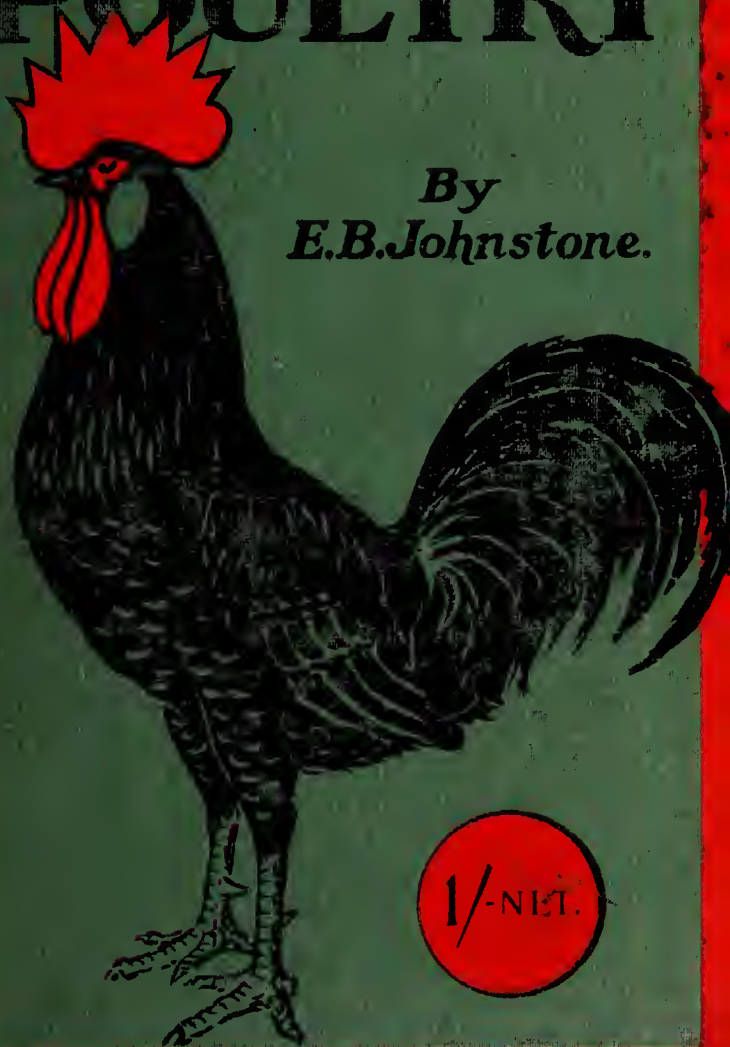
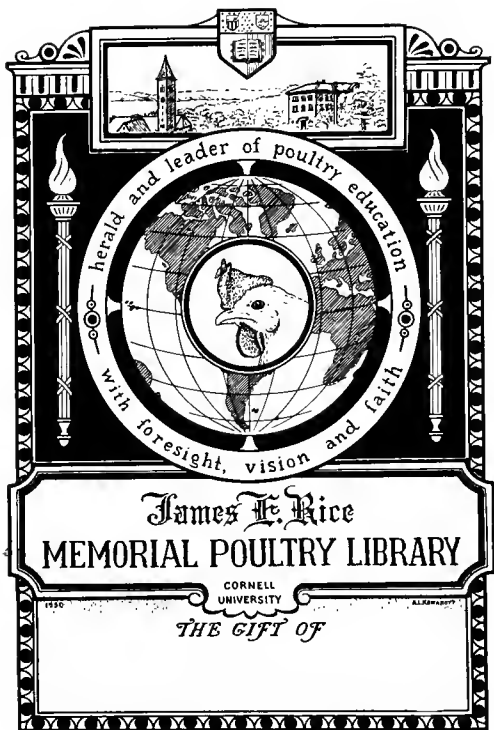


The **A B C** of  
**POULTRY**

By  
*E.B. Johnstone.*



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## PREFACE

It has long been my opinion that a book, partaking somewhat of the nature of a dictionary and forming a handy work of reference to the poultry-keeper, was much needed.

Books, large and small, upon poultry-keeping there are galore. Nevertheless—as the correspondence columns of the poultry papers bear ample witness—every week hundreds of poultry-keepers are beset with difficulties, which these books do not enable them to overcome. The more so is it the case since in recent years the advent of scientific appliances and knowledge has upset the dogmatic theories and vague fallacies of our forefathers.

Every year now finds poultry-keeping in all its manifold branches less and less a matter of chance and more of certainty. This book, entitled: **THE A B C OF POULTRY: A REFERENCE WORK FOR AMATEUR, PROFESSIONAL AND FANCIER**, has therefore been compiled in the hope that it would supply this need for a work which would give in concise but lucid language information and explanation of the many appliances, methods, and commodities now in vogue.

Lastly it may be added that a special feature of the book is its division and classification into paragraphs, each dealing solely and exhaustively with the subject in treatment. By reference to any paragraphs, which are in relation to each other, the reader should be enabled to obtain all the information he may desire, with the minimum of trouble.

The acknowledgments of the author are due to the Editress of the *Feathered World* for permission to republish matter upon the fattening of fowls, and to the Board of Agriculture and Fisheries for permission to quote from their leaflets.



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# The A B C of Poultry

**Methods of Fattening**—Though the process of improving the quantity and quality of the flesh upon fowls is one calling for a keen discriminating judgment, backed by a ripe experience, it is possible for a novice to obtain a very fair amount of success.

It should be understood that unless a fowl is a suitable subject for fattening, improvement of its flesh qualities is not possible. A fowl intended for the fattening pen should be healthy, quiet in temperament, and, if a male, not more than four to five months old. A cockerel of a greater age than this will not prove satisfactory unless caponised.

There are, generally speaking, four methods of fattening—by trough, machine, hand and funnel. The first of these is the one most employed, though the second is almost universal where fattening on a large scale is carried on. Of the last two little need be said beyond mentioning the fact that both demand an amount of hand labour far too excessive in most circumstances. Expert fattening by hand, however, achieves a greater finish and measure of success than all other methods. The operator, holding a fowl between his knees, takes a pellet of food from a pile previously rolled up. Dipping it in milk, he rapidly inserts it into the fowl's mouth. With gentle pressure of finger and thumb around the gullet the food is then quickly passed into the crop. From twelve to fifteen of these pellets, according to individual requirements, are fed to one fowl, which is then returned to the quiet of the fattening pen, and the next bird operated upon.

Fattening by trough is perhaps on all counts the best method. The birds, penned in narrow slatted cages

accommodating three to five, are fed twice or thrice a day. The food, mixed to the consistency of thick porridge, is placed in long troughs, which are removed directly the fowls show signs of having eaten all they care to. Curtains of sacking or sail cloth are then drawn across the cages, and the fowls left in peaceful darkness until the next meal time. Liquid is not usually given, as sufficient is consumed with the food.

Fatting by cramming machine is the process in nearly all cases adopted by those dealing with large quantities of fowls. In the hands of an expert operator the cramming machine cannot be said to entail more than slight temporary discomfort upon the bird, but the process is viewed with disfavour by many.

The food, which is mixed with great care to the consistency of thick cream, is poured into the cramming machine, and the operator, holding the fowl under one arm, extends its neck and inserts the rubber nozzle of the machine into the beak and down the gullet. With a firm but gentle pressure of the foot upon the treadle sufficient of the food is pumped into the crop, the fingers of the disengaged hand gauging the quantity.

The operation, though a simple and quick one, needs care, dexterity and a keen judgment, or the crop of the fowl may be either insufficiently filled or gorged to bursting point. It is imperative also that the operator be careful to release the treadle of the machine with a sharp jerk before withdrawing the nozzle from the fowl's gullet. Neglect of this precaution may cause a quantity of food to be pumped into the fowl's windpipe, when suffocation almost immediately ensues.

**Foods Employed in Fattening**—A consideration of the class of market for which fatted fowls are intended soon determines the quality and character of the food to be used. Where first-class results are aimed at, and extra expense is of no importance, pure Sussex ground oats mixed with soured skim milk, together with a small quantity of shredded mutton fat, should be fed.

In cases where the extra cost of ground oats is not justified, a mixture of thirds, barley meal, and Sussex ground oats can be very advantageously employed. This mixture is in many cases sold under the name of ground oats, but is several shillings cheaper per cwt. than the pure article. Maizemeal is also an inexpensive fattening food, but the yellow and greasy nature of the fat it forms prevents its being largely used.

For fowls that are being brought into condition on a grass or other run a mixture of buckwheat meal, middlings, and ground oats in equal parts forms an admirable diet. Well-cooked mashed potatoes may also be fed. In all cases of fattening a regular supply of boiled nettles once or twice a week, mixed with the food, is of aid in keeping the fowls in health.

**General Hints on Fattening**—When feeding by machine the crop of each fowl should be felt first, and if food remains from the previous meal the bird should be returned to the pen unfed.

Darkness, quiet, and an equable temperature are essentials to success.

Fattening sheds should be well ventilated, and the pens raised at least  $2\frac{1}{2}$  ft. from the ground, with floors slatted to permit the manure to fall through.

Attempts should not be made to fatten birds singly. Fowls eat in competition with one another when fed together.

The cost of three weeks' fattening should not exceed 5d. per bird.

During the first week weight may be lost by the fowls, but it should be more than regained in the succeeding weeks.

Meals, whether two or three in number, should be given with the utmost regularity.

To ascertain how fowls are doing when fattened from the trough, the crop should be felt immediately after a meal. If found to be soft and flabby, and therefore not full, it may be inferred that the bird's appetite is

failing. The effect which skim milk exercises in whitening and improving the flesh should not be underrated. If the milk is allowed to sour before being used it will have no ill, but rather beneficial, effects upon the fowls.

After penning fowls for fattening they should be starved for twenty-four hours. They will then eat a good meal and settle down. This important precaution should not be neglected.

**Singeing**—Fowls after being plucked and stubbed will be found to be covered with numbers of fine hairs, which are removed by the process of singeing. The bird should be held by the legs in one hand, while the flame from a spill of paper or a taper is rapidly passed over with the other, until all hairs are removed. The operation is a simple one and demands no more than the exercise of a little care so that the skin is not blackened or burned. If preferred, a small heap of straw can be lighted, and the bird very quickly passed over the flame; or, when large quantities of birds are to be singed, a metal saucer containing lighted methylated spirit may be used. Whatever means be employed it is necessary to stretch out the limbs of the bird and turn it well around so that all parts may be singed.

#### Useful Crosses—

##### FOR TABLE MERITS.

- Indian Game—Dorking.
- Old English Game—Dorking.
- Indian Game—Buff Orpington.
- Old English Game—Buff Orpington.
- Indian Game—Barred Rock.
- Old English Game—Barred Rock.
- Brahma—Dorking.
- Sussex—Dorking.
- Buff Orpington—Faverolle.

##### FOR LAYING MERITS.

- Leghorn—Black Hamburg.

Minorca—Black Hamburgh.

Leghorn—Houdan.

Wyandotte—Leghorn.

Leghorn—Ancona.

Ancona—Barred Rock.

La Bresse—Wyandotte.

**Exhibitions and their Effect upon Utility Poultry-keeping**—It not infrequently happens that ignorant writers inveigh loudly and at length upon the absurdities of the modern exhibition system. They draw attention to the sums of money, and vast amount of energy expended in the direction of breeding birds faultless in colouring of feather, and all the details of an arbitrary standard of perfection, and they lament that time and money should be wasted upon the pursuit of a wholly worthless ambition. Yet to those who view the subject with unprejudiced eye, it must be apparent that the efforts of the fancier are by no means wholly detrimental to utility poultry-keeping. To the skill and enthusiasm of the exhibitor the many new breeds of poultry are due, and it cannot be gainsaid that these new breeds benefit the interests of poultry-keepers incalculably.

It is perhaps not too much to say that it is entirely to the fancier that we owe the preservation of our breeds in their purity. On the other hand insane breeding for some arbitrary point has been the economic ruin of more than one breed. As a proof of this the well known fate of the Black Spanish fowl may be instanced. Poultry keepers will readily recall how injurious to the utility value of the breed were the enormous white faces so successfully bred for. Other examples might be multiplied, but sufficient has been said to show that the modern practice of exhibition with all its faults is not entirely without virtue.

**Feeding of Naturally Reared Chicks**—Perhaps in no other branch of poultry management is dogmatism so

rife. Many theories, arising from ill-conducted experiments, imperfectly drawn inferences, and unblushing ignorance, have been advanced, and the advocates of this or that fad hastily condemn those who do not fall in with their own peculiar views.

It is, however, easy not to go astray if the needs, and—more important still—the *reasons* for those needs, of little chicks are carefully considered in the light of common-sense.

First it should be noted that a highly nutritious diet is necessary for the support of a system such as that of a chicken, which has to bear the strain of a rapid production of blood, bone, tissues, muscle and feathers. For this reason the correct nutritive ratio for chicken feeding is generally considered to be as high as 1 in 3.

But though good and liberal feeding should be the order of the day, it is quite unnecessary to supply food during the first twenty-four to thirty-six hours. At that period nature has amply provided for the chick by means of the yolk within the egg from which the chick emerged; the greater part of this yolk is absorbed into the stomach of the chick prior to hatching, and is digested by it after its arrival in the world.

The adoption of the natural method of rearing chicks affords the poultry-keeper a wider scope in the choice of foods. Brooder-reared chicks—in the somewhat unnatural conditions of their lives—need constant occupation and exercise, and these needs have brought dry feeds into almost universal use. But for naturally reared chicks soft food can not only be safely used, but is very beneficial.

One golden rule, however, must be observed when mixing soft food for chickens. It should never be given in a sloppy or even a moist condition, but should invariably be dried off to a friable state, that is, sufficiently dry to crumble in the fingers without sticking. Neglect of this precaution is largely responsible for bowel troubles.

For the first three or four days the old-fashioned feed



of hard-boiled eggs, grated fine and mixed with bread-crumbs, has much to recommend it. It is best placed before the chicks on a clean board, which is removed when the meal is finished. Later on chicken troughs or dishes may be used. After the first period a good dry feed should be given, and those poultry keepers who hatch hundreds of chicks will possibly prefer to feed such small grains from the start since the labour of preparing egg and breadcrumbs in large quantities would be found excessive. However, when dry feeds are used from the first they should only contain a few different sorts of the smallest grains.

During the first fortnight a meal should be given to the chicks with the utmost regularity every three or four hours. After that period four meals a day will suffice till the birds reach the age of two months, when three feeds in the twenty-four hours are all that they require.

It should be borne in mind that food of a very fatty or starchy nature is not suitable for chickens, and the characteristics and values of foods must be carefully considered. This is one of the golden rules in chicken rearing. Haphazard feeding cannot be too strongly deprecated.

For young chicks oatmeal well-mixed with water or a little new milk makes an excellent food, as do also most of the patent chicken meals on the market, if mixed in a similar way. Alternate meals of dry and soft food—despite the faddists—give splendid results with naturally-reared chicks, but it is important that the morning meal commence with soft food, and the evening meal end with dry food.

After a fortnight or three weeks, ground oats can be used for chickens, and there is no finer food, but it should not be used earlier on account of the husk it contains. Biscuit meal—if a good sample—is also useful, and is perhaps best mixed with equal parts of middlings. The latter meal is extremely useful for chicken rearing, but should not form a staple article of diet by itself,

being at its best when used to dry other moist meals.

Groats can be fed to chicks of fourteen days and upwards, if crushed. After one month it can be given whole. At two months tail wheat is a suitable grain for the evening feed. It need scarcely be said that only the best sound grain should be used. The idea that corn mill sweepings and damaged samples will do for young stock is obviously an absurd one.

Animal food is of course a necessity for chicks, but most naturally reared ones will find sufficient when on a good grass run. If they lack this, it should be supplied in the shape of a little meat, cooked and finely chopped, or a brand of dry feed containing ants' eggs and flies. Green bone should not be fed before chicks are at least a month old, and it should be cut much finer than for adult birds. It should also be fed sparingly, with a wise regard to circumstances, and not more often than every other day.

Green food is a most important item of the dietary, and grass, lettuce, dandelion, or the sprouting shoots of young corn can be given. All green food for very young chicks must be chopped fine.

An occasional change of diet is much to be recommended inasmuch as it promotes appetite and digestion. In all things pertaining to chicken rearing the discretion of the poultry-keeper must be exercised. By the use of a little hemp in damp inclement weather, or a judicious addition of dainties if chickens seem to flag, the skill of the rearer can be turned to advantage, and the intelligent care that such methods imply forms the foundation of success. If any tendency to looseness of the bowels is observed, rice should be fed for a day or so. This will be found a valuable corrective.

The question of water for chicks seems to be a vexed one, and although it is without doubt a necessity for brooder chickens, many experienced poultry-keepers seem to obtain first-class results by withholding it from those that are naturally reared. Certainly it is better

for chicks to be without water than to drink that which is impure. At the same time perhaps the most common-sense plan seems to be to allow chicks a drink two or three times daily, removing the water vessel in the interval. In this way it is assured that any water the chicks may drink is fresh and clean.

In all cases, grit must be accessible easily to very young chicks. After a few days, however, they can be trusted to search it out for themselves if at all within reach. Otherwise a constant supply should be maintained, care being taken that it is sufficiently sharp and small.

The inexperienced feeder sometimes finds it difficult to gauge the quantity of food to be given to chickens, but if young stock are provided with the number of meals previously advised the matter is simple. Just as much as the youngsters can eat with a zest should be given at one meal, when they cease to eat with an appetite it may be taken that they have had enough.

**Poultry Manure**—The value of this by-product of poultry culture is not universally recognised. Being highly charged with nitrogen, phosphoric acid, and potash, so powerful and cheap a manure ought to find a ready sale to market gardeners and others, who would find it as effectual as and distinctly cheaper than artificial fertilisers. If well stored, the manure should be worth from three to four pounds a ton in a dried condition, and since the nightly excrement of a fowl amounts to nearly two ounces, and in the case of larger breeds, sometimes as much as a quarter of a pound, it may be seen that the value of poultry manure is not insignificant. Many farmers have recognised this, and allow poultry keepers to run birds on their land for an almost nominal sum, regarding the manuring, which the fields receive, in the light of rent.

**One Pen Cross**—This name is accorded to the method of mating half-bred hens in alternate years with males of the two different breeds, so as to preserve a balance of blood. Thus Orpington-Faverolle hens may be

mated to a Faverolle cock, and the progeny to an Orpington male, whose offspring would be of equal Orpington and Faverolle blood, thus reverting to the original cross.

**Management of "Brooders," "Rearers," or "Foster-mothers"**—The rearing of chicks by artificial means becomes more frequent every year, and the reasons are not far to seek. Perhaps the most obvious of these is the economy of time and labour effected. For though it is perhaps unwise to keep more than fifty chicks in a rearer, yet that number would entail the services of at least four broody hens; whereas one rearer, if correctly managed, would certainly involve less labour than half that number of feathered mothers. Other advantages are found in the immunity from insects, which brooder chicks enjoy, unlike naturally-reared youngsters, and the fact that they are better under control, and are protected from vermin and accidents.

The first point to be remembered in connection with rearers is that much greater harm is done by overheating the brooder chamber, or sleeping compartment, than by slightly underheating it. In the latter case nothing more serious than some slight check to the growth and progress of the chicks would be likely to result. While by the former evil are caused colds, and worse diseases such as inflammation of the lungs, and complaints of the bowels, liver and kidneys.

An even temperature of 80 to 85 in the brooder chamber should be ample; but, early in the year, when cold nights are to be expected, the precaution should be taken in the evening to increase the heat slightly.

As the chicks grow older the heat should gradually be diminished till they are entirely without it. At what period this should be accomplished naturally depends upon the state of the weather, the time of year, and the breed of the chicks, inasmuch as some sorts feather earlier than others.

As a rough guide it may be laid down that Leghorns

—which feather well—may be cold-brooded at about six to eight weeks old in May.

The floors of brooder chambers should be bedded down with short-cut straw, wheatflights or granulated peat-moss. The last mentioned is excellent in every way save for the serious fault it has of balling on the little chicks' feet, and getting into their eyes. Nevertheless, many poultrymen use it on account of the warmth it affords the chicks at night.

Since brooders, rearers, or foster-mothers differ greatly in form and construction, it is not possible to give precise details, but the principal points in their management may be summed up thus:—

An even temperature should be maintained. If it is observed that chicks crowd very closely together, it may be taken that too little heat is being given, whereas if they separate to a marked extent the converse is the case. Brooder chambers should be well aired daily, and plenty of ventilation without draughts allowed.

The chicks should have ample space, fresh air and sunshine; should be protected from cold winds and rain, but should not be coddled.

It should be borne in mind that chickens increase in size very rapidly, consequently a brooder, which will accommodate fifty day-old chicks, will possibly be too small for that number at a fortnight old.

Lamps should receive careful and regular attention, and no inferior oil should be burnt in them.

On no account should chicks of different ages, and sizes, be reared in the same brooder, the risk of the larger ones crushing the smaller being very great.

**Cross-Breeding**—It is now no longer a disputed point that for certain purposes cross-bred fowls will be found of greater utility than pure-breds. Upon the skill and discretion of the poultryman much, however, depends. The qualities which the breeder desires to secure are usually obtained in the offspring in increased measure by judicious selection and mating of birds already

endowed with those qualities. Moreover, a greater hardiness and vigour almost invariably results.

When an increase of table merits is the object in view a male from any of the breeds with pronounced "table" qualities should achieve the desired result. It should be noted that yellow blood may best come through the male as the bulk of the progeny will then be found to have pale coloured legs and flesh.

In order to obtain superior layers it is necessary to mate a male of one of the laying breeds, and it should be of good laying strain.

To cross to the best advantage some idea should first be obtained of the degree to which the qualities of a fowl are indicated by its external appearance and structure. Large combs, small active bodies of extra posterior development, and length of leg, are all to some extent indications of laying merits. Fowls of good table quality will show larger bodies of a more square shape, with shorter legs, and small neat combs. But the presence or absence of any one of these characteristics cannot be regarded as an infallible sign. It is rather by a general observance of these points that a decision can be arrived at.

**Egg Production for Commercial Purposes**—Where the production of eggs on a large scale is the main object of the poultry farmer there are many points which—though trifling enough in themselves—at once collectively become of the highest importance. To disregard these in many instances makes all the difference between failure and success. In the first place it is well to remember that rightly or wrongly, the general public distinctly prefer brown shells to white; hence the majority of salesmen in London and the Provinces give their first consideration to tinted eggs. Again the competition engendered by the enormous foreign supplies daily arriving in this country calls for the closest attention. That home produced eggs can be marketed in far superior condition to foreign stuff is

surely incontrovertible; that in very many cases it falls in quality lamentably below cannot be denied.

But the reasons for this are not far to seek. So long as English farmers hold back eggs for a rise in price, so long as they pack them badly, and market them in an unclean, ungraded, and unsatisfactory state, so long will the foreigner deservedly reap the reward of his enterprise and business capacity. It should be the ideal of English producers to have their eggs well graded, clean-packed, and in the hands of the retailer within three days of being laid. They should also study the idiosyncrasies of public and middlemen, and endeavour to gratify them. They should, by the management of their fowls on sound, common-sense lines, market their eggs largely in those winter and autumn months when the highest prices are to be realised, and a more flourishing condition of their trade could not but speedily result.

To this end it is advisable—where birds of a sitting breed are kept—to permit them to indulge their sitting proclivities in the spring and summer. The rest thus afforded will induce laying in the later months. It need scarcely be added that other essential factors towards success, such as correct dates for hatching, retention of the best layers, and the keeping of young birds, cannot be disregarded.

**Shell-making Material**—Although fowls can gather a wonderful amount of chalk, lime, and other calcareous substances from ground which seems little likely to provide such stuff, in confined runs the supply cannot but fall short of the demand.

To give grit only is not, as some poultry-keepers imagine, sufficient, though undoubtedly it is of some slight service in the formation of shell. Green cut bone, also, owing to the earthy and mineral salts it contains, supplies a certain amount of shell-forming matter, and fowls which have a daily ration of cut bone certainly need less help in that direction.

Oyster shells, if properly prepared, make the best of material with which to supply laying hens for the formation of their eggshell. If placed for a few days in a covered pail of quicklime over which a little water has been sprinkled to slake it, they will be found friable and fit for use after a short exposure to the air. A thorough baking in the oven will also render oyster-shells more brittle, and kill any injurious organisms that may be present.

Old mortar, cement and pounded crockery can also be used, and if a supply is kept in the fowls' pens they will use it as required.

**Bonecutters**—These machines are practically essentials to those who wish to supply cut bone regularly to their fowls. The size should be graduated according to the number of fowls for which bone is to be cut, and it should be noted that machines possessing a large power wheel economise labour to so great an extent as to more than justify their extra cost. It should be possible also to remove the cutting knives for sharpening. For large flocks on poultry farms machines operated by steam power become necessary. Prices range from 30s. to four or five pounds.

**Cork Filings**—These, being used in the packing of fruit, can be obtained of most greengrocers at nominal prices. Sixpence will usually purchase a considerable quantity.

**Grit**—This is an essential for healthy digestion in fowls. It is not, however, always necessary to supply it, as many runs contain a sufficient quantity of small stones. These should have sharp edges, or they are useless for the purpose. Flints, when broken up, are best suited to poultry, and they can be purchased properly prepared both for chicks and adults, at about 3s. a cwt., or can be crushed privately in the machines sold for the purpose.

The following information on the subject of grit may prove useful :—If a constant supply is kept before fowls



they will use it as needed. As grit is swallowed it passes into the gizzard of the bird, and is retained to grind the food until the sharpness is worn off the edges, when it passes out of the body. Thus it is seen that though sharpness is needed, it is unwise to give such extremely cutting substances as crushed glass and crockery, which are likely to lacerate the intestines, and cause inflammation.

**Grit Crushers**—Many different forms of crushers are on the market. A smasher consisting of a heavy hammer, and a small iron stand with perforations will suffice for a dozen fowls, but for greater numbers a more elaborate machine should be chosen or grit purchased ready prepared.

**Green Food**—This is a necessity for poultry of every description, and a great preventative of liver-disease, and kindred ailments. It may be given in almost any quantity if the precaution be observed to feed a regular supply. Irregular feeding on green food is especially harmful, and likely to cause bowel troubles. Grass, lettuce, cabbage, dandelions, etc., cooked or raw, are all excellent for fowls; and nettles, if well boiled and mixed with soft food, may be added to the list. This last is useful for moulting birds, and has a cooling, purifying effect on the blood.

**Water**—This, it is scarcely necessary to say, should be given pure, and care taken to keep it fresh and clean. If poured into dirty vessels on which green slime has accumulated, grave risk of disease is incurred. In winter the ice-chill should be taken off, though the water should by no means be warm, or scarcely even tepid. In summer it should be shielded from the sun's rays and constantly renewed. It may be pointed out here that, since an egg is largely composed of water, fowls which are in full lay require an ample supply, and undoubtedly a lack tends to check egg-production, and diminish the size of the eggs.

**Shell-less Eggs**—These eggs, which lack all shell, and are contained by the skin only, occur from a variety of reasons. Insufficient shell making material is not infrequently a cause, as might be expected, but quite as often an over-fat condition of the fowl is indicated. Sometimes, however, an abnormally active layer will generate eggs in her ovary more quickly than the organs, whose functions it is to clothe the egg with shell, can work. Again the converse may be the case, and shell without yolk may be deposited. When a yolk lacking all white and shell is laid, definite disease of the egg-organs is indicated.

