PRACTICAL POULTRY KEEPING

BY R.B. SANDO

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ILLUSTRATIONS

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INTRODUCTION

THIS book is written with a view to filling the need for poultry information that is dependable and practical and meets the requirements of the average man with chickens—the beginner and the small breeder.

I have written in an elementary manner so that the novice cannot err, yet most of the teachings contained herein will apply to poultry keeping on either a large or a small scale. They should help the amateur to derive more pleasure from his fowls and the business poultryman to make more profit. Every statement is based upon the author's personal experience with poultry, covering a period of fifteen years and all the different branches of the business.

Unstable theory, imagination, and sensationalism have been carefully avoided in this book. The aim has been to state facts as honestly and simply as possible. Of the subjects upon which authorities differ I have presented the most common-sense opinions, so that no statement

will mislead or cause loss to anyone. I have striven to make the entire volume literally helpful and practical, so that the man who reads it can go right out in his own hen yard and get busy.

R. B. SANDO.

Potsdam, Ohio, January, 1912.

CHAPTER I

POULTRY KEEPING AND KEEPERS

Rudimentary Facts

PEOPLE of all ages have found it easy to speculate and exaggerate regarding the profits from poultry. There is just enough profit and pleasure plainly evident in the thing to make the keen observer constantly expectant of greater things.

All classes of men, women, invalids, and children, including almost all the different vocations and professions of life, have a greater or lesser number of representatives dabbling in the chicken business. Some of these people have only a small flock for family use, or a few fancy fowls for pleasure and recreation, while others are so badly inoculated with "the chicken fever" that they have visions of a day when they may give up their less fascinating regular business routine and "make their fortune" from poultry.

As a recreational hobby or a side-line for

pleasure or profit, nothing is better than poultry raising, or appears to offer greater inducements for enlarging the scope of one's operations. But while I highly recommend the small flock wherever possible, the large flock is not to be attempted by every one. Too many of the people who have aspirations in the latter direction do not truly understand the basic principles underlying the business; they need to know what poultry keeping really is and is not, and what qualifications are required in the individual.

Principles of Poultry Keeping

There are current some very erroneous ideas concerning poultry keeping. Chief of these may be mentioned, first, that the business is very easy, that there is nothing to learn which an average intellect cannot quickly grasp, and that the fowls require so little care that their owner has light work and much leisure.

Another of these ideas is that the profits of the business are very large, and even if there are losses due to inexperience these cannot possibly be heavy enough to bring disaster. Lastly, it is a common fallacy that anybody can

succeed with poultry, regardless of physical or mental capabilities or aptitude for the business.

Beginners cannot be blamed for taking more or less stock in such ideas, for they have been circulated for years by zealous promoters and advertisers. Besides, the beginner's hopes and wishes naturally lie in that direction. But it is just as true that not everybody can raise chickens with profit as it is that fowls will pay a very fair profit under favorable circumstances.

Poultry keeping is a comparatively easy occupation in that it requires no great knowledge or ability, but it involves a variety of simple operations and success depends upon the regular, faithful, and generally accurate performance of many small tasks.

Even simple operations become complex when one has to do many of them simultaneously as in poultry keeping. After they have become learned and practiced until their performance becomes almost mechanical they come easy, but they have to be mastered one by one and it takes time to become proficient in them through practice.

Poultry keeping is not hard work, but it is tedious, and often keeps one so closely applied

that it becomes monotonous. There is the daily grind of routine work, day after day, Sundays and holidays included—feeding, watering, cleaning coops, etc. Even on a small scale poultry may prevent one from enjoying certain pleasures, such for example as going visiting of Sundays, and during the season of hatching and raising little chicks at least one must be on hand early in the morning and late at night. The work is hard only because it is constant, and a single neglect may ruin all.

A small flock does not always require expert care to do well, but a man must have at least an elementary knowledge of fowl life and its requirements before much of his time can profitably be spent on poultry, regardless of kind or size of flock. The more a man knows of chickens the better position is he in to derive the utmost possible from them, even with a small flock; while with a large flock one's store of poultry lore must be large, for as the number of the flock is added to, so are the intricacies of its management multiplied.

Branches of Poultry Keeping

All poultry keeping may be divided into two

main classes—market and fancy. Market poultry plants produce eggs or meat for eating purposes. There are a number of specialty egg farms, keeping a variety of fowls that lay prolifically, regardless of their size or market qualifications. Meat plants produce squabs, broilers, roasters, or capon fowls, marketing no eggs and keeping only a sufficient number of adult fowls to furnish eggs for hatching their products.

Most people who raise poultry for market are more or less interested in both eggs and meat, for the different branches combine well and serve to provide nearly equal employment and income all the year around. The small breeder seldom establishes arbitrary lines bounding the different branches; he simply produces and sells whatever comes most natural. It is only the large plants that are strict specialists, either for eggs, or for broilers, or for roasters and capons.

The exclusive broiler business, or the broiler and roaster business, requires the most skill of any market branch because it involves the hatching and rearing of a large number of chicks each year. The egg trade is safest and most profitable for beginners and should be

worked up first; after that, one can branch out in the more risky broiler business if he desires. All branches of market poultry keeping require proximity to a good city market for the highest prices and greatest profits.

Fancy Poultry Keeping

The fancy poultry business has made remarkable progress during the last decade. Time was when fifty cents was considered a good price for a chicken, but nowadays ten dollars is no money at all for an ordinary red-headed rooster. There are hundreds of them in this country held at $25 to $50 each, and the leading prizewinners at large shows sell readily for $100 and upwards. Prices of eggs have soared from a dollar a setting to $5, $10, $15 and $25 per setting, while exceptional instances of much higher figures could be cited.

By paying attention to fancy fowls many breeders have added to their profits and pleasures. Fancy poultry in this connection means exhibition or show stock, as distinguished from ordinarily good pure-bred stock such as every progressive poultryman should keep. The small poultry keeper often makes as good a

showing with fancy fowls as large breeders, for it is quality and not quantity that counts here, and the man with only a few fowls can have every one of high quality and can know individual characteristics and peculiarities.

Fancy poultry breeding tends mainly toward exhibition purposes. The ownership of a few choice specimens brings with it a desire for comparison with others, stimulating in a legitimate way the sporting blood which is in almost all people to a greater or lesser degree. This comparison, the meeting with fellow fanciers, and the winning of a few ribbons or cups add zest to the pleasure derived. One hundred "points" constitute the perfect fowl, a certain valuation being placed upon each section, such as comb, breast, back, etc. Of course no specimen has ever attained to a perfect score, but there are numbers of them scoring well up in the nineties.

Hundreds of poultry shows are now being held in America every year, and each of these is a bureau for the dissemination of poultry news and information, especially that relative to fancy fowls. Six thousand birds in competition at one show is a recent record. At the show the fowls are found in long rows of neatly ar-

ranged coops, and each one of the hundred or more varieties has its own special points of beauty and merit. Not only are these fowls exceedingly attractive in form and color, but they are valued at what seem like ridiculously long prices to those who have never given the matter special attention.

However, the difference in profits from market and fancy poultry keeping is not so great as the difference in sales prices seems to indicate. The fancier has to pay big money for good breeding fowls to retrench his blood lines occasionally, while expenses for exhibiting, advertising, cooping, and shipping, etc., are a constant drain. Besides, only a small part of the fowls raised by fanciers are really valuable; from twenty-five to sixty per cent. of the chicks from every ordinary mating prove to be culls worth only market price. Half of the remainder will be worth only a dollar or two each, and it is from the few others that the profits will have to come—and will come if the breeding fowls have been correctly mated.

This thing of striving for the nearest possible approach to perfection is fascinating. It requires brains and skill; there is no luck about it. The breeding fowls must be mated together

in such a way that their best progeny will be as good as or better than themselves. This develops one's powers of observation in trying to control the influences which are ever present in shape and color production at their best.

The skillful fancier is an artist in feathers just as truly as the painter is an artist in oils. The fancier has the advantage of dealing with living, breathing things, which adds to the interest of the thing, but makes the work more difficult because he cannot arbitrarily control results by his own desires. Just as there are pictures in oil that can be bought for a few dollars and masterpieces that command thousands of dollars, so do the prices of fancy fowls cover a wide range of valuation. Superior quality is not to be found every day, and when it is met with high prices may be expected.

Opportunities with Poultry

Poultry keeping is a legitimate business, and there exists a strong demand for the enlargement and expansion of the industry. But while there is money in chickens under right conditions, there is no fortune waiting for every

Tom, Dick and Harry who ventures to try his hand at poultry raising.

There is a golden opportunity occasionally to boom a certain variety of fancy poultry, especially a new one, but this requires experience, capital, success in breeding and mating, and the winning of blue ribbons wherever one shows his fowls all over the country. Then record prices may be asked and received, and good profits made. But this is not the main branch of the industry; it exists principally for people who have a hobby or fad and can afford to gratify a personal desire for the best by paying a big price for fancy chickens if they happen to want them.

But the backbone of the poultry business, after all, lies in the commercial end of the thing, and that is what is usually meant by the bare term, "the chicken business." Millions and millions of common eggs and chickens are produced for every one aristocrat that proudly plumes himself in the exhibition hall. American people must have their eggs for breakfast and their chickens to eat, and with the increasing scarcity and high prices of cattle and wild game there is an ever-growing demand for good poultry and eggs. At present America is

forced to import large quantities of these food stuffs every year, which might be produced at home at a saving to the consumer and a profit to the producer.

In this branch of the business there are always opportunities for one possessed of stick-to-it-iveness and a liking for the business. But, frankly, poultry keeping is never a get-rich-quick scheme, nor are the profits ever strictly enormous. The man who is content with a moderate beginning and a fair return on his investment of time and labor and capital will eventually find poultry keeping all he could reasonably desire financially, besides being healthful employment.

There is no difficulty or mysterious knowledge necessary for success with poultry. The "tricks of the trade" are open to all who observe and think. However, those who have failed at everything else and try poultry raising as a last resort are likely to fail with poultry as well, while those who think it is an "easy business"—merely throwing out feed and gathering eggs—need only invest in it to learn their mistake. But I have never witnessed a failure that could be blamed upon the general unprofitableness of the industry; there were al-

ways individual circumstances that brought about the unfortunate result.

The Family Flock

There is pleasure and more or less profit in a small flock of chickens for almost everyone with a little yard room and half an hour or more of spare time each day. I can sincerely recommend a few chickens to everyone so situated. Table scraps and all sorts of waste materials and time may be utilized in the management of the family flock, and the result is a reduction in living expenses with the added pleasures of a recreational hobby and a constant supply of good eggs and chicken meat, which is an important item nowadays.

The business and professional life of the average American is so strenuous that if not eased up by some side-line or hobby it burns up vitality too rapidly. For recreation of body and mind by interesting and healthful outdoor employment, the breeding of good poultry is supreme. For children it makes a practical nature study, keeps them out of mischief by providing light employment mornings and even-

ings, inculcates in them valuable business ideas, and may later assist them in completing their high school or college education.

Side-Line Poultry Keeping

As an adjunct to another occupation, such as farming, fruit growing, gardening, or dairying, poultry can be made to pay maximum profits, and usually the results are more satisfactory than where exclusive attention is given to either poultry or the other business. This is because poultry are gregarious and utilize most of the waste products of the other occupations, while they all harmonize well in production, the rush seasons coming at different seasons of the year, and, in marketing, a combination of poultry and fruit or milk or vegetables will attract many customers. This way is not a short-cut to riches, but such a business well managed will pay a good living profit and more.

Poultry raising enables the farmer to bring into profitable use unworkable hillsides, rough rock lands, uncultivated woods and meadows, besides turning waste grains and feeds into a source of revenue. Fruit growers find their yields are larger and better when fowls have

the run of their orchards because they keep the trees and bushes free from noxious bugs and insects, while the rich poultry droppings greatly benefit the soil. The gardener and dairyman have many waste products for poultry feeding, while the products can be marketed together without extra expense but often with considerable increase over common prices.

Poultry as a Business

As a purely business proposition, specialty chicken raising should not be tackled without considerable preliminary experience and a complete understanding of the requirements of the business. While there is money, pleasure, and health in a well-established and properly managed poultry farm, it, like Rome, cannot be built in a day. I have made my own plant produce a clear profit of ten to twelve per cent. in certain years, besides paying myself a comfortable salary as manager, but this result was not attained until after we had passed through a good many less pleasant experiences.

The financial results people have obtained from poultry as a business range from bankruptcy to several thousands of dollars a year

profit. I have never known of a poultryman becoming a millionaire, and most of the so-called wealthy poultrymen would not be ranked so high in other trades. A man must either be an exceptionally good poultryman, or an ordinary poultryman with the strategy of a financier, to command more than $1,200 a year, whether he is in business for himself or working for someone else. There are many people in the poultry business to-day who are making comfortable livings, and there are a few whose annual earnings amount to as high as $5,000 to $10,000, but the number of American experts actually in the latter class does not total a score.

Retired millionaires and wealthy people often take to chickens in later life, but if the facts are known it is not true that their fortunes have been amassed from that source. Skillful poultrymen find it comparatively easy to make more money from an investment of their own time and capital in poultry than anywhere else, but as a rule they are satisfied with a good living allowance for their labor and an additional six to ten per cent. for their investment of capital.

Capital Required

Another mistaken idea of a good many who

want to go into the chicken business is that it doesn't require much capital. One thousand dollars is commonly supposed to be ample for a venture on a scale to make a living. Clerks and laboring people often save that amount and then think they can invest it in chickens and make a good living ever after. But it is not so.

It takes money to start properly with chickens on a large scale. A satisfactory, established poultry plant can seldom be rented. It does not pay to erect buildings on rented land, so the only safe way is to buy a place. This may be of any size, but ten acres is the very minimum for a poultry plant to make a living. If there is room enough to raise one's own grain crops, there is a great reduction of expenses and consequent boost to the ultimate profits from the fowls.

After the expense for land, come the equally heavy ones for houses, stock, and equipment, besides a margin of several thousand dollars which should be kept in the bank for use while the profits are beginning or for an emergency. Thus it can be seen that two or three thousand dollars is a minimum amount, while five thousand would be better. One could feel then

that he was safe no matter what occurred, and financial worries would not be added to those of caring for the fowls.

I would never advise a person to go into debt to start poultry keeping, unless his ability in that direction were thoroughly well proved. Nor does it pay to buy a place and stock it on the installment plan on the strength of expected profits. Sometimes the profits do not materialize, and when they do the interest on notes or mortgages consumes considerable.

Start Small Always

But it is all foolishness to enter the chicken business on a large scale anyway. The start should always be small and the growth so gradual that no break occurs anywhere. The man who wants to resign a clerkship or other position for chicken raising should first try a few fowls on a back lot, then on a plot at the edge of town, and then as he succeeds further and the profits from the thing justify he can make the change to exclusive poultry farming. That way a man's previous experience will make the transition safe, and if results on a small scale do not thoroughly justify it the change

should never be made. That is a simple matter of waiting a few years for dependable knowledge, rather than running a risk founded upon hearsay and guess-work.

Secrets and Systems

There are very few valuable secrets in the poultry business, while the intensive "systems" rarely ever increase the profits above those ordinarily received by skillful poultry-keepers. The best system is simply the application of good sense and judicious management. Some systems are good in so far as they encourage people with limited room to keep a few chickens for their own use, or to try to get a little pleasure and profit out of a few fancy fowls; but there is no intensive scheme that will not sooner or later impair the vitality of the fowls by too close confinement and hard forcing, and, anyway, this is never a short-cut to fame and fortune.

The secret of feed at a comparatively few cents a bushel is now quite generally known to be nothing but sprouted oats. One pail of dry oats or wheat when soaked and sprouted will make two pailfuls of feed which is excellent

for supplying palatable green food to confined fowls.

The secret of picking out the laying hen is a simple matter of examining the pelvic bones which are located directly under the vent of the hen. If the bones are close together the hen is not laying, but if they are spread apart so that two or three fingers may be inserted sideways between them, this shows that preparations have been made for the passage of eggs.

There is no method, secret or otherwise, of having every hen in the flock a 200-egg hen, or of telling whether or not an egg will hatch before it is started to incubate, or whether it will hatch a male or female chick. Secrets and systems that have apparently escaped the thoughtful student of poultry culture for centuries can usually be put down as advertising hot-air.

When ordinary chickens are kept for market or for eggs, from one to three dollars per head is considered a fair annual profit. Since the cost of feeding a hen for a year is from a dollar to a dollar and a half, it will be seen that this return represents from 100 to 200 per cent. clear profit, not counting time and labor. Of course, with fancy chickens the returns per fowl

should be much higher than this, but the expense incurred and the experience required are also greater.

Women Poultry Keepers

It is probable that the bulk of the supply of poultry products comes from flocks cared for principally by women. On farms the care of the fowls is usually left to the farmer's wife or daughter, while in towns the absence of the men from home during working hours leaves the care of the poultry mostly to the women, even when the men take an interest in it.

Women can raise poultry just as successfully as men, on a small scale; but as a rule poultry keeping on a large scale is beyond a woman's strength, unless she can press into service some male member of the family or has hired help for the heavy work. In such cases, women have been known to handle several hundred hens, and make the profit from them a substantial part of the family income. At any rate, most housewives find a few hens convenient for furnishing poultry supplies for home use, or profits for pin-money, or light outdoor work as a diversion from the monotony of housework.

Invalid Poultry Keepers

Invalids are often attracted to poultry keeping because there is not much heavy work connected with it, and it makes a fascinating nature study which keeps invalids interested and cheerful. People are often benefited in health by the outdoor work attendant to poultry keeping, for it has all of the good features involved in the "back-to-the-farm" ideas. But the dust and filth encountered in cleaning out coops and houses is hard on throat and lungs, and in the winter time one has to do considerable slopping around in cold rains, snow, or ice, which may do no particular good. A person unable to give his fowls regular attention in all kinds of weather cannot expect them to be very profitable.

The all-important thing for invalids is to keep their poultry work within the limits of their strength; otherwise it will do them more harm than good. A person with comparatively little strength can attend to a small flock, but as the number of fowls is increased the work becomes heavier and decidedly more confining and monotonous. Invalids can make as much

money with a small flock as any other class of people, and as the work builds them up physically they can increase their poultry plant until it may ultimately yield them a good living income.

Qualifications for Success

It doesn't take an unusually smart person to succeed with poultry, but on a large scale a man ought to have a pretty good business head on him. Then he can plan economies, systematize labor, and have everything working most effectively. In some branches of the business a man is seriously handicapped if he is not a good correspondent and salesman. At any rate, one must have a reasonable amount of gray matter and the ability to reason out cause and effect in their relation to certain conditions of feeding, housing, and management.

In addition, one must possess a greater or lesser number of the special qualifications which are supposed to distinguish the successful poultryman. These include energy, economy, resourcefulness in emergencies, and persistence along certain well defined lines. In the aggregate these qualifications are often called

a natural aptitude for the business. Never can a man make the most out of poultry if he is careless or negligent, allowing filth, parasites, and disease to prevail; or if he is rough and unkind to the fowls.

