a long shipment of a large number of chicks. In these boxes $\frac{1}{2}$ inch board is used, except at the ends. The bottom of the box is covered with bran or sawdust and burlap is securely tacked over the top.

Let the breeder really breed and produce live chicks—not possibilities of chicks. I believe that the day is not far distant when the sale of eggs for hatching will be in a large measure superceded by the purchase of live chicks. The up-to-date breeder must adjust himself to this change if he is to maintain his position in the poultry world.

Two facts are evident: First, that there is too much wasted energy in commercial poultry farming. Too many men are so situated that they cannot handle all its seven branches to the best advantage, economically. Second, that commercial poultry farming is not receiving its just compensation when the products are wholesaled to commission dealers. Only a private trade in a city of some size, will give the maximum return. Our branch-farm system is netting over \$2.50 per hen to the branches.

The chief merit in the system, however, is that there is less labor and expense per layer, enabling more hens to be kept for the time and money expended. An additional merit is that many a man can undertake the lessened labor of a branch farm as a side line, who would meet with but poor success if he attempted all the arduous and confining duties of an independent plant. All his chicks can be of one age, lessening his brooding season to six weeks instead of running through three or four months.

We believe that along some such lines the commercial egg farming of the future must seek its maximum returns. The present system supports too many middle-men, places the eggs in the hands of customers in the city when stale, and makes but a small return to the producer. "A dollar a hen" is not sufficient return on the labor and investment necessary to run an egg farm.



1. Bleeding. 2. Preparing for the stick. 3. Completion of the stick. 4. The first handful of feathers. 5. Plucking the fluff. 6. Almost ready for the pinners.

KILLING AND DRESSING POULTRY

DRY PICKING AND HOW IT IS DONE—COMMENTS ON SCALDING AS A METHOD OF DRESSING—THE DIFFERENCE BETWEEN WELL DRESSED AND POORLY DRESSED POULTRY MAKES A WIDE DIFFERENCE IN PRICES—CARE MEANS MORE PROFIT

P. T. WOODS, M. D.

MILLIONS of dollars worth of poultry intended for market is wasted every year through carelessness, mismanagement or ignorance of proper methods of preparation, handling and shipping. In an effort to stop this great waste, the United States Department of Agriculture has put a corps of experienced workers, investigators and lecturers in the field to determine the best methods of preparing poultry for market, killing, dressing and shipment of same. Dr. E. M. Pennington, one of these experts, recently, before the Missouri Carlot Shippers Association in convention at St. Louis, Missouri, said in part as follows:

"Three great food staples, poultry, eggs and butter, are represented here today, and I think it may honestly be said that a determination on the part of producer, packer, carriers, warehousemen, commission men and retailers to work for better poultry in the market, would soon mean a revolution in the quality from the viewpoint of birds bred to be good, and dressed to keep good until they are eaten.

"That better poultry may reach the consumer, that the millions upon millions of dollars wasted each year may be saved, the Department of Agriculture has been studying the dressing and handling of poultry in relation to keeping quality. Whether this quality will keep for a short or long period, whether the bird shall go to the consumer in fine, sweet flavor, or flat and tasteless, or with an unpleasant flavor, is frequently demonstrable before it is killed, since food in the crop means food in the intestines, and such a condition lowers the keeping quality.

"Again, the killer makes a miscut, all the blood does not escape, and the chicken leaves the packing huose so unattractive in its appearance that it is rated 2c a pound lower than its well-bled fellow. The haul is harder on the bird incompletely bled than on that which is well bled, and so is every step of its journey to the consumer, especially if that journey includes the halt in cold storage. This is one of the reasons that the same carlot, after its storage period, varies so widely in individuals, especially if bad bleeding is not closely graded out when packing first quality stuff. The killer who gets just the same price for a bird badly bled as for one in perfect condition, and who is paid by the piece,

does not take the time to set the knife properly, and sometimes it goes back beyond the skull, when there comes a great bruised looking ring, caused by the blood settling in the loose tissues just below the head; or he holds the bird's neck between his thumb and finger while he sticks to bleed, and the mark of the pressure, even though it is of such short duration, shows when the bird begins to age. Or, worse than all, to save time he tries to bleed and brain with one cut and generally succeeds in missing the large vessels in the neck altogether.