**Disease**—A clean bill of health should be the result of correct management and feeding of poultry free from inheritance of ills. It should be remembered that disease is an abnormal not a normal condition, and is bred by sudden changes of temperature, unnatural warmth, impure water, unsuitable food, lack of sharp grit, fresh greenstuff and cleanliness, and by irregular, or over-feeding. Suspected cases of illness should be isolated without delay, and reasonable precautions observed. It is wise also to watch newly-bought fowls, or birds fresh from exhibition, lest any disease be introduced into the pens.

When fowls seem seriously ill, and especially when infectious disease is suspected, the old-fashioned "kill-at-once" cure is no foolish one. For the sake of other poultry-keepers any course likely to maintain a high standard of health should be adopted. Tinkering with impaired constitutions or breeding from birds which have known illness, is responsible for much disease that more heroic remedies might have prevented.

**Disinfection**—When serious infectious illness has occurred in the fowl run it becomes necessary to disinfect with scrupulous care, and—since prevention is better than cure—periodical disinfections three or four times a year are advised. Houses, coops, etc., should be

brushed over with hot limewash to which Jeyes' fluid or other efficient disinfectant has been added. Great care should be taken that no cracks or crevices are overlooked, and to attain this end a syringe ejecting a fine spray is useful. Troughs and water-vessels used by diseased birds should be soaked in any strong disinfectant solutions, or if not of value should be burnt. All infectious bodies of fowls should be burnt, not buried, and ground—in cases of diphtheritic roup, etc.—should be dressed with lime.

(See **Cleansing Tainted Ground.**)

**Leg Bands**—These rings of brass, copper, india-rubber, or galvanised wire, are made in various sizes for both young and adult stock. Prices range from 2s. 6d. to 6s. 6d. a gross. Their use is essential when trap nests or other methods of egg-recording are in operation. Numbers stamped upon them make it a matter of easy certainty to recognise each individual fowl; and, when required, rings can be purchased bearing the date of the year.

**Prevention of Crowing**—When fowls are kept in close proximity to dwellings it not infrequently happens that the crowing of cocks in the early hours of the morning causes complaint on the part of neighbours. An entirely efficacious, though slightly troublesome, remedy is to shut the offender up nightly in a roomy basket. No discomfort is caused to the fowl, which can roost in comfort, but all attempts at crowing are rendered futile by the basket lid, which prevents the upright attitude necessary for the operation.

**Establishing a Strain**—It is often a moot point with poultry-keepers as to what really constitutes a strain, and when a breeder is legitimately entitled to designate a strain of birds by his own name. If the meaning of the term "strain" be understood and attentively considered, it will be seen that it not only misleads, but

entails serious misrepresentation to advertise a chance collection of fowls, or the eggs therefrom, as of the owner's "strain." The term should only in the strictest sense be used to designate birds which, by careful breeding on systematic lines, have in common some characteristic, or quality of really fixed type; that is to say the progeny of those birds should reproduce with certainty features that have been a distinctive characteristic of the parents, and which have resulted from long and accurate breeding. The words "long and accurate breeding" are used advisedly, since in this way only can fixity of type or feature be attained, and that fixity is of the essence of the title "strain."

Thus a breeder, who by several years of selection and breeding has produced birds of marked laying capacity, and, be it noted, capable of reproducing that merit in their progeny, can fairly refer to his birds as of laying "strain." It must be emphasised that, since in a couple of generations fixity of type or feature can in no measure be attained, only several years of scientific and accurate breeding can "establish a strain."

**Choice of Land for Poultry Rearing and Farming—** Upon the quality and nature of the soil, the aspect and situation of the land, and the natural advantages with which it may be endowed, depends much of the success that may result from poultry-culture. Above all the quality and nature of the soil must be carefully considered since different branches of poultry farming demand different soils.

Where the rearing of fowls for market is a main object a warm light soil is desirable. It is well known that chickens grown upon cold, heavy lands take not only several weeks longer to mature, but never in the end make as fine birds as those reared upon lighter soils, and where rearing on a large scale is practised this difference is of vital importance.

Again where egg-production is chiefly held in view heavy clay land is not unsuitable; but damp, low-lying

ground is seldom considered advantageous, although exhibitors of yellow-legged breeds find that the deepest and most brilliantly coloured legs result in birds run on damp, heavy soils. As might be expected the converse of this holds good, and white-legged fowls intended for exhibition may be most advantageously kept upon light, chalky soils.

Other points in relation to land and poultry culture, that may be noted as important, are the aspect and amount of shelter afforded. A southern aspect has naturally considerable advantage over an eastern or northern one in winter, and undulating or otherwise sheltered ground is at all times preferable to open, wind swept plains. For many purposes orchard or woods are ideal, especially in summer, but in winter the latter are too cold and damp to be eminently desirable.

It may be remarked in conclusion that it is a popular error to regard sandy or pure gravel soil as ideal. This is far from being the case. From the fact of its poor quality and infertility a scarcity of pasture is inevitable, with a corresponding lack of natural animal food, which is in itself one of the finest advantages that poultry gain by a free range.

**Number of Fowls per Acre**—To lay down a hard and fast rule as to the number of birds that may be kept in health and profit upon a given space is scarcely possible. Much depends upon the soil, the nature and treatment of the runs, the breed of the fowls, and a host of other details. As a rough guide, however, it may be taken that the maintenance of one hundred head per acre should not foul the ground for many years, if not in perpetuity.

Where hay or root cropping is regularly practised, the manurial output of the birds is largely neutralized, and a process of continual sweetening of the land is to a great extent effected. Obviously, therefore, a larger head of stock can be kept upon land from which the manure is thus taken, either by natural or artificial

means, than where no such removal takes place, as upon confined runs or worn pasture. When other stock is kept upon the land, it is inadvisable, under general circumstances, to permit the head of poultry to exceed ten or twelve per acre.

**Diagnosis of Disease**—When a fowl evinces such signs of indisposition as ruffled feathers, lack of appetite, and mopingness, an examination into general symptoms is necessary if the trouble is to be identified, and the correct treatment administered.

Often enough the absence as well as the presence of certain symptoms can give a clue as to the nature of the illness. The body temperature of the fowl should be ascertained either roughly by the hand, or with a clinical thermometer. It may be considered normal if of ninety-nine degrees. The condition of the evacuations, and also of the eyes and nostrils should be taken into consideration, and the state of the breath must be observed. If sweet it will be known that no serious stomach derangement is present. Sharp irregular breathing denotes inflammation of the lungs; in severe cases of the liver also. Extreme emaciation and pallor indicates either worms or some serious internal malady such as liver or kidney disease.

Where only slight general signs of sickness are present, the fowl may be suffering only from a temporary indisposition of no gravity, such as indigestion or other slight disturbance of the system.

**Cost of Rearing Chickens**—On this subject many investigations and experiments have been made, both in England and America. To so great a degree, however, do results vary according to circumstances that strangely conflicting conclusions have been arrived at. It may be accepted as a rough guide that the cost of growing pullets to a laying age should not exceed 1s. 9d. to 2s. 3d. according to breed and circumstances.

In experiments conducted at University College,

Reading, as to the growth and cost of rearing White Wyandottes, Buff Orpingtons, Crossbreds (Houdan-Buff Orpington, and Indian Game-Buff Orpington) and Faverolles it was found that the inclusive cost, apart from labour and interest on capital, of rearing thirty of each of these breeds to thirteen weeks was about 8½d. per head. One result that might hardly have been expected was that the cross-breeds both cost slightly less, and were lighter in weight than the pure breeds. The birds in the test showed, moreover, interesting variations in weight, ranging as they did from nineteen to thirty-seven ounces, although the same treatment was meted to all.

The foods employed, in addition to greenstuff, were of five sorts—a dry feed mixture (wheat, maize, dari, canary seed, oatmeal, millet, hemp, rice, meat and grit) for the first four weeks. After four weeks the same dry feed was fed, with the smaller grains omitted (canary seed, oatmeal, millet), and an addition made of a little linseed. After eight weeks Spratts' chicken meal, wheat in the whole state, and a mixture of barley meal, toppings, and meat was added to the menu.

It will be noted that despite the low cost of growth per head for the thirteen weeks the foods fed were of an eminently desirable and nutritious character.

The cost of such items in chicken rearing as incubator and brooder oil, etc., should prove trifling enough in comparison to the number of chickens. The use of any good oil at 9d. a gallon would enable chicks to be hatched and brooded at the rate of a fraction of a penny each.

It should be borne in mind that the cost of rearing chickens is not entirely covered by the estimates given above. Such charges as depreciation of dead stock, cost of labour, etc., cannot well be included despite the fact they may be by no means inconsiderable.

Again the ultimate destiny of chickens is a consideration largely influencing their cost. Cheap fattening foods, and much waste stuff can often be profitably utilised for chickens intended for consumption, whereas such

economy very often becomes extravagance when stock for breeding purposes is concerned, since unhealthy or unsuitable birds may result from anything but a carefully considered diet.

**Influence of Male in Relation to Egg-production—**Exhaustive experiments in this direction go to show that the number of eggs produced by a pen of fowls is in no way affected by the absence or presence of a male bird, with the qualification, however, that pullets will be brought on to lay sooner if they run with a male. Since fertilised eggs deteriorate more rapidly than sterile ones—solely due to the life within—the absence of a cock is of distinct advantage when eggs are produced for consumption only. This point is also worthy of consideration when eggs are laid down in waterglass or otherwise preserved.

**Structure of the Fowl—**To deal exhaustively with the subject of a fowl's anatomy would encroach unduly upon space, but an enumeration of the principal bones in a fowl's body, together with some information as to their nature, should not be out of place.

Comparing a fowl's skeleton with that of a mammal, it is noticeable that the bone is lighter owing to the presence of air cavities and fewer fibres of organic matter. Bird bone is also denser and of a whiter colour ; there is moreover a more pronounced tendency to ankylosis. The skull contains large cavities for the sense organs. The bones are thin, and the base strong, with one condyle. The beak consists of the superior and inferior mandible. The neck is composed of the cervical vertebræ, which are sixteen in number. These bones, with the exception of the first two, the atlas and axis, are furnished with cervical ribs. The breastbone, or sternum, has a thin blade in the centre at right angles to it termed the keel. The ribs are seven a side, consisting of the dorsal or floating ribs and the sternal or true ribs. The humerus, or shoulderbone, is connected to



the coracoid, which in its turn is joined to the sternum. The leg has three joints, the upper of which is the femur or thighbone, attached to the pelvis, and joined at the other end to the tibia, or legbone. To the tibia is connected the tarso-metarsus, or shank, to which is attached the foot on an ankle joint. The toes are usually four in number, though sometimes there are five as in the Houdan or Dorking. The wing is composed of the humerus to which is attached the forearm, consisting of the radius and ulna, at the point of junction of which are the bones of the hand. In the rump of the fowl are found the acetabulum, the ischium and the pygostyle. This last terminates in the parson's nose, and consists of the caudal vertebræ, which are five in number.

**Removal of Cock's Spurs**—When, as is often the case, a male bird with age develops such appendages to a formidable degree, it is necessary to remove them if injury to his wives is to be prevented. Lacerated backs and similar evils are apt to befall hens mated to a cock armed with sharp, powerful spurs.

A method of removal often practised with success is to impale a hot baked potato upon the spur till it nearly touches the leg of the fowl. This should be removed after a few minutes and the spur will then come away if whittled with a blunt knife. The soft matter remaining in the centre may be left to dry up, and care should be taken that it is not touched by the knife. No pain is caused by the operation if carefully performed, but when drastic measures are not deemed necessary the sharp horny tips of the spurs may simply be pared or filed down.

**The Art of Feeding Poultry**—Since the feeding of poultry demands very real care, thought, and discrimination, it may well be called an art. Perhaps in no other direction does the amateur go astray so frequently. Often when every other reason is advanced

to account for the empty egg-basket, overfeeding pure and simple is at the bottom of it.

A fowl is not a large animal, and, without forgetting the eggs which it produces, cannot be said to require a large amount of sustenance. The size of the bird's crop may well be considered in its relation to the matter, and when expanded to its fullest limit it is not large. When a fowl receives an excessive daily ration, the process of laying on fat internally immediately commences. The egg-organs and ducts become congested and coated; egg-laying, for a time, perhaps, unduly stimulated, falls off, and later on disease of liver or kidneys follows.

It should not be forgotten when feeding poultry that many things need to be taken into consideration. Are the birds laying? Have they free range or confined pens? Is it summer or winter; wet or fine? Are the fowls themselves of large heavy-eating breeds, or of light small-feeding ones? An Orpington or a Brahma will eat half as much again as an Ancona or Leghorn.

It will be obvious, therefore, that no hard or fast rule as to quantity can be laid down. But, fortunately, several methods exist of ascertaining whether fowls are consuming a correct ration. It is a golden rule never to put so much food before fowls that any is left by them; nor should the birds even have as much as they can eat. If fowls stand about inactive after their morning meal it is safe to assume that they have eaten not wisely but too well. A half ration in the morning is an admirable plan. The birds will then bestir themselves afterwards, and in scratching about obtain that exercise, which means good health for them.

Fowls on free range seldom or never need feeding more than twice a day; in confined runs a small midday meal of cut bone, or other animal food is often advisable. In both cases a full evening ration of grain should be fed. This will digest slowly, and sustain the birds throughout the night.

If it is suspected that fowls are over-fat the truth of

the suspicion can easily be ascertained by killing one, and examining the condition of flesh and intestines. To the experienced it is, however, usually sufficient to handle a live bird. Another way is to examine the birds' crops on the perch at night. If about half full at twelve o'clock it may be taken that they have something in the neighbourhood of the right amount. Frequent shell-less eggs often indicate overfatness, but they are not an infallible sign, and may be due to other causes.

It is very rarely that fowls are underfed, but should too little food be given the poor condition of the birds and the empty egg-basket should make known the state of affairs.

Food, if soft, should never be thrown upon the ground, but should be given in clean troughs, and means taken to prevent the fowls from trampling on it, and fouling it. Grain can be thrown down, and is best thus fed, but only when the ground is clean and has sweet grass or fresh litter upon it. Hard food contaminated with mud or droppings is not less injurious than soft, though many poultry-keepers seem to forget it.

When it is possible to make fowls work for their grain by burying it in clean litter this should be done. The exercise they thus obtain can only promote health and egg-production.

Times of feeding naturally vary according to the season of the year. Just before the birds go to roost, and with the earliest daylight in the morning, is an ideal arrangement. But whatever the meal hours may be they should at all events be regular.

**Fertilization of Eggs**—This subject opens up a large field for knowledge, research and conjecture. In latter years much that was formerly obscure has been made plain. It is now known that with healthy, vigorous stock, correctly mated and fed, fertility of eggs is in a certain measure assured.

Without doubt, however, and for no apparent reason,

there are some seasons when every poultry-breeder obtains an undue proportion of sterile eggs. This, though in turn ascribed to the weather and other causes, has not yet been satisfactorily accounted for.

The following are some contributory causes to infertility of eggs. The feeding of too stimulating a diet to stock; cold weather; damp runs; unhealthiness in either male or female birds; want of exercise; lack of greenstuff; too many or an insufficient number of hens to one male.

The right number of hens to mate with one cock varies according to the time of year, the breed of the fowls, and the state of the weather. In cold inclement seasons, and very early in the year three or four females should be run with one cock, if of a heavy breed such as Orpingtons, Brahmas or Rocks. Later in the season (from May onward) nine or ten may be allowed to one male. Fowls of the light breeds such as Leghorns or Anconas may be mated in larger numbers. At the beginning of the breeding season four to six females to one male may be mated up, and later twelve to fifteen should not be too many.

It is important to remember that to give too few wives to a male is as likely to result in infertile eggs as too many. Nor should it be forgotten also that on free range a greater number of birds can be mated to a cock than when they are kept in confined runs.

Care as to the selection and treatment of both male and female breeders will be needed if a high percentage of fertile eggs is to be obtained. A cock that has been running with hens all the year round will in all probability be too exhausted to breed many or strong chicks. Again a very immature cockerel cannot be expected to give good results, nor can fowls which have been treated to a sustained forcing diet, or that have been much exhibited. Neither can hardy offspring be expected from young pullets that have just commenced to lay, or from birds which have suffered any serious illness.

A male intended for the breeding pen should never

experience an undue strain upon his resources. To this end a few months' rest out of sight and hearing of his wives, with perhaps a cockerel or two to keep him company should be allowed him, previous to breeding. The good results of this procedure will be made manifest in the fertility of the eggs, and the strength of the chicks from his pen.

An occasional cause of infertility is an over-gallant male. Owing to the assiduous care he bestows upon his wives during meal-times the greater part, or the whole of the food is gobbled up before he gets a chance, and he becomes half-starved and unfit for his work. If it is noticed, therefore, that a cock calls his hens busily, and neglects to eat, special attention must be devoted to seeing<sup>d</sup> that he does not go hungry.

A male that is too inactive will usually repulse the hens, and they in their turn will not frequent his company. In such a case if fertile eggs are desired the cock should be replaced without delay by a more vigorous bird.

Infertility may also result from vulture hocks, or huge combs on fowls. If the former are trimmed, or the latter dubbed, the evil should speedily be remedied.

The question of the duration of the male influence is a very vexed one. All investigation and reports go to prove that variations impossible to prognosticate occur. Such details as the breed, vigour, and age of male and females, the season of the year, and the state of the weather seem to govern the matter.

When it is desired to use another male in the breeding pen, it is wise to allow at least a fortnight to elapse—in order to make certain of the change of parentage—after the removal of the first cock, before incubating eggs.

The laws of nature in relation to breeding are, however, so subtle and so difficult a matter of comprehension that, despite all care and foresight, results that are little expected frequently occur. For these reasons it is well for the amateur or novice not to blame hastily the

vendors of sittings of eggs or day-old chicks should they turn out not quite according to specification. Reputable breeders will always give attention to complaints, and if verified upon enquiry, will also as a rule make ample compensation.

**The Case for and Against Grass Runs**—It is a popular belief that a grass run is an ideal thing for fowls, and that the fortunate possessor of one has an immeasurable advantage over the man, who can give his birds only a bare range of dry earth, gravel or other substance. That grass is an excellent thing for poultry it is impossible to deny; greenstuff and animal food in its best and most natural form exist in constant supply to fowls run on it. But often enough there are disadvantages which far outweigh the advantages. A small grass run, even if it be sparsely stocked, is quickly trampled down and fouled by droppings. In such condition the grass is little better than poison to the fowls that eat of it, and little insect or grub life can be found. Thus the two chief advantages are replaced by a very definite evil, and the almost irresistible conclusion is reached that any flooring is superior to grass where small runs are concerned.

**Disposal of Old Hens**—It is important to choose the right moment for the disposal of fowls which have passed the prime of the productive period. In summer when prices for eggs rule low old hens can best be spared from the run. Although a hen may be laying at such a time it is not always economy to renew her lease of life. Many London firms buy up any quantity of old hens at prices from 1s. 3d. to 2s. These sums, though low, when realised, are profitable, since much food and often valuable run-space would be expended upon a valueless object.

In February and March old hens will often fetch excellent prices if broody. Gamekeepers and poultrymen, who hatch with hens, often experience great

difficulty in obtaining sufficient sitters so early in the season. When it is desired at such times to dispose of old hens an effort should therefore be made to induce broodiness, and the birds will then fetch three to five shillings each—an excellent price for a worn-out hen.

If old fowls are to be killed off for home consumption a very suitable time is at the commencement of the moult. It is, however, imperative that the feathers should only just have begun to fall, or the bird will be dry, thin and flavourless.

**Killing Fowls**—The subject of killing fowls is one deserving of the utmost care and consideration, since, if cruelty is to be avoided, the operation must be performed with the utmost speed and dexterity. The insertion of a sharp two-edged knife upwards into the bird's brain should bring about almost instantaneous death, but this method is neither cleanly nor to be entirely recommended. A better plan is dislocation of the neck.

Grasping the wings to prevent fluttering, and holding the fowl head downwards, the operator should take the head firmly between the fingers. The neck should then be rapidly extended, while the head is simultaneously bent sharply back, and pulled down firmly. Complete severance of bone, muscle, tissues and nerves takes place, followed by instantaneous cessation of feeling, owing to the brain, which is the seat of sensation, being separated from the spinal column.

The operation, if adroitly performed, is without doubt the most humane possible. It should be done firmly and with sufficient force, but an excess must not be used, or the fowl's head may be completely torn from the body. Immediately afterwards the fowl should be allowed to hang head downwards while plucking takes place, so that the blood may drain from the body. Though some convulsive movements almost invariably take place they are of a purely automatic, muscular nature, and the belief of medical authorities has been

many times expressed that death brought about in this manner is as instantaneous as can be humanly compassed.

It need scarcely be said that the novice should carefully watch the expert operator first, and should also practise, in so far as possible, on a dead fowl before attempting to kill a live one.

**Ovaries of the Hen**—The ovaries of the hen are situated on the left side, in front of the kidney, and below the pelvic girdle. They are connected to the backbone by the peritoneal folds, and by a band from the base of the fourth thoracic rib. Though every hen possesses two ovaries only one comes into operation, the remaining one being undeveloped. The size, shape, and appearance of the active ovary varies according to the season, and the age of the bird. The ovary of a laying hen is not unlike a bunch of grapes in different stages of growth. As each ovum enlarges it bursts the ovisac partly by distension and partly by the grasp of the first part of the oviduct. This duct consists of three parts, the first of which is funnel shaped, and receives the liberated ova as they fall. As the ovum passes through the first two portions of the oviduct the yolk is enclosed by the albumen or white of the egg. In the last part—the uterus—the white is covered with the membranous and earthy deposit composing the shell. Finally the egg reaches the cloaca, and is laid.

**Preservation of Dead Stock**—When working out a balance sheet poultry keepers usually make a charge of ten per cent. for depreciation of dead stock. This accords to the stock a life of ten years. With care and attention at the right moment, however, most dead stock should last a considerably longer period. Coops, houses, stakes, boarding, etc., should be painted, tarred or creosoted every two or three years as required. While there is no doubt that paint is the most slightly preservative,



it is too costly, and takes too much time and labour in applying, for the majority of poultry keepers, who are unable to make appearances their first aim.

Between tar and creosote there is little to choose. The former is perhaps the more difficult to apply, and also the more unsightly. When houses, coops, etc., are composed of thin or cracked boards, however, it greatly conduces to warmth and weather-resisting qualities. An excellent method is to apply first a coat of tar, and over it while wet, place sheets of brown paper, tarring them as they dry. Gas-tar suitable for such work should not cost more than 10s. a tub of forty-two gallons. It should be applied hot, and the addition of a little paraffin will hasten the drying.

Creosote should be well worked in, and is also best applied warm. Several coats should be brushed over allowing each to dry in turn. Houses, etc., thus treated, should be done over annually, or every eighteen months. A creosote, which can now be obtained, is dyed green, and is distinctly more sightly than the brown variety. It is, however, slightly more expensive.

All appliances, when not in use, should be packed away in a clean, dry condition under shelter. Incubators and foster-mothers should be overhauled, and cleaned of soot, dirt and debris. Oil should not be left in the lamps, or water in the tanks. Thermometers should be packed separately in small boxes, and deposited in the egg-drawer, or other safe place. If these precautions are observed costly appliances will last much longer, and great economy be thereby effected.

**Sale of Day-old Chicks**—In recent years this branch of the poultry industry has grown to large proportions, and seems likely to develop still more. It has much to recommend it, and has many advantages over the sale of eggs for incubation.

In the latter case the number of chickens that will hatch is an absolutely unknown quantity, and often much disappointment and dissatisfaction is caused to

the purchaser, who, not without reason, resents an expenditure of perhaps six shillings for a sitting of eggs from which three chicks have hatched. When, however, a dozen day-old chicks are purchased no uncertainty or risk is involved. If any of the youngsters are found dead on arrival the vendor almost invariably replaces them.

Day-old chicks should be despatched directly they have dried off after hatching. They will travel excellently at that period, and are packed fairly tightly together in boxes of wood or cardboard specially constructed for the purpose. These boxes contain small ventilation holes round the top of the sides. A piece of flannel, the size of the box, is frequently tacked round the top for warmth, in such a way as to bag loosely down upon the chicks.

The yolks, which have been absorbed into the stomachs of the youngsters just before hatching, afford them all the nourishment they need for twenty-four to thirty-six hours. Prices vary according to quality, and range from five to fifteen shillings per dozen for utility stock, and up to perhaps as many pounds for the finest exhibition birds.

**Poultry Papers**—The amateur, who gives real interest to his hobby, should take in one or more poultry papers. A weekly perusal of the same cannot but be advantageous. Articles by specialists on their subjects, containing much valuable information, appear constantly; while gleanings of all manner of useful hints and knowledge can also be obtained. In addition there are in most poultry papers correspondence columns open to subscribers, and the novice, who needs advice on such questions as the mating of his birds, the best breeds for him to keep, the correctness of his management, the right dates for him to hatch, etc., cannot do better than take the advice of the expert employed by the paper to answer such queries.

The names, addresses and prices of the principal

papers dealing entirely with poultry are given below.

*The Feathered World.* (Price, 1d. weekly.)

9 Arundel Street,

London, W.C.

*Poultry.* (Price 1d. weekly.)

12 Mitre Court Chambers,

Fleet Street,

London, W.C.

*Feathered Life.* (Price 1d. weekly.)

5 Fetter Lane,

London, E.C.

*Reliable Poultry Journal.*

(Price 4s. 2d. per ann., monthly.)

R.P.J. Publishing Co.,

Quincy,

Illinois, U.S.A.

English agent :

Mr. Randolph Meech,

Hamworthy,

Poole,

Dorset.

**Testing Eggs**—At some period during the first week of incubation, and again during the last, it is customary to test eggs in order to ascertain their fertility or the reverse. The objects of this testing are several. Where many infertiles occur the remainder of two batches of eggs can be placed under one hen, and a fresh lot given to the other. Again, infertile eggs can be removed and eaten, or hardboiled for the consumption of the young chicks, when they emerge. The removal of addled eggs is also an advantage as any impure odour they may give off might prove injurious to the embryos in other eggs. In artificial incubation the removal of infertile eggs is advisable inasmuch as such eggs, from their inability to retain or develop heat, may adversely affect the temperature of those eggs with which they are lying in contact.

Testing is accomplished by means of testing lamps, most of which give an intense light through an opening masked with transparent material so that the heat from the flame may not reach the eggs to their possible detriment.

By holding a fertile egg up to the opening of a testing lamp in a dark room it is possible to discern the maturing germ—a small black spot, having radiating threads, which give to the spot the appearance of a spider. The size and distinctness of a germ thus shown depends upon its strength, and upon the length of time for which it has been incubated.

At the third day a healthy germ is generally distinct enough to be recognised, but it is far better to wait until the sixth or seventh day, when a verdict can be arrived at without fear of mistake. A germ, which is dead, can often be recognised at an early date, but sometimes it is not possible to be certain upon the point till incubation has progressed further with the healthy eggs. It will then be found that an egg containing a dead germ is lighter in colour, or shows a broken red line against the shell or appears cloudy against the light, putrefaction having set in.

An infertile egg—it may be emphasised for the benefit of the novice that an infertile egg is a very different thing to an addled egg—can readily be recognised by the fact that no germ is present in it, and that the contents within the shell remain clear and unaltered. Incubation for any length of time has of course no power to work any change upon such an egg, except in so far as it may be possible for it to become stale by the natural processes of evaporation.

It will be seen, therefore, that infertiles may be removed from hen or incubator, and used for culinary purposes, and it is a common practice of those incubating on a large scale to sell such eggs at slightly reduced rates to confectioners, or photographic paper makers.

Eggs tested upon the eighteenth or nineteenth day of incubation will present a much altered appearance.

If live chicks are within, a dark mass with a clear-marked air-space alone can be seen. Addled or infertile eggs will appear as previously described.