One must have his heart in his work to make it come easy. Not that a strong love for the business is necessary for success, because an excess of affection for animals is apt to bias one's judgment as to their needs. But to be a good poultryman one must have something of the ability to see things from the fowls' viewpoint and keep their welfare and happiness constantly uppermost in his mind.

After all, in the final analysis, successful poultry keeping resolves itself very largely into a matter of common sense. A man lacking experience, or capital, or business qualifications, or all three, would not expect to make a success on a large scale in any other profession, and it cannot be done with poultry. But there is pleasure and profit in a small flock of fowls that are rightly cared for, and on a large scale poultry keeping is a good business proposition after one has acquired the necessary skill.

CHAPTER II

HOUSING AND YARDING

Principles of House Construction

GOOD housing is one of the main factors in successful poultry keeping. The house should always face south or slightly southeast, so as to get the benefit of the most sunlight. Its construction should be such as to make it comfortable for the hens and convenient for the attendant, yet a house does not have to be elaborate or costly to give satisfaction. As a rule, houses comparatively simple in construction are best, for frills and ornaments lead to crevices and nooks that make breeding places for vermin. The house may be made in any style to suit the owner's fancy, so long as proper attention is paid to these four prime requisites: light, warmth, dryness, and ventilation.

Poultry houses may be made of very cheap

materials and give satisfaction if they observe the points stated above. The hen cares nothing

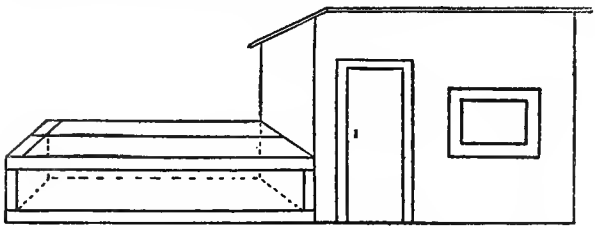

FIG. 1. CHEAP HOUSE AND WIRE COVERED RUN FOR 15 OR 20 FOWLS. HOUSE 8 x 12 FT.; RUN 8 x 12 FT., 30 INS. HIGH. SUITABLE FOR A TOWN BACK YARD.

for architectural effect if she is comfortable, hence the plans that follow consider practical utility rather than ornamentation. However, where attractiveness is an object, one may secure it in the same style of house by adding ornaments, by keeping the building and fence attractively painted, and by growing vines and shrubbery. Where extreme economy is necessary in building, it is better to keep the house comparatively small and have it tight and well constructed, rather than make it larger and of inferior quality and unsatisfactory design.

The more nearly square a house is, the less the cost of construction. However, it should never be more than fifteen or sixteen feet deep,

or the sun cannot reach the parts most remote from the south windows.

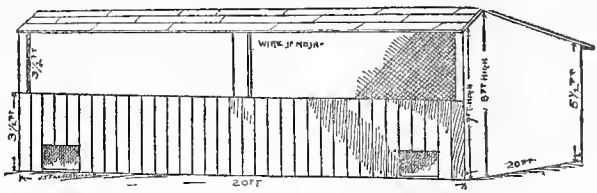

FIG. 2. PARTIAL OPEN FRONT HOUSE. SECRET OF SUCCESS WITH THIS TYPE IS TO BUILD IT LOW AND DEEP.

Brick, concrete, or stone buildings are rarely used on successful plants. While they are more durable than lumber, they also cost more and usually have an unhealthy chilliness in cold weather. Piano boxes and large dry goods boxes can often be used to advantage in constructing small chicken houses.

HOUSE FOUNDATIONS

A poultry house should rest upon a firm footing, for convenience when building and to prevent the house from sagging out of shape later. Also, a good wall helps keep the house warm and prevents drafts and cold currents of air from passing along the floor in winter.

A concrete foundation is usually less expensive and more effective in excluding water and "varmints" than one made of stone. It need not be more than five or six inches thick, should extend at least half a foot above ground and into the ground about a foot, or far enough to prevent heaving by frost.

Floors

There are three kinds of poultry house floors —cement, earth and board. The latter kind is going out of use in many sections where lumber is high, although still used in houses that are portable or that are to be built with more than one story.

Earth floors have the advantage of extreme cheapness and satisfy the fowl's natural desire to scratch and wallow in dirt. Yet in a rainy climate, or in a damp location, a cement or board floor will not conduct dampness so readily as earth, and dryness is a cardinal requisite in a good hen house. For the sake of economy earth floors should be used wherever possible, but fill them up with sand or gravel at least a foot higher than the surrounding land and renew the top layer once or twice a year.

Cement makes a durable and serviceable floor, for it is rat-proof, easy to keep clean, and in case of disease may be scrubbed and disinfected more thoroughly than any other kind. Cement floors are not chilly or hard on the fowls' feet if they are kept well littered.

Walls

In climates where little zero weather is experienced, a wall composed of one thickness each of boards and tarred paper makes a comfortable house. This may be arranged by placing unmatched boards (sheathing) next to the studding and then covering the exterior with felt, or the felt may be placed next to the studding and covered with tongued-and-grooved boards. The latter plan looks better—and costs more.

In cooler localities, the rear and end walls should be double—first, sheathing next to studding, then a layer of tarred paper, and then siding. This makes a comfortable house for almost any climate. The front wall never needs to be more than one thickness each of boards and tarred paper, for the south side should provide sunlight and ventilation, but the

other walls and the roof must be absolutely wind and rain proof.

Roofs

A shed-roof has the advantage of being easier to build, requires slightly less material to construct than a gable or combination roof, and throws all rain water to the rear. Hence that style is most common, yet with open-front

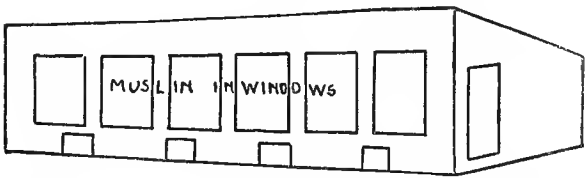

Fig. 3. A Cheap House for Fairly Warm Location.

houses that are made properly deep—say, fifteen feet or more—it is usually best to gable the roof, which gives it sufficient pitch without making the front wall excessively high. A house with most of its roof sloping to the north will last longer and is cooler in the summer because not exposed to the vertical rays of the sun.

A leaky poultry house is an abomination for

which there is no excuse since there are so many excellent brands of prepared roofing. Such a roof makes a tighter house than shingles and is less expensive. Also, it may be given a lesser degree of slant than a shingled roof, making possible a house comparatively deep and yet with both front and rear walls low. A shingle roof, however, has the advantage of being affected less by heat and makes a house more pleasant in summer.

Roosting Quarters

Fowls cannot keep warm by exercising while roosting, hence this part of the house should be comparatively snug. With the roosts in the rear of the house, and that part low and tight as I have suggested, there is no necessity for a separate and warmer room for the fowls to sleep in. However, in cold climates, or with large-combed fowls, it is often desirable to hang curtains of burlap or muslin down in front of the perches at night, keeping the fowls warm by confining their own bodily heat. The curtains may be attached to rollers at the ceiling and conveniently operated like window blinds, or fastened permanently at the top and folded

away from the middle to each side like window curtains.

The roof may be ceiled under the rafters as far forward in the house as the point the sleeping curtain drops from. This should be several inches or half a foot in front of the droppings platform, so that undesirable gases and foul air may fall to the ground. The curtains should be used only on the coldest nights, giving the fowls at other times the benefit of as much pure, unconfined air as possible.

Ventilation

A poultry house is not much good unless it is well ventilated. Pure air is even more important for fowls than for other domestic animals because their body temperature is several degrees higher, and, besides, the unpleasant gases and odors natural to poultry houses must be dissipated. In poorly ventilated roosting quarters the moist warm air exhaled from the fowls' lungs is condensed on the walls, and in winter appears as hoar frost which freezes at night and melts when the sun warms up the building.

Until recent years the correct ventilation of poultry houses was a serious problem. The

ventilators which work quite satisfactorily in dwelling houses and barns give very unsatisfactory results on hen houses, and are no better than nothing at all. The modern and model

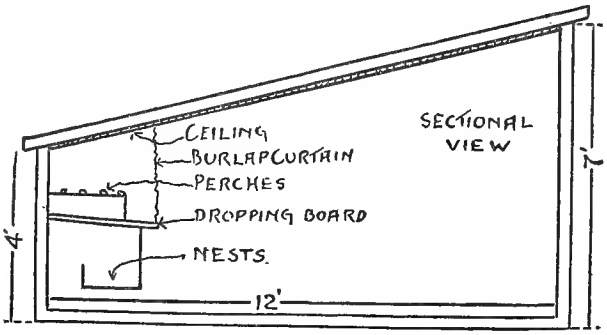

FIG. 4. A GOOD INTERIOR ARRANGEMENT OF A HOUSE.

method of ventilating a poultry house is by means of window openings in the south side of the building, which are covered with a burlap or muslin curtain during cold or stormy weather. In some localities the entire front of the house may be open most of the year. Such houses are closed in front with poultry netting to keep marauders out and the fowls in when this is desirable.

In any climate the curtains should be raised most of the time, giving the fowls and house

plenty of sunlight and fresh air. Frames covered with canvas or muslin are made in sections to fit the opening, hinged at the top, and swung up and fastened to the roof when not in use. With the house constructed tight on all other sides, as I have advised, this system permits a gentle diffusion of air without direct draft. The principle is the same as that "you can't blow into a bottle," because all the available air space is already occupied.

The main secret for success with open-front houses is to have them low and deep. By having them low the fowls keep warm, and

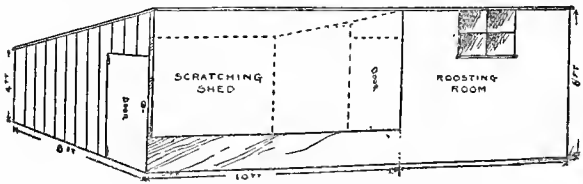

FIG. 5. POULTRY HOUSE WITH SCRATCHING SHED AND ROOSTING ROOM. MOST DESIRABLE WHEN A SHALLOW BUILDING IS WANTED.

by having them deep the roosts can be placed far enough from the front so that the sleeping fowls will not be bothered by the wind or other elements. The fresh-air type of house has had to overcome considerable adverse pre-

judice, but it is now coming into quite general use because it has been proved to have a beneficial effect upon the winter health and vitality of fowls. The system may seem radical to beginners, but fresh air is as invigorating and healthful for fowls as for humans, and people are just coming to a full appreciation of its benefits for all sorts of creatures. Fowls are provided with the warmest kind of clothing (feathers) and can withstand a great deal of cold if it is not accompanied by drafts and dampness.

Types of Houses

The essential elements in poultry house construction do not vary much; among the best houses it is mostly a matter of detail. Where many fowls are kept, it is cheaper and more convenient to have the houses comparatively large, dividing the flocks by partitions rather than separate houses.

Yet there are many who prefer the colony plan, which gives each flock a separate house, scattered at intervals over the poultry farm. This gives the fowls an abundance of range, and if disease should break out in one flock it

can be kept from spreading to the others. While this is perhaps the best way where one has plenty of room, it is impracticable where

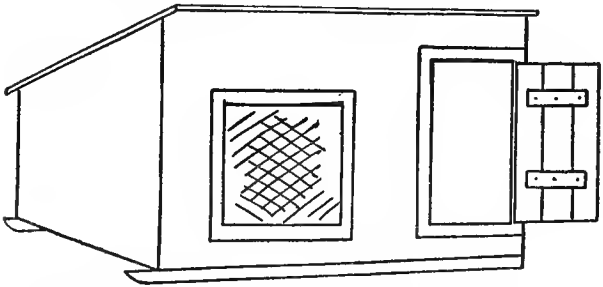

FIG. 6. A GOOD COLONY HOUSE—8x12 FT.—ON SKIDS FOR MOVING HANDILY.

hundreds of fowls are kept, as the scattered houses make extra work and inconvenience, especially in bad weather.

However, people who use long, continuous houses usually find that the shorter ones—say

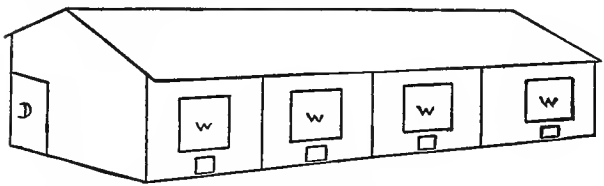

FIG. 7. A HOUSE WITH PASSAGEWAY ON NORTH SIDE.

not more than seventy-five to one hundred feet —give vastly superior results to the quite long ones, and then there should be a board partition in the building every twenty or thirty feet to prevent drafts and long currents of air.

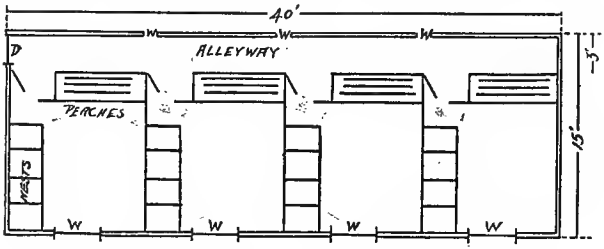

FIG. 8. GROUND PLAN OF HOUSE WITH ALLEYWAY.

Some poultry house plans have a passageway the length of the house in the rear, enabling the attendant to pass quickly through in feeding and watering the fowls. However, this extra space is usually of little real value, while there are certain advantages to be gained by passing directly among the fowls.

YARDING POULTRY

Free range is desirable because it encourages fowls to exercise by ranging after subsistence, yet it is not at all necessary to success. The

vast majority of fowls are yarded nowadays, for fowls will thrive in almost any place that is kept clean and sanitary. An orchard is an ideal place for poultry, but not everybody is blessed with an orchard.

Where fowls must be yarded they should have as large a space as convenient, up to the

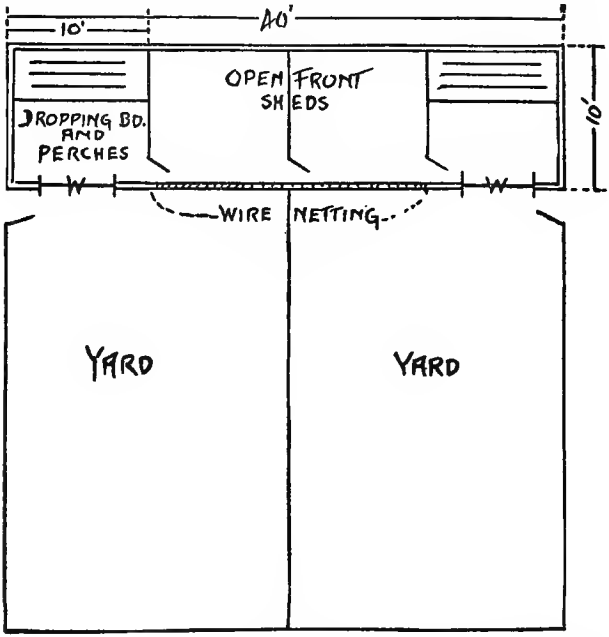

FIG. 9. GROUND PLAN OF A TWO-PEN SCRATCHING HOUSE.

point that satisfies their apparent longing for room. While fowls have been known to thrive where they were so crowded they had scarcely room to turn around, such intensive methods will fail after a generation or two when the stamina of the flock begins to deteriorate and the soil becomes contaminated.

Perhaps the best way of yarding poultry is to have two runs for each pen of fowls, using them alternately. In the one have grass or green stuff of some kind growing while the fowls are foraging in the other lot. This gives the ground occasional rests from the presence of fowls, and the plowing and growing of the crops purifies the soil. With the double-yarding system, one run may be in the front and one in the rear of the house. Where there is only one run for a flock, that should always be to the south of the house.

With the double yarding system the location for the house should be the highest point of all, the ground sloping gently away to the north and south if possible. With the single yarding system, the slope should be to the south or south-east, and if that is not a natural condition cutting and filling should be engaged in, for then the ground will dry off quicker after rains,

the house sills will not draw damp and rot, the fowls will not have an unhealthy, muddy place, and much of the filth and droppings which collect in the yards will be washed away from the house. Well drained, sandy loam or gravelly soil is best for the yards; being porous, it absorbs the filth and droppings at every rain, thus keeping the runs sanitary.

For flocks in permanent yards, especially if uncultivated, at least fifty to seventy-five square feet of yard room should be allowed to each fowl. On a large scale, three acres of land for one thousand adult fowls is about the limit of intensiveness; five acres would be much safer, especially for breeding stock. These figures are especially adapted to the general-purpose breeds; Asiatics will often thrive with less range, while Leghorns and other nervous breeds should seldom be attempted on a small plot.

Small yards should be kept clean by raking, spading, or cultivating in some way quite frequently. If possible make them of sufficient size to allow the use of a horse cultivator, as it is quite a task to cultivate by hand even a small plot a half-dozen or more times a year. Besides purifying the soil, if the runs are large

enough to grow grass or grain in them it lessens the labor of supplying green stuff and the fowls relish it more when they can eat it as it grows.

Fences

Poultry fences are usually made stationary, but may be of a portable type in sections of about twelve feet in length with a base board and top board for rigidity in moving. Picket and lath fences are sometimes used in small yards where appearances are an object, being attractively designed and painted. Wire netting is commonly used by poultrymen, but the recent preference has been for woven-wire fences because they are stronger and more durable. Cedar posts are best, with chestnut usually ranking next.

The best height for the fence is more or less variable, but usually it is three or four feet for Asiatics, four or five feet for general-purpose varieties, and six or seven feet for Mediterraneans. A base board prevents the fowls from burrowing underneath the fence and escaping from the pen or catching their combs in the wire. A foot is high enough except where

yards are side by side and contain pugnacious male birds and then the fence should be boarded high enough that the cocks can not torment and fight one another,—usually twenty-four to thirty inches. Use no top rail unless necessary to support the fencing material, and then the fowls will have no ostentatious object to aim at in trying to fly out.

Shading The Yards

Fowls need protection from the sun in summer almost as much as from the cold in winter, without it their comfort and health will be seriously impaired. Of course natural shade is best—that made by green leaves and shrubbery—but if that is not present artificial shade must be provided by means of wooden frames, frames covered with cotton cloth, or supports on which are placed birch and evergreen branches. These also offer the fowls protection from hawks and marauders.