"The keeping time for a badly bled fowl, even under good conditions, is much shorter than where the tissue has been well drained.

"Torn skins or rubbed skins are another inducement to prompt decay, especially when they are dragged about over a dirty surface, as when bench roughed or laid on racks, instead of being hung to cool, or piled high on grading tables, or packed in unlined barrels or boxes. The unbroken dry skin of a chicken is a great protection against decay. When it is wet, or broken, the flesh underneath is at the mercy of the environment. The muscle just under the skin of a well bled, sound skinned bird contains very, very few bacteria, and the deep muscle practically none. But the rubbed skinned bird has generally a good starter less than 24 hours after killing and a fair crop after the first haul, and an overwhelming number by the time it gets to the retailer. So numerous are these tiny things that they have made marked differences in the chemical composition of the flesh before any odor is noticed. But the flesh does not stand up; it is not a clean, bright color, and the sweet, fresh flavor is gone. Then, if we put that chicken into cold storage, it goes down rapidly. We cannot keep a frozen bird from marked deterioration if it goes into the freezer in anything but the pink of condition. Compare the late storage bird after three months in the warehouse with the one that went in promptly and see for yourselves the loss in appearance. And the loss in flavor is just as pronounced. After six or nine months the differences are still wider. So it is going to pay you to get rid of these rubbed skins, and if rubs are bad, you can see how much worse tears are—even little ones.

Don't Scald-Pick Poultry

"While we are discussing effect of sound skins on keeping, let us look, for just a moment, at the results of scalding. This is so wide-spread a custom and so insistently demanded by certain localities, and is so bad for the bird, that it deserves special discussion. We all know how hard scalded poultry is on chilled rooms, how soon it becomes slippery when ice packed, and how it does not store so well as dry picked. We find but few practical, progressive men, who really advocate scalded stock. This is a case where the public must be educated to take dry picked stock. You can help educate by pushing dry picked birds, little by little, into the scalded markets. It is greatly to be regretted that scalded chickens are so widely used, not only because they spoil more quickly and are harder to handle, but because they do not store in a frozen condition as well as dry picked. A dry picked chicken, well dressed and chilled and promptly stored, is a pretty sure thing when frozen. For three months its flavor cannot be distinguished from the fresh, and at the end of six months the difference is a negligible quantity. Nine months show a lessening in flavor, the flesh beginning to shred a little and it is a wise thing to get that chicken sold and eaten, for every week that it is carried increases the difference between it and the fresh specimen. But we never feel sure of a scalded chicken in storage. It may keep in good condition for nine months, and it may not keep three months, even when carefully prepared for storage.

Chilling is Important

"If one continues the history of the handling of poultry in a chronological sequence, the next subject will be chilling.

Like the subject of scalding, it ought to receive more attention than can be given here. Of all the individual factors for good keeping of poultry, none is so important as the prompt and complete removal of the animal heat. If artificial refrigeration cannot be obtained; if there is no possible way to chill the fowls in cold, dry air; if one must resort to water and ice, there are undoubtedly modifications which can be made in the process which will tend to lessen the evils which always follow it. The skin and flesh soak up water, as you can readily determine for yourselves if you will weigh them before and after their bath.

"For good keeping quality, let us keep the chickens dry, and help the safeguards that nature has provided rather than hinder them. The soaking of the chicken skin in water is some like the scalded skin, except that the latter is more destructive to the skin structure. One has only to glance at the great difference in the appearance of the skin of a dry picked and scalded bird to realize that some radical change has occurred to it. It is a commercial necessity that we shall dress our poultry in such wise that it will keep to the very best advantage, and that the inherent qualities of the bird as an article of food shall be enhanced, not lessened. Because a farmer raises a fine chicken, it by no means follows that it is still a fine chicken when it reaches the consumer's table. It may be so lowered in grade by poor dressing that

a much inferior chicken, well dressed, is better eating."