Other, and mostly old-fashioned, methods of testing eggs exist, but their results are uncertain and often detrimental to hatching prospects. The practice of testing by candle or lamp light is certainly the most efficacious and safe, injury to the eggs being practically impossible if the operation is not so prolonged as to unduly cool them.

Testing eggs by immersion in water is unwise for several reasons. In the first place unneeded moisture may be supplied to the eggs, in the second the test is not entirely reliable. It is commonly supposed that those eggs which float about on the top of the water contain live chicks, and those that sink, dead chicks or germs. It may happen, however, that an egg encloses a chick, which has reached the stage when its beak pierces the egg-chamber membrane. Such an egg will sink despite the fact that it contains a healthy chick, ready to emerge. Again eggs that are being incubated by machine lack the protecting film of oil or grease which comes from contact with the sitting fowl's body. The hatching chances of such eggs are thus likely to be endangered by their being plunged into water. For this reason alone the water test is not an advisable one.

**Perches**—Since most fowls prefer to roost as high up as possible, fighting and overcrowding takes place if perches are affixed at varying heights in the fowl-house. It is important, therefore, that all perches should be placed at the same level, and they should also be removable to admit of periodical cleansing for the suppression of parasites. The best size of quartering for perches is two inches by one, and the edges should be rounded off. When branches or rough poles are used as perches, and they are excellent for the purpose, all bark should be peeled off, and no cracks or crevices left to harbour insects. When erecting perches in houses care should

be taken that they are not placed where the fowls will be subjected to draughts, and the best height from the ground is about two feet.

**Food Troughs**—These necessities in a poultry run are sold at all prices, and in hundreds of different styles, by appliance makers. Expensive troughs are quite unnecessary, and often enough are unsuitable. Stoneware, glazed earthenware, galvanized iron, and enamelled tin are among the materials employed. A very simple and useful trough is that made easily and almost without cost with four pieces of smooth wood. Two long, narrow pieces are placed edge to edge, so that each end of the trough is V-shaped. At the ends the remaining two pieces of wood are securely nailed at right angles. In this way a most suitable trough can be constructed in a few moments, and one that can be thoroughly and effectively cleaned, as need occurs, by scrubbing with a hard brush dipped in soap and water.

Of the many varieties of food troughs sold by appliance makers those constructed of galvanised iron or enamelled tin are generally best. Such troughs admit great ease of cleansing, and are in some respects superior to wooden ones. For growing stock it is often necessary to use troughs with hooped partitions in order that the weaker birds may be less easily crowded away by the stronger ones. All troughs, whatever their shape, should stand firmly so that the fowls are unable to knock them over and trample on the contents.

**Drinking Vessels**—It may be laid down almost without fear of contradiction that the simpler the type of drinking vessel the better. Elaborate fountains, which are supposed to conserve a constant supply of untainted water for fowls, seldom, in fact, do so. Too often they are extremely difficult to clean thoroughly, and contain ridges, corners, or crevices, which become slimy, filthy and odorous, thus tainting the water, and causing illness among the stock. Perfect ease of cleansing

should be afforded by all good drinking vessels, whatever their shape or material.

For adult fowls undoubtedly an open vessel of enamelled tin, of the type sold by Spratts, Ltd., at 2s., is the best. Such vessels are cleaned with the minimum of trouble, last a long time with care, and on the white enamelled surface dirt shows immediately. Galvanised iron receptacles are also excellent, and have the distinct advantage over earthenware that in winter frost is powerless to crack them; but on no account should chemicals—such as tonics, etc.—be added to the drinking water of fowls, when contained in iron dishes, as the action of the chemical upon the metal may result in the birds being poisoned.

For young chickens some form of drinking fountain is needed. Any type that can be easily kept clean, that holds a supply of water in fresh condition, and does not enable the little birds to wade in it, may be used. Such a fountain should not cost more than 1s. 6d. or 2s.

**Pedigree Egg Trays**—These trays contain separate compartments for the eggs, and are most frequently employed by breeders of exhibition stock. They are a necessity for incubators when it is desired to identify the egg, and the chick that has emerged therefrom, for pedigree-breeding, or other purposes.

**Litter for Houses and Coops**—A good litter intended for fowl-houses and coops should have several qualities. If intended for use in scratching sheds it must certainly be clean, light, and warm, and also of such a nature that grain can be quickly buried in it to afford the fowls scratching exercise. Dusty material, or that which is close, hard, or lumpy, is not to be recommended for the purpose. Straw cut in short lengths, chaff, or wheat flights make excellent litter. The last named is especially useful in brooders, and chick shelters. The cost

is small, being about 9d. for a large sack, and a small quantity littered down an inch deep will keep a brooder or chick coop sweet for four or five days.

Litter not intended for scratching purposes, but merely to form a floor covering, and to catch droppings, can be of a firmer and coarser style. Peat moss is best used for such a purpose. Many poultrymen, however, find sand, earth or ashes a useful substitute, and when sufficient quantities can be obtained without difficulty such material certainly saves the cost of the moss.

Floors of poultry houses and sheds should be well littered down two or three inches deep, more especially in winter, and if the perches are high, additional warmth is thus afforded in the first case, and in the latter protection to the fowls' feet when flying down from perch in the morning. On no account should litter be allowed to remain in houses and coops without regular attention. Peat moss, though it may not need renewal for several months, must be regularly raked over; sand, earth or ashes should be cleaned away once a week, and a little fresh material thrown over droppings every other day. The use of quicklime on the floors of poultry houses is not advisable. Some authorities recommend that a little should be sprinkled daily over the manure; but though this may have a sweetening effect, there is no doubt that fowls by picking up particles are apt to incur intestinal irritation or inflammation. Moreover, the practice often leads to neglect, and irregular cleaning of houses, thus defeating its own object.

**Galvanised Wire Netting**—Many qualities, gauges, and meshes are nowadays sold. The best for erection of fowl-runs, and general use in the poultry yard, is 2 or 2½ inch mesh, of the best galvanised quality. The gauge—that is the thickness of the wire—is a matter of individual choice, but it pays in the long run to purchase a stout netting which will last. If 2 or 2½ inch mesh netting is employed, the gauge should not be less than 17 or 18. The use of a larger mesh generally entails a



stronger gauge, since the netting is more liable to buckle.

Prices of wire netting vary according to gauge, mesh, width, and quality, and are also subject to trade fluctuations. They are usually quoted at per roll of 50 yards. The cost of a fifty yard roll of 2 inch mesh, 18 gauge, best quality galvanised wire netting would approximate 7s. 6d., if of 3 feet width.

The mesh of netting intended for the bottom of chicken coops, etc., in order to exclude such vermin as rats and hedgehogs, should not be larger than one, or one and a half, inch.

**Hedges**—The value of a good thick hedge, three or more feet in height, around a poultry pen, can scarcely be over-estimated. From an ornamental aspect such a hedge is distinctly superior to unsightly erections of boarding, wattle, or galvanised iron; and the amateur, who keeps poultry as a hobby, and is therefore disposed to consider appearances, cannot do better than provide a hedge round his pens.

In cold exposed situations some such shelter is indeed almost essential for fowls intended as breeders or layers. Moreover a good hedge, so situated that the fowls can get in the lee of it, whatever the quarter of the wind may be, is a great preventative of roup, colds and erratic laying.

Evergreen shrubs and bushes, such as rhododendron, barberry, or Portugal laurel, can take the place of a hedge, but often are not so convenient since, if the undergrowth becomes thick, fowls may contract a habit of laying there. Moreover birds are then often very difficult of access, when it is desired to handle them. Such bushes have the distinct advantage, however, of giving shelter from the time of planting, while the growth of a hedge is a comparatively slow matter.

The hedge most commonly planted is the whitethorn or hawthorn. It has many merits, being easily grown, and fairly dense. It is also suited to most soils, unless

extremely damp. The young roots, which should be two or three years old, can be planted in autumn or spring, and if placed in double rows present a more compact appearance. To obtain thickness and density the shoots should be trimmed down once a year, and kept free from grass and weeds. Another excellent hedge is the myrobellum plum. It makes a dense quick growth, and, as hedges go, soon affords shelter.

Where the expense of a long hedge is not desired the rootlets may be planted in star shape, or in the form of a cross. Excellent shelter is thus provided fowls at small expense, and in times of biting winds, or driving rains they will readily avail themselves of the complete protection afforded. Two or three years, however, are needed for a hedge to establish a strong, thick growth of sufficient height for fowls, and a few hurdles, or some boarding or sheets of galvanised iron can be supplied in the interval.

**Post Mortem Examinations**—The death of a fowl, unless due to an accident or other obvious cause, should always give rise to serious consideration on the part of the poultry keeper. It is, indeed, of the utmost importance that the reason of the death should be accurately ascertained. If this is done further losses may be prevented, or even the outbreak of very serious epidemics warded off.

To successfully conduct a post mortem examination, and to adduce correctly the cause of death is, however, a matter needing an amount of scientific knowledge far beyond the ken of the average poultry-keeper. It is quite insufficient to draw a fowl, and discover from the general appearance of the organs that any are diseased. To profit by such a discovery much more detailed knowledge is necessary. Such questions as :—What precise disease was afflicting the organs ? Had it reached an advanced stage ? How was it induced ? What remedy does it call for ? etc., must all be answered. To do so would in all probability entail difficult microscopical

examinations, or complex bacteriological processes, involving much technical knowledge and ability. It is, therefore, in most cases true economy to submit the body of the fowl to an expert, whose opinion can be relied upon. It is of the utmost importance that any information likely to bear upon the case should be sent with the bird. Such information may include the length of the illness, the symptoms displayed just previous to, and during that period, the foods that are used in the poultry yard, the general treatment of the fowls, and the nature of their run, that is, whether it be free or confined, on damp or dry soil, on grass, or gravel, etc. Without such data to go upon the specialist is more or less working in the dark.

A body intended to be the subject of a post mortem examination should be sent off without delay, and should be packed in ice if the weather is warm, since if decomposition sets in, however slightly, changes may take place which render accurate diagnosis difficult.

Nearly every poultry paper has an arrangement with an expert, who performs post mortems for readers at a small fee, varying from 1s. 6d. to 2s. 6d. The address to which bodies should be sent, and all particulars are usually given in each issue of the paper; and to prevent delay and disappointment such particulars should be carefully read and directions followed to the letter.

**Fencing Stakes**—These stakes can be purchased in varying lengths, ready pointed and tarred up to 18 or 24 inches. The cost approximates  $\frac{1}{2}$ d. per foot, and the usual size of quartering employed is two inches by one and a half. For extra stout posts, when required for the corners of pens, or other purposes, 2-inch quartering is usually sufficient. In some parts of the country rough poles can be purchased cheaply, and if the erection of netting is not required to be of a very substantial character, a measure of economy can be effected by their use. In many ways, however, such poles are inferior to the quartering cut for the purpose.

**Food Choppers**—These appliances are a necessity in nearly every poultry run. When meat is fed to chicks or adult birds, or when swedes, turnips, carrots, etc., are fed raw, or require to be quickly cooked, the food chopper is an indispensable saver of time. They are made in many styles, and can be purchased from 4s. 6d. upwards. Those which possess discs enabling food to be chopped into different sizes are especially useful.

**Capons**—The comparative table merits of a capon are confined almost entirely to the increased size of body, and bulk of flesh, since—despite many assertions to the contrary—the meat lacks something of the flavour and juiciness of young fatted fowls.

However to the poultry farmer, or those who hatch largely, the practice of caponising undoubtedly means increased profits, since the value of large numbers of cockerels, useful for table purposes only, can thereby be increased 50 per cent. Another and no small advantage of caponising cockerels is found in the fact that—the reproductive powers being destroyed—such birds can run at large with other stock.

If the operation be skilfully performed by an expert upon strong, healthy birds, it is not so severe as might be expected, and losses should not exceed 3 per cent. A capon well fed for several months will put on a wonderful amount of flesh, and mature to twice the size of a cockerel. In the autumn and winter months—the demand being especially brisk at Christmas time—good capons fetch 6s. 6d. to 8s. apiece, and it will therefore be easily seen that the farmer, or poultry keeper, who caponises fifty cockerels, which might otherwise realise 2s. 9d. to 3s. 6d. a bird, very largely increases his margin of profit. The cost of another six months' extra feeding need not exceed 2s. to 2s. 6d. a head.

Only cockerels of a tender age are suitable subjects for the operation; that is they should not be more than twelve to sixteen months old. They must be starved for thirty-six hours first. It should be understood

that the effects of caponising are to retard maturity, and to permit a much greater size and bulk to be attained, without sacrifice of the tenderness of the meat. The methods of procedure are not described here, as it is scarcely possible to convey an impression of sufficient accuracy to be valuable ; moreover, to operate without real knowledge of the anatomy of a fowl, and without having familiarised oneself first with the methods of an expert, would be to inflict wanton and dangerous cruelty upon the bird.

After the operation the subject should not be allowed to perch, but should roost on a deep bedding of straw or peatmoss. But in three or four days' time the wound should be sufficiently healed to permit of the capon running with other birds.

If only a few cockerels are to be caponised the services of an expert can be enlisted at a charge of about 1s. per head, inclusive of carriage ; but obviously a large proportion of the profit is thereby dissipated, and the practical poultry farmer, who deals with large numbers of birds, should of course undertake the work himself.

**Poulardes**—This term is applied to pullets in which the reproductive powers have been destroyed. Such birds, like capons, attain a larger size and greater plumpness, and fetch very much higher prices than the average fatted fowl. The operation does not demand the extirpation of the ovary, and it is quite sufficient to cut across the oviduct. The practice, however, is rare in England, since pullets are too valuable as egg-producers to become really profitable as poulardes. On the continent also the operation is now less often performed.

**Plucking Fowls**—The operation of plucking a fowl should immediately follow the death of the bird, and may be commenced before the cessation of all convulsive muscular movement. While the bird is warm the feathers can be removed a great deal more easily than

when it is cold and set. The danger of tearing the skin is also lessened. A good hand will pluck fowls at the rate of ten to twelve an hour; and in large fattening establishments a rate of payment obtains of about one penny per bird. The utmost care must be taken to preserve the skin intact, as large or frequent tears by turning brown on exposure to the air, not only detract from the appearance of the bird, but also depreciate its market value considerably.

The back of a fowl is usually the first part to be denuded of the feathers, and the breast, neck, underparts of the body, wings, legs, and tail follow in turn. The feathers for a few inches down the neck, and around the point of dislocation are invariably left. It is important that, during the whole operation, the head of the fowl should hang downwards so that the draining of the blood from the body may be facilitated.

Some little knack is required to pluck the feathers firmly and cleanly, without tearing the skin. It is best accomplished by a sharp moderate pull in the opposite direction to which the feathers lie. Excessive force must never be exerted. Many fowls are of course more liable to tear than others, and a tender spring chicken will need much more careful handling than a two years' old rooster. The way in which the feathers of the back come out usually affords an expert hand some index as to the ease with which a bird will pluck.

When fowls are intended for market it is as well to conclude the plucking and stubbing with a little attention to the legs and feet; indeed, no reasonable precaution to secure a good appearance for the birds should be neglected, since such details will largely affect the prices at which they sell.

If plucking be postponed for any reason till the fowls are cold, it is a good plan to scald them in boiling water first. This loosens the feathers to an appreciable extent; but it is not advisable to adopt this method with any birds other than those intended for home consumption as it does not improve their marketable condition.

When plucking on a large scale is carried out, it is usual to save the feathers, and to this end the operator should work before a basket into which only the finer feathers are cast as they are plucked, those from wings and tail being discarded. If the feathers are to fetch any price at all afterwards, this rough method of grading is imperative.

**Stubbing**—This process must follow that of plucking. It consists of the careful removal of pin feathers and short stubs, by means of which a clean and edible appearance is given to the bird. Stubbing is undoubtedly a wearisome task to accomplish satisfactorily, but if it is not well performed the market value will suffer. Thumb and nail can be used, or a blunt knife may take the place of the finger nail. For broken quillstubs a small narrow-pointed pair of pliers is often useful. Young birds, or those just through the moult, of course entail very much more trouble than others, owing to the amount of pin-head feathers present.

**Purchasing Poultry**—In this direction too many precautions can scarcely be observed. It is not too much to say that forty per cent. of poultry vendors are absolutely dishonest. If such men, by misrepresentation or other means, can dump inferior live stock at high prices upon the unwary they will, without hesitation, do so.

It should be observed that these strictures do not apply necessarily to the hosts of private individuals who advertise in the weekly poultry papers. Many black sheep there are among them, but it is to the ranks of the "professionals" that these remarks mainly refer. Not only the lesser lights, but many of the large, well-known, and much advertised poultry farmers will take any advantage of the purchaser that may be in their power. Such gentry having once received a remittance, can generally be persuaded to disgorge only by the operation of the law.

Unfortunately almost every opportunity for ill-dealing is theirs. Indeed, many, if not the great majority, of the points or merits by which the value of a fowl is determined to the purchaser cannot be verified by a momentary examination. External indications are in fact closely limited in their value; and only work in breeding pen or nest-box, both as regards utility and exhibition stock, can, perhaps, decide the question of a fowl's value. Repudiation of the transaction is obviously then too late to be possible.

To quote one example of many. The finest expert alive would be unable to declare solely by ocular examination that a pedigree layer, for which possibly half a guinea may be demanded, is really the offspring of parents rigidly bred and selected for laying capacity. Only a process of six months or more careful trap-nesting could verify or disprove the claim.

It is an argument with many that a well-known breeder, exhibitor, or poultry farmer, cannot afford to imperil a reputation by shady dealings. Unhappily the shortsightedness of such a policy is too often no deterrent. In many instances within the knowledge of the writer, poultry farmers known almost all over the country, have sent out to purchasers cockerels of unhealthy parentage, birds with terribly crooked breasts or otherwise entirely unfitted for the breeding pen, pullets that were quite immature and hatched several months later than the time specified, and exhibition stock whose performances in breeding could only result in utmost disappointment and loss. While the purchaser, having sent money for birds of a very different stamp, can get no sort of satisfaction unless by troublesome and expensive legal proceedings.

When buying poultry, therefore, under no circumstances should remittances be forwarded direct to the vendor, be he of established reputation and integrity, or unknown. Money should invariably be deposited with one of the weekly poultry papers, which have a deposit system.



By this method a certain amount of safety is assured to the purchaser. The goods, which are forwarded on two or more days' approval, can be inspected, and if approved, in so far as mere ocular examination can suffice for that, the editor should be notified. He then forwards the deposit money to the vendor, thus completing the transaction. Should the goods fail to give satisfaction, they must be returned promptly, and the editor upon information sends back the money to the depositor. Poultry papers, which undertake the deposit system, in most cases charge a commission of 6d. in the £. But the slight extra outlay thus entailed is above all things justified. If, for any reason, it is not desired to utilise the deposit system, goods should only be ordered on several days' approval, and the would-be purchaser then has the right, within the limits of the time specified to insist upon a repudiation of the transaction.

When eggs for incubation, or day-old chicks are purchased, it is obvious that entire trust must be reposed in the word of the vendor. Such orders should, therefore, be placed only with dealers that have a reputation for honesty and fair-dealing, although, as mentioned before, this precaution is by no means to be regarded as infallible.

**Marketing Poultry**—Too much care and attention to detail can scarcely be given to this branch of the poultry industry. Whether the producer is dealing with a few dozen birds or with hundreds, his margin of profit cannot but be affected by the manner in which this last and most important part of his task is accomplished.

Birds which are handled by large salesmen in the metropolis, or provinces, have to deal with stern competition and varying influences. It should not be forgotten, therefore, that in ninety-nine cases out of a hundred it is appearance that sells the fowl, despite the fact that the intrinsic quality of the bird may in no way be indicated by it.

All consignments should contain nothing but well

plucked, well shaped, and well packed birds with clean legs, empty vents, and unsoiled skins.

It need hardly be said that birds must be well chilled and set before being despatched. To pack a bird before it is cold is to court disaster.

Those practices known in the trade as "ringing" and "topping" are seldom successful, and should be rigidly eschewed. It is scarcely possible that an experienced salesman could permit himself to be gulled by the simple expedient of placing a few old birds amongst the young, or of packing the best stuff on the top of the hamper. Unless the consignment is from a regular customer, he will certainly satisfy himself that the quality is uniform.

Consignments are often best packed in unreturnable hampers, since trouble is thus saved the consignee; but on many railways an organised system of crate delivery and collection is undertaken by the company.

Clean fresh straw is one of the best packing materials, and should ensure the arrival of the fowls in sweet condition. In hot weather, however, it is sometimes advisable, before forwarding, to finger-draw the birds—that is to remove the intestines through the vent. Sometimes crushed ice is also packed in between the layers of birds. Either precaution should result in the goods arriving in bright wholesome condition.

It is to the man who carefully studies the requirements of the class of trade for which he caters, who sends regular consignments of good firm stuff, that the reward of good prices comes. He it is, too, who makes the most show against the strong competition of birds from abroad.

The question of the middleman is one that largely affects the producer of poultry flesh. Any method, plan or system that will enable the producer to supply the consumer direct obviously conduces to the advantage of both, more especially the former. The margin of profit, which the average price of a table fowl allows, is not a large one. Hence the saving of even a fraction

of that profit is not to be despised. This economy can in many cases be effected by a little enterprise, and of recent years the fact has been recognised by poultrymen all over the country. The result is to be found in systems of co-operation, in private trade done by advertisement, in regular family contracts, and in many ways, all of which work very greatly for the producer's benefit.

**Egg-grading**—It is the constant complaint of egg-tradesmen that home producers ignore the necessity for suitable grading of eggs. That this is one of the first means by which the superior enterprise of the foreigner is able to overcome what should be the stern competition of the home-produced article cannot be denied. Several different methods of grading eggs are in vogue. A sloping table fitted with cross-bars at different heights is sometimes used. The eggs are rolled down this table, and are automatically sorted by the cross bars under which they roll, or against which they stop, according to their bulk. Another egg-grader is composed of a metal ring of a standard size through which the girth of an egg is measured.

Perhaps one of the best methods of grading is by hand and eye alone. The operator, by means of one or more eggs of certain sizes before him, makes a rapid comparison, and grades accordingly. A practised hand can work in this way with astonishing accuracy.

**Marking Chicks**—When rearing chicks which for any reason it is desired to distinguish from their fellows, some method of marking has to be adopted. A little difficulty is often experienced in achieving this, since the tiny size of a chick renders unsuitable many of the expedients by which adult birds are identified.

The practice of toe-marking, which originated in America, has been pursued with success. By means of a steel punch constructed for the purpose a small hole is perforated in the web of the chick's foot. As this web is far from being sensitive and the operation is also

momentary, it is practically painless. The hole will always remain to identify the chick among its unmarked fellows. Another and ingenious method is that of painting the chick with a dab of aniline dye. This offers a greater means of individual identification, but at the same time the stains need occasional renewal as the chick feathers. Sometimes it is desirable to place the identification mark underneath the chicks' wings to prevent their mothers pecking them.

Small wire leg-bands with a numbered tab attached can also be used, but are unsuitable for quite young chicks.

**Blood in Eggs**—This occurrence appearing in isolated cases only, demands little consideration. When, however, eggs containing blood specks or clots occur with any frequency, efforts should be made to discover the bird which lays them. If the spots are situated in the yolk a rupture of a blood vessel in the ovary is the cause; if in the white of the egg a ruptured vessel in the oviduct is indicated. The eggs are quite fit for human consumption unless the spots are very large or numerous. In such case the egg should not be eaten, as the ovary of the layer may be in an advanced state of disease, and it is by no means certain that the germs of the disease may be innocuous to the human subject.

A fowl that is overfat, or has been fed on too stimulating a diet, may lay blood-specked eggs. When discovered, the bird should be penned separately, and fed on a spare diet, so that egg laying is checked for a while. A little Epsom salts should also be added to the drinking water. If serious disease of the ovary is suspected, the bird should be killed.

**Dropping Eggs from Perch**—Nature will not invariably work with the automatic regularity of a machine, and there is little cause for wonder if eggs are occasionally matured at irregular intervals. Hence the fact of eggs being laid from the perch at night need cause the poultry

keeper little concern. If, however, this should occur constantly it may in all probability be due to over-feeding or too stimulating a diet. The fowl's rations should therefore be curtailed slightly, and if any of the birds show serious signs of overfatness, soft food should be knocked off for a while. The addition of a little Epsom salts to the drinking water will also be beneficial.

**Double Matings**—The system of double mating is of comparatively recent origin, and an outgrowth of scientific mating for exhibition. Though deprecated in many quarters, and with some reason, the practice is certainly on the increase, and is fostered by the standards adopted by fanciers' clubs for many breeds.

It will be seen readily that where the colouration and markings of a fine male exhibition specimen differ essentially from the colour and marking of a good exhibition female two separate pens will have to be mated up to produce the best results in each bird. Hence the terms "pullet-breeding" pens, and "cockerel-breeding" pens. By the first is denoted a breeding pen, which, owing to adherence both in male and females, to the correct female standard of points, is likely to produce pullets which will be correctly marked show birds; by the second is indicated a breeding pen likely to produce good cockerels.

To suppose, as some do, that by the term "pullet-breeding pen" is meant a pen of fowls whose offspring will be mainly pullets, is quite erroneous. Obviously it is quite beyond the power of the breeder to make certain of producing whichever sex may be desired.

**Trussing Poultry**—There are a variety of ways in which poultry can be trussed. Only a consideration of the requirements of the bird, and the cooking process it is to undergo, can decide the method. Fowls intended for roasting are usually trussed in very different fashion to those destined to be boiled. Different styles are in vogue also in different counties. The main thing, however,

which has to be considered, is the anatomy and quality of the fowl. No attempt here is made to give precise details of different methods of trussing, since it can scarcely be learnt from printed directions. Actual demonstration and instruction by an expert should be given to the novice, who will then learn how to truss a bird so skilfully as to add materially to its appearance of plumpness, or conceal its lack of that attribute, without having recourse to that crude and indefensible practice of smashing the breastbone to which so many poulterers are addicted.

**The Dust Bath**—This is a most necessary but often neglected institution in the fowl run. On free range fowls will scratch up their own dust baths, and use them daily, but in confined runs some arrangement has usually to be provided. Boxes or small covered shelters filled with sand, earth-dust, ashes or gravel should be supplied. Over the dusting material some poultry-keepers also sprinkle insect powder occasionally. It need hardly be said that both material and powder must be kept dry to be of use. As regards the materials for dusting it should be mentioned that ashes, although most efficacious, are not suitable for light-plumaged fowls if their appearance is a matter of consideration to the owner.

Unless dust baths are accessible to the fowls an undesirable multiplication of insect life will almost certainly take place. This is, of course, especially the case in summer. It should not be forgotten that it is within the power of parasites to work serious harm to fowls, since by causing them perpetual worry, and draining their blood, the constitution may be weakened to a considerable extent. Hence the importance of the dust bath which is the fowl's natural means of combating insect pests.

**Incubator Charts**—When artificial incubation on any scale is carried on, the operator should always keep careful record of the conditions prevailing during the

hatch, and should note the smallest detail that may seem relevant. These records, when compared with hatching results, often throw valuable sidelights upon the art of artificial incubation, and thus may enable higher percentages to be obtained in future hatches. Printed incubator charts are best used for the purpose. They contain spaces in which may be written the name of the incubator, the date when incubation commenced, and when eggs are due to hatch, the number and breed of the eggs, the number fertile, addled, broken, or hatched. Double ruled columns, in which details of the morning and evening visits to the machine may be entered, are also provided. In these the temperature of room and egg-drawer should be noted; also the outside minimum and maximum temperature, and the moisture in the atmosphere. In order to measure accurately the amount of moisture—one of the most valuable details—an instrument called the hygrometer can be employed.