Natural shade can be secured by means of bushes, shrubs, or trees of almost any kind. Those that bear fruit or nuts are especially valuable, providing a source of revenue as well as shading the yards. Plum, peach, apple,

pear, apricot, cherry—all such trees thrive exceptionally wel lin poultry yards because the

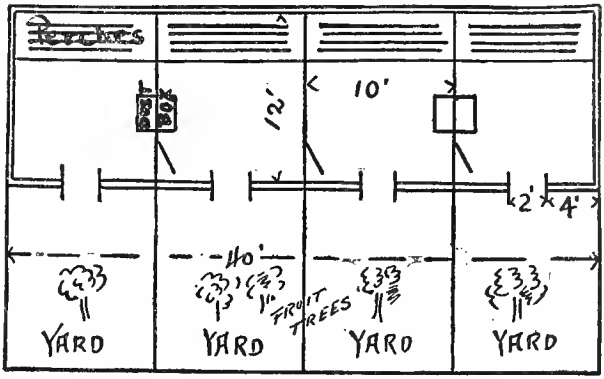

FIG. 10. A GROUND PLAN THAT IS O K.

fowls deposit rich manure and destroy injurious bugs and worms. The poultryman who does not start an orchard in his poultry yards is certainly overlooking an important point. In some localities grape vines thrive well in poultry yards, being trained to posts or to the boundary fences and pruned to bear their fruit high enough so that the fowls can not reach it. Evergreens make excellent wind-breaks and also furnish shade, while the same may be said of arbor vitae, white pine, and Norway spruce.

CHAPTER III

FIXTURES AND EQUIPMENT

The Roosts

THE roosts should all be on the same level and not more than two or three feet above the floor. By having them level the fowls do not strive for the highest positions, as otherwise always occurs, but distribute themselves evenly over all the perches. By having them low there is no danger of jars, bruises, or internal injuries to the fowls in jumping or falling off the roost.

The best perches are from two to three inches wide, slightly rounded at the upper edges, and one or two inches thick to prevent sagging with the weight of the fowls. The roosts should be clear of the poultry house wall and then vermin can not spread all over the building but must remain where they can be reached with

lice-killer. Roosts should also be easily movable so that they may be taken outside of the building and scalded and disinfected occasionally.

The roost illustrated shows a simple and satisfactory type. It has few hiding places

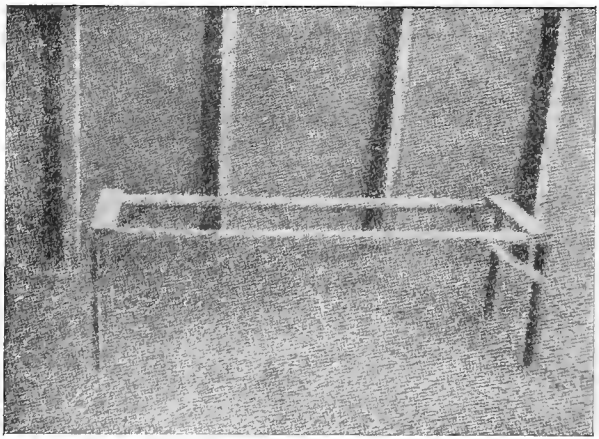

FIG. 11. A SIMPLE AND SATISFACTORY ROOST.

for vermin, may be moved about easily, and can be made by anyone with little or no expense. The perches should be about eighteen inches above the floor for medium-sized breeds, lower for heavy or clumsy Asiatics, and higher for the Mediterranean varieties that like

to perch high. The best space to leave between perches is about sixteen inches.

The Nest Boxes

The nest boxes should give the laying hen plenty of room, but should not be large enough to allow several hens to crowd in at the same time, resulting in broken eggs which may lead to the egg-eating habit. Twelve by fourteen inches is a common size for nest boxes. They may be of any reasonable depth, but if more than six or eight inches it is best partially to cut away one side so that the hens can enter without jumping on eggs previously laid.

Soap or other small boxes, such as may be secured of any grocer, cost little and are perfectly satisfactory. Each one should be separate, and not joined to the others or to the poultry house wall, as this facilitates cleanliness and makes it easier to exterminate vermin. Select a quiet, secluded location for the nests, for the hens prefer to deposit their eggs there, and in a rather dark place they are less likely to disturb the contents of the nest or break eggs. One nest for every three or four hens is sufficient.

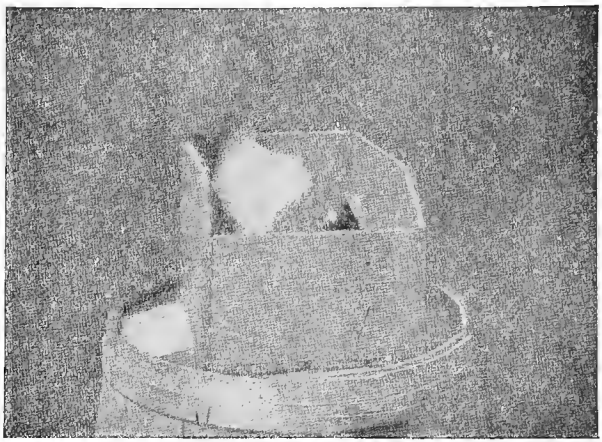

FIG. 12. A GOOD NEST MADE FROM A GROCERY BOX COSTING FIVE CENTS.

The nesting material commonly used is excelsior; hay and straw are usually too coarse and stiff. Cedar excelsior is best, as it has a tendency to keep down vermin. Remove and burn the old nesting material every few months and replace it with fresh; this keeps the nests clean and kills lice—two important points.

TRAP-NESTS

Trap-Nests keep the hen imprisoned when

she goes on the nest until released by the attendant, who records her leg band number and places the egg to her credit. These nests are the only sure method of picking out the layer from the loafer and of knowing the exact number of eggs a hen produces in a given time. They often disclose startling facts; for instance, some hens in the flock may be laying two hundred or more eggs in a year, while others, seemingly as good, lay only a very few eggs and thus eat up the profits earned by the producers.

By selecting the greatest layers and their best daughters each year, and mating them with males from good layers, it is possible wonderfully to improve the laying qualities of the average flock. A few generations have in some cases almost doubled the egg-yield. It takes a little time to visit the nests four times a day, as should be done, but one who is trying to build up a laying strain will be well repaid for all time and effort spent in this direction. Almost everyone can at least select a few hens and test them by trap-nesting, and from these hatch the breeding fowls for the improvement of the succeeding year's flock.

The best trap-nests are patented, so we can

not give plans here, but their cost ready-made is so small that it is usually cheaper and better not to try to make them at home.

Nest Eggs

Nest eggs are not much used nowadays; they are neither necessary nor desirable, unless medicated eggs are used for killing lice. These are made of materials which give off an offensive odor that drives vermin out of the nest and from the bodies of the hens that use the nest.

Dropping Boards

A platform is sometimes put under the perches to catch the droppings from the fowls while they are roosting. It is a great convenience in a well-kept house, while a neglected house is better without it. If the droppings are removed every morning or two it is much easier to sweep them off the platform into a bucket than it is to shovel them up off the ground, and the house is cleaner afterward. But if the droppings are allowed to accumulate, the boards become saturated with liquid manure, and being necessarily close to the perches, they

make bad conditions worse by compelling the fowls to breathe impure, foul-smelling air.

FIG. 13. DARK NESTS TO GO UNDER DROPPINGS BOARDS.

The droppings platform may be of matched flooring or any similar material that is smooth on one side. It should extend eight or ten inches beyond each side of the roost in order to catch all the droppings from fowls on the outer perches. For a single perch the platform should be about twenty inches wide; for two perches, three feet wide. A two-inch strip should be placed around the edge to prevent the droppings from being scattered by the fowls.

The height of the droppings platform from the floor depends largely upon whether or not the nests are located under it. At any rate it should not be more than thirty inches above the floor; this makes it easier to sweep off, and the attendant is compelled to breathe less dust and impure air. The perches may be from eight to fifteen inches above the platform; a foot makes a nice height.

Hennery Outfits

Hennery outfits are often used to economize house room, but aside from that they have no particular advantage over the simple separate roosts and nests previously described. Such fixtures may be bought reasonably, or the

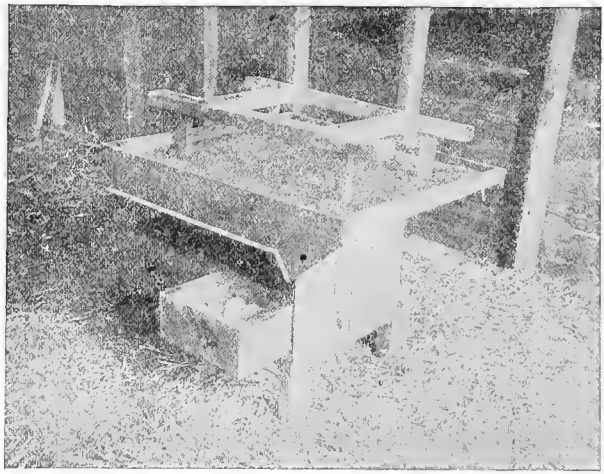

Fig. 14. A Combination Nesting—Roosting Arrangement.

poultryman may make them himself if he has the time and knack.

The fixture illustrated has two perches, each

thirty-two inches long, and two cross-pieces each fourteen inches long, with a total roosting capacity of eight or nine average-sized fowls. The droppings platform is a yard square and stands two feet above the floor. The roosts are eight inches higher.

Such outfits may be made of any size to meet the requirements of the flock. One, two, or three perches may be used, but it is best to have the fixture comparatively long and narrow; this gives sufficient length in it for the construction of all the nests required by the hens and also conduces to the good health of the fowls while roosting by not packing them in a concentrated mass.

With small flocks sometimes a single perch is best, allowing each hen about ten inches space. A fixture five feet long with two perches will accommodate about fifteen medium-sized fowls — more of small breeds, and fewer of large ones; with three perches it will provide roosting room for at least twenty fowls. Nests should be eleven by fourteen inches, inside measurement, and the droppings boards about fourteen inches above the bottom of the nests to give the hens ample head room while laying.

All wood used in making the fixture should be as light as possible without making it flimsy; one-fourth or three-eighths inch stuff is best for the nests and partitions between them, for the droppings platform, and for the hinged strip in front which laps down over the tops of nests. The roost may be set loose on the droppings platform so that it can be lifted off, or may be hinged to swing in castings in the rear and hung back against the wall of the house, giving a clear and unobstructed droppings board which may be easily swept off.

Food Hoppers and Troughs

Food hoppers and troughs can be made

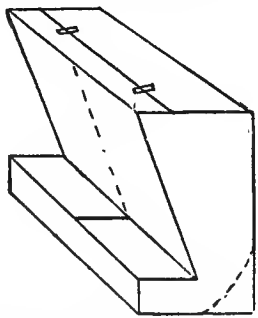

Fig. 15. Self-Feeding Hopper. Dotted Line Indicates Sheet of tin Fastened Inside to Force Feed to Front.

at home or purchased. If homemade they

cost little or nothing except the labor required, but if the poultryman has no time or liking for manual labor he can buy galvanized iron or tin ones that are more durable and afford better protection to the feed if used outdoors.

Grocers always have small boxes which may

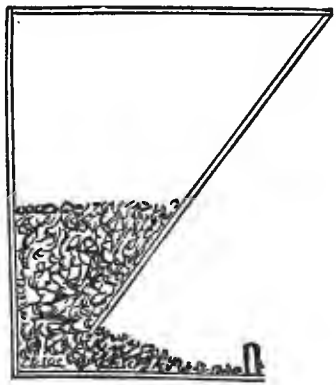

FIG. 16. INTERIOR VIEW OF FOOD HOPPER.

easily be converted into self-feeding hoppers or protected troughs, and the cost is practically nothing. The principle of construction can be readily gathered from the accompanying drawings. They may be made with one hopper or several, depending on whether the owner prefers to mix his feed or give each kind separately and let the fowls do their own balancing.

Drinking Vessels

A crock makes a good drinking vessel, but most people prefer the galvanized iron fountains that can be bought at any poultry supply house. These should be of sufficient size to require filling only once or twice a day. However, fresh water must be given at least once a day—and in hot weather several times a day—to prevent it from becoming stale and stagnant. In cold weather do not chill the fowls with freezing water; supply it warm, especially for little chicks. Patent fountains are now on the market which keep the water comfortable all day long and avoid freezing even in the coldest weather. These are a great convenience for the busy poultryman and also to the fowls.

Vessels should be high enough so that the fowls can not throw dirt and litter into the water. Wall drinking fountains may be bought which hang up on a nail in the wall of the house; or, if the ordinary kind are used, they may be set a few inches above the ground on little shelves or boxes. A cheese box, split in halves around the sides, is excellent for this purpose.

Merits of Incubators

The poultry world owes a large debt of gratitude to the modern incubator and brooder. Without them the present great magnitude of the poultry industry would be an impossibility. Yet their merits are often exaggerated and people are led to invest in them unwisely and unprofitably. The best machines on the market to-day are pretty good hatchers. But it is impossible to improve upon Nature, and the best incubator made is only man's nearest approach to what the hen can do.

Hens usually bring forth twelve or thirteen chicks from fifteen eggs, but incubators will scarcely average that well with untested eggs. The beginner must not overlook the fact that incubator reports consider only the fertile eggs, or those that contain living germs at the end of the first week's incubation. One-half of all eggs placed in machines is considered a good average for a year's hatching. The most successful plants seldom count on more than sixty per cent., and hatches of more than ninety per cent. come so infrequently that they delight the most expert operator.

The thing that spoils high records for incubators is the large number of chicks that die

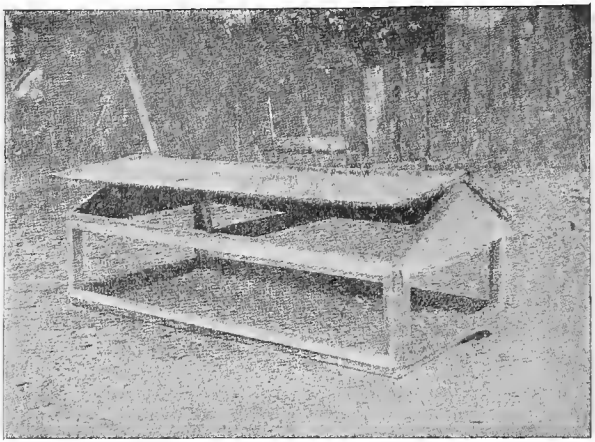

FIG. 17. CHICK SHELTER FOR BAD WEATHER.

in the shell. For some reason many germs stop developing during the third week of incubation, or come up to hatching time lacking the strength to get out of the shell. Nor does the difference between natural and artificial hatching always end with the birth of the chick. In the majority of cases, hen-hatched chicks are hardier and easier to raise than machine-hatched chicks. There are fewer cripples, and, taken generally, they appear fluffier, stronger-

legged, slightly larger, and less susceptible to bowel disorders.

The one real advantage of the incubator lies in the fact that it may be set whenever one desires, without having to wait upon the fickle fancy of a hen. A poultry keeper entirely de-

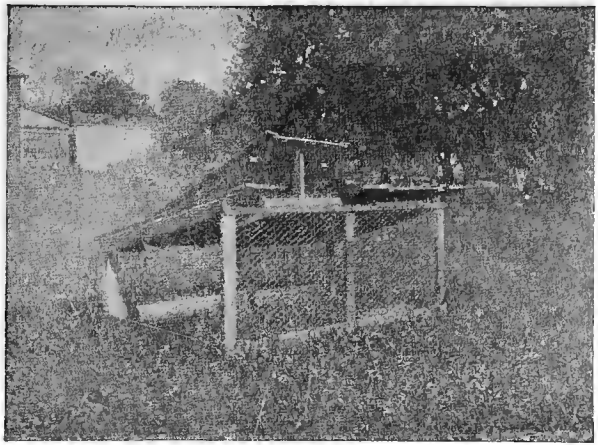

FIG. 18. CHICK SHELTER OF ANOTHER TYPE.

pendent upon hens for hatching is in a bad fix when the hens fail him. Yet, as a rule, hens naturally go broody at the time of year when eggs hatch best and chicks are easiest to raise.

While very early chicks bring the most money, they are hard to raise successfully, requiring special skill and extra provision in the way of housing and equipment while the weather is bad.

The small breeder who raises less than one hundred chicks a year seldom needs an incubator. If he has fowls of a non-setting variety, he should watch his opportunities to get broody hens from the neighbors. Such can usually be bought reasonably, say fifty to seventy-five cents each, for a mongrel hen makes as good a setter as a fine blooded one.

The man who raises from one hundred to two hundred chicks a year needs an incubator in about one-half the cases. Where more than two hundred chicks are raised per annum, it is usually best to resort to artificial methods, and where the number goes above three hundred or four hundred, I should say machines are quite necessary. Big plants are made possible only by the use of machines. There the greater ease and dispatch with which machines may be used more than offsets the other differences between natural and artificial methods. On most large plants where hens are used their work is complementary to that of machines—

hatching prizewinning eggs, or the foundation breeding stock, so that artificiality of methods may not result in a lessening of inherent vitality and constitutiontal vigor.

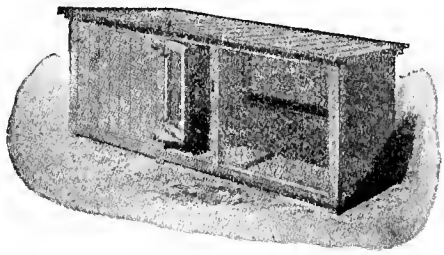

FIG. 19. COOP FOR HEN WITH CHICKS.

The expense of operating an incubator is slight, and the time and labor required are of no great consequence. It requires, on an average, four or five gallons of oil to run a 240-egg machine one hatch, and three or four gallons for a 120-egg machine in moderately cold weather; in warm weather, it takes less. The only care a good machine requires is keeping the lamp filled and the wick trimmed, turning the eggs morning and evening, and looking at the thermometer two or three times a day

to see that the correct heat is being maintained, which is 103 degrees. All this should not consume more than fifteen minutes of actual time each day.

There is more than one good make of machine on the market, just as there is more than one worthless make. The beginner should consider the experience of those who have tried different machines. Do not pay much attention to testimonials reporting one hundred per cent. hatches, but get a machine that has given satisfaction on the large, successful poultry farms or on government experiment stations. Home-made incubators, as well as cheaply constructed factory-made machines, are to be avoided.

The selection of a machine need not be the perplexing problem that some make it, for results with the leading makes do not differ greatly. If the beginner has to learn, unassisted, to run his machine, it will matter little which of the popular makes he buys. If a particular machine is being successfully operated in his vicinity by someone who will give him helpful advice occasionally, it is clearly to his advantage to have a machine of that make.

Brooders

Brooders are used even more generally than incubators. Where the latter are used brooders are an absolute necessity, and even where hens do the hatching it is often economy to raise the chicks in brooders and let the hens return to laying. The brooder is always warm

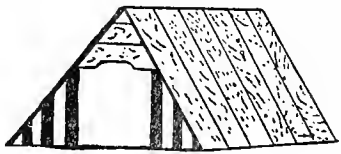

Fig. 20. A Simple A-Shaped Coop.

never deserts the chicks, is rat- and weasel-proof, and does not distribute lice to the chicks unless they are brought into it from other sources. Chicks grouped in flocks of fifty to one hundred in brooders may be cared for with a minimum of time and expense.

Cheap and home-made brooders are usually unreliable, and I cannot recommend them to beginners. The importance of a good brooder becomes evident when one stops to consider the fact that it is the number of chicks raised, rather

than the number hatched, that makes or mars the profits and pleasures of the business. It is often harder to raise chicks than to hatch them.