From the above it will be seen that the government favors the well bred, well fed market chicken and considers dry picked poultry preferable to scalded. While for immediate home consumption, when the birds are light scalded to remove the feathers and shortly after make their appearance on the home table, there may not be the same objection to scald picking as there is in birds intended for shipment to market, we must say that our own preference is for the dry picked bird, properly chilled after dressing and kept on ice for a day or so before cooking. In the latter case the bird is more tender than if cooked soon after killing and is usually better flavored and better eating.

Dry Picking Easily Learned

Some people complain that it is too much trouble to dry pick poultry for home use and that it is difficult to learn to properly dry pick fowls for market. Such complaints are not borne out in practical experience. We have found that the average person will learn to dry pick poultry rapidly and easily after a very few trials; that when one has once learned to dry pick he considers it much easier and quicker than scald picking.

The dry picked carcass presents a much more attractive appearance, stands shipment better, makes a better appearance in the market and actually

eats better than scalded poultry that has gone over the same route to market.

Dry picking may be quickly and easily learned if one will begin with adult fowls that are in full plumage. As the picker acquires skill, he will be able to pick the more soft meated broilers and roast-



PRIME MARKET POULTRY DRY PICKED

ers without tearing the tender skin. Personally, we prefer the New Jersey method of dry picking, several stages of which are shown in the accompanying illustrations.

The only trick in dressing poultry by this method is in learning the stick. If the stick is properly made, the feathers will come out very easily. Picking should always be done in light, well aired, comfortable quarters that can be kept warm in winter and comfortably cool in summer. The picker should be provided with a long burlap apron and a killing knife having a keen edge to the point and not too sharply pointed. The large blade of the average four bladed pocket knife is about right for adult fowls, while the smaller blades are a better size for young chickens. For ducks a medium blade shoemaker's knife is best. Such a knife is shaped like the pointed paring knife common to most kitchens, and should be of sufficiently good steel to be capable of carrying and holding an edge. The picker will soon learn to make a choice of knives to suit the size of the birds that are to be dressed.

Bleeding and rough picking is done by the picker in a standing position, the bird being suspended by a loop of cord passed about the legs and hung from a nail driven into the side of the killing room at convenient height to permit the picker grasping the wings and neck of the bird with the left hand, the forearm from wrist to elbow being held in a nearly

horizontal position. Hanging the bird against the wall is preferable to having it suspended in the center of the room as it cannot flutter out of reach in case it slips from the hand.

Provide a barrel for blood and waste feathers and another barrel for feathers which are to be saved. These should be placed convenient to the hands of the picker.

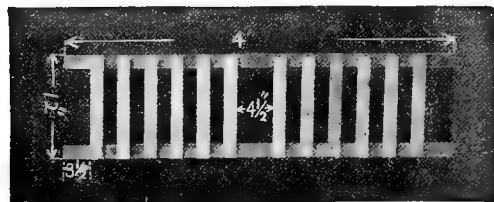
Making the Stick

With the fowl hanging in the position named in the foregoing paragraph, slip the thumb and first two fingers of the left hand down the bird's neck until they reach the angle of the jaw, forcing the mouth wide open and slightly stretching the neck. Insert the knife blade with the dull side toward the roof of the mouth. Rotate the knife quickly, first on one side and then on the other and with a slicing upward and downward motion sever the large blood vessels on either side of the neck cutting toward the bone close to skull.

As soon as the bird is bleeding freely, point the tip of the knife blade on a line with the angle of the jaw and the eye so that it is directed against the base of the skull near where it joins the spinal column and press the knife point sharply into the brain, giving a quick quarter or half turn to the blade after you feel it enter.