**Brooder Houses**—The practice of rearing chicks on a large scale in the early months of the year renders these appliances a matter almost of necessity to utility and exhibition poultry-keepers. By dispensing with a score of small rearers, each accommodating perhaps 100 chicks and demanding much detailed and individual attention, great economy of labour is at least effected.

Many different types of brooder houses—some of them of extremely elaborate construction—are in use. They are usually supplied with heat by a hot pipe system similar to that used in greenhouse construction. Wire guards are provided to keep the chicks from crowding too close to the source of warmth. Hovers, constructed of boards curtained with narrow strips of flannel, through which the chicks can pass in and out at will, are provided. These hovers sometimes run the length of the pipes, and sometimes occur at intervals in circular form.

A type of brooder house, which has been well thought of in America, and is now utilised on some poultry farms

in England, combines simplicity with cheapness of construction. Roughly speaking, a gabled roof is built over a trench dug in the ground. Entrance to this trench is gained by steps at each end. The attendant, when walking along the trench, has therefore a platform formed by the ground on either side of him, and level with his waist. These platforms are covered with some form of warm litter, contain hovers, and are divided with boards and netting into various compartments according to the requirements of the poultry-keeper.

The several advantages arising from this plan of construction will readily be seen. In the first place considerable economy of the heat supply is effected, since the lowness of the building affords but a small amount of air space to be warmed. At the same time ample ventilation can be secured by means of efficient ventilators in the roof. Again the acme of ease and convenience in manipulation and control of the chicks is gained by means of the narrow trench, which brings the chick runs level with the attendant's waist; and by dividing the runs into different sizes the chicks can be drafted off into suitable batches. Windows in the roof are usually large and are fitted with blinds or shutters, which can be drawn or opened at will.

The chief essentials of a brooder house are a constant supply of fresh air without draught, control of the heating system, and means of admitting every ray of sunshine. Simplicity is also a desirable attribute, since the all-important matter of perfect cleanliness will be difficult of attainment, where a complicated system of hot pipes, trapdoors, shutters, movable floors and other apparatus, exists.

It should be added that where practicable several small brooder houses will be found to afford very much greater convenience and efficiency than one large one. Slight variations in the style of each will then enable chick rearing to be carried on in all weathers and at all seasons of the year with the greatest success. Where, however, only one building is in use, the task of adapting



it to a variety of seasons and requirements is one of the greatest difficulty, often resulting in most undesirable elaboration.

Cold brooder houses, that is to say, brooder houses intended for chicks sufficiently mature to dispense with artificial heat, admit a greater diversity of construction than heated or winter brooders. The chief necessity is efficient ventilation, since a supply of pure air is above all things desirable for growing stock. It is important also that they should afford sufficient and an even amount of warmth and shelter. If cold at night, young stock will huddle to the warmest corner, and will trample upon each other till perhaps by morning half a dozen or more of the weaker birds will be found dead from suffocation.

**Development of the Embryo**—The growth of the chick within the egg, by means of sustained warmth at a requisite temperature, can truly be called one of Nature's most marvellous processes. Within a very few hours from the commencement of incubation development of the germ takes place. Indeed it is noteworthy that segmentation actually occurs prior to the egg being laid, brought about from the natural warmth of the hen.

By the end of the first day the blastoderm has expanded considerably, the clear area being more marked and the opaque area larger. During the next three days growth of head and optic, and cerebral vesicles takes place; the arteries form, nutriment is received from the blood, and respiration begins. Development of alimentary canal, kidneys, liver, and pancreas also takes place. By the fifth day the pectoral and pelvic girdles, and spinal cord evolve. On the ninth, growth of down and feathers starts. About the fifteenth day the beak of the embryo is fully formed, and hardens, till on the nineteenth the chick pierces the air-chamber with it, and true respiration commences. The whole structure of the bird then develops rapidly, the remainder of the

yolk—which has been affording sustenance to the chick during growth—passes into the stomach, and at the end of the twentieth, or beginning of the twenty-first day, hatching commences.

**Structure of the Egg**—The wonderful provisions and methods of Nature are clearly exhibited by the structure of an egg. The outer envelope or shell, composed of earthy and calcareous matter, contains minute perforations invisible to the naked eye, through which air is admitted to the embryo during the process of incubation. The white and yolk are enclosed within two skins, which are in close contact except at the top of the egg, where they separate, and the air-chamber is situated. The outer of these membranes is slightly thicker than the inner.

The white, or albumen, contains three separate layers, and surrounds the yolk, which is suspended by two strings of albumen called the chalazae. These strings are visible to the naked eye, and play an important part in preserving the balance of the yolk within the egg, so that the germ floats continually uppermost. The yolk of the egg affords food for the embryo during the process of incubation. It should be noted that all eggs contain a germ, not excluding those that are sterile. It is the impregnation of this germ with the male element that calls the fertility of the egg into being.

**Pedigree Breeding**—To the skilful practice of pedigree breeding can be attributed in the main the world-renowned quality of the live stock of Great Britain. Whether the goal of the breeder is the production of an abnormal milk yield, an extraordinary quantity of flesh, an abundance of eggs, or some arbitrary standard of perfection in external characteristics, it is by skilful pedigree breeding that he strives to achieve success.

The experiments of Charles Darwin in pigeon-breeding clearly demonstrated the marvellous differences which could be effected in a few generations by in-breeding

on well-considered lines. This consanguinity is the keynote of pedigree breeding. It is an inexorable law of nature that the qualities or characteristics of the parents are transmitted to the offspring, though they may not invariably be manifest in the first, second or even third generation. Where any marked characteristic appears in both parents the tendency to reproduction of that characteristic is the more marked. That fact is seldom ignored by breeders. Again the introduction of "alien" or unrelated blood inevitably causes a reversion in some or all of the offspring to a more remote ancestral type. This fact is of cardinal importance, for upon it the efficacy and powers of pedigree breeding depend. By breeding from birds that are related, desired qualities or characteristics can be gained or intensified with varying measures of certainty. It is by this pedigree breeding, viz., breeding from selected birds of known and established parentage, that new varieties of fowls are evolved.

Certain difficulties, however, obstruct the breeder's progress. Chief of these is the well-known fact that in-breeding results in physical degeneration. If carried to excess in-breeding would of course result in stock so weakly, stunted, and pre-disposed to disease as to be worse than useless. To the end, therefore, that he may breed from related birds without too great violation of nature's laws, the pedigree breeder keeps careful records of his breeding processes; and by mating birds of comparatively distant kinship, re-mating their progeny on carefully considered lines, and working with skilful caution he succeeds in perfecting and fixing the points or characteristics, which are the goal of his efforts. By communication with fanciers in whose yards are fowls bred from the same parentage he is able to introduce fresh blood, and yet preserve the integrity of his strains.

The matter of the introduction of fresh blood, when needed, of course demands great care lest the fruits of several seasons' breeding be impaired. Thus it is that many authorities recommend the importation of pullets,

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the poultry industry to their other operations, and with a marked influence on their incomes. Indeed, by discarding the effete and foredoomed method of leaving the poultry to take care of themselves, or of delegating the job to some farm hand, outworn for other work, a revolution has resulted. A special system, however, must be elaborated to suit the farmer's needs, and only such branches of the industry as are peculiarly adapted to his circumstances should be embarked upon.

Pure bred fowls are often hardly more suited to the farmer than barndoor mongrels, and the latter are always money wasters. Undoubtedly first crosses are the birds for the farmer's work. Their superior vigour and fecundity entitle them to this consideration, and the ordinary drawbacks do not apply in this case, since, broadly speaking the farmer's sole object is simply the raising of flesh and eggs for market.

Hundreds of owners of large farms would find it profitable to install an experienced poultryman, whose sole duties would be the care and control of the feathered stock. A skilful hand could earn for his master a very appreciable addition to his income, and the busy farmer would only have to give in return a little general superintendence, and perhaps a weekly consultation with his man on such matters as the disposal of the land for the birds, or the economical utilization of surplus crops. This, be it understood, entirely without any sacrifice or displacement of other branches of industry.

It is, moreover, now realised that poultry make very appreciable returns merely in the benefits they confer upon land by manuring and extermination of insect pests. Numbers of farmers, indeed, who have seriously taken up poultry culture, consider that such benefits quite balance the cost of labour incurred, and if this be so it is easy to see that profits should reach a very respectable figure. Many examples of this are given in Lewis Wright's *New Book of Poultry*.

Coming to more precise details, it is advised that the farmer should house his birds on the portable housing

system, keeping not more than twenty-five or thirty in one house. If flocks of good first crosses, as advocated above, are used, a few pens of pure fowls for breeding purposes may be kept at the homestead, or the excellent "one pen cross" method may be adopted.

Although elaborate trapnesting is not suitable for the farmer, some attempt should be made to single out and discard the really unprofitable hens, and to breed from the best layers only. Existing mongrel stock can be entirely cleared out, or all males removed and a good stock cock introduced. This in a couple of seasons will raise the standard of quality appreciably. Incubators must be used, since even the farmer has to hatch in the autumn, winter, and early spring, inasmuch as the table fowls hatched then fetch by far the highest prices. The egg trade must also receive suitable organisation, and a little trouble exercised at the start yields a hundredfold interest later on. In this direction efforts should be made to produce as many eggs as possible in October, November, December and January. Eggs in March, April, May, June and July are often more trouble than they are worth.

The raising of young stock for the fatters, and all general branches of the poultry industry are open to the farmer, but as a rule the specialist operations are best left alone. When pedigree birds, cocks of good laying strain or valuable incubation eggs are wanted, a good poultry farm can supply the farmer better and more cheaply than he can supply himself.

Lastly, and above all, a simple uniform method and style should be maintained. Appliances should be of as plain a character as possible, and limited within reasonable bounds. Operations should be conducted with regularity, foresight, and knowledge, and careful register of all expenditure be kept. The result will justify the enterprise of the farmer, who breaks from the groove of tradition and regards poultry culture from a serious standpoint.

**Henpecking**—When fowls are observed to peck each other, the attention of the poultry-keeper should at once be directed to the cause. It may be a habit contracted through idleness and want of occupation, which can be cured by the obvious remedies of providing litter and scratching material for the fowls, and hanging up swedes or turnips for the birds to amuse themselves by pecking at. Fowls cooped in tiny confined spaces are most liable to the habit.

When birds peck each other and are noticed to eat feathers, the cause is often found in a minute insect, which burrows into the roots of the feathers, and induces the habit by the irritation set up. If, however, the hens confine their attentions to the male bird—and sometimes they will peck till blood flows copiously—it is possible that the stock bird is an inattentive one, and he should be replaced by a more vigorous active cock. Again the cause may lie in a lack of essential elements in the diet. In such case an addition of animal food to the menu is desirable, or a little table salt added to the morning meal.

**Management and Cure of Broodies**—Before setting a broody upon valuable incubation eggs it is well to ascertain her qualities. All hens do not make satisfactory sitters, and a clumsy uncertain-tempered broody is a constant source of annoyance and inconvenience. A broody should be allowed to sit upon the nests for a full four to five days before being used, as hens, which are not well into a broody condition, will often refuse to sit when removed to the sitting box, or, worse still, may desert after a few days.

It is a good sign of a broody's readiness for maternal duties if she forsakes the perch for the nestbox at night. Indeed a broody should not be used until she does this. When hens are sold as broodies it is particularly essential that they should not be sent off too soon, or the railway journey may rid them of all inclination to sit. Unless every confidence be felt in a broody she should be placed



upon dummy eggs till the poultry-keeper is satisfied that eggs of value may be entrusted to her.

Broodiness in fowls can be encouraged by liberal use of food of a carbonaceous character, such as maize, buckwheat, hemp, etc. Dark, quiet nest-boxes are an additional assistance. To cure a fowl of broodiness she should be penned in a slatted coop within full sight of the other fowls at liberty. Her diet should be of a nitrogenous nature, and should also be a spare one. A teaspoonful of Epsom salts in the drinking water the first day is recommended by some authorities. If a broody be confined at the very commencement of broodiness she should be cured of all inclination to sit within three or four days.

**Trollever**—The use of portable houses has been largely prevented by the amount of labour required to shift them. Where this is a daily task, and when portable houses are used on a large scale, the excessive labour has been found a most serious matter. Of the many inventions brought out with the purpose of overcoming the obstacle the Trollever is undoubtedly best. It is inexpensive by reason of the fact that one machine can be employed to move any number of houses; moreover, the small fittings which need to be attached to each house do not involve an outlay of more than a few shillings. The apparatus consists of a pair of loose wheels, and a machine which owes its name to the fact that it is partly lever and partly trolley.

The heaviest fowl house of the portable type can be moved in a few minutes when the trollever is operated by a couple of men, and it is perhaps not too much to say that the Trollever should give a great impetus to the portable system of housing fowls.

**Constituents of an Egg**—It is common knowledge that an egg is one of the most nutritious of foods. Analysis reveals approximately ten per cent. of carbohydrates,

12 per cent. of albuminoids, 3 per cent. of salts, and 75 per cent. of water.

**Crooked Toes**—These defects in a fowl are often caused by roosting on too broad a perch, which does not allow the bird to grasp it with facility. In young chickens it may be congenital, or the result of a hard wooden floor, or one insufficiently bedded down with litter. The condition is almost always incurable.

**Hatching and Rearing by Turkey**—The turkey is often employed on the continent as a living incubator of hen eggs, and as many as thirty-five eggs are sometimes placed under a large bird. As the turkey makes a most reliable sitter the English farmer might often advantageously copy the example, and the time expended in attending to a large number of broodies would be well saved. As a mother the turkey is not less quiet and dependable than the hen, and chicks reared by her will thrive and make rapid progress. It is, however, a wise precaution not to allow the turkey her freedom until the chicks are ten days old, or she may follow the habits of her race and wander too far afield for her youngsters.

**Apoplexy**—This is not an uncommon disease in old fowls of the large varieties. It is the direct result of overfeeding, and rich food; and is sometimes brought on by the strain of much exhibition in close, hot buildings.

Holding the head of the sufferer under a flow of cold water will afford temporary relief. A very limited diet should follow, with a dose of Epsom salts in the drinking water.

**Bronchitis**—This complaint, as in the human subject, follows on a weakness of lungs or chest. The fowl breathes with a harsh sound and sometimes coughs also. Often the condition is induced by the state of the atmosphere, and with a change of the weather speedily

disappears. Or again it may become an almost chronic condition. In such case the best course is to kill the fowl. When a cure is attempted the bird should be penned in a warm moist atmosphere. Warm nutritious soft food should be given ; but even if any alleviation is attained the malady is quite likely to reappear.

**Catarrh**—As the name indicates, this disease is no more than an ordinary cold resulting from overheated houses, exposure, or sudden changes in the weather. Ruffled plumage, wet nostrils and eyes, and sneezing give ample evidence of the presence of colds in the poultry run.

Though a little care will soon put matters right, treatment should not be delayed as neglect may result in an outbreak of roup. Warmth, isolation of affected birds, nourishing soft food, and a tonic should effect a rapid cure. The addition of good roup powder in the drinking water is a wise precaution.

**Cholera**—A disease of a most serious and highly infectious nature. It is induced by impure water, tainted ground, or food. Drastic measures are needed to check the spread of the disease when once a case occurs. Healthy fowls should be removed to fresh ground, and a careful watch kept upon them. Affected birds should be killed at once, and their bodies burnt. The houses and runs that they have occupied should be disinfected and cleansed with the utmost thoroughness.

**Consumption**—Fowls with this disease evince very similar symptoms, such as constant coughing and rapid emaciation, to those of human beings afflicted with the same scourge. It is unwise to attempt a cure. Under the circumstances there can be no doubt that it is much best to slaughter the fowl immediately, and burn the body. In no case is it wise to breed from a fowl which has shown signs of the taint of tuberculosis.

**Cropbound**—A fowl afflicted with cropbound is usually detected by the swelling in the region of that organ, coupled with the usual evidences of indisposition. Irregular feeding, overfeeding after a long fast, or the obstruction of some foreign body may be the cause.

If the crop is only partly distended, and no hard matter is felt within, gentle kneading with the fingers may do good. On no account should food or water be given to a cropbound fowl. Since that which is already within the crop is not passing out, it is obvious that to permit more food to enter would only be disastrous.

Where other efforts fail, and the crop is much distended and hard, it is sometimes necessary to make an incision, and remove the obstructing matter. A small cut should be made through the skin, after plucking out a few feathers to facilitate the operation, and a second cut directed through the crop. All matter and contents must then be gently removed, and the crop carefully cleansed with a weak solution of permanganate of potash.

The cuts in the skin of the crop must then be sewn up carefully and separately. No food should be given for several hours afterwards, and for the next few days till recovery is perfectly established, only a little nourishing soft meal mixed to the consistency of porridge should be fed. Water must be withheld for a time, and it need scarcely be added that the bird must be kept in a comfortable coop without companionship.

**Diarrhœa**—Impure water, wet weather, sudden changes of temperature, and an irregular supply of green food often cause diarrhœa. No attention need be paid to a little looseness of the bowels, as indicated by droppings. But when the condition is at all serious or persistent, the affected bird should be the recipient of special diet.

Rice with a little powdered chalk may be given, or some bonemeal in the soft food. This last is an excellent preventative of diarrhœa in young stock, which often contract the trouble owing to unskilled treatment in

brooders or to unsuitable feeding. It is important that green food should be withheld for a time.

**Dysentery**—This disease is closely allied to diarrhoea, but shows itself in a more intense form, and the constant and liquid evacuations are tinged with blood. The affected bird should be penned in a warm dry coop well bedded with granulated peat-moss. Chlorodyne is generally considered by poultry-keepers to be the best medicine. Three drops in a teaspoon should be given several times a day. The food should be of a constipating character, such as rice. A little cooked meat may be given also once a day. Green food, for the time, must be struck entirely out of the menu.

**Diphtheritic Roup**—This disease is of an extremely contagious nature, and for this reason immediate precautionary measures must be taken when the complaint is noticed. Endless trouble and loss may attend the attempt to cure a few birds of comparatively little worth. It is, therefore, often the best course to kill all affected birds, burn their bodies, disinfect houses, coops, etc., scrupulously, cleanse the ground on which the birds have been running, and watch sedulously for any re-appearance of the complaint so that it may be nipped in the bud.

Symptoms of the disease are found in white membranous growths in the fowl's mouth, or in the formation of cheesy, yellow matter in beak, nostrils and eyes. This matter must be removed as it forms and all places washed with a strong solution of permanganate of potash. The Board of Agriculture authorities, in a leaflet on the disease, recommend the use of a ten per cent. solution of salicylate of soda, or boracic acid. They advise also the addition of a one per cent. solution of the soda in the drinking water of the fowls amongst whose numbers the disease has occurred. Any good roup powder as advertised by poultry specialists can be employed in place of the drugs mentioned.

If a cure is attempted, long and patient treatment, with constant scraping away of the growths as they form, will be needed. All patients should of course go isolated. If, however, the disease has reached an advanced stage it is absolute folly to permit the affected birds to drag out an existence, which is a source of the greatest danger to other fowls.

It is the experience of many poultrymen that late-hatched chickens are particularly susceptible to roup. In many cases the disease is directly attributable to carelessness in management of stock. Birds allowed to roost in close, overcrowded, ill-ventilated houses are almost certain to contract the disease, not only owing to the debilitating effect such unhygienic conditions have upon their systems, but also to the presence of colds caught by coming out in the early morning into a vastly colder temperature.

**Bumble-foot** — Many poultry-keepers assert that bumble-foot is caused by fowls jumping from high perches on to a hard floor. Others believe that the trouble is due to a parasite. Since the complaint is in the nature of an abscess, or inflamed corn, it is probable that either of these causes may be concerned in inducing it.

The swelling should be painted with iodine, and the patient placed in a shed or coop without perches, and deeply bedded down with granulated peatmoss. If the swelling persists it should be lanced, and the matter pressed out. All perches that have been used by fowls developing bumble-foot should be brushed over with paraffin or some strong disinfectant.

**Cramp**—Cramp is caused by damp, and is common amongst very young stock, but it must not be confused with leg-weakness to which it is totally different. The affected bird should be kept in a warm spot, fed on nourishing foods, and the limbs should be gently massaged with oil or embrocation. If these methods do not alleviate, it is probable that the trouble is a form

of muscular weakness attributable to entirely different causes, although the symptoms are almost identical.

**Egg-bound**—An egg-bound fowl will betray her condition by haunting the nestboxes for long periods without result. If it is suspected that a fowl is egg-bound she should be caught and examined, when the obstructing presence of the egg can often be detected. The condition is caused either by an unusually large egg or by a contraction of the oviduct.

The first remedy to be tried is that of holding the fowl's vent close to boiling water for a quarter of an hour. If this does not aid the expulsion of the egg, the vent and egg-passage should be well lubricated with oil. For the next few days the fowl should be sparingly fed in order to check further laying, and no food that is of a stimulating nature should be given.

**Eczema**—Fowls afflicted with this skin disease should be supplied with plenty of green food, and for the first few days should have a little Epsom salts dissolved in the drinking water. Afterwards a sprinkling of sulphur in the soft food may be given. Vaseline or a good suitable ointment should be rubbed on the affected parts daily. Affected birds should be isolated.

**Favus**—This in the first stages is a disease of comb and wattles. Later it may spread to the feathers of the neck, or other parts of the fowl's body, causing baldness. The disease is highly contagious, and will spread rapidly unless immediate precautionary measures are taken.

As the affection can be received by the human subject, and the fungus readily finds a hold upon an abraded surface, the utmost care should be taken when diseased birds are attended to; and disinfectants should be freely used. If the disease has spread to the feathers of a fowl no cure should be attempted, unless the bird is valuable.

The first symptoms appear in dirty white spots or

crusts forming on the comb. If these be detected on a bird it should be quarantined at once, and treated. Green food should be liberally fed, and for the first two days Epsom salts placed in the drinking water in the proportion of a teaspoonful to half a pint. An ointment of five per cent. of nitrate of silver in lard well rubbed into the affected areas, has been recommended by the Board of Agriculture and Fisheries. Crusts should be scraped off, and the places well fomented first.

**Gastritis**—The disease is of a serious character, and unless prompt measures are taken the fowl dies quickly. It may be due to a blow causing internal injury, or to a sudden chill. Fowls which, in mid-winter, roost one night in a warm house and the next out in the open, often contract the disease. Highly spiced foods, or poisonous substances may also cause gastritis, which is in fact an inflammation of the stomach.

The symptoms are those of sickness, feverishness, pain and thirst. All sufferers should be penned in a warm, dry coop, and given small quantities of nourishing food, without greenstuff, or anything of a spicy nature. Warm bread and milk with a few drops of brandy in it will often do good. Drinking water should have the chill taken off.

**Gapes**—This disease is one which will work terrible havoc among immature stock. It is caused by the presence of clusters of nematode worms in the windpipe and bronchial tubes. Important investigations by the Board of Agriculture authorities show that cases of gapes occur among many species of wild birds, and it is supposed that dissemination of the complaint may in some measure be due to them.

When chickens are noticed to stretch their necks frequently, to gape, and to exclude saliva from mouth and nostrils, the bright red gapeworm should be looked for. If found, the birds must at once be isolated, and the rest of the stock removed to fresh ground, which



together with the tainted runs should be purified with several drenchings of a one per cent. solution of sulphuric acid.

The causes of an outbreak are several. Overstocking the land is one of the most common ; rearing chickens for several consecutive seasons on the same ground, and allowing fowls to drink dirty water, are all possible harbingers of this disastrous disease.

As regards treatment, the Board of Agriculture, in a leaflet issued by them, recommend that a feather dipped in eucalyptus oil, or oil of cloves, be thrust down the throats of the birds, turned round, and withdrawn, when the worms will be found adhering. This operation should be repeated till as many worms as possible are removed. They should at once be burnt together with the feathers. If the treatment is to be entirely effectual it must be supplemented by the use of Camlin as directed by the makers, in order that those parts not reached by the feather may be rid of the worms.

**Leg-weakness**—This is a malady easy of incorrect diagnosis. Broadly speaking there are three forms of leg-weakness. In heavy male birds leg-weakness often results from the strain of a breeding season, or from over-exhibition. In such a case the cock should be removed from the hens, and fed on a strengthening diet containing a fair amount of animal food. A good tonic, or some such medicine as Parrish's chemical food should be given.

Another form of leg-weakness is frequently found in pullets commencing to lay, or which have not laid for long. A bird thus affected should be fed sparingly on grain, so that laying may be checked. A course of good "leg-weak pills" should also be given, or some strengthening chemical food.

Leg-weakness may be caused in young stock by too forcing a diet, with a lack of bone-forming material. In this form it is common amongst cockerels, and birds of long-legged varieties. Another quite different and sole

reason for leg-weakness is the often pursued practice of allowing young chickens to sleep on smooth, even, or boarded floors. This results in atrophy of certain muscles, which weakens the legs to such an extent that they are unable to support the body. Give chickens plenty of ashes, rough sand or any uneven form of floor upon which to roost, and this form of leg-weakness will speedily disappear.

**Liver Disease**—One of the most common and at the same time most formidable diseases with which poultry-keepers have to contend. It is induced by those invariable forerunners of ill-health, overcrowding, insanitary conditions, inbreeding, lack of exercise and green food, and especially by rich unsuitable foodstuffs, or too much feeding.

The symptoms shown by an affected bird are several. Extreme emaciation, listlessness, mauve or dark-coloured comb and wattles, with roughness of plumage are all external signs. Internally the liver will be found pale or brown coloured, and in bad cases soft and spotted with white or yellow patches. Lameness and tenderness in the region of the liver is also usual.

Investigations by the Board of Agriculture and Fisheries have proved that the disease is due to a bacillus of a similar variety to the bacillus of mammalian tuberculosis. Such bacilli are considered to gain entrance into the body of the fowl with the food, or by means of the evacuations of affected birds, but a tendency or predisposition to the disease is necessary for it to gain a firm hold. Since such a tendency may be inherited it follows that a diseased bird should not be bred from.

To exterminate liver disease, when prevalent in the poultry yard, strong measures are needed. Bodies of fowls, which have succumbed to the disease, should be burnt or buried in quicklime; the worst cases should be killed; and the remainder removed to fresh ground, while the tainted runs receive thorough purification,

and the houses are cleaned and disinfected. The diet of the fowls should be attended to, and food of a fatty, rich, or stimulating nature eliminated. When the cure of affected birds is attempted they should be fed sparingly, and penned in a run and house by themselves. A regular supply of green food, oatmeal, wheat, groats, or white Canadian peas may be given. Half a teaspoonful of Epsom salts to each bird should be dissolved in the drinking water for two or three days, or good liver pills may be employed.

**Prolapsus**—This complaint—commonly known among poultry-keepers as “down behind”—is often found in a fowl, which has had a long spell of laying, resulting in muscular weakness at the vent. The protrusion should receive a thorough bathing in a strong infusion of cold tea, and should then be gently pushed back. This should be done as often as it appears again, which may happen several times. Very little food should be given and anything stimulating struck out of the diet for a few days during which time a good tonic should be administered.

In hot weather, if the condition of the fowl has gone undetected for some time, her state will probably have become so aggravated that it will be necessary to put the bird out of her misery, immediately. Or again, if the case is an exceptionally bad one it may be necessary to kill.

**Roup**—This disease is of an extremely infectious nature, but is less serious and more easily combated than roup of the diphtheritic type. It should be noted that neglected colds in fowls are frequently a contributory cause of the disease. The first symptoms are running at the eyes and nostrils, and, at a later stage, offensive discharge, and swelled head and eyes.

Fowls, which are cured of simple roup at an early stage, may be used in the breeding pen, but if they have had the disease at all badly such a procedure is the most

absolute folly, since the offspring will be born with the strongest tendency to the disease.