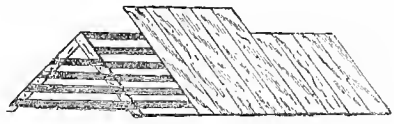

FIG. 21. A-SHAPED COOP WITH PEN 4 FT. LONG AND MOVABLE SHELTER BOARDS.

Sometimes this is because the chicks were improperly hatched in bad incubators, but even the most lifeful chicks will fail to thrive in poor brooders.

A good brooder is considerably more than merely a box with a lamp set inside it and sells for more money. It should be roomy, well-lighted, provide plenty of sunlight and fresh air, and be easy to keep clean and sanitary. These points, together with a good hover, should be insisted upon in buying either outdoor or indoor brooders. Which style is best depends upon whether or not one has plenty of house room; if he has, indoor machines will be found less expensive and will last longer.

Fireless Brooders

Fireless brooders are all right where one can keep them in a warm room and give them considerable attention until the chicks learn to use

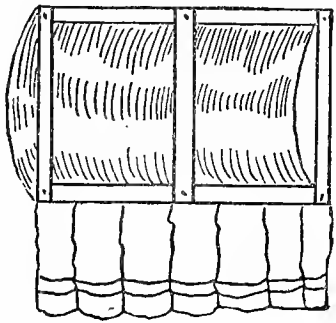

Fig. 22. The Hover Arrangement for Fireless Brooding.

them. I cannot recommend them for cold weather use, but they are all right in warm climates and for chicks hatched after March in northern latitudes. The principle of the fireless brooder is to conserve the animal warmth of the chicks and keep them warm with the heat they generate themselves.

Such hovers are very simple in construction, as can be seen from the accompanying sketches.

Many people make them from an old cracker or soap box, but they should be as nearly square

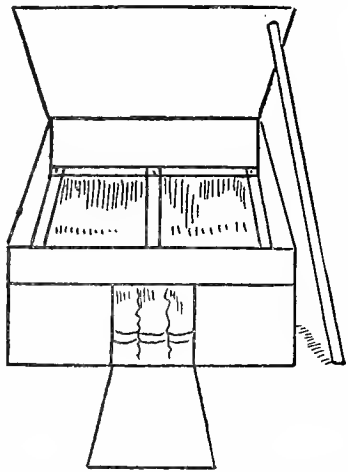

FIG. 23. INTERIOR VIEW OF FIRELESS BROODER.

as convenient. Simply take any such box, without top. Around the sides, about four and one-half inches from the bottom, nail cleats to support the hover frame. These may be adjusted to different heights as the chicks grow. For the top or hover part, make a wooden frame of one by two inch sticks, to fit inside the box snugly. Over the top of this tack several

thicknesses of heavy woolen cloth or felt. Then perpendicular to this, every four inches nail strips of other cloth or felt, cut in fringes to hang down almost to the floor. The chicks will snuggle around in this and keep warm, spreading apart when too warm. The whole hover arrangement lifts out, leaving simply an open box, very easy to clean. Have a chick exit in one side of the box, four or five inches square.

Bone Grinders

Bone grinders are an important part of the equipment of every poultryman who can get fresh bones regularly. Green cut bone is considered the best food of its kind, and it is usually cheaper and more satisfactory to buy a bone cutter and grind fresh bones as needed than to buy the prepared meat foods. Green bone cutters (not bone mills, which are for grinding dry bones and are of little practical value) can be bought at a cost of $8 to $10 upwards. There are cheaper machines on the market, but they grind slowly and require excessive time and muscle to operate.

Miscellaneous Equipment

In addition to the foregoing appliances and devices, there are numerous others, mostly needed on large plants and not requiring special

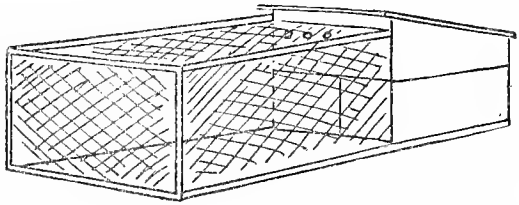

Fig. 24. Brood Coop for Hen and Chicks With Wire Netting Run.

mention here, such as food cookers, feed mixers, grit crushers, brooder house stoves, pipe systems, etc.

Hay cutters are not expensive and every poultryman with a good sized flock should have one to cut clover and alfalfa into short lengths for winter feeding.

Brood Coops

There are a variety of styles of coops suitable for housing chicks from the time they are hatched until they are ready for permanent quarters in the fall. A number of the simplest

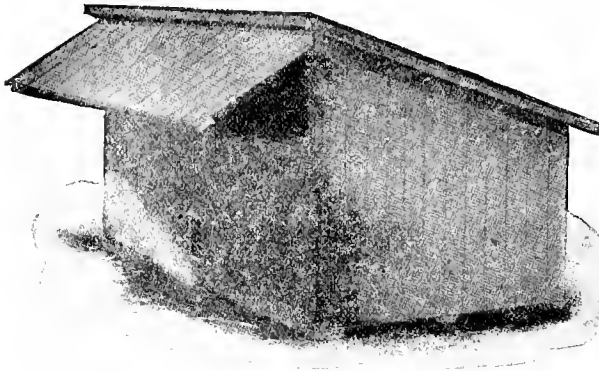

FIG. 25. A GOOD ROOSTING COOP FOR GROWING CHICKS.

and best coops are illustrated herewith. They require little further explanation, as they can be built most cheaply by making them of a size that best utilizes waste lumber and boxes. The important point is to see that they have tight roofs and dry floors.

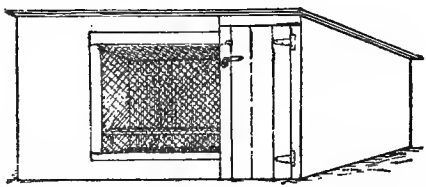

FIG. 26. BROOD COOP FOR CHICKS AFTER WEANING.

The brood coop for chicks after weaning may have a front of lath or netting, with burlap

curtains for bad weather, or made close with tight door and movable window for winter use. They are usually made without floors and of a size easily handled—six to eight feet long, about three feet wide, two to two and one-half feet high in the rear, and three to three and one-half feet high in front. One or two roosts run the length of the coop in the rear, about a foot from the ground.

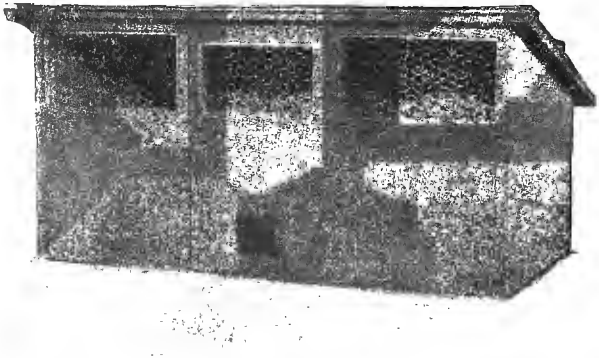

FIG. 27. COOP WITH HOOD THROWN BACK IN PLEASANT WEATHER.

As the chicks grow toward maturity they may be moved to a coop such as is shown in Fig. 27. This is six by eight feet, and six feet high in front. It need not be carefully made if used only for chicks in summer; a tight roof to keep out the rain and wire netting over the

window to exclude varmints are the main points.

The chick shelters shown in Figs. 17 and 18 are valuable for use with brooder or brood coop while the fowls are small. They give the chicks an outdoor run, yet offer protection from sun and storm and marauding animals.

CHAPTER IV

CHOOSING AND BUYING STOCK

Classification of Breeds

FOR convenience in classification, all breeds are first separated into "classes," the country of their origin or some other peculiarity determining the class in which each belongs. Almost every breed is then subdivided into a greater or lesser number of varieties, differing only in color of feather.

In the following descriptions a few terms may need explaining. Where the term "sitters" is applied it does not necessarily imply especial persistence but merely the natural instinct to reproduce. In the "non-sitting" varieties this trait has been almost eliminated, although an occasional hen may want to sit.

All eggs are classed broadly as "white" or "brown," but there are really many inter-

mediate shades and tints of color. The Mediterranean breeds seldom depart from their usual white or very light tinted eggs; but the brown-egg hens often vary from deep brown to light flesh color. This does not necessarily imply impure breeding, but other things being equal the hen whose eggs are truest to type is the most desirable.

The American Class

The American class contains the leading general-purpose breeds—the Plymouth Rocks, Wyandottes, and Rhode Island Reds. All are hardy, good layers of brown eggs, sitters, grain and flavor of flesh excellent, will thrive in confinement but good foragers if permitted.

Plymouth Rocks

Plymouth Rocks are of six standard varieties, the only difference being in color. All are of symmetrical proportion, neither blocky or angular in body type. Combs are single and serrated, and medium to small in size; the earlobes are red, while the skin, beak, legs, and toes should be a deep yellow color. Standard

weights for Plymouth Rocks are cock 9½ pounds, cockerel 8 pounds, hen 7½ pounds, pullet 6½ pounds.

Barred Plymouth Rocks have been the most common variety of poultry in America for years. They are an old farm favorite, yet very difficult to breed to a high excellence in color. The bars on feathers should be narrow and parallel and alternately white and bluish-black in color. The Barred is a good all-round variety.

White Plymouth Rocks are equal to the Barred in every economic quality, and are gradually coming to a popularity more nearly equal because they have the superficial advantage of color—easier to breed true to standard and no black pinfeathers to show on the dressed carcass.

Buff Plymouth Rocks are quite popular, but not so much so as the Barred and White. Their economic qualities are unexcelled, but they have a decided tendency to vary in color from cinnamon brown to lemon buff, or come with white or black feathers in wings and tail—which often results in an uneven looking flock.

Columbian, Partridge, and Silver Penciled Plymouth Rocks are comparatively new varie-

ties and are bred in small numbers as yet. They are very handsome and practical fowls, but require considerable skill in breeding.

WYANDOTTES

Wyandottes, as compared with Plymouth Rocks, are a little shorter bodied, chunkier and blockier, and average a trifle smaller. They have neat rose combs; ear lobes red; beak, skin, and legs a deep yellow. Standard weights are, cock 8½ pounds, cockerel 7½ pounds, hen 6½ pounds, pullets 5½ pounds.

White Wyandottes combine beauty and utility to a marked degree, and rank as one of the half-dozen most popular varieties in America.

Buff Wyandottes are an excellent variety, but only fairly popular.

Columbian Wyandottes are a comparatively new and fairly popular variety. Being white with black points like the Light Brahma, they dress like a white fowl.

Silver Laced, Golden Laced, Silver Penciled, and Golden Penciled or Partridge Wyandottes all are very beautiful fowls, but degenerate quickly in color if neglected. They are not

widely bred, but have a following large enough to keep them in the public eye.

The Black Wyandotte has never attracted much attention.

Rhode Island Reds

Rhode Island Reds are of a shape and size intermediate between the Plymouth Rock and Wyandotte and rank about the same in practical qualities, which is equivalent to saying that they are excellent fowls. There are two varieties of Reds, differing only in the shape of the comb, the one having a single and the other a rose comb. A novice would probably call the single combed variety—on its looks—a Red Plymouth Rock, and the rose combed variety a RedWyandotte. Standard weights are cock 8½ pounds, cockerel 7½ pounds, hen 6½ pounds, pullet 5 pounds.

The Buckeye, the American Dominique, and the Black and the Mottled Javas are other American varieties that are not without certain merit but are rarely bred.

The Mediterranean Class

Next to the American class in popularity

comes the Mediterranean class, comprising varieties which are all non-sitters, noted for their heavy laying of white eggs, their trimly built bodies, and extreme alertness.

Leghorns

Leghorns are of seven varieties, though only two have a broad popularity—the Single Comb Brown and the Single Comb White. Of the two the White seems to be the most popular in the East, while they are pretty evenly balanced in other sections of the country. The Single Comb Buff Leghorn was popular for a while, but has since gone backward. The rose combed varieties of the colors mentioned have never approached the single combed varieties in popularity, though Rose Comb White and Brown Leghorns are to be found all over the country. Black Leghorns are not often seen, and the Silver Duckwing variety is still more rare.

The Leghorns' chief claim to attention is their laying propensity. They lay better under average or indifferent care, except in early winter, than any fowls not of their class; and, except when frost is severe enough to affect their

large combs, they are reasonably hardy. Average Leghorns are too small to be of much value as market poultry, though they have nice yellow skin and legs. Certain breeders have specialized on improving their size and then they make a very fair broiler, for while they never get big, they make their first pound of growth comparatively rapidly and feather out quickly. Leghorns have no standard weights, the larger fowls being given the preference.

Black Minorcas

Black Minorcas are the next breed in this class in popularity, though far behind the leading Leghorn varieties in this respect. Ordinary Minorcas as found distributed over the country do not differ materially from Leghorns, except that they are longer-bodied and have larger combs, wattles, and ear lobes. Typical Black Minorcas, as bred in the sections where they are most popular, are medium large fowls, sometimes as large as Plymouth Rocks, are good layers of exceptionally large white eggs, and are good table fowls for home use, though their white skin and dark legs are against them in most markets. There are both single and

rose combed varieties, the former being the more common.

Andalusians and Anconas

Andalusians and Anconas do not differ greatly from Leghorns, except in color. The Andalusian is a trifle more on the Minorca type; the Ancona on the Leghorn type. The Andalusian is a slaty-blue in color, and very difficult to breed to standard requirements. The Ancona is a mixed (speckled) black and white fowl. Both have their admirers, especially among fanciers, and they may be rated as fowls for the fanciers and amateur rather than for commercial poultry breeding, although the Ancona variety, especially, has lately been attracting more attention for utility purposes.

Black Spanish

Black Spanish are practically extinct, except in the hands of a few fanciers who prize them as novelties.

Hamburgs and Polish

Hamburgs and Polish are of the same general type as Leghorns. Varieties of both

breeds were popular before the introduction of the Leghorns, but since then they have gone backward, being less hardy, more difficult to keep and rear, and lacking the yellow legs and skin which American markets prefer. They are beautiful and fairly useful fowls, however, and many fanciers still give them considerable attention for exhibiting at shows.

Most Hamburgs are too small to be of real practical value, though a few breeders maintain good size along with heavy laying traits. Polish fowls, though small, are usually plump and meaty, and good layers. Their large crests are a characteristic admired by fanciers, but make them susceptible to colds and roup when exposed to wet weather.

The Asiatic Class

The Asiatic Class, once of considerable economic importance, has been almost crowded out by the general-purpose breeds in the American class. All three of the Asiatic varieties—Brahmas, Cochins and Langshans—are large fowls, too large for general market demands, and those who keep them for commercial purposes supply special markets. All Asiatic fowls

have the advantage of extreme hardiness and, being quiet and docile, they give satisfaction in crowded quarters where an energetic fowl would be a nuisance.

In some cases this is more than offset by the objection to their foot and leg feathering, which is against them for marketing, or wherever the soil is heavy and there is much wet weather. Such fowls must be provided with houses where the floors are dry and littered with material that will quickly absorb the water in the foot feathers after they have been out on wet ground. With judicious management the Asiatics are good layers, but the average poultry keeper cannot get the results from them that he can from the American varieties.

BRAHMAS

Brahmas are of two varieties, Light and Dark. Their low pea combs and heavily feathered bodies and shanks enable them to withstand exceedingly cold weather. They lay a large brown egg, and are rather persistent sitters; color of skin and legs yellow.

Light Brahmas are especially good as a roasting fowl. They are the largest of chickens,

and as it takes them so long to attain full size they remain soft-meated much longer than fowls of the smaller breeds. Standard weights are, cock 12 pounds, cockerel 10 pounds, hen 9½ pounds, pullet 9 pounds.

Dark Brahmas are similar to the Light variety, except in color which is a combination of white, gray, and black penciling, giving a beautiful steel-gray effect when bred to perfection. However, standard weights are a pound lighter all around than those of Light Brahmas, and they are rarely bred.

Cochins

Cochins are hardy and stand confinement well, being of a lazy disposition; fair layers of brown eggs, persistent sitters. Have single combs, serrated, and small to medium in size; legs and skin yellow; bodies and shanks feathered still more heavily than Brahmas. There are four varieties of Cochins—Buff, Partridge, White, and Black. The latter two are rarely bred. The Buffs are the leading variety, and they are not really common. Standard weights are, cock 11 pounds, cockerel 9 pounds, hen 8½ pounds, pullet 7 pounds.

Langshans

Langshans are the smallest of the Asiatic breeds and the best layers under ordinary management. But their color (black—the white variety having never become popular) is against them for market poultry, especially since they have white skin. They are all right for home consumption or for dirty or smoky locations where the plumage of a light-colored fowl would soon be ruined. Standard weights are, cock 10 pounds, cockerel 8 pounds, hen 7 pounds, pullet 6 pounds.

The English Class

The English class contains the Dorkings, Red Caps, and Orpingtons—all three of distinctly different types, the Orpington being the only one of importance in America.

Dorkings

Dorkings are an English production of great antiquity, chiefly noted for their excellent table quality. They are found on many Canadian farms, but are rare in the States.

Red Caps

Red Caps are a fowl of the Hamburg class bred to a larger size, and are not at all common in America.

Orpingtons

Orpingtons are an English translation of the general-purpose type of fowl which prevails in the American class. They are similar in regard to egg production and type, only the Orpington is a trifle more "beefy," with a long, round body and a very full breast development. Orpingtons meet the demand of English markets for a white-skinned fowl with flesh colored legs, but the yellow skin and legs of the native American varieties are more popular in this country. However, this is a superficial difference which may be of no moment if one is raising fowls merely for home use or for an indifferent or unappreciative market.

There are three well established varieties of Orpingtons—the White, Buff, and Black, named in order of American popularity. The Spangled and Jubilee varieties have never made

much headway here. In each of the popular varieties there are single and rose combed subvarieties, the former being the more common. Standard weights are, cock 10 pounds, cockerel 8½ pounds, hen 8 pounds, pullet 7 pounds.

The French Class

The French class contains three breeds recognized in the American Standard of Perfection—the Houdans, Le Fleche, and Crevecœurs. The latter two are seldom seen here.

Houdans

Houdans are larger than Leghorns and lay white eggs almost as prolifically, but they are not quite so hardy a fowl. In color Houdans are a mottled black and white, have five toes, and are crested but not so heavily as Polish. They are of first-class table quality, but in marketing their white skin and dark legs are against them. Standard weights are, cock 7 pounds, cockerel 6 pounds, hen 6 pounds, pullet 5 pounds.

The Game Class

The Game class contains three distinct types

of fowls—the Pit Game, the Exhibition Game, and the Indian Game.

Pit Games

Pit Games are the original game fowl, having been bred for centuries in England. They have some economic value so far as productivity and table qualities go, but they cannot be classed for general-purposes with the breeds of the American class. They are truly "game" —pugnacious and quarrelsome—which qualities are destructive to comfortable and profitable work with poultry on the average farm and practical plant.

Exhibition Games

Exhibition Games are a type of long legged, long necked, exaggerated Pit game, having a place in the exhibition room and in the yards of certain fanciers, but not suitable anywhere else.