If the stick is properly made, a convulsive shudder will pass through the bird and the wings will be drawn stiffly back. This lasts but a moment. While it lasts, and before any fluttering commences, seize the wings firmly in the left hand holding the neck firmly with the little finger or the

SECTION NO. 1



Make four sections as shown above numbered one

last two fingers of the same hand. So hold the wings that primary and secondary feathers will be partly spread. Grasp these firmly with the extended, partly open fingers of the right hand and remove with a quick downward motion away from the fowl's body. If the stick has been well made, they will come away quickly and easily.

Next remove the stiff feathers from the tail, then quickly remove feathers from the more tender portions of the breast and body, pulling in the direction of least resistance, taking no more feathers in the hand at a time than can be removed readily and being careful not to bunch feathers from different portions in one hand. The method of removing the body feathers varies with different pickers. The main thing is to get them off of the more tender parts first, leaving the thighs until last. As a rule, the wings should be cleaned up as soon as the breast, back and abdomen have been bared. Even a novice should be able to get the feathers quickly off an adult fowl so that it will be almost clean before the muscular twitching ceases.

After the carcass has been rough picked, go carefully over it and remove all pin feathers and down. Long hairs may be removed by singeing in the flame of an alcohol lamp or in the flame of burning alcohol poured into a small tin dish. The alcohol flame does not smoke the carcass and leaves it clean. Such singeing should be very quickly done to avoid heating or charring the skin.

In killing, do not bruise the body and do not break the skull by striking with a club. Where poultry is to be shipped some distance to the market, or where it is liable to be stored,

it keeps in much better condition if the skin is not broken and if bones are not crushed. All blood should be removed from the mouth and washed from the head and face.

The dressed carcass must be thoroughly chilled before packing for shipment. If it is not practicable to do this in a chilling room or if such is not available, the birds may be cooled in an ice water bath. If packed for shipment before the carcass is thoroughly chilled, putrefaction takes place rapidly and the poultry, when removed from the box, has a disgusting appearance and is unfit to eat.

In markets which cater to high class trade, dry picked poultry brings better prices than the scald picked product. The large eastern markets pay a premium for well dressed, dry picked poultry and in some of them scald picked poultry goes begging at low prices. The same is true of some markets on the Pacific coast. A very large percentage, however, of the markets in the United States, in inland cities especially, handle scalded poultry exclusively and in most of them it is difficult to find attractive looking table poultry.

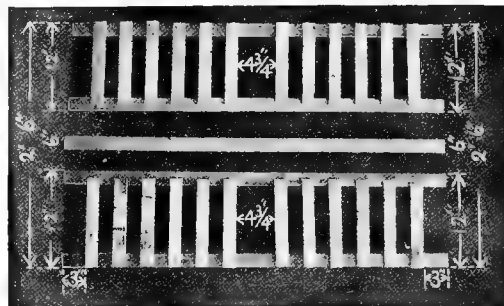
It is to be hoped that dry picking will become more general and that all of our markets will show a decided preference for products of superior quality.

DIRECTIONS FOR MAKING B. & S. SHIPPING COOPS

THROUGH the courtesy of Mr. F. S. Snyder, of the firm of Batchelder & Snyder Co., wholesale meat dealers, we are permitted to reproduce their plans and instructions for building a simple and inexpensive market poultry shipping coop.

Material Required

19 laths, each cut into four pieces of one foot in length. 75 one-foot pieces are required. 9 strips cut from 7-8 inch stock, each strip 4 feet long and 1 3/4 inches wide. 6 strips from 7/8-inch stock cut 2 feet 4 inches long. Six-penny slim nails for the 7/8 inch stocks; three penny nails for the laths. 3 pieces of tin or galvanized iron or common strap iron, each 6 inches long and 1/2 to 3/4 inches in width. To prevent splitting soak the laths and strips over night. Weight of coop when finished about 42 pounds.