All affected birds should be isolated, and good roup powder mixed in the drinking vessels of both the sick and healthy birds, care being taken that the birds drink of no other water. If taken in hand from the very first the disease may be cured without very great difficulty, but the utmost care and attention will be demanded. Beaks, eyes, nostrils, and mouths of sick birds must be washed daily several times in a strong solution of permanganate of potash. The birds themselves must be kept in dry, comfortable pens, well bedded down with granulated peatmoss constantly renewed, and they must have a good nourishing diet and the use of a good roup powder persevered with.

In order to ward off epidemics of roup in the fowl-run, shelter against cold winds and driving rains should be provided, and care taken to avoid, in so far as it is possible, sudden changes of temperature. Ground that has been tainted by diseased birds should be thoroughly purified by the elements of nature, or a dressing of quicklime, before it is again occupied. But should the disease take firm hold of the poultry-yard the most heroic measures will be needed to stamp it out. As in so many cases of illness with fowls, unless the birds are really valuable they are far better killed out of hand than tinkered with.

**Soft Crop**—Where no food or hard matter is felt in a swollen crop the distension may result from the presence of fluid or air. Holding the fowl head downwards, and pressing the crop gently, or puncturing the organ with a clean needle should do all that is needful. The same precautions as regards diet should be observed as in cases of cropbound. In cases of soft or slack crop, however, the trouble is very apt to recur.

**Worms**—Pallor of face, excess of appetite, and extreme thinness, all bear witness to the presence of

these internal parasites. When suspected, an examination of the droppings of the birds will generally enable the suspicion to be verified or disproved. Though death is rarely caused either by round worms (Nematodes) or flat worms (Cestodes) the birds thus afflicted will lose greatly in condition, and—when worms are present in great numbers—rapidly weaken in constitution. Growing stock especially will make little or no progress, and will become stunted, unhealthy and unprofitable. The evil may easily be remedied by isolation of affected birds, and administration of vermifuges. Pills of thymol are recommended by the Board of Agriculture authorities. They should consist of one grain of Thymol mixed in a little dough, and should be given twice daily.

**Swollen Wattles**—Such swellings may be either hard or soft. If the former they are of a scrofulous nature, and should be painted once a day with tincture of iodine, or the growth may be cut out. If soft, the trouble is due to dropsy, and the swellings should be punctured, and the fluid expelled, afterwards syringing with a weak solution of permanganate of potash.

**Coops**—An infinity of different styles and forms of coop are now cheaply manufactured by appliance makers. Coops intended for rearing chickens in the autumn or winter months should be made of stout, well-seasoned wood, and should have a sloping or gable roof to carry off the rain.

An excellent type is that designed for a hen and her brood of twelve to fourteen chicks. It has two compartments, one of which is used as a sleeping place and to confine the hen, and the other, with an open front of wire netting, serves as a sheltered run for the youngsters. A sliding panel across the front can be adjusted to give the required amount of air and shelter, according to the state of the weather. Such a coop costs about ten to twelve shillings, and is made, with slight difference of details, by many leading makers.

For use in the summer, chicken coops, well-constructed of thin wood, with bars to retain the mother, adjustable front for the night, and strong movable floor, can be bought new for as little as three shillings each. They are however, unsuitable for any but the warmest weather, unless placed within the shelter of a rearing shed.

Many other types of chicken coops exist, and can be bought to suit the varying tastes and requirements of the poultry-keeper. Before purchasing, care should be taken that they are strongly made to withstand periodical moving, are well ventilated without being draughty, and are built of sound well-seasoned wood.

Coops intended for fattening birds should accommodate three to five, have slatted floors, barred sides, and fronts with boarded tops. The cost for a pen holding three birds should not exceed four shillings, and divided pens of longer length can be constructed at slightly cheaper rates.

**Milk Chickens**—A certain demand, which, however, seems little on the increase, exists for these tiny chickens. *Petits poussins*—as they are also called—are often found on the menus in large London hotels, but the dish is something of a rarity on private tables. Efforts to popularise the taste might well be made by poultry-keepers, who, if they could create a brisk demand, would find the sale of milk chickens in several ways advantageous and profitable.

Prices vary from 1s. 3d. to 2s., according to quality. At six to eight weeks old the chickens are considered ready for killing, and they should weigh from ten to sixteen ounces. The object of the rearer of *petits poussins* should be to obtain well-fleshed, good flavoured and dainty birds, with but little bone. Only the quickly maturing breeds should be employed for the production of birds for this trade, and the Houdan, Faverolle, Leghorn, or La Bresse are considered most suitable varieties.

The chickens should be fed largely on flesh-inducing foods, such as barley meal, ground oats, or biscuit meal,

mixed with skim or sweet milk. The use of the latter, though conducive to the best results, often has the effect of sickening the chickens. For regular use, therefore, skim milk is to be preferred. Every effort should be made to prevent any check to the little chicks' growth, and the more uniform the size of the birds the more saleable they will be found. Since their span of life is so brief, methods of feeding and rearing can be employed which would be undesirable for other fowls. Where the market exists poultry-keepers would often find it extremely advantageous to kill off their surplus cockerels at eight weeks, and dispose of them for this trade. Obviously, however, only those birds of which the sex could be detected at six weeks, would be suitable for the purpose, since at least a fortnight's feeding up on meal and milk would be needed to bring them into plump well-flavoured condition.

**Marking Fowls**—In order that the poultry-keeper shall be in full control of his stock it is usually necessary to mark fowls. If it is desired merely to distinguish the two-year-old birds from those of one year, it is often sufficient to use plain copper rings. By ringing all pullets on the right leg one year, and those of the next year on the left leg, the age of the stock can be ascertained at a glance. Where a system of more exact and individual identification is required, numbered leg-bands must be used. If careful record of the numbers upon the rings then be entered up in a reference book, identification is easily established.

**Ten to Twenty Acre Poultry Farm: Outlines of Management**—It should be understood from the first that the prime necessity in a poultry farm is economy of labour. Among the multitudinous expenses nothing swells the debit side of the balance sheet to such an extent as the labour bill. In comparison, rent may be considered quite insignificant when it is realised that the annual hire of an acre, accommodating at least one

hundred birds, will seldom exceed 30s., and probably will be less than that. But labour is ever a costly item, and, therefore, in planning and laying out a small poultry farm every consideration and attention should be paid to the important matter of reducing it to a minimum.

The question of locks on houses, laying compartments and sheds should not be overlooked. If at the beginning all locks affixed are of a similar pattern the necessity for an unwieldy bunch of keys is overcome, and complications avoided. Such a detail, though perhaps trifling enough, may each day save quite an appreciable amount of valuable time.

Where a series of small pens are erected they should all be intercommunicable, and the doors or gates should be wide enough to permit barrows, coops, poultry baskets, or mowers to pass through easily. Houses should be near together in so far as it is practicable, so that the evening and morning rounds may be shortened.

The exact manner in which all these ends are to be attained must depend of course upon individual circumstances ; but the exercise at the start of a little care and foresight will prove invaluable later on.

On a ten or twenty acre poultry farm it has been found by many that the best size for pens is half an acre, upon which about fifty birds are run. Smaller enclosures than this entail undue expense in housing, stakes and fencing ; larger ones render control and management of flocks more difficult. Much or all depends, however, on the aims or ends of the poultry-farmer ; but it must be emphasised that on a small poultry farm the question of cost is paramount. Little profit will accrue to the small poultry-farmer who spends 9d. where 6d. would have sufficed.

If the farm consists of good grass land, it should be arranged that in April or May the contents of three pens be turned into one for a couple of months or so, and a crop of hay can then be taken off the remaining two. In this way the solution of the important problem of maintaining grass pens in sweet condition will be largely



facilitated and the value of the hay, which should not be inconsiderable owing to the beneficial effects of the fowl manure, will also go a long way towards paying the rent.

Farmers often find it profitable to graze sheep upon the land. In fact, the poultry-farmer cannot afford to ignore anything which may bring grist to his mill.

In apportioning out land to the different occupants, care should be taken to reserve sufficient for the rearing of the young chicks. If too large a head of stock be kept, the pernicious practice of rearing chicks on ground recently in occupation of adult birds will be indulged. Chicks must be reared on perfectly fresh ground if the fullest measure of success is to be attained with them. Therefore, devote a sufficient acreage to their needs, and let the ground, if it is pasture, be used on alternate years only.

Netting is often best erected by means of stakes made of one-and-a-half or two-inch quartering. If lightly tacked with staples, it is not a troublesome matter to remove it, and re-erect if required. It is an advantage to have houses, scratching sheds, and coops of as uniform a type as possible. This to a very great extent facilitates arrangements for and control of stock. Scratching sheds can often be used not only for adult birds in the winter months, but for the young stock in late spring and summer. Besides the welcome economy effected, the sheds make the best of all shelters for growing birds, owing to the amount of fresh air they admit.

In the management of a small poultry-farm one important matter must not be overlooked, viz., the keeping of accurate accounts. These should be divided into different heads as clearly as possible, so that unprofitable branches of trade may be reformed or discarded, and attention concentrated upon the paying ones. The poultry-farmer who does not know what it is costing him to rear his pullets to a laying age, feed his adult stock for a month, or produce his monthly quota of eggs,

cannot well curtail his expenditure to the closest limit.

Since on a small poultry-farm every yard of space cannot but be of value, small pens should be arranged in which fowls for table purposes can be reared in large numbers. These pens, if floored with ashes, gravel, beaten earth or a good compost, so that the removal of manure is possible, will accommodate five times as many birds as can be kept upon a grass run. Layers might also be penned in similar fashion, but certainly not in the same proportion; and in both cases the precaution should be taken to give special attention to the diet, in order that the deficiency of green and animal food may be made good.

An excellent trade for the small poultry-farmer to cater for is that in petits poussins or milk chickens. The turnover is quick, restricted space is not so great an obstacle as when birds are reared to four or five months, and prices are good.

Since a lingering succession of moulting birds causes an infinity of trouble, and often enough a scarcity of eggs when they are urgently needed, adult stock must be brought through the moult as regularly and expeditiously as possible. In short a regular system, conducted with foresight, must be established, and its value cannot be over-estimated. The poultry-farmer cannot live in the present only. His mind must grapple ever with the future. He must, despite the popular proverb, count his chickens before they are hatched, must plan out ahead the occupation of his ground, must prepare beforehand his appliances, must send his advertisements to the papers in good time, must systematise his business operations, must carry them out with care and promptitude, must fulfil his contracts to the letter, must anticipate a demand. If all these things be done, if initiative and keen intelligence be brought to bear, the management of a ten to twenty acre poultry farm should certainly be successful at all events from the monetary point of view.

**Moulting**—Though growth of feathers constantly takes place at all seasons, once during the year all fowls pass through a complete moult. This annual moult usually occurs in the summer or autumn months, but the exact period at which it takes place depends upon a variety of circumstances such as the date when the bird was hatched, the state of the weather, the feeding, laying and health of the fowl. The moult being a natural process, most fowls pass through it with comparative ease; at the same time it is a tax upon the system, and the older the fowl the more prolonged does its moulting period become.

Fowls that are at all weakly, highly bred, or debilitated, sometimes suffer under the strain of casting and growing plumage. In such cases every help should be given by means of dieting and general treatment. A little sulphate of iron in the drinking water is often recommended, and stewed linseed in the soft food twice a week, with an occasional addition of a little hemp or rape seed. Sunflower seed is also to be recommended as an extra in the diet of moulting hens. A pinch of sulphur in the soft food thrice a week is advantageous in warm weather, but when the moult has been delayed till the late autumn months this is not advisable.

Often for one or another reason it is desired to hasten or induce the moult in fowls, and there is no doubt that change of conditions is largely instrumental in effecting this. By penning fowls up in a warm place, feeding for a while on spare rations to check laying, and then giving a more liberal diet, with rape, hemp or sunflower seed in the menu, when moulting commences, much can be effected. Obviously, however, the process of Nature can be interfered with to a limited extent only.

**U.P.C. Laying Competitions**—Since the inauguration of these competitions in 1897, incalculable benefit has been conferred upon utility poultry-keepers in the direction of improving the egg-laying capacities of various breeds. The performances of which a well-bred

hen is capable have been clearly demonstrated to many who, perhaps, gave little thought to the matter, and scarcely realised the vast differences in the profits accruing from good and indifferent layers.

Pens of four pure-bred pullets, receiving precisely similar feeding, and, in so far as possible, the same general treatment, have taken part in each competition, which lasts sixteen weeks. That for 1905 was held from the middle of October to the middle of February, as a rule the most inclement months of the year. It will therefore be seen that the number of eggs laid by some of the winning teams have been quite remarkable.

The season of the year has, however, quite another bearing upon the matter. Although the months chosen are admittedly quite the most trying for layers, at the same time it cannot be denied that to many breeds the circumstance is of distinct advantage. Such fowls as Buff Orpingtons, and Wyandottes—the former especially—are by nature winter layers, hence it is the opinion of many that a twelve months' competition would afford a more reliable test, and yield more conclusive data upon which to arrive at a verdict as to egg-laying powers. It is obvious, unfortunately, that many practical difficulties stand in the way of so lengthy a competition.

It is an excellent feature of the competition that supremacy is not entirely decided by the number of eggs laid. The weights of the eggs are taken into consideration, and points awarded accordingly, two being given for each egg weighing over  $1\frac{3}{4}$  oz., and one for every egg of  $1\frac{3}{4}$  oz. or less.

A glance at the winning returns cannot but prove to the most sceptical that egg-laying powers are a question almost entirely of strain, and that the breed of the layers enters into it hardly at all. This point is emphasized by the competition officials, who rightly assert that: "The Competitions are not given to determine which is the best *breed*; the Club recognises that good laying is a question of *strain* and *not* of breed, and endeavours by means of these competitions to make

known those fowls which under a systematic treatment during the four worst months of the year have proved themselves to be good layers." A reference to the table below will show how varied have been the breeds of the first prize-winners. The rigid rules referring to the conduct of the competitions, and the efficient efforts made to apply, in so far as humanly possible, the same conditions to every pen competing, impart great value to the published results. A short table setting forth the nine first prize-winning pens reads thus:—

DATE.	BREED.	NUMBER OF EGGS.
1897.	Minorcas .. ..	161
1898.	Buff Leghorns .. ..	154
1899.	Silver Wyandottes.. ..	223
1900.	Barred Rocks .. ..	127
1901.	Golden Wyandottes .. ..	200
1902.	White Wyandottes .. ..	276
1903.	White Wyandottes .. ..	243
1904.	White Leghorns .. ..	245
1905.	White Leghorns .. ..	251

On the whole perhaps—taking minor prize-winners into consideration—Wyandottes have figured most prominently in the prize lists, and this fact upon consideration is not surprising. In the first place Americans, the pioneers in the field of breeding for eggs, have paid particular attention to that breed, and American utility blood has been largely imported into England. In the second place Wyandottes are by nature winter layers, like all general purpose breeds. Moreover, their egg-laying qualities are on the average more prominent than their flesh qualities. Whereas the Buff Orpington is distinctly more of a table bird than the Wyandotte, and, added to this, is more addicted to broodiness.

To many it must come as a surprise to find White Leghorns—an essentially summer-laying breed—figuring among the prize-winners. The conjecture cannot be avoided that if these fowls can acquit themselves so well in the winter months a twelve months' competition

would prove them invincible. But it is easy to dogmatise in that direction. Undoubtedly the influence of "strain" is pre-eminent. To it the more general influence of "breed" must yield. The value of success in one of these laying competitions should be found very considerable to the breeder. If he be engaged—as is not unusually the case—in the sale of utility stock and eggs, a splendid advertisement is thus afforded him; while he can also command greatly enhanced prices.

In addition to these benefits a silver cup, cash prizes, and—to pens laying over 240 eggs—a gold medal and first-class certificate are awarded. Other awards of certificates, medals, cash prizes, etc., are made to 2nd, 3rd, 4th, 5th, 6th, 7th, and 8th prize-winners.

The Secretary of the Utility Poultry Club is at all times pleased to afford information as to the competitions to those desiring it.

**Variation of Trap-nesting Method**—Though the practice of registering the laying performances of hens by means of trap-nests, is one that gives admirable results, the method unfortunately entails an amount of labour and attention, which many poultry-keepers are quite unable to bestow. In such cases a variation of the orthodox method has been devised, and one which gives good results, though it does not on the whole afford such accurate registration.

The method is simple, and consists of a small laying compartment, attached to the roosting house, and fitted with ordinary nest-boxes. Entrance is gained by a wire swing door, which the fowls readily learn to push open. This door, by opening inwards only, does not permit the exit of the bird, which can therefore be registered on the arrival of the poultry-keeper.

The advantages of the system are several. In the first place the detention of the fowl for an hour or so is a matter of no moment; whereas a bird within an ordinary trap-nest, by reason of its cramped quarters, needs almost immediate liberation. In this way a very

great economy of labour is effected, since the necessity for periodical visits to the nests is eliminated. Usually it is quite sufficient if the laying compartment is attended to thrice daily. Another advantage is found in the fact that many fowls will refuse to enter a trap-nest, being deterred therefrom by memories of previous close imprisonment. The laying compartment, however, presents no such terrors, and the birds will enter freely.

That the system should not be without disadvantages is, of course, inevitable. They are not serious, fortunately. It sometimes happens that a fowl will enter the laying compartment without laying. Thus the attendant is, perhaps, confronted with the difficulty presented by two eggs, and three birds. Obviously discovery of the defaulter is impossible. In such case it is customary to credit each fowl in the recording sheet with an egg. Since the contingency occurs seldom, such a procedure causes no inaccuracy of any import. Often, however, it is found that a fowl, which enters the laying compartment and does not lay, has laid earlier in the day, in which case the register can be performed with complete accuracy.

The second drawback to the laying compartment system is found in the fact that, while the birds which lay are registered, it is not possible to identify the actual egg which each has laid. This knowledge is, however, only needed during the breeding season, hence the detail is comparatively trifling, since during that period trap-nests can be employed if requisite.

### **Approximate Costs and Comparative Values of Poultry Foodstuffs and Grains**

**WHEAT**—Cost : 17s. a sack. This grain is a valuable one for poultry feeding, but is, of course, slightly expensive. Is often used as a summer ration.

**BARLEY**—Cost : 15s. a sack. A good grain for fowls. It is slightly heating and is a valuable grain upon which to feed pullets that are coming on to lay.

**OATS**—Cost : 12s. a sack (English White), 13s. 6d.

(Best clipped Russian). This is the best of all grain for laying fowls. The nutritive ratio being one in five, it is, in so far as one grain can be, almost perfect; but it should not be forgotten that the quantity of fat-forming constituents is a little excessive. Care should be exercised in choosing oats for poultry, as some samples, on account of the amount of husk they contain, are quite unsuitable. Short full-bodied oats are best fitted for fowls, and clipped oats, that is grain with the husky tails removed, are excellent.

**MAIZE**—Cost: 15s. a sack—This grain should always be used cautiously, on account of its heating and fattening powers. It is useful in wintry or inclement weather, if fed in small quantities. Although not less fattening than oats it is usually undesirable for fattening purposes, owing to the superabundance of yellow fat it forms.

**BUCKWHEAT**—Cost: 17s. a sack (French). This is a popular grain with French poultry-keepers. It is not in general use in England, but is useful to ring the changes on. Contains an excessive amount of fibre, and is richer than most grains in carbohydrates.

**DARI**—Cost: 17s. a sack. This is a useful grain, when blended with others. Can be included with advantage in the grain dietary of fowls coming through the moult.

**BEANS AND PEAS**—Cost: 24s. a sack (Small English Beans); 21s. a sack (White Canadian Peas); 23s. a sack (Maple). Unusually rich in albuminoids, and consequently of value for summer feeding, when balancing a diet of high carbohydrate value. They should be fed to poultry in a split condition.

**LENTILS**—Cost: 11s. a bushel (split). Often included in "dry feed" for chicks, and are of value for that purpose. They require to be kibbled first.

**HEMP SEED**—Cost: 6s. 6d. a bushel. This grain is of an oily and heating nature. Should be fed to chickens sparingly, but is of value in cold or damp weather. It is seldom used for adult birds, but is sometimes useful for birds coming through the moult.



**MILLET**—Cost : 8s. 6d. a bushel. This small grain is found in nearly all “dry feeds,” and is of value for young chicks.

**CANARY SEED**—Cost : 12s. a bushel (first-class quality) ; 9s. a bushel (good quality). This is also commonly included in “dry feeds,” and is a useful grain for quite young chicks. It is, however, too expensive to feed to chickens older than a few weeks.

**RAPE SEED**—Cost : 9s. a bushel (English). Another ingredient of “dry feeds.”

**PINHEAD OATMEAL**—Cost : 16s. a cwt. A very valuable feed for young chicks. Is included in most good “dry feeds.”

**MIDLINGS, THIRDS, OR TOPPINGS**—Cost : 7s. a cwt. This meal varies somewhat, and is the subject of much confusing nomenclature. Though in essence the same, being the product of ground wheat, varying qualities in accordance with the milling processes it has gone through, render samples of slightly different value. Sharps, pollards, or boxings are also names given to this meal. Millers lack a uniform standard, and consequently the name accorded is seldom a criterion of the quality of the meal. Middlings is one of the commonest constituents of first feed mashes for adult birds, and is deservedly popular with poultry-keepers as it is a valuable though inexpensive food.

**GROUND OATS**—Cost : 10s. a cwt. (pure) ; 7s. a cwt. (containing barley meal, or thirds). A fattening food par excellence, but of value for growing stock also. When thus used, however, the birds should be at least two months old, as the amount of husk present renders it unsuitable for younger stock. In its pure state ground oats is of most value for fattening, but is often sold in an adulterated form containing an admixture of barley meal or thirds. In order that the full value of the large amount of husk should be obtained, special methods of milling are employed ; these methods are most generally practised in Sussex, the seat of the fattening industry, hence the term Sussex ground oats.

**MAIZE MEAL**—Cost : 9s. a cwt. A food of a fattening and heating nature, but does not produce the best results owing to its yellowness. Is used by some poultrymen, when pure ground oats are found too expensive.

**BARLEY MEAL**—Cost : 8s. a cwt. A common adulterant of ground oats. Some authorities strongly discountenance its use as a general food for poultry. For adult stock on free range it may, perhaps, form a small part of the dietary.

**PEA MEAL**—Cost : 9s. a cwt. A very valuable poultry food, if not used to excess. Is rich in albuminoids, and forms a good substitute for animal food. Greatly utilised where a high nitrogenous ration for laying fowls is desired.

**OATMEAL**—Cost : 16s. a cwt. An excellent ration for young growing stock ; being free from husk and fibre it can be fed to quite young birds. It is, of course, a slightly expensive food.

**BRAN**—Cost : 6s. 6d. a cwt. A frequent ingredient of morning mashes, and used to form the bulk of such feeds. It should, however, be scalded before being fed to poultry. The reasons for this are two : in the first place the danger of intestinal irritation from the presence of fibre is lessened, and in the second the softening nature of the process enables a fuller nutrient value to be obtained by the birds.

**LINSEED**—Cost : 7s. 6d. a cwt. Occasionally of value in the dietary for fowls. Is often fed to moulting fowls, or chicks that are feathering.

**BISCUIT MEAL**—Cost : 17s. a cwt. A valuable egg-producing food. Qualities, of course, vary greatly, and the expense of the food is a consideration. Some biscuit meals contain meat, and some, crushed oystershell. Both of these ingredients are extremely useful, when biscuit meal is fed to birds in confinement. Care should be taken, however, to see that the meat is a good sample.

**GREEN BONE**—Cost : 2s. 20 lbs. If fed with discretion one of the finest rations for laying fowls, and incomparably the best substitute for insect food. It

should not be fed to chicks under one month old, and then in the smallest quantities only. For laying hens half an ounce a day should be ample. In summer, birds on free range should not require it. By the term "green" is meant bone that is raw. Bones, which have been cooked in any way are almost valueless to fowls, certainly as an egg-producing ration. Only the softer bones containing marrow should be cut; shin and other hard bones are unsuitable.

**BONE MEAL**—Cost: 10s. a cwt. Bone meal should not be confounded with green or cut bone, to which it is quite different. The feeding of bone meal to young stock assists in the growth of large sturdy frames, and imparts stamina. Adult birds seldom or never require bone meal; though it may assist in the formation of shell, it is otherwise of little use to them.

**GRANULATED MEAT**—Cost: 15s. a cwt. This is a substitute for animal food, and may be fed to young or adult stock, which are kept in confinement, or are otherwise unable to find sufficient natural insect and animal food. The greatest care should be taken to feed only good wholesome meat. Diseased, badly preserved and tainted flesh is provocative of very much more harm than good. Granulated meat should be soaked in boiling water for several hours, and the resulting liquor, containing the poisonous preservatives, should be drained away.

**SKIM MILK**—Cost: 2d. a gallon—Food for fattening fowls may be mixed with soured skim milk. It may also be used to mix meals for young stock, but should be used sparingly.

## Food Tables

### A

#### 1 part of Granulated Meat.\*

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\* It is important that granulated meat should be well soaked for some hours in boiling water previous to use, so that the poisonous preservative chemicals may be eliminated, and thrown away in the resulting liquor.

5 parts of Middlings.

3 parts of Vegetables.

Approximate cost per cwt., 7s. 6d.

### B

1 part of "Superfex."

3 parts of Middlings.

3 parts of Vegetables.

Approximate cost per cwt., 7s.

### C

1 part of Granulated Meat.

5 parts of Middlings.

2 parts of Clover Meal.\*

Approximate cost per cwt., 10s.

### D †

4 parts of Scalded Bran.

2 parts of Cooked Maizemeal.

2 parts of Pea Meal.

1 part of Cooked Lean Meat.

2 parts of Scalded Clover Hay.

Approximate cost per cwt., 10s. 6d.

### E ‡

2 parts of Lean Meat.

3 parts of Scalded Bran.

3 parts of Chopped Cabbage.

2 parts of Boiled Potatoes.

Approximate cost per cwt., 8s.

### F

3 parts of Biscuit Meal.

1 part of Middlings.

Approximate cost per cwt., 14s. 6d.

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\* Clover meal should be well scalded and soaked for twelve hours previous to use.

† As recommended by the Board of Agriculture and Fisheries.

‡ As recommended by the Board of Agriculture and Fisheries.

## G \*

- 3 parts of Biscuit Meal.
- 2 parts of Pea Meal.
- $\frac{1}{2}$  part of Stewed Linseed.

Approximate cost per cwt., 13s. 6d.

## H †

- 4 parts of Ground Oats.
- 1 part of Potatoes.
- 2 parts of Lean Meat.
- 4 parts of Toppings.

Approximate cost per cwt., 10s.

## I †

- 1 part of "Superfex."
- 4 parts of Middlings.

Approximate cost per cwt., 9s. 6d.

## J §

- 1 part of "Superfex."
- 4 parts of Middlings.
- 1 part of Granulated Meat.

Approximate cost per cwt., 10s. 3d.

## K ||

- 3 parts of Middlings.
- 3 parts of Barley Meal.
- 1 part of Granulated Meat.

Approximate cost per cwt., 8s. 6d.

## L

- Dry Feed.
- 3 parts of Blue Peas.
- 1 part of Tail Wheat.

\* Suitable for Moulting Hens.

† Suitable for Growing Stock.

‡ Suitable for Chicks of ten days to six weeks.

§ Suitable for Chicks of six weeks and upwards.

|| Suitable for Growing Stock.

1 part of Hemp Seed.

1 part of Lentils.

1 part of Rape Seed.

Approximate cost per cwt., 11s. 6d.

With the exception of the Rape Seed all the above grains should be passed through a kibbling machine, before being fed to young chicks.

#### M \*

3 parts of Tail Wheat (crushed).

2 parts of Dari (crushed).

2 parts of Canary Seed.