Cornish Indian Games

Cornish Indian Games are larger and meatier than either of the other two, and so

much less pugnacious that there has been a recent tendency to drop the "game" part of their name and call them simply Cornish Fowls. They are good foragers, hardy, mature early, fair layers of tinted eggs, more or less inclined to broodiness, good as table fowls, dressing with very little waste on account of their full breasts and egg-shaped bodies. Standard weights are, cock 9 pounds, cockerel 7½ pounds, hen 6½ pounds, pullet 5½ pounds.

The Bantam Class

The Bantam class is not of great practical value, being bred mostly for ornamental purposes or playthings for children, as the fowls become very tame and like to be petted. Bantams are too small for practical table use, and are only fair layers of very small eggs, yet they will furnish eggs and some meat for a small family so situated that they could not keep a large fowl, for Bantams may be housed in a drygoods box and kept on a lawn or in a garden where a larger fowl would be a nuisance.

There are twenty-five or more varieties of Bantams, most of them being miniature reproductions of a large breed. The Buff Cochin

Bantams are the most popular variety of Bantams in America. The Light and Dark Brahma varieties are also good. The eight varieties of the Game Bantams are more or less common and valuable, along with the Seabright Bantams of which there are two varieties, the Golden and Silver.

Merits of Different Breeds

There is a wide field of choice for the man selecting a breed of fowls nowadays. Different combinations of size, shape, and color have been propagated and perfected in almost infinite variety. Any pure breed is good, only some are better for certain purposes than others. Specific detail on this point is given in the preceding breed descriptions, so that no one need go astray.

We have not illustrated the different breeds, because pictures of all sorts of fowls can be seen in any poultry magazine or catalog, and it is better for a man to see live fowls of a certain variety before buying that kind anyway. He can do this at any good poultry show—seeing fowls in almost endless variety and in their most attractive condition.

While the Mediterranean breeds are the heaviest layers, and therefore best for the egg specialist or anyone who demands a white egg, the general-purpose breeds—as exemplified in the American class—are best adapted to the needs of the average poultry keeper. This is proved by the fact that nine-tenths of the people who keep poultry in America keep fowls of a general-purpose type. Which of the many varieties of this type of fowl is best depends largely upon individual circumstances. Ordinarily the beginner should choose one of the most popular varieties, unless for some special reason another kind is to be preferred, although lesser known.

The differences between the general-purpose varieties are mostly superficial, and any one of these varieties may be substituted for another in any case where superficial differences are immaterial. That is to say, the productiveness and real worth of the different fowls of this class are much the same, except such differences as color of feathers and skin and legs. In this country people generally prefer yellow-skinned poultry and will buy more readily and often pay a premium to get that kind. Therefore it is to the advantage of a market poultry grower to

keep that kind of fowl, meaning easier sales and better profits, with no difference in cost of production.

But if he is growing fowls only for his own table, and has no prejudice in the matter of color of skin, it will make no difference whether his stock is yellow skinned or white skinned. The color of plumage can be considered in much the same light: A white or buff fowl in the pinfeather stage dresses so much easier and cleaner looking than the others that most large plants prefer them; but for home consumption, or small scale production, this matter may not be of serious importance.

So far we have considered mainly the economic aspects of the various breeds. Most people who keep poultry want to get, if possible, at least something in the way of financial returns as well as pleasure from their hobby; but there are others who are interested only in the pleasure or fancy side of the thing, and if the tendency is for growers of poultry for economic purposes to concentrate on a few varieties, the tendency among fanciers is quite opposite; they prefer to give their tastes and inclinations for color and general make-up free rein, and for the sake of oddity prefer new or comparatively

obscure varieties, providing they have more or less beauty and merit.

Other things being equal, the variety that best suits one's tastes should be selected, as that one will get the best care and attention. It is often worth a great deal to have fowls that readily appeal to one's affections, for their care will then be easy and spontaneous, where it would otherwise be tedious and comparative drudgery.

Mating Breeding Fowls

The intelligent and systematic mating of the breeders is a very important matter where eggs are wanted for hatching. The male bird should be allowed to run with the females in the breeding pen at least two weeks before eggs are set.

In selecting the breeders, discard every fowl that is not of rugged health, or that is deficient in size, shape, or color. Do not let sentiment play a part, for quality is always better than quantity. A perfectly sound male at the head of the breeding pen is very essential; if possible, have the male of even a little better quality than the females.

It is usual to mate young cockerels to old hens, and old cocks to young pullets. Pullets and cockerels should not be mated together, unless very early-hatched and well matured, but young stock of the one sex should be balanced by seasoned maturity in the opposite sex. This insures stronger fertility in the eggs, although fowls of the same age may be mated together if both sexes are well matured, being at least a year old.

The best results are usually secured when one male is mated with not more than eight to twelve females of the Asiatic and American classes, and twelve to eighteen of the Mediterranean class. Sometimes good results are secured when one male looks after a greater number of hens than this, but not unless he is an exceptionally vigorous fellow.

How Many Breeds to Keep

One variety is enough for the average poultry keeper to try to handle. It is absurd to start out with several breeds to test their relative merits, for then no one variety is mastered sufficiently to get the best out of it. After succeeding with one kind of fowl, the beginner may safely add others if he chooses, but there are

many advantages in having a reputation as a specialty breeder of one variety.

Beginners often think it advisable to keep two varieties of different classes and types to meet different demands or serve different purposes. But the truth is that the special adaptabilities of the different breeds to different purposes are as much theoretical as real, and in time the poultryman realizes that the few practical advantages of keeping two types of fowls are about offset by the disadvantages in having to maintain two separate stocks and in adapting the accommodations to the different habits of the fowls.

If the variety first chosen should begin to lose its charm, do not be in too big a hurry to change; remember that no variety is perfect in every respect, but they all have special qualities which handsomely reward the men who can best develop them.

Pure Breeds Are Best

There is no argument regarding the superiority of pure-bred poultry over scrubs and mongrels. The latter kind are never tolerated on a really progressive plant. Standard breeds

are not alone for fanciers to exhibit, but every poultryman who wants to get the most profit and pleasure from his fowls must have stock of fairly good breeding. While it cannot be said that success with poultry can be achieved only with thoroughbred fowls—for success depends upon other things quite as much as on the kind of fowls kept—yet it is always true that good stock is one of the greatest of aids to maximum profit and satisfaction and the beginner should avoid scrub birds of no special breeding.

Standard-bred poultry means a more attractive flock, because all fowls are uniform in size, type, and color; it means more eggs and larger size in the fowls, because purity of blood has come only through generations of careful selection; it means more money when fowls are sold in market, because they are uniform in type and market characteristics, adding attractiveness; it means quicker and more uniform growth in the chicks, and, last but not least, it means healthier, hardier stock.

Pure breeds require no more feed or attention than common stock, and the only difference in cost is in the original investment, which is small compared with the advantages to be derived.

Starting with Pure Breeds

There are three good ways to begin with pure breeds—(1) by buying mature stock; (2) by buying eggs for hatching; (3) by buying newly-hatched chicks. All three methods have their advantages and disadvantages, and people get all kinds of results—good, bad, and indifferent—from each. In brief it may be said that in buying stock the risk of total loss, as well as the possibility of getting fine stock very cheap, is less than in buying eggs or chicks. When one buys stock he secures for his money something tangible and real; when he buys eggs or chicks he secures greater possibilities for his money than the stock, but these may or may not develop.

Perhaps the best way is to divide the amount of money available for the purpose, buy a few fowls, and invest the rest in eggs or chicks. As a rule it is best to buy of a nearby poultryman, for that saves transportation charges, fowls will not need to become acclimated, eggs will have less chance to be broken and chicks to be chilled, while on the road.

Buying Stock

Buying stock is the method of starting usually considered most successful, but it is not always so. It requires a heavier original outlay, but one knows just what he is getting and takes no chances on the hatchability of eggs or disease and accident while raising the chicks. Three to five dollars apiece will buy very fair breeding stock—good enough for an experimental start, except that one may spend two or three times that amount for an extra pair of exhibition quality if he has the means and wants to learn the exhibition game immediately. While it always pays to get as good stock as one can well afford, yet beginners who invest in very high priced stock cannot derive the utmost out of it simply because they are not qualified to exhibit judiciously, mate, and breed from them.

The best time to buy fowls is in the summer and fall. Prices are lower then and there is a larger selection to choose from. Besides, this gives time to study the fowls, to learn how best to feed and manage them, by the time eggs are desired for hatching. It takes time for fowls to become accustomed to new surroundings and

rations, and people who wait until spring to buy are often disappointed because the hens do not lay readily or the eggs do not hatch well.

Buying Eggs

Buying eggs is the cheapest and often the best plan where the start is to be made in late winter or early spring, that is, during the natural hatching season. One feels then that he is learning the business in all its detail, starting at the very foundation; yet on the other hand this gives greater opportunity for failure to creep in. However, there is always the attractive chance of getting a good hatch and a lot of good chicks at a cost far below what fowls of the same quality could be bought for at maturity.

The common prices are $1 to $3 per setting for eggs from utility to medium exhibition stock, $3 to $5 per setting from good exhibition stock, and $8 to $15 per setting from celebrated prize-winners. There has been a recent tendency to boom prices on eggs for hatching to figures much higher than these, but results from such eggs are seldom enough better than from medium-priced eggs to justify the extra expenditure.

Buying Baby Chicks

Buying baby chicks is much like buying eggs, except that the uncertainty of hatching is eliminated. The chicks are shipped before their thrift and quality are apparent, and results at the end of the season are usually only a little better than with eggs. This little, however, is an inducement to many to try chicks rather than eggs, especially if it would be a bother for them to set hens or incubator.

Shipped as soon as possible after hatching, the chicks need no food for two or three days, which generally allows ample time for shipping, but upon arrival they need prompt and careful attention to give them the right kind of a start. Prices on baby chicks are usually about twice as much as for eggs from the same quality stock, the most common prices being from twenty-five to seventy-five cents each.

CHAPTER V

FOODS AND FEEDING

PROPER feeding is one of the most important factors in poultry keeping. Yet there are not many absolute rules governing feeding that can be laid down for the guidance of the novice, and this is one of the phases of poultry keeping where results depend largely upon the good or bad judgment of the attendant. There should be no guess-work in feeding, but one should adopt the method that he finds most economical and satisfactory for his peculiar conditions.

Practical knowledge and skill, enough for ordinary use, can be acquired without the expenditure of a great amount of time and study. A simple, common sense understanding of the needs of an animal organism and plain knowledge of the properties of the staple poultry foods are enough for the average poultryman to know. There is nothing about poultry feed-

ing too deep or too hard for anyone of ordinary intelligence who gives the subject a little careful attention and notes the effects of his feeding on his fowls. The latter is the important point.

Almost anyone can follow a good formula and get fair results, but to get the utmost possible out of a flock of fowls one must have a judgment trained to observe, closely and without conscious effort, their individual physical appearances, to note the very beginning of a departure from normal thrift, and to decide almost instinctively how to preserve or restore the health of the fowls. Hence, expert feeding is a fine art in which skill is not mechanical, but comes through practice. To excel as a feeder of poultry a man must have more than a book knowledge of the properties of foods and the principles of feeding, but the basic facts which follow are important, for they make the foundation upon which the beginner's practice must be built.

Food Elements

All food stuffs contain, in greater or lesser degree, three main elements which are essential

in the feeding of live stock and poultry. They are protein, carbohydrates (including fat), and ash.

Protein is the nourishing matter, supplying material for bone, muscle, blood, feathers, and eggs. A food is valuable in proportion to the amount of protein it contains. This element has no substitute, and rations deficient in it are always unsatisfactory. Foods that are unusually rich in protein are often called nitrogenous foods.

Carbohydrate elements, principally starches, form the bulk of the dry matter in nearly all foods and are the principal sources of heat and energy. Surplus amounts are stored up in the body as fat, to be drawn upon later for extra heat or energy.

Ash and fiber are the subordinate food elements, consisting of lime, husks, and other mineral and waste matters, mostly indigestible. All ordinary foods contain a sufficient amount of these substances, and they scarcely need be considered in formulating practical rations.

How to Balance Rations

A " balanced " ration is one with protein and

carbohydrates combined in proper proportion to supply fully the needs of the fowls but without excess of either element. A ration is too "wide" when it contains an excessive proportion of carbohydrates, making the fowls too fat; it is too "narrow" when rich in protein and deficient in carbohydrates. In the latter case, the over supply of protein will to a certain extent take the place of the lacking carbohydrates; but this is not advisable because it is a hardship on the kidneys and liver of the fowl to dissipate the excessive amount of nitrogen, and it is more expensive to furnish protein than the needed carbonaceous food. So, for both physical and economic reasons, the ration should always be a little wide, rather than a little narrow.

The best ration for laying hens is generally regarded as 1:5; that is, one part of protein to five parts of carbohydrates. A great deal depends, however, upon circumstances—the breed, the physical condition of the fowls, the time of year, etc. While the proportion should be kept as nearly correct as possible, a slight variation is not usually serious because fowls are more or less able to adapt different foods to their special requirements.

Successful breeders who do not use the ratio of 1:5 usually choose one a trifle wider, say 1:5½ or 1:6. About the only exception to this is where the fowls are of a large and sluggish variety, when the ratio might well be narrowed to 1:4½. The smaller and more active the fowl the wider its ration may be, for energy burns up carbon. All fowls need a wider ration in winter than in summer, because it is harder to maintain bodily warmth then. Growing chicks and hens that are producing heavily of eggs should have rations rich in protein. Stock being specially fattened may have the widest ration of all, say 1:8.

Food Values

The nutritive ratio of a food or ration expresses the proportion of digestible elements of protein to carbohydrates, determined by chemical analyses. While nutritive ratios are prone to vary in different sections of the country and with different brands and varieties of the same food stuff, those presented herewith are as accurate as any that could be given for general use.

GRAIN FEEDS

Wheat	1:7	Buckwheat	1:7.4
Wheat Middlings	1:5	Sunflower Seed	1:6
Wheat Bran	1:4	Millet Seed	1:5
Indian Corn	1:10	Kaffir Corn	1:9
Gluten Meal	1:1.5	Peas and Beans	1:3
Oats	1:6	Hemp Seed	1:5
Oat Meal	1:5.7	Linseed Meal	1:1.5
Barley	1:8	Malt Sprouts	1:2.5
Rye	1:5.7	Rice	1:11

VEGETABLES, ETC.

Green Grass	1:7	Turnips	1:8
Green Clover or Alfalfa	1:5	Potatoes	1:12
Dried Clover or Alfalfa	1:3	Red Beets	1:5
Mangel Wurzels	1:5	Lettuce & Cabbages	1:2

ANIMAL FOODS AND MILK

Beef Scraps	1:0.8	Fresh-cut Bone	1:1.2
Dried Blood	1:1	Whole Milk	1:4
Animal Meal	1:0.5	Skim-and Butter-Milk.	1:2

Systems of Feeding

There are two main systems of feeding poultry, (1) mash and (2) dry feed. Each has many successful followers and which is best often depends upon individual circumstances. Most people get best results from a judicious blending of the two systems, as indicated later, and that is the plan I use and recommend. To the fowls it will make little difference which system is used if it is used properly. Method and regularity in feeding are all important, and whatever be the system adopted it should

be followed closely and changed only for some very good reason. A common mistake of the novice is to make frequent and radical changes in his rations and in his time and method of feeding—a sure way to bring about digestive troubles and ultimately destroy the usefulness of such fowls as are not killed outright.

The Mash System

The mash system involves the feeding of a wet, scalded, or cooked mash once a day, dry grains also being fed once or twice.

Most successful poultrymen use mashes more or less, for they have certain advantages. Chief of these may be mentioned, first, fowls enjoy a mash more than dry grains because moistening and cooking increases palatability. Small potatoes and other waste vegetables and table scraps may be added to the mash with economy. Bulky foods, such as hay and bran, which fowls sometimes do not relish separately, may be mixed in the mash and the fowls will eat all of it to get the richer portion. Lastly, the mash makes a good gauge of the condition of the flock, for if it is not eaten eagerly it is clear that the fowls are overfed or that the

other food contains too large a proportion of some substance prominent in the mash.

However, the mash has certain disadvantages which prevent a good many poultrymen from adopting it. For one thing, fowls can fill up quickly on soft food, without taking exercise; hence, it has a tendency to make them greedy and lazy, which is bad where they must be kept confined, or with a variety naturally sluggish. Sometimes, too, mashes have a tendency to produce indigestion or looseness of the bowels, especially in the hands of a beginner.

To avoid this, they should be fed in a crumbly state rather than wet or sloppy, while sour or moldy mashes must never be fed. In compounding the mash be careful that it is not too concentrated, containing an excess of the richest food elements, such as meals and meat preparations; or that it is not too light and bulky, composed mostly of hay or bran which fill the crop without supplying sufficient nourishment.

A good mash is naturally somewhat forcing. Hence, its use will add to the profits of the broiler grower whose chicks must be brought quickly to marketable size, or to the profits of the egg-farmer who wants all the eggs he can

get when prices are highest. Fowls that are being forced for heavy egg-production and which will be discarded after their first or second laying season may be fed a mash every day —or even two mashes a day—during the season of highest prices for eggs. Breeders who are more solicitous for the constitution of their fowls, wanting them to remain profitable for two or three years, especially where hatchability of the egg is a factor, should feed no more than four or five mashes a week, and perhaps fewer would be better in the majority of cases.

The Dry-Feed System

The dry-feed system is less bothersome than mashes and probably is safer for the beginner. It does not contain the possibilities for quick growth and heavy egg-production that may be obtained by the skillful feeding of mashes, but on the other hand there are not the possibilities for trouble which may become serious in inexperienced hands.

Dry-feeding is especially advisable where it is inconvenient or bothersome to make and feed a wet mash, or where the mash would likely

be badly prepared or ill-balanced, or on an extremely cold day when a wet mash would freeze quickly, or for a flock that is affected with mild chronic diarrhoea.

Dry-feeding has none of the forcing effects of mashes; hence, while chicks may not grow so fast on dry feed as on mashes, the growth will be more natural and better from a breeding standpoint. In the same way, hens fed a daily mash will probably lay more eggs than those that get nothing but dry grains and seeds, but the eggs usually produce larger hatches and stronger chicks from flocks that get mashes comparatively infrequently.

In dry-feeding remember that when all hard grains are fed the fowls get no extra bulk in them and of course no succulence as in a mash that is made properly bulky; hence, unusual provision must be made for bulky and succulent food—especially green food—and hay or grass and vegetables must be supplied regularly.

The usual method of dry-feeding is to scatter all grains and seeds in a litter of straw or chaff. This makes the fowls scratch and hunt to get their food, keeps them busy and contented, and adds to their physical well being.

In cold weather it also prevents them from standing around and becoming chilled.

The Dry-Mash

The dry-mash has made hopper-feeding popular with certain dry-feeders. The dry-mash contains the same general constituents as the wet mash, but instead of being moistened and fed in troughs at stated intervals it is placed dry in self-feeding hoppers and kept before the fowls all the time.