Two of the sections one and the sliding bar form the top

"Make four sections, numbered 1, as follows: Take two of the four-foot strips and nail them together, nailing on them twelve of the one-foot strips of lath. The end laths are to be from 3 to 3 1/2 inches from the ends, as shown in the

illustration, and a space of $4\frac{1}{2}$ inches is to be left in the centre of the section. Nail on the two laths to fix this space, then divide the remaining space between the end laths and the centre laths equally and nail on the strips.

"Next make three sections, numbered 2, using for this purpose two of the strips measuring 2 feet 4 inches in length, nailing on a one-foot strip at each end, another one-foot strip in the centre, and then three more laths dividing the remaining space on each side of this centre strip, utilizing for each of the sections numbered 2, nine of the one-foot strips. When this is done you will have the coop ready to nail together except covering the bottom. Please observe that in nailing the finished sections to each other all laths are to be inside the coop when finished. Observe the illustrations of the completed coops.

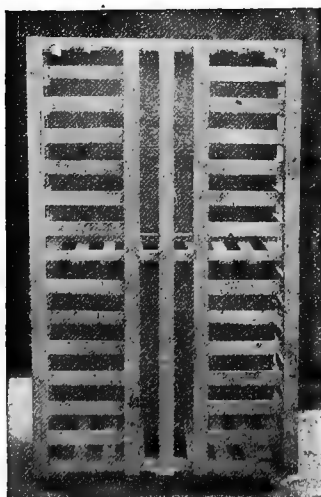
"To assemble the coop, stand one of the sections, numbered 2, on end and balance on top of it one of the sections numbered 1, so that the end of section 2 will appear between and divide the space in centre of section 1. Next nail one of the sections 2 to the end of the under side of this section 1, which has already nailed in its centre the first section 1 which you have handled. In nailing on the sections 1 to the ends of section 2 be sure that the lath strips are turned toward the inside of the coop. These sections 2 constitute the centre and the two ends. Now turn this over and nail on to the exposed ends of the three sections 2, one of the remaining sections 1. This will complete the two sides, the two ends, and the centre of the coop. Next, nail on the two remaining sections 1, which will make the top of the coop except for the centre sliding bar. Now take the three straps

of tin or galvanized iron and fit them over the four-foot sliding bar which is to form the door for the coop. The centre iron strap may be added or not, at the pleasure of the builder; this is not shown in the illustration, but we would advise that centre strap be attached so that in case chickens are confined in one end of double coop the bar can be slid out half way without risk of their getting out while the other end is being filled. If desired, a single screw, bolt, or pin can be inserted through one of the straps and the bar beneath it so that it cannot possibly slide. If very small broilers (1 lb. or less) are to be shipped the spaces between laths should not exceed $1\frac{1}{2}$ inches.

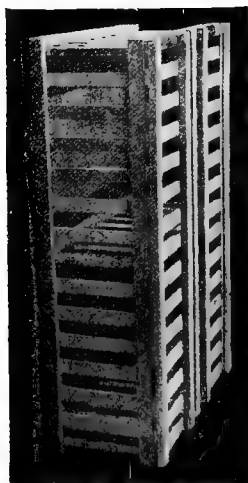
"Nothing remains now to be done save to cover the bottom with half-inch boards. This may be boarded over either crosswise or lengthwise, according as the stock you have on hand may be cut to advantage. If boarded lengthwise it would be desirable to put a cleat over both ends and in the centre after the bottom is nailed on. If boarded crosswise cleats would be unnecessary, although it would protect the bottom if four-foot strips of lath or of $\frac{3}{4}$ -inch stock were nailed over the bottom and at the outer edges.

"The total cost of material used would be from 25c to 50c a coop, according to the quality of the stock and the section of the country where it is procured. The weight of the coop shown in the illustration is 42 lbs.

"In shipping poultry to us be sure that your name and shipping address only appear on each coop. Notify us also of the number and kind of birds you ship to us, and your post-office address."



TOP VIEW
Coop standing on end



CORNER VIEW
Coop standing on end

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