2 parts of Pinhead Oatmeal.

2 parts of Millet.

1 part of Maize (crushed).

1 part of Hemp Seed (crushed).

1 part of Granulated Meat.

1 part of Grit.

1 part of Lentils (crushed).

Approximate cost per cwt., 11s.

#### N †

3 parts of Tail Wheat (crushed).

1 part of Dari (crushed).

1 part of Canary Seed.

1 part of Pinhead Oatmeal.

1 part of Granulated Meat.

1 part of Grit.

Approximate cost per cwt., 10s.

#### O ‡

3 parts of Tail Wheat (crushed).

2 parts of Maize (crushed).

2 parts of Dari.

\* Suitable for spring, winter and autumn use. When fed to chicks of eight weeks and upwards the hemp and dari need not be kibbled.

† Suitable for summer use.

‡ Suitable for chickens of 2 months and upwards.

2 parts of Buckwheat (crushed).

2 parts of Rice.

1 part of Granulated Meat.

1 part of Linseed.

1 part of Grit.

1 part of Bone Meal, or Crushed Oyster Shell

Approximate cost per cwt., 8s. 6d.

**Egg-production**—In order to secure the very best egg results special measures, such as do not usually come within the ken of the average poultry-keeper, should be taken. How far these measures are practicable in his own case each poultry-keeper must decide for himself. It should, however, be remembered that even a small addition of twelve eggs a bird per annum is by no means to be despised, since, after a fowl has laid sufficient eggs to pay its expenses, every additional egg represents a full profit.

In the matter of egg-production there is not the slightest doubt that America is foremost, and a consideration of the means by which the end is attained may be advantageous. Speaking broadly, the American poultryman keeps three aims in view: special dieting, breeding by selection, housing and general management.

The first of these is now almost an exact science, and the days when each poultry-keeper pinned his faith to some pet grain are past. Starting with the admirable theory that an egg being composed of certain compounds, the diet which most nearly supplies those compounds will also be the most successful in producing eggs, the up-to-date poultryman enlists the aid of the chemist, and ascertains the exact component parts of the food which he gives to his fowls. In this way he supplies the correct material to his birds, and expects them to make use of it. But, as every poultry-keeper knows, some fowls are vastly superior layers to others. Hence it is obviously useless to feed a high egg-producing diet to bad layers. Such a proceeding is likely to result in disease, for the fowls, making no extra use of their

good feeding, merely become overfat. It will be seen therefore that it is necessary to eliminate bad layers. Thus arises the second of the up-to-date poultryman's aims—breeding by selection; that is to say the careful elimination of inferior stock, and the retention of the very best.

When it is stated that the progeny of a hen largely inherit their mother's egg-laying capacities, it will be seen how important this is. American, and some English, poultry-farmers have by careful breeding produced fowls capable of laying over 230 eggs per annum. Compare such a performance with that of the average barn-door hen, which lays perhaps 80 or 90 eggs in a year, and it will be seen why often enough "poultry do not pay."

Thirdly comes the question of housing and management. This is a more general matter, and should be read and studied in detail under the various headings in this book. Remember only that cold, damp, lack of exercise, faulty ventilation, and crowding in houses, all militate against egg-production. It should now be made plain that to secure the best egg results it is necessary to secure first-class laying strains, feed the fowls on a high egg-producing diet, carefully select the finest layers from which to breed each hatching season, and manage the birds on common-sense, health-inducing lines.

The following paragraphs should all be read and studied in their relation to egg-production: "Recording Nests," "Age of Layers," "Crossing for Eggs," "Chemistry of Food," "Nutritive Ratio," "Useful Food Tables."

**Thieves**—On poultry farms and in fanciers' yards the possible depredations of the poultry thief demand serious consideration. Insurance is, of course, one means of combating the evil, but where valuable stock is kept the actual worth of the fowls does not always represent the full measure of loss, since breeding operations for



the season, and other matters extending into the future, may be seriously involved.

Electric alarms, costly and fallible as they are, should be fixed up if exceptionally valuable stock is kept, and in all cases the services of one or more large and savage dogs should be enlisted. The efficiency of these is largely increased, and is indeed very considerable, if they be chained by free rings to wires stretched taut across the fields or around the pens. In this fashion the dogs are enabled to patrol the place, while being under control.

**Thermometers**—The thermometer is an almost indispensable instrument to the poultry-keeper, and its occasional or regular use should be of the greatest service. In brooder houses or rearers a self-registering maximum and minimum instrument will tell an infallible tale as to the state of the temperature during the night, and the risks of guesswork are easily avoided. When incubators are in use it is wise to keep a duplicate thermometer at hand. If a breakage should occur such a precaution is often invaluable. Moreover, if any suspicion be entertained as to a thermometer's accuracy the doubtful instrument can be tested or replaced.

Broadly speaking, thermometers are of three kinds. The ordinary instrument indicates the temperature only, others can be set to register either the maximum temperature, or the minimum, or both. Mercury thermometers are generally held to be more accurate than those filled with coloured spirit.

**Prices of New-laid Eggs**—Very considerable variations attend the prices of eggs according to the time of year, and doubtless will continue to do so, until the universal adoption of correct up-to-date poultry management brings the country's output into a more even level. At present the months of April, May, and June invariably usher in a glut of eggs, and prices in consequence tend to their lowest in those months. In November,

December, January, and February, the highest prices are obtained, and eggs are sold retail in nearly all parts of the country at 2d. to 2½d. each; occasionally as much as even 3d. is reached. In March and April prices are usually as high as 1½d. to 2d. each, but towards the end of the latter month a marked falling off commences, till in May, June and July from 1½d. to ¾d. each is the current rate. In August, September, and October prices rise gradually till the end of the last month finds them at 2d. to 2½d. each. For a uniform weekly supply of eggs throughout the year a fair average price would probably be 1½d. each.

**Feeding of Artificially-reared Chickens**—While in many ways the management of chickens reared in brooder houses and foster-mothers differs but little from that of naturally-reared chicks, the experience of recent years points to the necessity for a few fundamental alterations.

In the first place it has been found that the use of soft food is attended as a rule by many cases of bowel complaints, and it seems well established that chills and overheating are not, as first supposed, entirely responsible. Every day, therefore, the practice of feeding brooder chicks on a sole diet of "dry feed" becomes more common. The advantages of this system are several. By scattering the dry feed liberally among the litter, chicks are kept constantly active and busy—this alone tends to better health. Moreover, the use of dry feed has been found to produce more vigorous and more tightly feathered birds, with far less tendency to bowel troubles than when on a soft food diet. Again the economy of time and labour in using dry feed is not inconsiderable, and since those poultry-keepers who use brooders generally operate on a large scale, this is of importance.

It must be stated with emphasis that brooder chicks cannot do without water, and it should be supplied frequently in fresh, clean condition. To leave young

chicks without water for hours is often fatal as they will rush to it when at last it is given, and sometimes over-drink to such an extent as to die soon afterwards.

The grit supplied to brooder chicks should be of a size suited to their age, and should be scattered in their litter with the dry feed.

Some form of animal food must be supplied, and cooked chopped meat, granulated meat, ants' eggs, dried flies, and finely cut green bone, can all be used for the purpose. The last mentioned is, however, unsuitable for birds under one month.

Green food is almost more of a necessity for brooder chicks than those that are naturally reared, and a regular supply must be maintained. The importance of this cannot be over-estimated, since if green food be fed at infrequent intervals, diarrhoea and bowel disturbances will ensue.

When chickens are weaned from the brooder, and more natural conditions of rearing supervene, the plan of alternate meals of soft and dry food can be adopted. From this time on, little or no difference need be made between brooder and naturally-reared chickens, and the foods, methods, and care recommended in the latter case should serve for the former.

**Washing Fowls**—This is a matter of some difficulty, and to ensure complete success practice is needed. When washing a fowl for the first time the novice should never make the attempt upon a valuable exhibition bird. It is best to acquire the necessary dexterity upon a fowl whose appearance after the process is a matter of small importance.

It need scarcely be said that everything must be well prepared beforehand, and soap, towels, several tubs of water, and a drying pen or basket, should be in readiness. The tubs must be filled with water of different temperatures—one containing hot water of about 95 degrees, a second lukewarm, and two cold. Rain water is best on

account of its softness, and the soap employed must be non-scented and free from chemicals.

Throughout the whole process the fowl should be held firmly to prevent all struggling. After roughly cleansing the legs and feet of the fowl, a thorough lather should be worked up, the bird should be gently dipped in the water and the feathers thoroughly wetted.

The soapy lather must then be well and firmly rubbed all over the body, the wings being spread out and the utmost care taken to miss no parts. The process can then be finished in the second bath of water, using sufficient force to eradicate the last speck of dirt without breaking the quills of the feathers. Next plunge the bird into lukewarm water and rinse thoroughly till all soap is removed. The final rinsing may take place in the cold water, and should be a short one. When this is accomplished, and not a trace of soap remains, the drying should be proceeded with as rapidly as possible.

A few moments must be spent patiently squeezing out all the water that can be pressed from the feathers, and the bird can then be rubbed with a fairly hard towel. When rubbing feathers the wrong way, which will be necessary to ensure rapid drying, only a gentle pressure should be used, for though the web will straighten when finally dry, the quills can easily be damaged.

In the last part of the process the bird may be penned in a wire cage placed in a warm room, or a little distance from a fire. When completely dry, the feathers can be improved by a gentle stroking, and a rub with a silk handkerchief. It is a common practice with exhibitors when washing a white fowl, to use a little blue in the water. This intensifies the white of the plumage, but the greatest care must be taken not to put too much, or the result will be disastrous. A good roup powder may be given in the drinking water for a few days afterwards, as a precautionary measure against colds as a result of the operation, but if the bird is not allowed to dry in a draught, and all reasonable care is taken, this should not occur.

**Nutritive Ratio**—The modern poultryman, in order to choose for his fowls suitable foods, combined in the correct proportions, is accustomed to divide roughly the constituents of any food, or combination of foods, into two classes, the carbonaceous or nitrogenous materials. The proportion between these two classes is termed the “nutritive ratio.”

The correct nutritive ratio to be observed in the feeding of poultry is generally considered to be 1 in  $4\frac{1}{2}$  or 5; viz., one part of nitrogenous to four and a half, or five, of carbonaceous materials. It should be noted, of course, that a hard and fast rule is not possible. In young growing stock the proportion may be as high as 1 in 3 or  $3\frac{1}{2}$ ; while in adult stock, not engaged in the production of eggs, a considerably lower ratio than 1 in 4 would be desirable.

It will, however, be seen how easily a suitable food table can be built up by means of this “nutritive ratio.” Also it is necessary only to know the composition of any food in order to ascertain its value, and suitability for fowls.

**Chemistry of Food**—Upon analysis the compounds of foods are generally determined into several classes; viz., the albuminoids or nitrogenous materials, which supply the chief elements in the animal body for the growth of flesh, and tissues; the carbonaceous materials, which—principally by the presence of fats and oils—play an important part in the supply of warmth in the body, necessary for the vital processes; the salts and minerals, which assist in building bone, muscle, feathers, blood, and eggshell; the husk or fibre, which is of little value as food; and lastly, oxygen and hydrogen in the proportions forming water.

**Recording Nests**—These nests are usually constructed of wood in such a way as to trap the fowl on entering to lay. The bird is thus detained until the arrival of the poultry-keeper, who is enabled in this way to keep

an accurate egg-register by means of which the best layers can be distinguished from the inferior ones. When recording or trap-nests are employed it is necessary to have an efficient means of marking the fowls, and for this purpose numbered rings are affixed to the birds' legs.

It is scarcely necessary to add that recording nests are essential to those desirous of attaining the highest measure of success in breeding for egg-production. At the same time their use is not adapted for small poultry-keepers, since regular and unremitting attention is a *sine-qua-non* for their effectual employment.

Prices of nest vary from 4s. to 5s. 6d., but it is important to purchase the best, and such as are unfailing and simple in operation, and which present no unusual features such as are likely to deter the fowl from entering. An allowance of one nest to every three birds should prove sufficient.

**Recording Nest Sheets**—These sheets consist of ruled columns and spaces, dated and arranged for the week, month or year, wherein the number of the fowl, whose egg-register is to be kept, is entered, and a mark placed for every egg as laid. The sheets when correctly kept and tabulated form the best evidence of the value of each fowl as an egg-producer, and form, therefore, the best guide when it is desired to select for breeding.

**Packing Eggs**—Many methods are employed to ensure the safe transit of eggs through the post or by rail. When intended for consumption only, it is usually sufficient to wrap each egg in paper, and place in a partitioned box, filling up the corners with pieces of paper loosely crumpled up. Eggs for incubation need, however, additional care to avoid jars, which might break the yolks, destroy germs or otherwise prevent hatching. If a fine layer of cork filings, or cork dust, is shaken over a partitioned box, the eggs inserted, and all remaining space filled with the cork, any chance of injury to the eggs should be reduced to a minimum. (See "Cork Filings.")

**Peat Moss**—This material, when granulated, makes an excellent litter for fowl houses and coops. It should be spread a few inches deep, and if turned over once or twice in a week will only need renewal every three or four months; when removed from the fowl house it forms a valuable by-product as a strong garden manure. By reason of the deodorising and absorbent properties of the moss all smells and foul exhalations are in a great measure prevented, thus ensuring pure air for poultry to breathe. Prices for the commodity vary from 3s. to 4s. 6d. a cwt.

**Detection of Good Layers**—Though some authorities declare that it is not only possible but easy to distinguish the best laying fowls by their appearance, there are few experts, and still fewer amateurs, who could do so with any certainty. Obviously to select a first-class laying hen from one of the very worst is a different matter. In that case a strong contrast would be offered. In the former a keen, clear eye, tight, glossy plumage, alert, healthy appearance, and bright, full comb would be observed; while in the latter the opposite of these characteristics would present themselves.

Thus it will be seen that, though to some extent the relative merits of layers may be judged by appearances, for a more exacting selection other methods become necessary. A keen observation of the nestboxes may assist to some degree since it is possible to identify the eggs of many fowls by their shape, size, and colouring. Also a watch for the most active birds, and those first down from the perch in the morning and last to go to roost in the evening, may help. But for more definite and certain results it is absolutely essential to employ mechanical means such as recording nests.

**Destruction of Egg-Germs**—When dealing with the eggs of pure-bred, exhibition or otherwise valuable stock, it often becomes necessary to destroy the germs lest unscrupulous persons should incubate them when

they have come into their hands for other purposes. To prevent this the eggs can be neatly pricked with a needle, or they can be immersed in boiling water for a few seconds. The latter alternative has the advantage of leaving behind no evidence of the procedure.

**Scaly Leg**—This extremely contagious disease is the result of a minute insect, which causes a grey crust to form on the legs of the fowl, thickening and roughening the scales. In bad cases lumps of this crust will break off, leaving a raw, bleeding surface. In the earlier stages a cure is not difficult. The legs should be dipped in paraffin three or four times in as many days, and later they should be well scrubbed with a brush in warm soap and water. Afterwards vaseline should be rubbed on the bird's legs well up to the hocks. Another scrubbing should follow a second dipping in paraffin, and the treatment continued till a cure is effected.

When "scaly leg" makes its appearance in a fowl run, all houses and coops should be limewashed, and perches painted over with paraffin in order to exterminate the offending insects.

**Tumour**—In some swellings varying in size from that of a walnut to a hen's egg, and consisting of a hard lump with little or no discharge of matter, excision is possible. With a clean knife make a cut sufficiently large to permit of the removal of the tumour, which will usually come away with little difficulty, and without pain to the bird. The wound should then be washed in a strong solution of permanganate of potash and water, the edges connected with plaster, and left to heal.

When, however, the swelling discharges to any degree, or is tender and soft, it should be lanced, and the matter pressed carefully out. The bird, while undergoing this treatment should be fed on good, nutritious soft food. Care should be taken not to breed from it.

**Egg Eating**—This vice is a difficult one to eradicate, and not unfrequently goes long undetected, as many



fowls addicted to the practice will clean up so effectually as to leave not a trace of the egg behind.

An American, and often efficacious remedy, is to supply an egg-eater with any quantity of eggs, allowing the bird to eat of them to an extent which sickens her of the practice. Another cure consists of placing eggshells filled with cayenne and mustard in the nests and runs, but this is not invariably effectual as many birds are too wary to partake of them, while others will even eat them apparently with avidity. If all efforts fail, it is wise to kill an egg-eater, as such a fowl will teach others the habit to the serious loss of the poultry-keeper.

**Feather Eating**—This troublesome habit is frequently attributed to a lack of green food, or idleness on the part of the fowls. Other authorities—and with more reason—assert that the trouble is due to the ravages of a minute insect in the quills of the feathers, which by the irritation set up induce the birds to peck at their feathers, and pull them out.

When fowls are thus afflicted they should be isolated, and a mixture of lard and creosote—a quarter of an ounce of the latter to half a pound of the former—rubbed into the skin and roots of the feathers.

Proper facilities for dust bathing, and cleanliness in houses and coops should prevent any appearance of the trouble.

**Vermin, Methods of Protection Against**—The ravages of vermin in a poultry run are of too serious a character to be ignored, and it is sometimes necessary to take elaborate precautions if loss is to be prevented. Rats, stoats, weasels, and hedgehogs are perhaps most to be feared inasmuch as any of these pests will find entrance through the smallest of holes into coops and houses, and will often kill scores of small chickens between the morning and evening visits of the poultry-keeper.

Where the presence of rats in any numbers is known, every means should be taken to extirpate them, since constant damage both to live and dead stock will

otherwise ensue. Great care is, however, necessary, if all mishap to the legitimate occupants of the run is to be avoided. An efficacious method of extermination is to place a quantity of ground oats or other meal within reach. When the rats have become accustomed to feeding on the meal, an equal quantity of plaster of Paris, well dried over a fire, should be mixed with the ground oats. Water should be placed close by, and the rats by drinking to alleviate the inflammation will hasten their end. It is, of course, imperative that the meal and plaster should not be accessible to the feathered stock.

Another excellent plan is to use the "Liverpool virus" sold by most chemists. This virus, as the name implies, is a germ culture, which, if given to the rats according to the directions proves wonderfully deadly.

Where the inroads of stoats, weasels, and hedgehogs are to be feared small meshed wire should be fixed to the bottoms of coops, and houses, the birds should be carefully shut in at nights, and all holes stopped up.

In neighbourhoods where foxes abound swinging wire doors should be hung in front of the entrances to poultry houses. These will effectually protect the inmates since foxes are seldom known to adventure any obstacle likely to trap them.

**Separation of Sexes**—For the full growth and development of both pullets and cockerels it is essential that they should be separated so soon as the sexual instincts begin to exert an influence. The age at which this may occur varies greatly. With light breeds, such as Leghorns or Anconas, separation may be deemed necessary at even six or seven weeks, while heavy breeds may often be left together for twice that period. Separation should be as pronounced as possible, and it is no idle precaution to arrange that the pullets shall be entirely out of sight and sound of the cockerels.

**Productive Period of the Hen**—Upon a true comprehension of this important subject much of the profit of

poultry-keeping depends. As a general rule it is certain that in the succeeding twelve months after a pullet starts to lay, by far the greater number of eggs are obtained, that the second year will show a slight decrease in the quantity, and the third a diminution of such proportions as to make the fowl unworthy of her keep. For this reason it is advisable to maintain an equal number of pullets and hens each year, and to kill off the latter in the summer, replacing them with young stock, which may be expected to lay in October or November.

**Sex of the Embryo**—Upon the vexed question of the sex of the life within the egg much has been written, and many theories have been advanced.

It is often asserted that eggs, which are long and narrow, will produce cockerels, and that from those of short round outline, pullets will hatch.

A little consideration will show that this argument is fallacious, since many hens have a tendency to lay eggs of a distinct and individual type. It is obviously absurd to expect that a hen, which lays batch after batch of long, narrow eggs, will be the mother of an equal number of cockerels, and the contention therefore falls to the ground.

It may be definitely stated that at present no means, other than incubation, exists by which the sex of an egg may be determined. Yet the operation of some laws of nature, which bear upon the matter, are now more or less known. It has been established that from early broods a predominance of cockerels may be expected, and that either parent may exert a prepotency, which will result in the majority of the brood being of the sex of the parent exerting that prepotency. By some authorities it is also asserted that the sex of the offspring depends in a measure upon the physical condition of the mother, to the effect that hens in a fat condition will tend to produce cockerels, and those in lean, hard state, pullets.

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**Crooked Breastbones**—The reasons for this deformity are many. It is still a debated point, however, whether the influence of heredity may be counted among them. Some authorities certainly incline to the opinion that a tendency to the defect can be inherited, and brought out by improper treatment.

Too forcing a diet, and lack of proper bone-forming constituents in the food undoubtedly result in crooked breasts, as does also an over-early perching habit. The growth of fowls under domestication is so much more rapid, and takes place under such entirely different circumstances than when the birds are wild, that where early perching in one case has no effect, in the other it is most harmful.

As a general rule, chickens should not be permitted to perch before they are four to five months old, and even then great attention should be paid to the sort of perch upon which they roost.

It is noticeable also that general insanitary conditions leading to enfeeblement of the system may often bring about the deformity. Under most circumstances it is wise rigidly to exclude a crooked breasted fowl from the breeding pen.

**Size of Eggs**—This is frequently a matter of some importance to the poultry-keeper since too large or too small eggs are less saleable, and fetch considerably lower prices than when of medium size. The most popular egg with London salesmen is that weighing slightly over two ounces, or about sixteen pounds to the "Long hundred."

### Principal Breeds and their Characteristics

**ANCONA**—Extremely active, and rather timid fowls. First-class layers, with indifferent table qualities. Chickens mature quickly. Non-sitters. Single-combed.

**ANDALUSIAN**—Excellent layers of large white eggs. Non-sitters. Single-combed. Table qualities fair.

**BLACK SPANISH**—A once useful breed. Rarely seen nowadays, the economic qualities being spoiled by continued breeding for immense white faces.

**BRAHMA**—(Dark and Light). Large heavy birds of indifferent laying qualities. Fair table fowls. Economic qualities injured by much exhibition breeding. Of chief value for crossing purposes. Pea-combed. Sitters.

**CAMPINE**—(Gold and Silver). In the front rank as layers. Non-sitters. Good foragers. Hardy and quick growers. Single-combed.

**COCHIN**—(Black, White, Cuckoo, Buff, Partridge). Large, fairly hardy birds. Inferior in both laying and table qualities to many other breeds. The presence of heavy foot feather renders them unsuitable for many runs where appearance is a consideration. Of some value for crossing. Good sitters and mothers.

**DORKING**—(Silver, Dark, Cuckoo, Red, White). Pre-eminently a table fowl, of magnificent shape for edible purposes, and excellent colour and quality of flesh. Fair layers of white eggs. Single and Rose-combed. Five-toed.

**FAVEROLLE**—(Salmon and Ermine). First-class all-round fowl. Table qualities predominant. Hardy and of good fattening quality. Eggs fair sized. Chickens mature quickly. Five-toed.

**GAME**—(Brown, Red, Pile, Duckwing, Black Breasted Red). Of no marked economic value. Bred in the main for exhibition purposes.

**HAMBURGH**—(Black, White, Buff, Golden, Silver). Small birds of active habits. Good layers of small white eggs. Not so suitable as some breeds for confined runs. Table qualities indifferent. Non-sitters. Rose-combed. The Black variety is in some respects superior to the others, being a layer of larger eggs, and standing confinement fairly well.

**HOUDAN**—Moderate layers, and very fair table fowls. Fatten easily and mature quickly. Useful for crossing. Five-toed. Leaf-combed.

**INDIAN GAME**—Large, well-breasted fowls of great value for table purpose crossing. Poor layers of tinted eggs. Non-sitters. Slow growers.

**LA BRESSE**—(Black and White). Good layers of white eggs. Excellent flesh qualities. A breed much in requisition in France for table purposes.

**LAKENVELDER**—Handsome fowls of fair laying capacity. Require good range.

**LA FLECHE**—Layers of good sized white eggs. Slightly delicate fowls, and needing dry soil. Horned comb.

**LANGSHAN**—(Black, White, Blue). Fair layers of deep tinted eggs. Medium table birds, but slow growers. Good sitters and mothers. Single combed. The economic merits of the fowl have not been improved by the departure from the Croad short-legged type to the opposite extreme.

**LEGHORN**—(White, Black, Brown, Buff, Cuckoo, Pile, Duckwing). A very popular breed of first-class laying powers. Small eaters, and non-sitters. Poor table qualities. Chickens hardy and feather well. Eggs white and good-sized.

**MALAY**—Tall birds of little utility value. Good sitters and mothers. Almost entirely a fancy variety, though of some value for crossing purposes.

**MINORCA**—(Black and White). First-class layers, with poor table qualities. Stand confinement well. Non-sitters. Single-combed. Eggs white, and large.

**ORPINGTON**—(Black, Buff, White, Jubilee, Spangled). An all-round fowl of fair table and laying qualities. Addicted to broodiness. Eggs slightly tinted, and medium-sized. Single and Rose-combed.

**OLD ENGLISH GAME**—Excellent table fowls. Useful for crossing to impart edible value. Indifferent layers of tinted eggs.

**POLISH**—(White-crested Black, Gold and Silver Spangled, Buff Laced). Good layers of white eggs. Non-sitters. Inclined to delicacy, and being susceptible to colds need especial care in housing and sheltering.



**REDCAP**—An excellent laying breed. Non-sitters and hardy. Rose-combed.

**ROCKS**—(Barred, Buff, White). Good all-round fowls. Rapid grower, fair layer and excellent mother. Eggs tinted. Single-combed.

**SCOTCH GREY**—An all-round breed of fair egg-laying and table qualities. Hardy and of use for crossing. Indifferent sitters. Single-combed.

**SUSSEX**—(Red, Light, Speckled). Magnificent table fowls with splendid quality of flesh. Good fatteners, mothers, and fair layers.

**WYANDOTTE**—(White, Buff, Gold, Silver, Columbian, Partridge). A very popular and hardy breed of American origin. Some varieties, notably the White, are in America regarded as pre-eminent among layers. Their characteristics, as in all breeds nowadays, but possibly to a greater extent, vary according to the lines upon which they have been bred. Table qualities are usually good, and the hens are good mothers and layers of medium-sized tinted eggs. Rose-combed.

**Mating of Breeding Stock**—It is, of course, an absolute essential that all fowls intended for breeding should be strong, healthy birds of strong healthy parentage. They should, moreover, be at least ten to twelve months old, and whenever possible older than that. To breed from immature stock can only result in weak, undersized chickens, and it should be borne in mind that a fowl is not at her breeding prime till well into her second year.

It is a good axiom that two-year-old hens should be mated to a vigorous twelve or fifteen months old cockerel; and pullets to a strong active two-year-old cock. Only active birds of known qualities should be employed, and they should be in good hard condition.

When making a selection of stock for breeding purposes every detail should be carefully considered, since in all probability errors cannot be rectified at a later date. While the question of consanguinity, or blood relationship of the breeders, is of the utmost importance to the

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**Management of Male in the Breeding Pen**—A great deal of the success attained in hatching and rearing chickens depends upon the care and treatment bestowed upon the stock cock.

A male intended for the breeding pen should be one of unimpaired vigour; and in order that his strength may be conserved he should be denied intercourse with the hens during all periods but the breeding season. Before mating up, a little high feeding such as may be effected by the addition of some cooked lean meat, etc., to the menu will benefit. Many specialists recommend the addition of a little sulphate of iron to the drinking water.

If the male be a good-tempered, active and healthy bird—and no other should be employed—strong fertile eggs may be expected about eight or ten days after he is introduced to the hens.