This plan is all right for young stock because they can scarcely eat too much for good growth, but it is not suitable for general use with mature fowls. The only exception is where the fowls have their liberty; then it is all right to hopper-feed because the substances the fowls can pick up by foraging will attract them more than the mash anyway and thus they will have incentive to exercise. But in confinement fowls are liable to become lazy and overfat on the hopper system. Light, bulky foods, like bran or cut clover, may be safely kept before fowls all of the time, but except in the instance cited the richer foods should be avoided.

People who cannot be present to feed their

fowls regularly two or three times a day often resort to hopper-feeding with more or less success. But the fowls kept must be of a rather active variety and should have at least one meal each day that they will have to work for.

Commercial Feeds

There are on the market many brands of prepared poultry feeds made to cover all phases of poultry feeding. The feed for little chickens is called Chick Feed; after that comes the Developing Food for youngsters four weeks to four months of age; for broilers there is a supplementary Fattening Food; and for mature fowls there are the Scratch Feeds and the Dry-Mash Feeds, which furnish complete and well-balanced rations.

If the novice buys a reliable brand, containing good quality food compounded by an expert, it relieves him of all the uncertainty and most of the bother connected with amateur feeding. These feeds usually cost a little more than it would to buy the same bulk of staple grains and mix the feed one's self; hence, the experienced breeder usually formulates his own rations, but until he gets a little personal experi-

ence the tyro can often afford to pay a few cents extra on the hundred pound bag and be sure he is feeding right.

Variety in Feeding

A variety of foods is almost as important as properly balanced rations. It is neither good policy nor economy to confine one's feeding to one or two staple grains the year round. At least three different grains should appear in the rations, and a combination using a greater number is desirable.

Almost any ration may be used, so long as the correct proportion is maintained. It is a good plan to have several different combination, changing the bill of fare each day, as a properly varied diet stimulates the appetite and general health of the flock. The ration should always show a proper nutritive ratio, and in computing it one must not forget to consider the other foods—animal and vegetable—for they are almost as important as grain.

Corn, wheat, and oats are the three staple grain feeds for poultry, and many breeders obtain satisfactory results by feeding equal parts of these three grains. This surely is a simple

ration, and if greens and meat are included it makes a fairly well balanced diet, although for summer feeding or Asiatic fowls it might often be well to reduce the proportion of corn.

Sample Rations

One of the most common rations is this:

Morning—Mash of corn meal, bran, and beef scrap.

Noon—Wheat or barley, and oats or millet.

Evening—Cracked corn.

Greens or vegetables are supplied freely, and grit and shells kept always before the fowls. Morning and evening are full feeds—the fowls being given all they want. The noon feed is light, say half as much as the evening feed of grain. If one prefers to feed the mash in the evening, simply transpose the morning and evening meals as above stated.

Two good mashes, for feeding on alternate days, are measured by bulk as follows: (1) equal parts of cracked corn, ground oats, wheat bran, and middlings; (2) two parts bran, one part corn meal, one part ground oats, three parts beef scrap, three parts cut clover. A good dry-mash mixture is made, by weight,

of six parts middlings, six parts corn meal, three bran, one part oil meal, one part alfalfa meal, five parts beef scrap.

Preparing the Mash

The mash is sometimes cooked, sometimes scalded (half-cooked), and usually merely moistened. There is no particular difference, except that wet, uncooked food sours quickly. Cooked food remains sweet much longer and is therefore preferable when enough for several feeds is to be prepared at one time. Most mashes probably are not prepared until feeding time, but a good way is to mix the mash thoroughly, in a pail or tub, with boiling hot water; cover with a heavy blanket to preserve heat and aroma, and then let stand several hours before feeding.

Soft food should always be fed in clean troughs to avoid contamination and waste. Clean the troughs after each meal and scald them out every week or two. Troughs should be long and narrow, and several small troughs are better than one large one, because every flock contains a few domineering hens which will intimidate others and prevent them from

getting their full share when the food is all at one place.

How Often to Feed

It is mostly a choice between two times a day and three times a day. Busy people have been known to do fairly well by feeding only once a day and making that a heavy meal, but success in such cases must come in spite of the method rather than because of it.

Most practical poultrymen feed three times a day in winter and twice a day in summer. When fowls have to be confined on account of bad weather, three meals a day serve to break the monotony and keep them better contented than two meals, even though the noon feed is nothing but green stuff or vegetables. Fowls should not be fed too frequently, but just often enough to avoid the kind of idleness that may lead them to contract such vices as egg-eating or feather-pulling. In the summer, when they can enjoy outdoor life, this consideration is not important and two feeds a day will suffice.

How Much to Feed

There is no stated quantity of food that is

always best for a certain number of fowls. A great deal depends upon the size of the fowl, the quality of the feed, and the severity of the climate or the time of year.

Most beginners who take a pride in their fowls show their affection by feeding them too much. There is also such a thing as not feeding enough, and underfeeding is as bad as overfeeding, with the added danger of being more difficult to detect.

Fowls should be well fed, yet not overfed. In this, both kind and amount of food are factors. So long as a chick is growing, or a hen is laying eggs, it is hard to overfeed them; but when they are making neither growth nor product, the feeder must be cautious. The novice should handle his fowls as often as convenient, feeling of the breastbone and between the thighs, to see if they are lean or fat.

The common rule for a full feed of mash is: All the fowls will eat up clean and quickly, say in fifteen or twenty minutes. Feeding more is not only liable to gorge the fowls, but results in waste which should be promptly thrown away, for soured or contaminated food is unhealthy and unsanitary. Neglect of this point

is one of the chief dangers of the mash in careless or inexperienced hands.

When grain is fed in litter, a quart makes a full feed for a dozen average fowls. If the litter is made sufficiently deep—say half a foot—the fowls will not overeat because that means extra work to dig out the grains.

Feeding Hours

Morning, evening, and where three meals a day are fed, noon, are the common feeding hours. The exact time of feeding does not matter so much as seeing that the fowls get their meals regularly at the accustomed time. The appetite of a properly fed flock is as accurate as clock-work and should not be disappointed. Fowls should be fed as early in the morning as suits the attendant's convenience, and in the evening long enough before twilight so that they can see to gather a full meal.

Some people feed the mash in the morning, and some in the evening. A few use it at noon, but that is not best; vegetables or cut bone, or a light grain feed, is better then. Whether to feed the mash morning or evening depends mostly upon the convenience of the attendant.

So far as the fowls are concerned, it is possible to advance an objection to mash at either time. In the morning it gives the fowls a quick meal without exercise and conduces to habits of idleness; fed in the evening, the mash is quickly assimilated and the fowls' digestive organs become empty before morning.

Exercise and Feeding

Exercise and feeding go hand in hand. Fowls must have a certain amount of exercise to thrive, and the best inducement to make them take it is a reward of food. The general provision is to litter the poultry house floor with straw, hay, leaves, cut corn stalks, or any similar material that will make the fowls scratch to get the grain thrown in it. The best depth for the litter is four to six inches.

Fowls are sometimes exercised by hanging cabbage or beets just out of their reach so that they must jump for every mouthful they get. In some cases this is all right, but on hard floors it may cause the fowls to have corns or bruises, or internally injure heavy hens that may be carrying a lot of partly developed eggs.

Fowls also exercise by wallowing in dust, and

there is no way that gives them more pleasure and benefit. Provide them with a dust bath in a sunny spot of the house or yard and give the fowls a chance to put variety in their exercise.

Condiments and Tonics

There is little food value in most of the powders on the market. If the fowls are out of condition, the best of the patent condiments will help to stimulate their digestive organs and restore their thrift. They may also serve to correct the novice's faults in feeding; but healthy fowls should not have much of such treatment, and usually are better off without it, unless being temporarily forced for growth or eggs.

A pinch of salt added to the mash occasionally makes it more palatable and supplies a need of the fowls for mineral matter that is often neglected. A little linseed meal in the mash every week or ten days is also good, and it may be fed every few days to moulting fowls or youngsters growing feathers. Red pepper, mustard, and similar substances often have a slight tonic effect, but if used at all they should be fed in small quantities and not too often.

Green and Vegetable Foods

Green and vegetable foods occupy an important place in poultry feeding. Fresh, tender grass and the new blades of growing grain are greatly relished by fowls. Lawn clippings have considerable value, while all the varieties of clover and alfalfa are excellent and may be stored away and cured for winter feeding.

The material should be cut up fine and steamed when used, feeding it separately in troughs or as a foundation for the mash. Clover and alfalfa are highly nitrogenous, rich in lime which conduces to good egg shells, and being bulky as well as nutritious they give a good proportion to the mash and aid in the digestion of the grain.

Where alfalfa or clover is sold baled, a common practice of poultrymen is to throw a bale in the corner of the poultry house, the wires remaining fast, and allow the hens to help themselves at will. Finely cut clover or alfalfa prepared especially for poultry feeding may be bought in sacks of almost any poultry supply house at small cost, and almost all successful poultrymen make use of such material.

Of the vegetable foods, cabbage is probably best, with mangel wurzels a good second. Lettuce, turnips, beets, carrots, apples, etc., all are excellent. Potatoes are starchy and good for fattening. Onions are nourishing and have a tonic effect, but if used freely are liable to impart a strong flavor to the eggs. Vegetables may be fed raw, whole, or chopped in pieces; or they may be cooked and added to the mash.

Almost any kind of grass, vegetables, bulbs, or tubers that the fowls will eat are good for them.

Meat Foods

Meat foods are necessary to take the place in the ration of the bugs, worms, and insects which fowls delight in when they have liberty. It always pays to provide this feature, for without it fowls cannot yield maximum returns.

Green cut bone is probably best and is usaully given the preference where it can be obtained regularly and at a reasonable cost. Perhaps no other one feed that poultrymen use has a more pronounced favorable influence upon the health and thrift of the fowls, or is

better liked by them, or can be fed with greater economy.

There are also commercial preparations known as ground beef scraps, animal meal, dried blood, and bone meal, ranking in value in about the order named. They have all waste and grease properly extracted by boiling, and have the advantage over fresh bone of keeping for an indefinite length of time. There are many different brands of these feeds, varying in price and feeding value, and one is usually safest in buying a well established brand, which should not cost over $2.75 or $3 per hundred pound bag.

One ounce per fowl every other day makes a full feed of any kind of meat or bone preparation. More than this makes the ration too concentrated and is liable to produce bowel derangements.

Grit, or its equivalent, the hen must have in her gizzard or she cannot properly grind and digest her food. Fowls have no teeth, but grind their food in the gizzard. Where they have a good range they will often be able to pick up enough sharp sand and gravel to suffice, but in confinement and bad weather grit must be provided.

Shell seems indispensable to laying hens. Ground oyster shell is most commonly used, which contains carbonate of lime for making egg shells. Oyster shells also furnish grit, but not enough to suffice, as they are soluble.

Charcoal is an extremely valuable bowel corrective and blood purifier. In granulated form it is kept constantly in boxes or hoppers before the fowls by most poultrymen. It may also be had in powdered form and mixed in the mash.

Wheat is the best all-round grain for poultry. Perhaps the majority of successful poultrymen make it their main feed. Screenings have not the feeding value of wheat and should not be used unless the fowls seem to relish them and they can be bought cheap. Bran and middlings are ground wheat separated into parts, the former being the exterior and the latter the interior of the grain. Bran, being light and bulky, not heating or fattening, is good for summer use, or for free hopper feeding, or as a foundation for the mash. Middlings (shorts) are relished by most fowls and usually have a place in mash feeding.

Corn is the grain best liked by poultry, but if much of it is fed it becomes too heating and

fattening and the grains are so large that fowls get too much of their ration without exercise. Cracked corn may be fed more freely than whole corn because the fowls have to work harder to get it in litter. At usual prices it is the most economical grain feed and should constitute the major part of the grain ration in winter. Feed it in the evening rather than morning. Corn meal and corn chop, especially the latter, are almost invariably used as the basis of the mash.

Oats are a well balanced poultry food, but sometimes they are not relished on account of their coarse, indigestible husk. They make a good summer feed for mature fowls, or a light midday meal. The pointed hulls will not damage the fowls' crops if a good quality of oats is used and not fed to excess. Variety may be added to the ration by giving an occasional feed of steamed or boiled oats instead of the regular mash. Ground oats are excellent for mixing the mash, and rolled oats and pin-head oat meal are often used for little chickens.

Buckwheat is good for fattening, or for variety by occasionally substituting it for corn or wheat.

Barley, compared with wheat, contains a

little more bone and muscle forming food—also more fiber and husk.

Rye ranks between barley and corn. It is less fibrous than barley—a little more fattening. Fowls often do not like it, but it may be used occasionally if cheap.

Beans and peas are rich in nitrogenous materials. In Europe they are used for poultry more commonly than here. They may be fed whole, or ground and mixed in the mash.

Millet seed is nutritious and on account of its smallness induces fowls to scratch. Most poultrymen use it more or less, depending on price.

Kaffir Corn has a feeding value midway between corn and oats. Poultrymen who live where it can be easily secured would do well to use it rather freely.

Rice makes a palatable and good chicken feed, especially for young stock, where it can be procured reasonably.

Sunflower seeds, fed in small amount, tend to keep the fowls' feathers smooth and oily and are especially valuable during the moulting period.

There are a number of other feeds that are good for variety or may be secured cheaply in

certain sections. Among these may be mentioned sorghum seed, broom corn seed, hemp seed, linseed meal, cotton seed meal, waste bread, broken crackers, etc.

Fowls must be supplied liberally with good water. So large a proportion of their diet consists of concentrated foods that an abundance of liquid is necessary to keep the digestive organs working freely. Besides, laying hens require a great deal of water for the manufacture of eggs.

Milk—sweet, sour, or clabber—may be given as a drink, or mixed with the mash. It is a valuable and nutritious food and may be used with economy wherever it can be bought at a low price. As a drink, however, milk is but a partial substitute for water, which must always be supplied.

CHAPTER VI

HATCHING AND RAISING CHICKENS

Saving Eggs for Hatching

THE first requisite to successful hatching is good eggs. These cannot be laid by weak, scrubby stock, and it is of paramount importance that the breeding fowls be thoroughly healthy, of rugged constitution, and properly housed and fed. Any fowl that has ever been seriously ill with a contagious disease should not be bred from.

Eggs intended for incubation should be gathered several times a day during cold weather, or often enough to prevent chilling. The sooner they are set after being laid the better; strong germs may sometimes be held for two or three weeks, but ten days is usually the limit for maximum results. Keep them at a temperature of forty-five to sixty-five degrees, and turn them half over every few days to pre-

vent the yolk from settling to one side. Wash all dirty eggs before setting. Discard all ill-shaped and all very large or very small eggs, also those having chalky shells, as they are too porous and not properly finished.

Buying Eggs for Hatching

If you have to buy eggs for hatching, be sure they are carefully selected and perfectly fresh and fertile. Eggs secured at the grocery or picked up promiscuously over the country seldom give satisfactory results. Secure them of a reputable poultry breeder, or produce them yourself if possible, and then you will know what you are getting.

Hatching With Hens

The first thing is to make sure that the hen is really sincere in her apparent desire to incubate. Young pullets are seldom dependable, while hens that are very large or overfat are usually clumsy. If it is desirable for the hen to sit in a different location, move hen, nest box and all, after dark before the good eggs are given her. Test every hen by letting her

sit on spoiled eggs for a few days. If she stays on the job all right, without being nervous or fidgety, she is then ready to commence hatching in earnest.

Fifteen eggs are enough for any hen to cover, and during very cold weather or with very small hens, better results are often secured if no more than eleven or thirteen eggs are allowed to each one. At the same time the eggs are given the hen, she should be treated to a good dusting with a reliable brand of insect powder. This is important, for a hen cannot sit with comfort, or hatch with success, if her body is constantly tortured by a host of blood-sucking lice. It is also well to dust the hen again a few days before hatching time, so that the chicks will not contract lice immediately upon hatching. Do not use lard or grease, as it will penetrate the egg shells and kill the germs.

Do not set a hen where she will be open to all the light, or to disturbing influences, such as other hens crowding in to lay. The three great things for sitting hens, so far as environment is concerned, are—quiet, warmth, and subdued light. The nest should be large enough so that the hen may occasionally change her position, but if too large the eggs will roll

around and become chilled or broken. Excelsior makes the best nesting material; straw and hay are too stiff.

If possible, have food and water in front of the nests all the time, then the hens may come off to eat and drink whenever it suits them best. Also have a box of dust or dry earth convenient for them to wallow in. That serves to break the tiresome monotony of sitting, provides needed exercises, and tends to keep down vermin.

It is unnecessary to sprinkle the eggs and "fuss" with the hen in the various ways sometimes recommended, unless the season happens to be an exceptionally dry one or the location of the nest is unnatural in some way. As long as things seem to be going favorably, let the old hen alone; she knows her business. Of course if an egg should chance to get broken, clean the nesting material and the soiled eggs immediately, so that conditions in the nest will not become foul and unhealthful.

As many hens as possible should be set at one time, for in this way the infertile eggs can be tested out at the end of the first week and the remaining good ones divided up among the number of hens necessary to cover them, send-

ing the other hens back to laying again or resetting them.

Operating an Incubator

It is always best for the beginner to follow closely the instructions sent along with the machine he is using, because different makes of machines and different climatic conditions necessitate different methods of operation, and the manufacturer of your machine ought to know better than anyone else how best to operate it.

There are, however, a few general principles that hold good with every machine and every condition of environment. First, make sure that your thermometer is correct. New thermometers are sometimes imperfect, and old ones will occasionally vary, so test them occasionally alongside a physician's thermometer. The incubator must set level, or the distribution of heat and ventilation to different parts of the hatching chamber will be unequal. Use a good grade of oil—something that tests 150 degrees or higher—and avoid undesirable soot, fumes, and gas.

The eggs do not need turning until the third day; after that turn twice a day until the eigh-

teenth day, then stop. Too high a temperature will hasten the hatch, while too low a temperature will prolong it. At the conclusion of each hatch, thoroughly clean and disinfect the egg chamber. Remove all smoke and soot from the heater and scour the burner.

The location is not vital with a good machine. A specially constructed incubator cellar is expensive and unnecessary where only a few machines are used. A common cellar is all right if it is dry and well ventilated, but a damp, musty one is bad. Any room in an ordinary dwelling house will do.

Hatching Time Problems

The chicks should begin to pip the shells on the twentieth day and all be out by the end of the twenty-first day. Hatches abnormally early or late usually have less thrift. The more nearly simultaneously a hatch comes off and the quicker it cleans up, the better.

As a rule it does not pay to help chicks out of their shells. If they haven't the vitality to get out, they haven't the vitality to live, or, perchance surviving, to make profitable growth. Besides, it is always more or less harmful for

the attendant to interfere at hatching time. If the hen is disturbed she is likely to step on chicks that would otherwise thrive.

With an incubator, a frequent opening of the door allows the cold outside air to blow in over the weak, wet chicks, chilling them and drying out the moisture that is essential then. However, it is usually well to open the incubator when the hatch is about two-thirds over, removing the empty egg shells, putting the dry chicks down in the nursery drawer, and seeing that no empty egg shells have slipped over pipped eggs to suffocate the enclosed chicks.

Crippled or deformed chicks should be killed promptly. It is usually a waste of time to try to raise such chicks, and even if they live they are more bother than they are worth. Amateurs are prone to hesitate at this point, but good business policy demands its observance.

Do not be in a hurry to remove chicks from the incubator or from the nest; give them time to dry off and gain strength. Then when they are moved be careful that they do not get chilled; put them in a deep basket and cover with warm cloths or burlap. The brooder lamp should be started, or a good coop pro-

vided for mother hen and brood, a day or two before the chicks hatch, so that everything will be ready for them.

Feeding Chicks

Just before hatching, the chick absorbs the remnant of the yolk of the egg which Nature provides to support life for the first few days. Hence, chicks do not require feeding until they are forty-eight to sixty hours old. The exact time varies somewhat, depending upon the variety and precocity of the chicks; but in almost every case chicks are the better for absence of food during the first forty-eight hours.

Water and grit and charcoal should be placed before the chicks along with their first meal, and then kept constantly before them ever after. Do not neglect this point, for it is vital.

No infallible formula for chick feeding can be prescribed, but there is less variance of methods than with old fowls. The dry-feed system obtains most largely, that is, the feeding of seeds and cracked grains. For this purpose, the following makes an excellent mixture, all parts being by weight:

Cracked wheat	15 parts
Pinhead oats (granulated oat meal)	10 parts
Cracked corn (meal sifted out)	15 parts
Fine cracked peas	3 parts
Broken rice	3 parts
Millet seed	2 parts

If more convenient, almost any of the commercial grain mixtures for feeding chicks may be substituted for the above mixture. Where only a few chicks are being raised, the prepared feeds are probably as cheap as the mixture given, and it is often more convenient to buy them ready mixed than to buy different small grains and mix them at home.

Many people feed their chicks nothing but one of these grain mixtures, except to supply green food and meat scraps. Others feed largely of the above mixture, but for variety once a day they give a feed like this: Infertile eggs are boiled half an hour and rubbed together with about six times their bulk of rolled oats, the eggs having been run through an ordinary meat chopper. When the chicks reach the age of three or four weeks, the rolled oats and egg mixture is gradually displaced by a mixture with the following composition, by weight:

Wheat bran	2 parts
Cornmeal	4 parts
Middlings or "red dog" flour	2 parts
Linseed meal	1 part
Screened beef scraps	2 parts

This mixture is moistened with enough water to make it crumbly, but never sloppy, and fed in pans or troughs. These must be kept clean, and no more food given at a time than the chicks will eat up clean.

Young chicks like moist mash better than dry feed, and will eat more of it because they can digest and assimilate more. This is a point that it often pays to take advantage of at the time when chicks are most susceptible to rapid growth. But their development must be moderate for the first two or three weeks at least, and at all ages the digestive organs must be kept in normal condition by the partial use of hard feed, and the gizzard must not be deprived of its legitimate work and allowed to become weak by disuse.

Another dry-feed method is something like this: First, give the chicks water, pinhead or steel-cut oatmeal, and fine chick grit. This pinhead oatmeal constitutes the sole feed of the chicks for the first week. After that half oatmeal and half cracked wheat are used for a

week. Then finely cracked corn and cracked wheat are used and the oatmeal is no longer fed.

Oatmeal and the broken rice and cracked peas previously mentioned may seem a little expensive, but chicks do not consume large quantities of them and one should not try to economize in raising young poultry by restricting the quantity or quality of feed which will produce the best results. Do not try to substitute rolled oats for oatmeal, as the rolled oats are cooked in preparing them for market and form a soggy mass, when fed alone, as soon as they get in the chick's crop.

When the chicks are three weeks old, a little sweet beef scrap is put before them and they are gradually allowed to become accustomed to helping themselves to it. By the time the chicks are four weeks old, whole wheat and cracked corn in the proportion of one part corn to two parts wheat, constitutes the main grain feed, and the beef scrap is placed in a protected trough where the chicks can help themselves.

During all this time tender green stuff is given in as large quantities as the chicks will eat. Lawn clippings, cut clover, lettuce leaves, onion tops, radish or mustard leaves, rape or

any similar tender green stuff, is good for growing chicks and there is no danger of feeding too much. The grain is fed two or three times a day, in such quantity as the chicks will eat clean within half an hour. Besides this, a dry mixture of equal parts of corn meal, coarse wheat middlings, and linseed oilmeal is kept in a protected trough where the chicks can eat between meals.

For the first two weeks some care must be taken that the chicks do not overeat. After that time they can safely be permitted to help themselves, but food should not be allowed to lie uneaten on the ground from one meal to another. The object is to keep the appetite good, but never let the chicks get hungry enough to prevent constant growth.

Never feed dry grain on a bare surface; scatter it in a litter several inches deep, for chicks that do not get sufficient exercise are susceptible to leg weakness, bowel diseases, and other ills. Chaff from the haymow floor makes an excellent litter for little chicks, as it is fine and they like the minute hay seed it contains.

Wheat screenings may be fed occasionally if they can be bought cheaply, but always remem-

ber that wheat contains far more nourishment. Milk, if obtainable, may well be used occasionally after chicks are ten days or two weeks old, but be careful to avoid soiled, bedaubed plumage on the chicks and unclean conditions in feeding milk.

Grit is the only teeth chicks have, and without a constant supply of it they cannot properly grind and digest their food. Sharp sand will serve for the first few days, but after that some coarser material must be provided.

Charcoal is of great assistance in avoiding the bowel disorders so common with young chickens. Keep some setting around where the chicks may pick at it at all times, but remember that when exposed to the air it gradually loses its valuable properties by absorbing the impurities from the atmosphere.

The General Care of Chicks

Cleanliness is essential with chicks. Filth in brooder, coop, or yard lowers vitality and invites disease. Keep the floor of the brooder or coop lightly covered with sand, hay chaff, or similar material, and sweep this out together with the droppings and accumulated filth every morning or two. If the coops are crowded,

they should be cleaned every day. Disinfect them every week or two.

Do not hatch more chicks than you can properly attend to. When the first downy balls of life arrive it is a temptation to want lots of them; but most people who raise a limited number of chickens lead busy lives, and after the first burst of enthusiasm passes away they find that for lack of time, or room, or inclination, the chicks must suffer. And since a close observance of every detail is necessary for success, a few chicks well cared for are better property than twice that number half cared for.

Don't put too many chicks together in one lot; large broods are unnatural, and crowding or other evils will surely bring disaster. Fifteen to twenty chicks are as many as one hen can well brood, while the biggest individual brooder made should not contain more than one hundred chicks. Most machines give better results when they contain no more than sixty chicks, and forty or fifty is often better.

Lice and mites often cause loss. Hen-hatched chicks are sure to be more or less lousy, while incubator-hatched chicks are seldom free from the pests for any length of time. The only sure way of keeping them under control is

to begin fighting them as soon as the chicks are hatched, and then keep on fighting indefinitely.

Brooder Temperatures

Correct temperature in the brooder is important; chilling produces bowel and other disorders, while overheating gives hot-house chicks lacking in the necessary vitality and stamina.

Most experienced poultrymen regulate the brooder temperature more by observing the chicks than a thermometer. When the chicks spread out on the floor of the brooder and soon go contentedly to sleep, the temperature is all right; if too cold, they bunch up and crowd closely together; if too warm, they scatter apart, spread out their wings, and breathe rapidly.

Ninety-five to one hundred degrees is the best temperature to maintain under the hover for the first day or two. At the end of the first week, the temperature should not exceed ninety degrees; at the end of the third week, eighty degrees. It is economy and also adds to the hardiness of the chicks to wean them away from artificial heat as rapidly as possible. A

bunch of growing youngsters always possess considerable bodily warmth of their own.

Weaning the Chicks

The time to wean chicks from the mother hen, or from brooder heat, depends somewhat upon the breed, the weather, the location, and the shelter and care that will be provided for them. The little fellows should be sufficiently well feathered to insure protection from sudden climatic changes or any other unfavorable condition that may arise. The Mediterranean varieties are usually pretty well feathered at the age of six weeks; the Asiatic varieties usually require twelve or more weeks, while the American varieties are midway between the two extremes.

As soon as the chicks are weaned they should be taught to roost, for then the general conditions of cleanliness and health are better and the chicks get more pure air when roosting than when huddled together in a pile on the floor. There will be no danger of causing crooked breast bones, providing the perches are made wide enough—say four or five inches—until the shape of the chicks' bones has become

fixed. Place the perches only a few inches above the floor until the chicks begin to use them, then gradually raise them above the droppings and foul air near the floor.

Separate the sexes as soon as the cockerels begin to crow or assert masculine traits, for otherwise the contentment and development of the pullets will be interfered with. The cockerels themselves will grow faster in celibacy, for then they will eat more and not waste their energies.

Feeding Half-Grown Chicks

The most successful method of feeding pullets is perhaps the most simple. Separate protected troughs or self-feeding hoppers are kept filled with cracked corn, wheat, oats, beef scrap, cracked bone, oyster shell and grit, one kind of feed in a trough, where the pullets can help themselves whenever they desire. Fresh

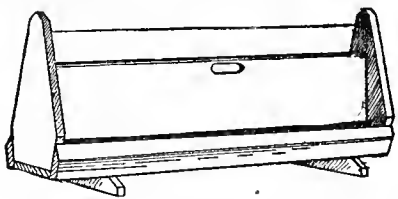

Fig. 28. A Protected Feed Trough.

water is kept constantly before them. There are no regular hours for feeding, but care should be taken that the troughs never become empty. In another trough give the pullets free access to the following mixture, by weight:

Wheat bran	1 part
Cornmeal	2 parts
Middlings	1 part
Beef scrap	1 part

This method saves labor in feeding, and the chicks do not hang around the troughs and overeat, but help themselves to a little at a time, then go off to hunt insects and come back when hunger suggests. Chicks allowed to choose for themselves eat about the same quantity of beef scrap that experience has proved is best for them.

The method of feeding the cockerels should be practically the same as with pullets, except where they are to be sold for food a different

FIG. 29. A SIMPLE, SATISFACTORY FEED TROUGH.

method may well be used toward the last to finish them for market. Special fattening pays, because plump soft-fleshed cockerels bring

a better price than those picked up indiscriminately. The grain mixture commonly used is as follows:

Cornmeal	100 pounds
Wheat middlings	100 pounds
Meatmeal	40 pounds

This should be fed twice a day as a porridge thick enough to drop, but not to run, from a spoon.

Maturing Pullets

It is a delight to watch young pullets grow and develop in symmetry, take on attractive new feathers, and begin to show a reddening

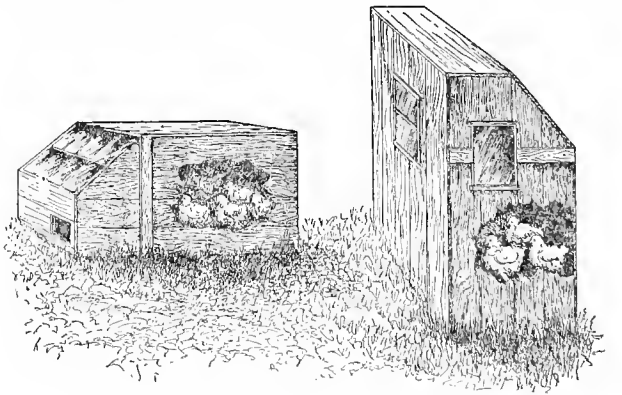

Fig. 30. Coops made of Piano Boxes.

of combs and wattles. Good care is especially important at this time, for in addition to developing her own bodily characteristics of bones, muscles, feathers, etc., the pullet has also to turn part of her energies toward the proper development of the internal reproductive organs, the ovaries.

It is at this time that the germs of the eggs are being formed, and it is important that each of these shall contain all the hereditary quality and life power necessary for the production of a new chick with the ability to thrive and mature and in turn reproduce its kind. This is the work of Nature, and is not a machine process; it is life development, deliberately done with a definite purpose. Stimulating foods and condiments to hasten egg-production should not be used, for to force the development of the reproductive organs is unnatural, unhealthy, and unwise.

Provide the pullets with plenty of room as they grow, and remember that good ventilation is necessary for sound constitutions. Keep the coops clean, supply fresh water frequently, fight lice and mites, and plow or spade up the runs every week or two if they are not sowed to grass; a hard, baked surface tends

to stunt the chicks' growth, besides making an unattractive and unpleasant ranging place. Remember, too, that damp or foul air, raw winds, unpalatable food, and filthy water, all tend to delay, interrupt, or prevent egg-production.

Give the pullets plenty of animal food, green stuff, and exercise. Of grains or dry-mash, let them eat what they want, when they want it, and as much as they want, from hoppers or troughs. If a proper variety of foods is at hand, they will select the ones they need most.

Early laying is a trait most poultrymen seek in their pullets, but if premature it dwarfs their size. Leghorns and other Mediterranean varieties often lay at the early age of four or five months. The American breeds usually require a month or two longer, and the Asiatics are still slower. The first few eggs from a pullet are always undersized and sometimes imperfectly formed, but ordinarily a little time will correct all that; if it does not, dispose of the fowl.

Caponizing Cockerels

Capons are castrated male birds—that is,

their generative sexual organs have been removed. The operation is usually performed before the cokerels begin to crow, say at the age of two to four months. As a result, the cockerels lose their fighting proclivities, become quiet and peaceable, and have even been known to successfully brood motherless chicks.

Caponizing makes birds become a pound or two heavier than they otherwise would, and the growth of tender, delicate chicken flesh is continued, instead of the fowl growing into hard, stringy, muscle-flesh. Consequently, capons usually sell for two or three times the price of cocks of the same age, which makes the process of caponizing profitable work.

By an expert, the operation can be performed quickly and with scarcely any pain to the fowl. It is simply a matter of making a little incision between the first and second ribs on each side of the fowl, and removing the testicle lying there with a pair of tweezers. A little practice and steady nerve will make almost any one proficient at the work. Good operators seldom lose more than two to five per cent of the fowls, and these die by bleeding in a few minutes which leaves them perfectly good for table use. A set of instru-

ments can be purchased for $2 or $3 of poultry supply houses, and full directions for use accompany each outfit.

CHAPTER VII

POULTRY DISEASES

THERE is not often much gained by doctoring fowls. They are naturally healthy, and disease is nearly always the result of neglect or carelessness. Fowls that are well housed and given wholesome food and pure water, with plenty of exercise in fresh air and sunshine, rarely need doctoring.

A sick chicken is a very difficult thing for most people to handle successfully, and in treating fowls it is indeed true that "an ounce of prevention is worth a pound of cure." Once a chicken becomes seriously ill, especially if the disease is contagious, the safest cure is the hatchet. In such cases do not kill the sick fowl where healthy specimens can get at the blood or excrement, and the dead carcass should always be burned rather than buried.

But if the fowl is valuable, or the disease only mild, it would be foolish not to attempt a

cure. Quickly remove the fowl to a separate coop to prevent contagion, and then give the entire premises a general clean-up. Burn the litter and disinfect everything around the house and runs with a strong solution of crude carbolic acid or other disinfectant. Put a few drops of some good antiseptic in the drinking water and dust air-slaked lime over and under the perches, in the nest boxes, and over the floor. Then watch the remainder of the flock, and if any of them show symptoms of trouble remove them, too, from the main flock, feed lightly on a ration composed mostly of green food, administer a remedy, and be guided further by the persistency of the attack. Medicines and drugs prepared for human beings can often be used to advantage for fowls, as the effect is the same, but the dose should of course be lessened for fowls.

Roup

Roup deserves first place as a contagious and destructive poultry disease. It is especially prevalent during the fall and winter months, caused mostly by drafts and dampness, overcrowding, filth, etc. Roup is a contagious

catarrhal disease, characterized by running at the eyes and nostrils, puffed eyes and swollen head, or cheesy mucous in mouth and throat. It is a difficult disease to cure, and perhaps one of the easiest and best methods is to use one of the advertised roup cures.

Another good way is to give two treatments a day of hydrogen peroxide, diluted one half, forcing it well back in the throat and in each nostril with an atomizer or small syringe. Also warm a very dilute solution of permanganate of potash and hold the fowl's head submerged in this for a few seconds each morning and evening. If the eyes are closed or smeared with a sticky fluid, bathe them with salt water, a half teaspoonful of salt in a pint of water. Another good head lotion is composed of one part spirits of turpentine to six parts glycerine; apply with a bit of absorbent cotton twisted about the end of a toothpick, or use the end of a stiff feather.

Canker

Canker consists of yellowish ulcers or cheesy growths in the fowl's mouth or throat. Burnt alum or a little aristol should be applied to

each sore place several times a day. Spray the throat well each morning with fifty per cent hydrogen peroxide and swab it out each evening with a five per cent solution of creolin or zenoleum.

Common Colds

Common colds are often acquired by fowls during inclement weather, even when they are well managed. The symptoms are water running out of nostrils and eyes, accompanied by more or less coughing and sneezing. There is no foul odor present, as is always the case with roup. Colds are not difficult to cure, but they must be taken early. Remove the cause if possible, air the house daily, and do not allow the fowls to be exposed to cold winds or rains. One of the best remedies is a teaspoonful of aconite in a quart of drinking water, no other drink being allowed. Twenty drops of spirits of camphor dissolved in sugar and put in a pint of drinking water is also good.

Bronchitis

Bronchitis is a simple cold accompanied by

wheezing or rattling in the throat. It may be caused by drafts, dampness, overcrowding, or dusty and filthy houses, in which the fowls are compelled to breathe irritating vapors and dust. Give the fowl three drops of syrup of ipecac twice a day and make it inhale the steam from a quart of boiling water in which has been placed a teaspoonful each of carbolic acid and camphor.

Cholera

Cholera of a genuine nature fortunately is comparatively rare among fowls. Where it does exist there is not much to be done, for it puts an end to a flock in short order. Whenever cholera is suspected, or there are serious bowel derangements which might lead to cholera, the ailing fowls should be quickly isolated and the whole premises disinfected and made sanitary.

Bowel Disorders

Bowel disorders, due to indigestion or improper feeding, are comparatively common among flocks in unskilled hands. Charcoal is

about as good a preventive as there is and should be fed liberally. For looseness of the bowels, place one dram of hydrochloric acid in each quart of drinking water, or sustitute one-eighth of an ounce of sulpho-carbolate of zinc. Constipation is usually caused by lack of exercise and green food. Correct conditions and give castor oil, castoria, or any convenient laxative.

Bumble-Foot

Bumble-foot results in an abscess or corn on the bottom of the fowl's foot, usually caused by a jar or bruise in jumping from a high perch upon a hard floor. If taken early, a few applications of tincture of iodine will usually effect a cure. If the fowl is lame, open the growth by making an X-shaped incision, wash out all the matter with warm water containing a little carbolic acid, bathe the wound daily with hydrogen peroxide, and bandage after applying some healing lotion such as carbolated vaseline.