### Monthly Notes

**JANUARY**—Table chickens may be hatched this month and will fetch good prices later, as will also unfinished birds of sixteen weeks, consigned to Surrey and Sussex fatters. Incubators, rearers and brooder houses must be overhauled and placed in working order. Eggs for incubation should be collected early, before frost can work harm. Water troughs should be emptied at nightfall to prevent the necessity for thawing out in the morning. Breeding pens should be mated up for the production of laying stock of heavy varieties.

**FEBRUARY**—Heavy breeds should be hatched this month for November laying. The value of green food must not be forgotten at this juncture, and swedes or turnips may be hung up for the fowls to peck at. In this, as in other winter months, soft morning food should not be given steaming hot. If given just warm it will be more beneficial to the fowls, especially when birds are apt afterwards to stand about in the cold and wet.

**MARCH**—Young chickens will need every care and attention during boisterous weather, but it should be

remembered that the other extreme of coddling is not advisable. Nature's method of survival of the fittest need not wholly be discountenanced. If no attempt is made to rear weakling chicks the worry and inconvenience of ailing adult birds later will be prevented. When chicks are reared on a large scale, dry-feed should be bought in quantities and stored in a dry place.

**APRIL**—The hatching of light breeds such as Leghorns, Houdans, Hamburgs should now be in full swing. Spring cleaning can be commenced, and houses, coops, perches, nestboxes, etc., cleaned and lime-washed. Chickens hatched early in the year can be cold-brooded about this time.

**MAY**—Stock cocks can be removed from the breeding pens, and placed by themselves. Where hay is cropped, pens should be emptied and the grass permitted to grow. Incubators, foster-mothers, and hatching coops can be cleaned and stored. Cockerels that are well forward might be drafted out and disposed of to the fatters, who should give good prices early in the month.

**JUNE**—The most important matter of shade for growing stock must be attended to. Separation of the sexes will be urgently needed, if not already done. War should be declared against parasites, which otherwise may increase enormously in the hot weather. A commencement should be made in clearing off old hens so that room may be made for growing stock.

**JULY**—Fowls that go broody should be cooped immediately on discovery. They are then more speedily cured. The clearance of old stock should be completed, and full precautions taken against overcrowding. Green food must be supplied to fowls on pens where the grass is burnt up.

**AUGUST**—Houses, coops, etc., should be tarred, creosoted or painted, where it is necessary. The lull in other operations affords a convenient opportunity to erect other runs, repair gates, netting, etc. Examination of stock for parasites might be accomplished, and dusting with pyrethrum powder given where needed.

**SEPTEMBER**—Young pullets, bred for autumn and winter laying, should be brought along. Nourishing food and plenty of exercise will assist. Pens should be cleaned of moulted feathers. Summer foods may be discontinued, and the diet re-arranged with a view to autumn and winter egg-production.

**OCTOBER**—Scratching sheds and houses may be prepared for use in bad weather. Roosting houses may be rendered snug and watertight for the coming winter. Layers should receive an addition of cut-bone or meat to supply the increasing scarcity of animal food.

**NOVEMBER**—Attention should be devoted to table birds intended for Christmas trade; and capons, etc., can be brought along with a view to speedy penning for the fattening process. When chickens are wanted in the first week in January, breeding pens must be mated up towards the middle and end of the month.

**DECEMBER**—On cold, dark mornings fowls are best kept in the houses till the morning feed. A keen watch should be kept for any cases of roup so that a bad outbreak may not occur. The afternoon feed of grain should not be given till just before dusk so that the long interval till next morning's breakfast may not be increased unduly. Where scratching sheds are in use the meal may be given half an hour earlier, and the grain can be well buried.

**Prices of Exhibition Stock**—Immense variations naturally occur in the prices obtained for show fowls. Sums ranging from four to twenty pounds are given frequently; and where popular breeds—especially of recent development and short of the standards of perfection—are concerned, very much higher prices are matters of fairly common occurrence. In recent years probably the highest price obtained for a fowl was that of one hundred and seventy-five pounds given for a Partridge Wyandotte cockerel. But sums in the neighbourhood of this have been realised many times for exceptional specimens.



**Poultry-keeping upon Intensive Lines**—While the maintenance of a large head of poultry upon a limited area is quite feasible, the operations of the poultry-keeper need to be planned with unusual skill and foresight to attain complete success. The chief consideration of the poultry-keeper in such circumstances is the removal of the accumulating manure before it produces ill results among the stock. To achieve this it is necessary to divide the ground up into two or more runs, occupying each one in turn with poultry, and cropping those empty to sweeten the soil. Mustard, and many vegetable and root crops, effectually eliminate manure, but it is obvious that the soil must not be too heavily charged. In some cases ground can be kept sweet by removing the top layer of soil, and digging the rest well over. In all such operations, however, the head of poultry kept must be skilfully regulated, or disease, or at the least poor laying, will result.

Undoubtedly intensive methods of poultry-keeping can be conducted with success, but it cannot be denied that many additional dangers and difficulties attend them. When layers are kept by intensive methods the stock should never be kept beyond the first year, but should be killed or got rid of and fresh birds introduced. These should be of the healthiest and most vigorous procurable, and it need scarcely be said that the stock should never be employed for breeding purposes.

Dryness is absolutely essential when fowls are kept under crowded conditions. The poisonous exhalations of manure-charged ground are trebled upon wet, heavy, soils, rendering the task of maintaining poultry in health quite impossible.

**Prices of Utility Stock**—It is obvious that the value of utility fowls depends much upon their age and breed, and the time of year at which they are sold. Roughly speaking it may be said that a pure-bred pullet of no more than average merit should fetch from 4s. 6d. to 5s. 6d., at six to seven months old in October or November.

A pullet bred from a good laying strain should rise in value under similar circumstances to 6s. or 7s., while one from a noted breeder's farm, and having claim to be of prolific laying blood, might command from 7s. 6d. to 12s. 6d., or even in exceptional circumstances 15s.

The prices of male utility stock as might be expected rule slightly higher, and commencing at 5s. would rise according to age, time of year and quality to one or two guineas. Perhaps 8s. 6d., 10s. 6d., and 12s. 6d. are the prices most commonly given for a good stock cock or cockerel. Occasionally utility males will fetch very high prices, since poultry-keepers are often anxious for American and English sires bred from hens of abnormal egg averages.

**Nests**—Nestboxes are usually affixed in a row at the side of the fowl-house, or sometimes at the back in such a way that the top of the boxes form a manure board to catch the droppings. In some types of houses access may be gained to the nests by a shutter or slide opening from outside, and in other cases the nests themselves are affixed outside the houses. The convenience afforded by outside nestboxes is found by many poultry-keepers to be slight, and they certainly impart additional unwieldiness to the house. Moreover unless exceptionally well-fitted, and constructed of seasoned wood they are apt to develop cracks which admit the rain and make the house draughty.

The nests should be lined with soft, sweet material such as hay, peatmoss, or wood wool. This should be renewed occasionally in order that the eggs may be collected in clean condition, and the multiplication of insects prevented. On no account should fowls be allowed to roost in the nests.

**Wing Locks**—These appliances—as the name implies—are attached to the wings of a fowl in order to restrict its freedom. They are seldom employed by

poultry-keepers—and though conceivably of use in some circumstances—are not wholly to be recommended.

**Parasites**—It is inevitable that the poultry-keeper shall be in a perpetual state of warfare with parasites, but there is no reason why that war should not be a uniformly victorious one. If prosecuted with unabated vigour, insect pests should be comparatively unknown in the fowl run. Certain precautions, however, must never be omitted. Before any newly acquired fowls are placed with the other stock, they should be examined and dusted with insect powder. If badly infested with vermin they should be cooped for a day or two, and thoroughly dusted twice daily, till free.

Nestboxes and perches should be painted over periodically with turpentine, methylated spirit, creosote or disinfectant; and houses, coops, scratching sheds, etc., should be frequently limewashed, or creosoted, special attention being paid to all niches and crevices. Dust baths should be accessible to the fowls, and they must be kept dry. Upon scrupulous cleanliness does the suppression of insect life alone depend. If this be attained parasites will trouble the poultry-keeper but little.

**Rearing of Table Fowls**—Methods of feeding and rearing fowls which are intended for consumption at four to five months old do not call for the same attention to the maintenance of the acme of health, which is so desirable an attribute in breeding and laying stock. It is obvious that the short span of life allotted to table fowls renders this unnecessary. Indeed, the main consideration of the poultry-keeper is to ensure a quick and uniform growth, attained by foods and methods which are as inexpensive as possible.

In order to produce the best table birds it is imperative to employ suitable breeds. Perhaps it is not too much to say that that is the crux of the question. But not only must fowls be of suitable breed, they must also be

suitably bred, which is a very different matter. The production of flesh and the production of eggs do not go hand in hand. The best layers are generally the worst table fowls, and it is clearly very natural that this should be so. Hence the producer of table birds, when purchasing fowls for such a breeding purpose, must choose not only a "table" breed, but birds that have not lost their "table" characteristics and points by breeding on egg-producing lines. In most cases the best table specimens are produced by crossing, but pure-bred fowls of such varieties as the Houdan, Orpington, Dorking, Indian Game, Faverolle, La Bresse, etc., all give good results. Such birds when employed in breeding table stock should be deep-breasted, short on the leg, large-bodied and small-combed. Their offspring should then possess good table characteristics. In choosing ground for rearing table chickens the time of year must largely be taken into consideration. In winter the southern slope of a well-bushed or thinly wooded hill is suited to the purpose. At such a season the great desiderata are shelter from piercing winds and the means of utilising every ray of sunshine. It must not be forgotten that the great aim of the poultry-keeper should be to maintain an unbroken progress of rapid growth and development. Anything likely to militate against this must be guarded against sedulously, hence the necessity for discrimination in the choice of rearing grounds. In summer, orchard or woodland offer the most ideal sites, shade from the hot sun—than which nothing causes chickens to flag more—being eminently desirable. Though the growth of table chickens may be maintained along more or less unnatural lines by means of forcing diets and other methods, at the same time the laws of nature cannot be set at naught entirely, and fresh air, sunshine, and exercise are essential factors in success.

The question of soil upon which table fowls are to be reared is not less important than aspect and situation. Upon damp, low-lying and heavy lands, chickens take longer to grow, and do not eventually make as good

specimens as those reared upon light, dry and warm soils. This difference is certainly appreciable enough to markedly diminish the margin of profit which can be attained. Upon this the best authorities are in agreement, for it is indeed obvious that a certain measure of growth and development must be obtained within a certain period, if poultry flesh is to be grown with profit. Hatching must be carefully timed to meet market requirements, and most poultrymen doing a large trade in table fowls are accustomed to hatch at all seasons of the year, especially from September to March. To the producer of table fowls, therefore, the incubator is an indispensable appliance, since reliance cannot be placed upon broodies, which are often unobtainable during the most important hatching months.

The question of food for table chickens offers a large scope for the selection and discrimination of the poultry-keeper. Obviously, it must be nourishing and provocative of speedy growth, with the additional and most important attribute of inexpensiveness. The last qualification bans many otherwise excellent prepared and artificial foods now on the market.

For the first week or ten days a cheap dry feed can be most advantageously used; then—for the ultimate end of the chickens must ever be borne in view—soft food should be fed. There are several reasons why a diet of soft food at an early stage is advocated. In the first place, it is a well-known fact with poultry-keepers that chickens fed largely on grains and dry feeds are not nearly so suited to the fattening process as those grown on soft food. Secondly, the flesh lacks something of the flavour and juiciness that well-mixed soft food imparts. The commencement of the soft food diet may consist of foods which are bone-forming as well as flesh-producing, so that a good frame may be built up. For this purpose oatmeal, with a little bone dust occasionally, is excellent. Where grain is partly used, groats and cracked wheat can be recommended. When the days are dark and short and the nights long, grain—

despite what has been previously said—should be used for the last meal at night. If the full measure of progress is to be attained, however, one or two meals by artificial light will have to be given. It is perhaps a work of supererogation to add that those necessities of life for chickens, grit and green food, must not be omitted. Water can be given or not according to the predilection of the poultry-keeper. It is, however, an essential when dry feed forms a bulk of the diet. It is scarcely necessary where soft food is fed, if meals are mixed to the consistency of thick porridge.

When the birds reach the age of two to three months, biscuit meal, ground oats, and barley meal can be used for the entire menu. The first food is valuable as an occasional change for the chickens, and the last two can be given mixed in equal parts, or, if desired, ground oats for one meal, barley meal for the next. Used alternately in this manner, it is possible that the birds feed with better appetite. Although it is important that the birds should continually eat well, it must not be thought that anything is gained by stuffing them. They should on the contrary have at one meal only as much as they will readily clear up. The aim of the poultry-keeper should be to rear his birds with strong, keen appetites so that they eat large meals *naturally*.

The provision of such accessories as green food, animal food (including meat and cut bone) and other extras, largely depends upon the time of year, the state of the weather, and the nature of the birds' runs. In confined pens some form of animal food is needed; on free range the fowls will find sufficient for themselves. In damp, cold weather a little hemp seed, or a dash of spice in the soft food, is often beneficial. When the chicks feather, stewed linseed twice a week is advantageous, or a sprinkle of sulphur can be added to the food. As the sulphur, however, tends to open the pores of the skin, it should be used with discretion, or colds, followed by such a disaster as an outbreak of roup, may result.

The defect of crooked breastbone is one that table

fowls are particularly liable to, on account of the forcing they undergo. It is, of course, extremely detrimental to their sale, and every care must be taken to prevent the occurrence of the evil. Roosting upon perches should be entirely tabooed from first to last, and sheds should be deeply littered down with wheat flights, bracken, peatmoss or some form of litter.

It may be emphasised that individual methods must vary with individual needs, since circumstances cannot but alter cases. It is to the poultry-keeper who possesses the gift of adaptability that most success comes. By utilisation of food that can be obtained cheaply, even if slightly inferior to other foodstuffs, the margin of profit can often be expanded. By taking advantage of every circumstance that may tend to the chickens' advantage much can also be gained. On farms where a large acreage is available frequent change of ground materially assists, and stubble, plough or pasture can be occupied in turn with excellent results. Where restriction of space is experienced other efforts must be made to keep chickens "going," and under such circumstances it is perhaps wise to use dry feeds a little more freely. By burying it deeply in litter, occupation and exercise will be ensured to the chicks, which more than compensates the disadvantages attending the use of grain for table chickens. Lastly the important matter of separation of the sexes must be mentioned. As soon as the cockerels can be distinguished from the pullets such separation may take place. Without doubt if it be not accomplished development of both sexes will be appreciably retarded.

**[Incubation by Natural Means—**Although artificial methods have to a large extent supplanted the sitting hen, it may be conceded that the natural process, apart from all other considerations save that of actual results, is still superior.

Moreover, the beneficial effect which a spell of sitting has upon a fowl often makes it advantageous for the

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sizes. Some poultry-keepers when working on a large scale fit up a shed with nests and runs, and this, if carefully done, effects an admirable economy in time and labour. In all cases it is important that ample ventilation should be provided, since nothing is more detrimental to the hatching prospects of eggs than impure air.

Once daily the sitting hen should be permitted off the nest to feed, stretch her wings, and dust. It sometimes happens that an over-zealous sitter will refuse to leave the nest. As it is important both that the eggs should receive a little cooling, and the hen have food and rest, she should be gently lifted off, raising each wing in turn before doing so, in order to ensure that no eggs are dragged from under her and broken.

It is a mistake to allow the hen to return to the nest too soon. A quarter of an hour to an hour according to the time of year and temperature, will do eggs and hen more good than harm. At later periods of the hatch, when the chicks within the eggs are generating animal heat, three or four hours without warmth may not injure the hatching prospects. It is not suggested that so long a cooling be given eggs, but the fact is noted as proof that eggs in the latter stages of incubation are not so quickly chilled as is often supposed.

The diet for sitting hens should be of a carbonaceous character, and consist of hard grain. Equal parts of oats and barley with a little maize make an excellent meal, allowing the fowl to eat all she may care to. The addition of some sharp grit is most necessary. Water need only be supplied once daily.

The practice of allowing a sitting hen to incubate two batches of eggs in succession is not to be recommended. The strain of six weeks close confinement is certainly injurious to the fowl, and the chances that she may tire of so long a bout and desert her eggs are not inconsiderable. Moreover, when the vitality of a fowl is lowered to any extent the warmth in her body falls below par, and her eggs may incubate too slowly.

Upon the twentieth, or late upon the nineteenth day of incubation strongly fertile eggs should chip. When chipping is first observed the hen should be immediately returned to the nest, and left for twenty-four to thirty-six hours. Too much attention or worrying at this juncture is liable to fluster the hen, and may result in her crushing one or more of the chicks.

When the chicks have finally hatched off the mother should be attended to first, since she will give to chicks all the care they need. After a good feed and drink she may be allowed to brood her youngsters, who will require no food for twenty-four hours. Any eggs left in the nest may be tested, and if the contents are alive, should be allowed to remain. It sometimes happens that an otherwise healthy chick may be glued to the shell and unable to emerge. In such a case the shell may be gently chipped away a little at a time, until the youngster frees itself. To assist weakly chicks from the shell rarely avails, as the operation is one of extreme difficulty, and the chick is usually too weakly to make its way in the world if it does hatch. When chipping an egg, if signs of blood are observed it may be known that the operation is premature.

It may be noted that all eggs do not invariably hatch punctually; cold weather may delay the hatch, or eggs which have been laid some days before incubation was commenced will often hatch out as much as a day late.

In autumn, winter, or early spring not more than nine eggs should be given to a fair-sized hen, and at no time should a broody have more than she can comfortably cover. Such a proceeding is likely to spoil many eggs since each in turn may be left out and chilled during the early part of the hatch.

It is sometimes convenient to set three hens at once, and, after testing on the fifth or sixth day, to divide the fertile eggs amongst two hens, and give the third a fresh batch. If any foul odour be noticed during the hatch a search should be made, and any eggs containing dead and putrefying germs should be thrown out as

their proximity to healthy eggs is injurious. If a sitting hen goes off colour during her labours it is wise to substitute a healthy broody. An unhealthy hen is not likely to hatch with complete success.

Perhaps the most successful method of setting a hen is, paradoxical as it may sound, not to set her at all. That is to say to allow her to steal her nest in hedge-row or field. When her full batch of eggs is laid, the eggs it is desired to incubate may be substituted. In such cases the hen will need absolutely no attention, but will care for herself and her eggs. If the nest is beyond the reach of vermin such a natural method nearly always attains the maximum of success, and a large healthy brood of chicks can be expected.

#### **The Profitable Side of Small Scale Poultry Keeping—**

It may be stated at the outset that this article is not intended to show the would-be small poultry-farmer how to make a comfortable income with a country cottage, a field or two, and a few hens. It is rather intended for those in suburban districts, who pursue the hobby of poultry-keeping hampered by restricted space and other difficulties.

By adopting a suitable method, carrying it out with a modicum of business acumen, and avoiding several cardinal errors, it should, however, be possible for the owners of twenty to thirty fowls to make to their income an addition of quite appreciable dimensions. But it is absolutely necessary to have a clear end in view, and to stick to it tenaciously until its possibilities or lack of them have been ascertained.

Several distinct ways of making money out of his hobby are open to the small poultry-keeper. It seems obvious to say that from selection of the wrong one springs failure. Yet how often is not some entirely unsuitable object aimed at.

Eggs for incubation, and day-old chicks sell most profitably, but fowls cooped in a tiny run are unsuitable

as breeders. They cannot produce strong, fertile-germed eggs that will hatch as satisfactorily as a customer would expect, and the sale of such eggs could only bring certain disappointment both to purchaser and vendor.

But where a run of a quarter of an acre, or more, in extent can be given to fowls, and when attention can be paid to the matter of exercise for them, the sale of day-old chicks and incubation eggs can meet with reasonable success, and should certainly be adopted.

From about the middle of February to the end of April sittings can be sold at prices varying from 6s. to 15s., and eggs from high class exhibition stock fetch very much more. It is not proposed, however, to deal with show fowls here. Obviously no closely reasoned argument is needed to prove that excellent profits can be made out of eggs at two, three, or four guineas a sitting, and birds at five times that figure. But room is required for breeding high class exhibition birds, inasmuch as the best will be a pick of half a dozen from perhaps 500 chickens. The expenses of showing and keeping the highest class stock is also considerable and—despite popular opinion—the small scale poultry-keeper, who contemplates money-making, will almost certainly find the utility side a more satisfactory one.

The sale of eggs from which it is intended to hatch fowls for eating is naturally not limited to the months mentioned above, but such eggs seldom fetch 4s. a dozen. Still at that price a very good profit can be made, and lastly those eggs, which do not sell for incubation, will always find a ready sale at reasonable prices for purposes of consumption.

With reference to the sale of day-old chicks it may be explained to those without experience in the matter that the birds are packed and forwarded directly they have hatched and dried off. No food is needed, as the yolk of the egg is absorbed into the stomach just prior to hatching. It has been proved by experiment that chicks travel better at twenty-four hours old than at a few weeks. Good prices are fetched by the youngsters,

ranging from 7s. to 12s. a dozen, according to quality ; and the cost of hatching them, allowing for the initial expense of an incubator, would not exceed  $\frac{1}{2}$ d. each, though, of course, variations would occur when eggs proved unusually fertile or the reverse.

In the direction of the quality of the stock a word remains to be said. It is important that a start should be made with a decent class of fowl. Judicious breeding with a selection of the best will then be time well spent, and the higher the standard to which the fowls are developed, the better the prices that may be asked and obtained for eggs and chicks.

Good type utility stock will always prove profitable, and a small connection can often be quickly formed by careful advertising, moderate prices, and honest efforts to satisfy customers. From a pen of twenty to thirty fowls, well managed in the manner outlined above, it should not be difficult to make an annual and slightly increasing sum of £10 to £15. The food bill should not be more than £6 to £10 per annum, and at the outside other expenses, not excluding advertising, postage, and the many sundries that accumulate, ought not to raise the total higher than £20. Since a yield of three to four thousand eggs would not be excessive, it will be seen, therefore, that a good margin of profit should be obtained without difficulty. All this, be it plainly understood, presupposes that the poultry-keeper is neither ignorant or foolish enough to mismanage valuable stock, and bring disaster upon his head in the shape of sick birds, scarcity of eggs, or dissatisfaction of customers.

To those, then, who have sufficient space at their command, this branch of poultry-keeping may well be recommended, but let it be said again that a real knowledge of poultry work is necessary, and the absolute novice would be wise to gain a little experience before embarking on it. The main thing is to feed the stock correctly, allow them plenty of green food, and force them to take regular exercise by searching for grain buried in litter.

A high percentage of eggs should then hatch, and the chicks from the eggs rear well.

Those, however, who have only tiny cramped runs for their birds, must proceed on other lines. For them there is little choice, and but one profitable branch of poultry-culture remains open. That branch is the rearing of fowls for table. In small confined pens it is quite possible to rear birds in a healthy state until they reach an age when they are fit for consumption. Conditions which would certainly re-act unfavourably on stock birds, have scarcely time to take effect upon fowls whose span of life is so brief.

If care is taken frequently and thoroughly to remove manure, and keep the floor of small pens sweet with some form of litter such as peat moss or wheat flights, little trouble should be experienced in maintaining comparatively large numbers within a small area. And this can be done with considerable profit. For sixteen weeks old birds, Sussex and Surrey fatters will give good prices nearly all the year round. Moreover, during a brief season—from February to May—when the supply seldom or never equals the demand, 3s. to 4s. a chicken in rough unfinished condition can be realised.

The birds, at fourteen to sixteen weeks, are sold alive in lean condition, and are finished off by the fatters for the London markets. Since the cost of growing chickens to that age ought not to exceed 1s. 6d. per head, inclusive of grit, chick feed, barley meal, ground oats, and the original cost of the egg from which the bird was hatched, the work is remunerative.

The poultry-keeper, who endeavours to cater for this trade, should purchase eggs of a good table breed, or better still, a first-class table cross such as Indian Game-Buff Orpington, Faverolle-Buff Orpington, or Old English Game-Dorking. In order that he may turn out a regular supply of birds, which will ensure both better prices from the fatters, and greater ease of disposal, he should accurately gauge the capacity of his pens. He should divide them up so that the youngsters

may be drafted into lots of different ages. He should hatch by incubator, since dependence on the caprice of the broody would often entirely upset his calculations, and he should feed his birds from the age of a month largely upon soft food. They will then give greater satisfaction when they reach the fattening pen.

Profits will naturally entirely depend upon circumstances, but the prices quoted above will show that the successful rearer will reap rewards of an eminently satisfactory nature. It need hardly be added that, whatever the branch of poultry-keeping may be, accurate accounts must be kept, and a yearly balance sheet brought out from which an idea can be gained as to the measure of success which is being attained. Such items as wire netting, houses, coops, stakes, nails, hinges, wood, drinking vessels, etc., should be calculated roughly to last ten years. One-tenth of the cost should therefore be debited under the heading of "Depreciation of dead stock."

**Housing of Stock**—The question of the housing of stock is one of the utmost importance, and when roosting houses or scratching sheds are being erected too much care and attention cannot be bestowed upon the matter. The ideal fowl-house should combine simplicity and cheapness with perfect hygienic conditions in all seasons of the year. Efficient ventilation, ensuring an ample supply of pure fresh air for the fowls throughout the night must be the first object of the poultry-keeper. Secondly, comes the importance of an equable temperature, that is to say, the fowl-house should be as warm as possible in winter and as cool in summer. Thirdly—and where poultry are kept purely for profit, this point is of paramount importance—comes the question of cost. It is as well to bear in mind, however, that the cheapest article is seldom the best.

The capacity of a fowl-house largely determines the comparative cost, hence many poultry-keepers are inclined to house their birds in large numbers. It may



be questioned, however, if the economy of such methods is justified by results. In the first place it is a matter of the greatest difficulty to ensure pure fresh air for each fowl when large numbers are herded together ; secondly, an outbreak of any infectious disease spreads with much greater rapidity, and is correspondingly more difficult of control. Despite the extra cost involved it is, therefore, advisable not to house more than thirty birds together, and twenty-five would be a better number. In calculating the capacity of a fowl-house it is a good guide to allow a minimum of 2 square feet of floor space and 12 cubic feet of air space per bird. Since makers often advertise houses to hold an excessive number of birds, it is well to check their statements by this rule, in order to prevent overcrowding.

The decision between portable or permanent houses is one for the poultry-keeper himself, whose choice will be governed by a variety of reasons. Houses that are fixtures can be built of course upon slightly different lines to those that are portable. For one thing, the question of weight needs less consideration, and this enables a superior form of roof to be used. Galvanised iron is undoubtedly among the best roofing materials, but—in order to prevent extremes of heat or cold—it should be supplemented by a covering underneath of wood or thatch. The last mentioned, though otherwise admirable, harbours vermin too freely to be entirely desirable.

All poultry-houses should possess good-sized windows or shutters, which are best made on the sliding pattern. If the fowl-house is a fixture the windows should be so placed as to receive as much sunshine as possible ; during hot summer weather the effects of this can be minimised by canvas blinds or awnings. The sweetening and health-giving effects of sunshine cannot be overrated, and a dark shady fowl-house is seldom a satisfactory one.

The height of fowl-houses should not be less than 5½ feet, and 6 feet is generally to be preferred. Constant

inconvenience is experienced when houses are lower than the minimum mentioned. As regards material for construction, wood is commonly employed, though experiments have been made with other substances. Only well-seasoned wood should be utilised, and it should be half-an-inch thick, or at least not less than that, many makers preferring very rightly to use wood of  $\frac{3}{4}$ -inch thickness. It is advisable to keep the walls and roof of the interior as smooth and free from bars, beams or crevices as possible. This facilitates cleanliness and limewashing enormously, and is a point in fowl-house construction too often neglected.