Scaly Legs

Scaly legs are caused by minute parasites which burrow beneath the scales of the fowl's

legs. Make a saturate solution of naphthalene flakes in kerosene and dip the fowl's legs in this every day or two until the crusts come off. Rub the liquid well in with a stiff bristle brush.

Gapes

Gapes is a parasitic disease of young chickens caused by worms in the windpipe. Letting the chicks out in the damp or wet, or ranging over old tainted soil, or eating infected bugs and worms, all may be contributing causes of the disease. The symptoms are frequent gaping and sneezing, accompanied by weakness and drooping wings. Give the coops a good washing with hot whitewash, sprinkle the yards with air-slaked lime, and plow under. Extracting the worms from the windpipe with a horse hair is sometimes practiced, but it is a tedious method and only gives temporary relief.

A small quantity of spirits of camphor in the drinking water is a good preventive, while one of the most common remedies is to dip a feather in turpentine and twist it around in the chick's windpipe several times a day.

Cases of long standing are hard to cure, and where chicks are bothered with gapes year after year the ground should be given a rest from fowls for a season or two, in the meantime giving the soil frequent applications of lime or strong salt water.

Diarrhœa Among Chicks

Diarrhœa among chicks may be brought on by breeding from debilitated stock, errors in incubation, faulty brooder conditions, chilling, bad feed and management. First find the cause and remove it. Give the chicks boiled milk to drink instead of water and add a little grated cinnamon. Feed charcoal freely. In bad cases, use some reliable bowel regulator for either fowls or humans.

Liver Diseases

Liver diseases usually come from overfeeding or lack of exercise. The symptoms are loss of appetite, yellow diarrhœa, extreme thirstiness, slow and labored breathing, and general listlessness. In its early stages the ailment may be cured by the use of some good liver pill.

Leg Weakness

Leg weakness is more or less common among brooder chicks, being caused by insufficient exercise, overfeeding, or lack of bone-forming material in the ration. The bird's gait is unsteady and it wants to squat most of the time, as the hocks are weak. Provide a fresh range, feed no forcing foods, but make the birds scratch for all they get to eat.

Oviduct Disorders

Oviduct disorders, such as soft-shelled eggs, double eggs, "break down behind," etc., usually come from overfatness or rations deficient in lime and shell-forming materials. If the hens are fat, cut down the ration and give more green stuff; otherwise, supply crushed oyster shells and feed freely of bran and clover to provide lime.

Vices

Vices, such as egg-eating and feather-pulling, results from overcrowding, insufficient exercise,

or lack of animal food in the ration. In an egg-eating flock, use darkened nests and let the hens partake of a few eggs well treated with cayenne pepper. As a final resort, trim the upper bill of each egg-eater back to the pink, but not so it bleeds. To stop feather-pulling, segregate the hens that are most persistent at it and feed quantities of meat and green food with salt in the ration each day.

General Remedies

For general lack of thrift or partial loss of appetite, use a little tincture of iron in the drinking water. For all germ diseases of throat or bowels, a pink solution of permanganate of potash is excellent. For all swellings or bruises, tincture of iodine will usually give relief. For frosted comb or wattles, use carbolated vaseline to which have been added a little glycerine and spirits of turpentine.

Vermin

Vermin, while not strictly a disease, may well be considered under this classification, for

their bloodsucking habits lower the fowls' vitality and make them susceptible to disease, if, indeed, the lice themselves are not sufficiently destructive. Fowls are rarely ever wholly free of vermin, and while a few of them may do no particular harm their multiplication must be frequently checked, especially in warm weather when they thrive wonderfully. Beginners often have trouble in detecting the pests, but they are almost always present, and every successful poultryman finds that he has to make occasional raids upon the increase of the parasites.

There are two main kinds of chicken vermin—(1) body lice, which may be detected traveling around over the fowl's skin, especially on the neck or under the wings and among the fluffy feathers around the vent; and (2) the red mites or lice which infest the roosts and nests and other fixtures, hiding in cracks and crevices during the day and coming forth at night to seek their prey.

Body Lice

Dust baths for the fowls to wallow in whenever they wish is one way of checking body

lice. The hens wallow and fluff their feathers in the dust, and the pores in the louse's body, through which it breathes, are closed thereby and death takes place from suffocation. Besides, the dust bath cleanses the fowl's body from impurities and provides healthful and enjoyable exercise.

Where lice are numerous, it takes a quicker method than wallowing to exterminate them. Use a reliable brand of insect powder, making sure that it is strong and fresh, treating each fowl individually and working the powder well down among the feathers of the skin. Pay special attention to the fluffy feathers around and under the vent, under the wings and thighs, and about the head and neck.

Little chickens are often bothered with the large gray head lice. These may be destroyed by greasing the head and throat with lard or sweet oil and using a louse powder elsewhere. Among young chickens, lice cause dumpishness, drooping wings, indifference to food, etc.

Mites

Mites are small and grayish in color, except when filled with blood, when they vary from

red to black. A good indication of their presence is their excrement—little grayish patches, like fly specks, on the roosts and adjacent parts which they traverse. Liberal applications of common kerosene will kill these parasites, painting or spraying the oil on every spot where the vermin could possibly find lodging.

Hot whitewash is also used with good results by many, while one of the best treatments consists in using one of the commercial liquid lice-killing preparations, because their fumes are as fatal as the liquid itself. Chloro-naphtholeum and sulpho-naphthol in water are other good liquid exterminators and are not expensive. In using any of these liquids, apply with a small spray pump, or paint with a brush or broom, as is most convenient.

THE END

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¶ Each book deals with a separate subject and deals with it thoroughly. If you want to know anything about Airedales an OUTING HANDBOOK gives you all you want. If it's Apple Growing, another OUTING HANDBOOK meets your need. The Fisherman, the Camper, the Poultry-raiser, the Automobilist, the Horseman, all varieties of outdoor enthusiasts, will find separate volumes for their separate interests. There is no waste space.

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THE AIREDALE. By Williams Haynes. The book opens with a short chapter on the origin and development of the Airedale, as a distinctive breed. The author then takes up the problems of type as bearing on the selection of the dog, breeding, training and use. The book is designed for the non-professional dog fancier, who wishes common sense advice which does not involve elaborate preparation or expenditure. Chapters are included on the care of the dog in the kennel and simple remedies for ordinary diseases.

"A splendid book on the breed and should be in the hands of every owner of an Airedale whether novice or breeder."—The Kennel Review.

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APPLE GROWING. By M. C. Burritt. Mr. Burritt takes up the question of the profit in apple growing, the various kinds best suited to different parts of the country and different conditions of soil, topography, and so on. He discusses also the most approved methods of planning a new orchard and takes up in detail the problems connected with the cultivation, fertilization, and pruning. The book contains chapters on the restoration of old orchards, the care of the trees, their protection against various insect-enemies and blight, and the most approved method of harvesting, handling and storing the fruit.

THE AUTOMOBILE—Its Selection, Care and Use. By Robert Sloss. This is a plain, practical discussion of the things that every man needs to know if he is to buy the right car and get the most out of it. The various details of operation and care are given in simple, intelligent terms. From it the car owner can easily learn the mechanism of his motor and the art of locating motor trouble, as well as how to use his car for the greatest pleasure. A chapter is included on building garages.

"It is the one book dealing with autos, that gives reliable information."—The Grand Rapids (Mich.) Herald.

BACKWOODS SURGERY AND MEDICINE. By Charles S. Moody, M.D. A handy book for the prudent lover of the woods who doesn't expect to be ill but believes in being on the safe side. Common-sense methods for the treatment of the ordinary wounds and accidents are described—setting a broken limb, reducing a dislocation, caring for burns, cuts, etc. Practical remedies for camp diseases are recommended, as well as the ordinary indications of the most probable ailments. Includes a list of the necessary medical and surgical supplies.

The manager of a mine in Nome, Alaska, writes as follows: "I have been on the trail for years (twelve in the Klondike and Alaska) and have always wanted just such a book as Dr. Moody's 'Backwoods Surgery and Medicine."

CAMP COOKERY. By Horace Kephart. "The less a man carries in his pack, the more he must carry in his head," says Mr. Kephart. This book tells what a man should carry in both pack and head. Every step is traced—the selection of provisions and utensils, with the kind and quantity of each, the preparation of game, the building of fires the cooking of every conceivable kind of food that the camp outfit or woods, fields, or streams may provide—even to the making of desserts. Every receipt is the result of hard practice and long experience. Every recipe has been carefully tested. It is the book for the man who wants to dine well and wholesomely, but in true wilderness fashion without reliance on grocery stores or elaborate camp outfits. It is adapted equally well to the trips of every length and to all conditions of climate, season or country; the best possible companion for one who wants to travel light and live well. The chapter headings tell their own story. Provisions—Utensils—Fires—Dressing and Keeping Game and Fish—Meat—Game—Fish and Shell Fish—Cured Meats, etc.—Eggs—Breadstuffs and Cereals—Vegetables—Soups—Beverages and Desserts.

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"Camp Cookery is destined to be in the kit of every tent dweller in the country."—Edwin Markham in the San Francisco Examiner.

CAMPS AND CABINS. By Oliver Kemp. A working guide for the man who wants to know how to make a temporary shelter in the woods against the storm or cold. This describes the making of lean-tos, brush shelters, snow shelters, the utilization of the canoe, and so forth. Practically the only tools required are a stout knife or a pocket axe, and Mr. Kemp shows how one may make shift even without these implements. More elaborate camps and log cabins, also, are described and detailed plans reproduced. Illustrated with drawings by the author.

EXERCISE AND HEALTH. By Dr. Woods Hutchinson. Dr. Hutchinson takes the common-sense view that the greatest problem in exercise for most of us is to get enough of the right kind. The greatest error in exercise is not to take enough, and the greatest danger in athletics is in giving them up. The Chapter heads are illuminating. Errors in Exercise—Exercise and the Heart—Muscle Maketh Man—The Danger of Stopping Athletics—Exercise that Rests. It is written in a direct

matter-of-fact manner with an avoidance of medical terms, and a strong emphasis on the rational, all-round manner of living that is best calculated to bring a man to a ripe old age with little illness or consciousness of body weakness.

"It contains good physiology as well as good common sense, written by an acute observer and a logical reasoner, who has the courage of his convictions and is a master of English style."—D. A. Sargent, M. D., Sargent School for Physical Education.

"One of the most readable books ever written on physical exercise."—Luther H. Gulick, M. D., Department of Child Hygiene, Russell Sage Foundation.

"A little book for the busy man written in brilliant style."—Kansas City Star.

THE FINE ART OF FISHING. By Samuel G. Camp. Combines the pleasure of catching fish with the gratification of following the sport in the most approved manner. The suggestions offered are helpful to beginner and expert anglers. The range of fish and fishing conditions covered is wide and includes such subjects as "Casting Fine and Far Off," "Strip-Casting for Bass," "Fishing For Mountain Trout" and "Autumn Fishing for Lake Trout." The book is pervaded with a spirit of love for the streamside and the out-doors generally which the genuine angler will appreciate. A companion book to "Fishing Kits and Equipment." The advice on outfitting so capably given in that book is supplemented in this later work by equally valuable information on how to use the equipment.

"Will encourage the beginner and give pleasure to the expert fisherman."—N. Y. Sun.

"A vein of catching enthusiasm runs through every chapter."—Scientific American.

FISHING KITS AND EQUIPMENT. By Samuel G. Camp. A complete guide to the angler buying a new outfit. Every detail of fishing kit of the freshwater angler is described, from rodtip to creel and clothing. Special emphasis is laid on outfitting for fly fishing, but full instruction is also given to the man who wants to catch pickerel, pike, muskellunge, lake-trout, bass and other fresh-water game fishes. Prices are quoted for all articles recommended and the approved method of selecting and testing the various rods, lines, leaders, etc., is described.

"A complete guide to the angler buying a new outfit."—Peoria Herald.

"The man advised by Mr. Camp will catch his fish."—Seattle P. I.

"Even the seasoned angler will read this book with profit."—Chicago Tribune.

THE HORSE — Its Breeeding, Care and Use. By David Buffum. Mr. Buffum takes up the common, every-day problems of the ordinary horse-user, such as feeding, shoeing, simple home remedies, breaking and the cure for various equine vices. An important chapter is that tracing the influx of Arabian blood into the English and American horses and its value and limitations. Chapters are included on draft-horses, carriage horses, and the development of the two-minute trotter. It is distinctly a sensible book for the sensible man who wishes to know how he can improve his horses and his horsemanship at the same time.

> *"I am recommending it to our students as a useful reference book for both the practical farmer and the student."* —*T. R. Arkell, Animal Husbandman, N. H. Agricultural Experiment Station.*
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> *"Has a great deal of merit from a practical standpoint and is valuable for reference work."—Prof. E. L. Jordon, Professor of Animal Industry, Louisiana State University.*

MAKING AND KEEPING SOIL. By David Buffum. This deals with the various kinds of soil and their adaptibility to different crops, common sense tests as to the use of soils, and also the common sense methods of cultivation and fertilization in order to restore worn-out soil and keep it at its highest productivity under constant use.

THE MOTOR BOAT—Its Selection, Care and Use. By H. W. Slauson. The intending purchaser of a motor boat is advised as to the type of boat best suited to his particular needs, the power required for the desired speeds, and the equipment necessary for the varying uses. The care of the engine receives special attention and chapters are included on the use of the boat in camping and cruising expeditions, its care through the winter, and its efficiency in the summer.

NAVIGATION FOR THE AMATEUR. By Capt. E. T. Morton. A short treatise on the simpler methods of finding position at sea by the observation of the sun's altitude and the use of the sextant and chronometer. It is arranged especially for yachtsmen and amateurs who wish to know the simpler formulae for the necessary navigation involved in taking a boat anywhere off shore. Illustrated with drawings.

OUTDOOR SIGNALLING. By Elbert Wells. Mr. Wells has perfected a method of signalling by means of wig-wag, light, smoke, or whistle which is as simple as it is effective. The fundamental principle can be learnt in ten minutes and its application is far easier than that of any other code now in use. It permits also the use of cipher and can be adapted to almost any imaginable conditions of weather, light, or topography.

"I find it to be the simplest and most practical book on signalling published."—Frank H. Schrenk, Director of Camp Belgrade.

"One of the finest things of the kind I have ever seen. I believe my seven year old boy can learn to use this system, and I know that we will find it very useful here in our Boy Scout work."—Lyman G. Haskell, Physical Director, Y. M. C. A., Jacksonville, Fla.

PRACTICAL POULTRY KEEPING. By R. B. Sando. The chapters outlined in this book are poultry keeping and keepers, housing and yarding, fixtures and equipment, choosing and buying stock, foods and feeding, hatching and raising chicks. Inbreeding, caponizing, etc., What to do at different seasons, The merits of "secrets and systems", The truth about common poultry fallacies and get-rich-quick schemes. Poultry parasites and diseases. A complete list of the breeds and subjects is attached. It is in effect a comprehensive manual for the instruction of the man who desires to begin poultry raising on a large or small scale and to avoid the ordinary mistakes to which the beginner is prone. All the statements are based on the authors own experience and special care has been taken to avoid sensationalism or exaggeration.

PROFITABLE BREEDS OF POULTRY. By Arthur S. Wheeler. Mr. Wheeler has chapters on some of the best known general purpose birds such as Rhode Island Reds, Plymouth Rocks, Wyandottes, Mediterraneans, Orpingtons, and Cornish, describing the peculiarities and possibilities of each. There are additional chapters on the method of handling a poultry farm on a small scale with some instructions as to housing the birds, and so forth, and also a chapter on the market side of poultry growing.

RIFLES AND RIFLE SHOOTING. By Charles Askins. Part I describes the various makes and mechanisms taking up such points as range and adaptibility of the various calibers, the relative merits of lever, bolt and pump action, the claims of the automatic, and so forth. Part II deals with rifle shooting, giving full instruction for target practice, snap shooting, and wing shooting.

SCOTTISH AND IRISH TERRIERS. By Williams Haynes. This is a companion book to The Airedale and deals with the origin of the breeds, the standard types, appproved methods of breeding, kenneling, training, care and so forth, with chapters on showing and also on the ordinary diseases and simple remedies.

SPORTING FIREARMS. By Horace Kephart. This book is devided into two parts, Part I dealing with the Rifle and Part II with the Shotgun. Mr. Kephart goes at some length into the questions of range, trajectory and killing power of the different types of rifles and charges and also has chapters on rifle mechanisms, sights, barrels, and so forth. In the part dealing with shotguns he takes up the question of range, the effectiveness of various loads, suitability of the different types of boring, the testing of the shotguns by pattern, and so forth.

TRACKS AND TRACKING. By Josef Brunner. After twenty years of patient study and practical experience, Mr. Brunner can, from his intimate knowledge, speak with authority on this subject. "Tracks and Tracking" shows how to follow intelligently even the most intricate animal or bird tracks. It teaches how to interpret tracks of wild game and decipher the many tell-tale signs of the chase that would otherwise pass unnoticed. It proves how it is possible to tell from the footprints the name, sex, speed, direction, whether and how wounded, and many other things about wild animals and birds. All material has been gathered first hand; the drawings and half-tones from photographs form an important part of the work, as the author has made faithful pictures of the tracks and signs of the game followed. The list is: The White-Tailed or Virginia Deer—The Fan-Tailed Deer—The Mule-Deer—The Wapiti or Elk—The Moose—The Mountain Sheep—The Antelope—The Bear—The Cougar—The Lynx—The Domestic Cat—The Wolf—The Coyote—The Fox—The Jack Rabbit—The Varying Hare—The Cottontail Rabbit—The Squirrel—The Marten and the Black-Footed Ferret—The Otter—The Mink—The Ermine—The Beaver—The Badger—The Porcupine—The Skunk—Feathered Game—Upland Birds—Waterfowl—Predatory Birds—This book is invaluable to the novice as well as the experienced hunter.

> *"This book studied carefully, will enable the reader to become as well versed in tracking lore as he could by years of actual experience."—Lewiston Journal.*

WING AND TRAP-SHOOTING. By Charles Askins. The only practical manual in existance dealing with the modern gun. It contains a full discussion of the various methods, such as snap-shooting, swing and half-swing, discusses the flight of birds with reference to the gunner's problem of lead and range and makes special application of the various points to the different birds commonly shot in this country. A chapter is included on trap shooting and the book closes with a forceful and common-sense presentation of the etiquette of the field.

"It is difficult to understand how anyone who takes a delight in hunting can afford to be without this valuable book."—Chamber of Commerce Bulletin, Portland, Ore.

"This book will prove an invaluable manual to the true sportsman, whether he be a tyro or expert."—Book News Monthly.

"Its closing chapter on field etiquette deserves careful reading."—N. Y. Times.

THE YACHTSMAN'S HANDBOOK. By Commander C. S. Stanworth, U. S. N. and Others. Deals with the practical handling of sail boats, with some light on the operation of the gasoline motor. It includes such subjects as handling ground tackle, handling lines and taking soundings, and use of the lead line; handling sails, engine troubles that may be avoided, care of the gasolene motor and yachting etiquette.