The best floor for a fowl-house is undoubtedly beaten earth. Droppings and litter can then be scraped up with little difficulty, and when necessary a foot or so of the surface can be scraped away and fresh earth beaten down again. Such a floor is warm in winter and cool in summer, and has many advantages over boards. The inroads of rats or other vermin can be warded off by a layer of fine-mesh netting sunk a couple of feet below the surface.

Most of the leading poultry appliance makers construct different forms of fowl-houses, and many are well-designed, much advance in this direction having been made in recent years. Open-fronted houses with canvas or wooden shutters are frequently used with success, and in the warmer months are almost a necessity for growing stock. Certainly most poultry-keepers tend to the opinion that fowl-houses are infinitely better a little exposed to the elements than too closely shut in. Simplicity of style is, however, a desirable feature, and houses encumbered with intricate devices seldom give satisfaction.

It is most essential that portable houses intended for daily moving should be as light and at the same time as strong as possible. Most leading makers construct such houses to hold two to three dozen birds at prices ranging from 60s. to 80s. Houses of lean-to design are slightly

cheaper than those with span or gable roofs, and in certain situations are advantageous.

In all cases it is advisable to protect the roof of fowl-houses with tarred felt or galvanised iron. This not only renders them more weather-proof, but minimises extremes of heat and cold.

Shelters provided underneath houses are often objected to by writers on poultry matters. There is no doubt, however, but that they are a distinct boon to fowls housed in an exposed field. It is the abuse rather than the use of these shelters which so often makes them undesirable. If kept scrupulously clean, and lime-washed regularly, they are, as before stated, quite desirable.

**Egg Stimulants**—The folly of giving condiments, spices and forcing powders to stock birds should be evident. In addition to the deleterious effects on the birds themselves, eggs thus produced will certainly contain a high percentage of unfertiles, and those chicks which hatch out will be weakly birds predestined to disease. Of course the use of condiments on hens shortly to be killed, or discarded as stock, may be profitable in winter when eggs are fetching high prices. It is permissible also to administer condiments to stock birds, in changeable and inclement weather, but the greatest care should be exercised or more harm than good will be done.

**To Cleanse Foul Land**—When ground has been fouled by an excess of fowl manure the best means of sweetening it is to crop it with some free rankly-growing vegetable. If well dug over first, and thickly sown, the raising of one crop should effect an appreciable difference.

Ground that is foul, however, from the presence of diseased birds needs more drastic treatment before it can be regarded as fit to be occupied. Wintry elements, such as frost, snow, and rain will do much to kill dangerous organisms, but a succession of dressings with lime

will hasten the process. For each pole of land one cwt. of lime should be used, placed in small heaps, and slaked with water. When the lime has pulverised it should be spread evenly over the ground, a fine day being chosen for the work. It should then be left till the lime has been absorbed.

Some authorities recommend drenching the ground with a one per cent. solution of sulphuric acid, and there is no doubt that this is advisable in poultry runs that have contained birds suffering from roup, liver disease, gapes, etc.

**Preservation of Eggs**—The old-fashioned processes of preserving eggs by the use of lime, butter or bran are now entirely superseded by waterglass, or “silicate of sodium.” This may be purchased of chemists, or most dealers in poultry appliances, for about 1s. a tin, which will make half a dozen quarts of liquid. Into this the eggs are dropped when not more than one day old. Dirty or cracked eggs should not be placed in the liquid, and a lid should be kept on the receptacle containing it. Care should be taken to boil the water in which waterglass is mixed, and it should be of the thickest consistency compatible with the eggs sinking in it. As a rule, ten parts, by weight, of water to one of waterglass, will ensure this. The eggs should not be placed in the liquid till it has cooled. By this process eggs should keep perfectly fresh for six months. When used after being thus preserved they should be washed in warm water, and several small holes pricked in the shell, as the pores of it are closed by the waterglass, and cracks would otherwise follow immersion in boiling water.

It is noteworthy that sterile eggs are more easily preserved than those that have been fertilised, and for this reason it is as well to remove the male from birds whose eggs it is intended to preserve.

Vessels containing the eggs should be stored in a cool place, between 35 and 45 degrees. Such a temperature is the most conducive to success.

The preservation of eggs by cold storage is undoubtedly the most effectual process ; but it is attended by several disadvantages. In the first place, the cold storage process demands an expensive plant, and, secondly, the eggs preserved in this manner, when taken from the chilling chamber, deteriorate much more rapidly than eggs from a liquid preservative medium such as waterglass.

**Dates of Hatching**—When the production of winter eggs is aimed at, it happens often that the amateur gives the subject far too little consideration, and not infrequently any but the right reason is assigned to the paucity of eggs when they are most desired. Heavy, slowly-maturing breeds, such as Buff Orpingtons, should not be out of the shell later than March ; light and precocious breeds, such as Leghorns, should not be hatched before the middle or end of April, and will often lay quite early enough if hatched in the middle of May. The age at which pullets will lay cannot, however, be forecasted with any great accuracy. Much depends upon the feeding they receive when young, and an important, but often unsuspected factor in the case, is the sire of the birds. Some males mature more slowly than others, and without doubt this characteristic is often transmitted to the offspring.

With all breeds it is important not to hatch too early, or the pullets are liable to moult like adult stock just before the time when eggs are wanted. Of course when birds are to be produced for exhibition the fancier incubates at the time most suited to his individual requirements, and such times may be at any season of the year.

**Feathers**—The disposal of feathers at a price which justifies the collecting, packing, and forwarding them, is difficult. Prices are invariably low, and rule from 2d. to 3d. per lb. These feathers should be roughly graded, and those from the wings and backs of fowls are

too coarse to be included. White and light coloured feathers fetch slightly better prices than dark ones. It is important that all feathers sent to market should be clean and fresh. If kept for any length of time they should be cured.

**Candling Eggs**—The method of determining the age and freshness of an egg is extremely simple. By means of a powerful testing lamp the size of the airspace is ascertained, and this reveals the age of the egg, for the process of evaporation causes daily expansion of the airspace. This airspace in a new-laid egg is scarcely larger than a sixpence, while that of an egg some weeks old would be as large or larger than a penny. It may be noted that the airspaces of preserved eggs alter but little, the evaporation being held in check. In these cases, however, the roughness of the egg, or the presence of the preserving medium, betrays the egg.

**Incubation by Artificial Means**—The subject of the merits and demerits of the incubator as compared with the sitting hen has been touched upon under the heading, "Incubation by Natural Means." Suffice it to say now that to most poultry-keepers the incubator has become not only a convenience but an absolute necessity. Indeed it would scarcely be too much to say that the advent of the incubator has given a greater impetus to the poultry industry than any other invention or discovery. The variety of incubating machines now upon the market prohibits any detailed account of the management of an incubator, since much, if not all, depends upon the type of machine in use. It must be conceded that of all people the makers of a machine are best entitled to advise as to the ways and means of running it. Their directions should, therefore, be studied and faithfully followed, since only an expert can venture to diverge from the path they point out. Some general information as to the laws of artificial incubation should, however, be of service.

Though many inventors—and not without a measure of success—had worked at the problem of artificial incubation, no machine of real practical value existed until the Hearson machine was brought upon the market. Some incubators there certainly had been that could lay claim to successful incubation, but their working involved too much labour, and was too intricate to seriously threaten the supremacy of the hen. In the Hearson machine, however, the inventor had struck out on entirely new lines, and chief of the new features was the now famous thermostatic capsule, which is to be found in most hot water incubators of the present day. Previous to this no such sensitive regulator had been invented, and it at once gave the Hearson machine a supremacy which it has held in practically unbroken sway ever since.

A consideration of the methods adopted by nature will easily make known the fact that the first essential is a regular temperature. The care and all the efforts of the amateur should be spent in this direction. Experiments have largely indicated that to variations in temperature are due deaths in shell and deformed chickens. To this end, therefore, it is well to make certain that the thermometer in an incubator registers accurately. This can be ascertained by comparison with another in hot water. Care should be taken that the mercury has not become shaken up and separated, which would account for a difference of several degrees.

It is not suggested that the thermometer of an incubator should always be tested before use. Far too many precautions are taken by manufacturers to render this necessary. But if unsatisfactory results are obtained with a machine such investigation may lead to discovery of the reason.

It has been observed that a regular temperature is an important factor in incubation, and here it may be remarked that, though the theory of an even temperature for twenty-one days is an admirable one, in practice it is never attained either by hen or incubator.

About the tenth day of incubation the chick within the egg begins to generate heat of its own, and the stronger the fertility of the eggs the greater the amount of heat generated. Hence it will be seen easily that about this date a slight rise in the temperature of the egg drawer will probably occur, and later in the hatch the temperature may go four or five degrees higher. If this happens it must not be assumed that the regulator is working inefficiently; and no concern need be felt. Such a rise rather points in the direction of a good hatch. As regards the measures to be taken in such a case all depends upon the type of machine in use. The contingency is, however, sure to be provided for in the directions issued by the maker. Usually the flame of the lamp or gas is lowered, and a rise of temperature due to such a cause is seldom combated by alteration of the regulator, unless it be excessive.

The two principal types of regulator are the thermostatic capsule, and the double thermostatic bars. The first is found in the Hearson machine, and consists of a soldered capsule containing some twenty drops of a fluid, which boils at a certain temperature, causing the expansion of the capsule, which by an ingenious connecting rod arrangement raises a damper, and permits the escape of the surplus heat. The second type is found in the Cyphers hot air machine, and the same end is attained by very similar means; in this case the capsule being replaced by a thermostat constructed of metal bars sensitive to heat, and subject to expansion or contraction according to the temperature.

These details of the means by which regulation of the temperature is attained automatically should assist the novice in some degree when operating an incubator, but it must be mentioned that no hard and fast rules as to the temperature at which an incubator should be run can be given. They will depend upon the make of the machine, and, above all, the position of the thermometer in the egg-drawer, since it is obvious that registration will vary according to whether it is close to the source



of heat, or to the eggs, or midway between the two, etc. The aim of the operator will, however, almost invariably be the same—namely, for the actual temperature of the eggs at the commencement of incubation to be  $102\frac{1}{2}$  or 103.

Upon the question of moisture little can be said. Much depends upon the type of machine in use, the state of the weather, and the atmosphere of the incubator room. Here again the instructions of the maker should form the best guide. It may be borne in mind, however, that if high east winds prevail during the hatch the application of slightly more moisture than is usual would be desirable. As regards cooling, the best plan, undoubtedly, for the novice, is to place a batch of eggs under a hen set in as natural conditions as possible. A comparison between the machine and naturally incubated eggs should then give some guide by the air spaces. If these air spaces coincide, it may be taken that the amount of cooling given is about right. If the machine eggs, however, show a larger air space than the others it is probable that they are receiving too much cooling or insufficient moisture. The converse of this also holds good.

Before placing eggs in an incubator it is well to run the machine for two or three days first till a steady even temperature is attained. The egg-drawer should never be tightly packed with eggs, or the daily turning will be a troublesome matter. Neither should eggs be piled up on top of one another. It is a noteworthy point that experiment has clearly shown that eggs hatch better in a half-filled machine than in one crowded to the limit of its capacity. This is supposed to be due to the fact that the developing embryos can draw upon a greater and purer supply of oxygen.

To add eggs while a hatch is in progress is seldom advantageous; if this procedure is resorted to, the eggs should be warmed slightly first, and a folded strip of flannel placed so as to prevent contact with those already in. When eggs hatch too early it is a sign that

too much heat has been given, and vice versa. In the case of their hatching late, however, it may be observed that stale eggs frequently take longer to hatch, but when at all protracted the hatch is seldom a successful one.

The chief points which the novice in artificial incubation should bear in mind are :—Firstly, that the machine must have regular attention, the lamp being carefully trimmed and filled once daily, and the eggs being turned twice in the twenty-four hours, and cooled in accordance with the conditions prevailing. Secondly, the machine should be in a quiet place as free from movement, jar, or vibration as is possible. Thirdly, the regulator should not be tampered with unduly during the hatch. Fourthly, the atmosphere of the incubator room should be as pure as possible, efficient ventilation without draught being provided, and all smell of oil avoided. Fifthly, the machine should not be interfered with when hatching commences. Sixthly, a careful record of outside, inside, and egg-drawer temperatures should be carefully kept, together with all other details of importance. These records should prove of great value for future use and guidance. Lastly, too much should not be expected of the machine. It should be remembered that its capacity being, perhaps, five times as much as that of a hen, it follows that five times as many unfertiles, deaths in shell, etc., will result. From five hens sitting on twelve eggs each a hatch of forty-five chickens would be very fair. Do not, therefore, expect a higher rate than 70 per cent., by artificial incubation. Such results should give every satisfaction.

### Technical Poultry Terms

**BEARD**—A knot of feathers—as found on the Houdan—at the throat of the fowl.

**BREED**—A distinct kind of fowl, apart from varieties caused by colour or markings.

**BROODY**—A hen with her instinct to sit in active development.

**CARRIAGE**—The attitude as affected by the style or shape of a bird.

**COCKEREL**—This term is slightly ambiguous. It is usually employed to denote a male under two years; but fanciers sometimes hold that only males, which have not passed the last day of the year in which they were hatched, can be so designated.

**CONDITION**—The aspect of a fowl from the point of view of health as indicated by the appearance of comb, wattles and plumage.

**CREST**—A tuft of feathers—as found on Polish fowls—upon the top of the head.

**COMB**—The crimson and fleshy excrescence upon the top of a fowl's head. There are five varieties of combs commonly met with in fowls. First of all is the familiar upright "single" comb. Secondly comes the "rose" comb, now scarcely less familiar to poultry-keepers. This comb is broad in the middle and tapers to a point at the back. It should be covered with rows of distinct pointed spikes. Thirdly, the leaf comb may be mentioned. This comb is somewhat elaborate in outline, and resembles slightly a pair of oak leaves set in butterfly shape. Fourthly comes the "pea" comb, which is similar to three single combs in one, the middle one being slightly higher than those on either side. Lastly comes the "horned" comb, which, as the name implies, is very much the shape of a pair of horns.

**CROP**—One of a fowl's three stomachs, situate at the base of the neck, and close to the merrythought.

**DUBBING**—The process, often applied to Game and other fowls, of cutting the comb and wattles level with the head and throat.

**EARLOBE**—The skin by the ears and immediately below the face and eyes of a fowl. Earlobes may be red, white or bluish in colour, and are very much more developed in some breeds than others.

**HACKLES**—The neck feathers of a fowl.

**HOCK**—The joint immediately below the thigh.

**KEEL**—The upright blade of the breastbone.

**LACING**—The different coloured edging around a feather.

**PENCILLING**—Different coloured striping across a feather.

**PULLET**—The term employed to designate a young hen under twelve months.

**ROOSTER**—A rustic term for a male bird.

**SHANK**—The joint immediately above the foot of a fowl.

**SICKLES**—The main curved feathers of a cock's tail.

**SPUR**—The pointed and horny excrescence at the base of a cock's shank. Present also in more rudimentary form on the hen.

**STAG**—A term applied to a male ; generally a young male.

**TRIO**—A pen of fowls consisting of a male bird and two females.

**VULTURE HOCK**—A superabundance of unduly stiff feathers at the hock joint.

**WATTLES**—The crimson and fleshy excrescences hanging at the base of the lower mandible.

**WEB**—The portion of a feather on either side of the shaft. The skin connecting the toes.

**UTILITY FOWLS**—Birds kept chiefly or solely for the production of flesh and eggs.

**To Restrain Pullets from Laying**—It sometimes chances that the poultry-keeper desires to postpone the day when a pullet will lay her first egg. This most often happens in the case of a young bird intended for exhibition, since at no other time does a bird give evidence of finer condition and more healthful colour and gloss than when just about to lay. Or again the utility poultry-keeper may desire to postpone the maturity of early-hatched pullets from a well-founded fear that their forward condition may lead them after laying awhile to moult like old hens.

The best means of achieving the object is to move the birds to a fresh run under as dissimilar conditions as

possible as soon as they really look like laying. It need hardly be said that no stimulants or spices, as well as soft food, must be given, and the diet should be a spare one of tail wheat or other poor whole grain. This treatment should effectually check laying, but success is, of course, not always possible.

**Breeding and Exhibition of Poultry**—The ever-increasing number of fanciers, the severe competition experienced at the larger shows, the valuable prizes to be won, and the intensely scientific and technical methods now in vogue all tend to make the breeding of exhibition poultry at once a most difficult and fascinating hobby.

Although many improvements have been effected since the practice of showing originated, it cannot be denied that there is yet room for reform in the fancy. Despite the outcries of unsuccessful exhibitors, however, the decisions of poultry judges would seem to be tolerably pure. It should not be forgotten that few exhibitors are so impartial as to see the faults of their own exhibits no less plainly than those of others. It is in a great measure to this very human trait that many complaints of biassed or incompetent judging are due. Again many excellent judges are not without their own foibles and idiosyncrasies, which perhaps unduly influence their decisions. Such judges by their predilection for a particular stamp or type of bird, by their preference for one point over another, often bring down a storm of abuse and complaint. Yet such instances are certainly an example of staunch adherence to standards, which rightly or wrongly are believed to be correct. On the whole, then, the exhibitor of to-day can feel tolerably sure of a fair field without favour. But this does not mean that the lessons of experience should be ignored. It is in the power of the latest recruit to the ranks of the fancy to check bad and unfair methods by rigid boycotting of shows, which are responsible for such treatment. There is, beyond doubt, room for improvement in the management of many shows, and they are not always the

smallest. How often are the columns of the poultry papers filled with complaints of exhibitors, who have been cheated of their prize money, have received the wrong birds back from the show, or whose exhibits have been tampered with? No unbiassed exhibitor can deny the need for reformation with respect to such matters as the attention given to exhibits, penning of verminous or diseased birds, and handling of, or access to, birds by unauthorised persons.

Amongst the details that make for success few are more important to the young exhibitor than the choice of the breed with which he proposes to specialise. For this is an age of specialism, and it must be affirmed that to attempt the cultivation of several breeds is under most circumstances a great mistake. During the start, at all events, the budding exhibitor should confine his attention to one, or at most, two breeds. Since nearly every and certainly all the best known breeds have their own special exhibition standard, these should be procured and studied. From them a complete knowledge of the points and characteristics to be sought will be obtained, and their value in order of importance can be clearly understood. As an example, the exhibition standard for Buff Orpingtons is given below. It will be noticed that such a standard deals entirely with the principal merits and defects of the variety, together with their value or prejudicial effect in the show pen.

### Orpingtons

#### GENERAL CHARACTERISTICS OF COCK

**HEAD AND NECK**—Head : Small, neat, fairly full over the eye, carried erect. Beak : Strong and nicely curved. Eye : Full, bright, and intelligent. Comb : Single or rose. The single comb to be of medium size, erect, evenly serrated, free from side sprigs. The rose comb should be set straight and firmly on the head, full of fine work or spikes, free from hollow in centre, and narrowing behind to a distinct peak lying well down to head (not sticking up). Earlobes : Medium size and

rather long. Wattles : Medium length and well rounded. Neck : Nicely curved, with full hackle.

**BODY**—Breast : Broad, deep and full, carried well forward, long straight breastbone. Back : Short with broad shoulders. Saddle : Rising slightly, with full hackle. Wings : Well formed and carried close to the body. Shin : Thin and fine in texture. Flesh : Firm.

**TAIL**—Medium size, flowing and inclined backwards.

**LEGS AND FEET**—Thighs : Short. Shanks : Short and strong. Toes : Four in number, well spread.

**GENERAL SHAPE AND CARRIAGE**—Cobby and compact ; erect and graceful.

**SIZE AND WEIGHT**—Large. Between 9 lbs. and 10 lbs. when fully matured.

**PLUMAGE**—Close.

#### GENERAL CHARACTERISTICS OF HEN

**HEAD AND NECK**—As in the cock.

**BODY**—Breast : Back and wings : As in the cock. Cushion : Small, but sufficient to give the back a short and graceful curved appearance. Skin and Flesh : As in the cock.

**TAIL**—Medium size, inclined backward and upward.

**LEGS AND FEET**—As in the cock.

**GENERAL SHAPE AND CARRIAGE**—As in the cock.

**SIZE AND WEIGHT**—Large. About 7 lbs. or 8 lbs. when fully matured.

**PLUMAGE**—Close.

#### Colour in Buff Orpingtons

**IN BOTH SEXES**—Beak : White or horn colour. Eye : Red or brown, the former preferred. Comb, Face, Earlobes, and Wattles : Red. Shanks : White. Skin and Flesh : White. Plumage : Any shade of buff from lemon buff to rich buff, on the one side avoiding washiness, and on the other side a reddish tinge. The colour to be perfectly uniform throughout, allowing for the greater lustre on the hackle and saddle feathers, and of the wing bow in the case of the cock only.

## Value of Points in Bu Orpingtons

## COCK OR HEN

## Defects.

Defects in head and comb..	..	..	..	..	10
„ colour	..	..	..	..	35
Want of Shape	..	..	..	..	20
„ Size	..	..	..	..	10
Defects in legs and feet	..	..	..	..	15
Want of Condition	..	..	..	..	10
					<hr/>
A perfect bird to count	..	..	..	..	100
					<hr/> <hr/>

**Serious Defects for which Birds should be Passed—**

Other than four toes : Wry tail or any deformity ; the slightest feather or fluff on legs and feet ; long legs ; yellow skin ; twist or side spikes in comb, or comb over to one side ; yellow in legs or feet. In Buffs : Any white or much black in tail or flights. Legs any colour but white.

Nowadays nearly every variety has a club formed of members who are devoted to the furtherance of the interests of the breed, and the novice will find membership of such a club of inestimable advantage, since contact with influential and experienced exhibitors is thus obtained, while opportunity is also afforded of competing for special cups, medals and other prizes given by the club.

The choice of a breed in which to specialise is a difficult one to make. While many of the newer varieties, owing to their recent origin, present unusual difficulty in breeding good specimens, those of the older established breeds have been brought to such a pitch of perfection that the production of a bird which will win in the best company is a matter of considerable difficulty also. For the novice a breed which enjoys a certain amount of popularity, and which is not of very recent manufacture, offers the best chances of success. For such a breed



plenty of classes would be provided at shows, good birds and eggs could be purchased for a start, and many wrinkles for breeding results could be obtained from experienced exhibitors. The secrets of breeding, indeed, form a feature of the fanciers' world. While in the main the laws of pedigree breeding are applied and comprehended by every successful exhibitor, it is yet undoubtedly a fact that many comparatively little known and specialised breeding laws are made use of by exhibitors to whom the experience of years has made known important facts with reference to the breeds in which they specialise. The advice and assistance of such exhibitors is of incalculable service to the tyro, who should make a point of reading all that may be written by the specialists.

The novice in selecting a show at which his birds may make their debut, should bear in mind that discretion is the better part of valour. A few small shows are inestimably useful in enabling the exhibitor to obtain a little actual experience of such matters, and he will be afforded the opportunity of comparing his own birds side by side with those of other exhibitors. In this way an eye for the points of a show specimen can best be gained, and a capable judgment gradually formed. At such large shows as the Dairy and Crystal Palace, huge classes of most varieties are penned, and the honour of a card is a difficult distinction to obtain. At the same time much can be learnt from a visit to the principal shows, and the exhibitor who neglects to do so during his novitiate will surely miss much.

While the exhibitor of many years' standing has almost invariably a little store of private methods and secrets, often enough sedulously guarded from the knowledge of rivals, it is true that in the long run these methods and these secrets do not go a long way towards the attainment of success. Undoubtedly the main thing is to breed the birds right. If this be done, and provided the birds are well shown, the little dodges of competitors will be powerless to wrest away the honours. It should be

understood that the wiles of the faker are not being spoken of. Against them the honest competitor has no real safeguard, but in the acumen and uprightness of the judges. The practice of faking is doubtless a difficult one to deal with, and often enough it is difficult also to decide where fair and legitimate treatment ends and improper means take its place. The plucking of a few feathers only is surely venial, but to strip a shank of what should be a clean-legged breed of a heavy feathering is another matter, and one which would probably be detected. As a rule, however, the conscience of an exhibitor should decide well enough—only the most elastic one could condone anything at all serious.

Although experience alone can afford real instruction in the difficult hobby of breeding exhibition fowls, many of the commonest mistakes of tyros can be avoided by attention to the hints of older exhibitors. Many beginners labour under the delusion that the purchase at some show of a cock and pullets that have gained premier honours should enable them to start exhibition breeding on the most auspicious footing. This is seldom the case. Although success might attend such a proceeding, it is most improbable. The laws of pedigree breeding should make it plain that the progeny of fowls bought in such haphazard fashion—since the parents would in all probability lack relationship—could by no means be perfect show specimens. It is of the utmost importance for the beginner to remember that it is the inward rather than the outward quality of a fowl that tells in the breeding pen. What that inward quality may be only the details of the fowl's pedigree can show, and the value is in direct relation to the birds with which it may be mated. When purchasing breeding stock, the tyro should, therefore, pay great attention to the matter of the birds' breeding, and he should remember that at all events some consanguinity is desirable in fowls for the show breeding pen. It may happen that grand-looking birds may owe their merits to the work of chance, and such merits must be "fixed" in the fowls by several

generations of breeding along recognised lines, before they can reproduce themselves in the offspring with any certain results.

Of course the purchase of a breeding pen from the yards of a well-known exhibitor is a fairly safe proceeding. From such a pen good exhibition specimens might confidently be expected, since the vendor, if a reputable breeder, would mate the birds with due regard to their merit and demerits. The novice desirous of making a good start can, therefore, be recommended to place himself in the hands of a breeder of recognised standing, and should study his advice carefully.

A less expensive way of making a start is to buy a sitting of eggs from the owner of a first-class pen of birds. For the sum of one to three guineas the novice not only obtains the eggs, which should yield him good chickens, but at the same time reaps the fruit of the exhibitor's skill and experience; for the exhibitor by mating his birds to produce the best results, accomplishes that which is quite beyond the power of the novice, who recklessly and at haphazard purchases prize-winners at a show for no other reason than that they are prize-winners.

Birds intended for exhibition must be hatched with due regard for the date of the show at which they will figure. Without doubt a pullet when just about to commence laying looks as well as she ever will in the course of her life, and in classes for young birds, exhibitors endeavour as a rule to manage that their birds shall be penned at that psychological period. Since males generally take slightly longer than females to mature, early broods have to be hatched out for the cockerel classes.

The feeding of chickens intended for exhibition must be regulated with very careful regard to circumstances, though it need not differ essentially from the feeding of utility stock. The use of oatmeal, milk, ground oats, bone meal, good red wheat and groats assists largely in obtaining size. Sometimes, however—as in the case of

the breeder of bantams—it is the desire of the exhibitor to restrain large growth and frame. In such cases bone-forming foods should be withheld, and the diet should be of bulky rather than nourishing qualities. Canary seed, dari, swiss milk, rice, wheat and prepared chicken foods can be given.

When heavy feathering is required the constant use of biscuit meal is beneficial, and if birds require pushing along in order to reach maturity by a given date much can be attained by feeding at night by artificial light. In mid-winter when the days are longest, even two such meals are necessary, and it need hardly be said that at all times of the year the morning meal should be given as early as possible.

Chickens that drag along and do not make good progress should be examined for lice and other parasites. Vermin are often solely responsible for slow growth, and if prompt measures are taken, things will soon right themselves. Occasionally a change of food and surroundings does much to renew the vigour of flagging chicks. It must be remembered, however, that it is a matter of the greatest difficulty to make up for much lost time, and any set back to exhibition stock is very serious.

A well-shaded pen is an essential for all exhibition fowls, for it is unfortunately the case that all the choicest merits of a bird, which have been bred with the greatest care and difficulty, will quickly vanish unless the utmost care is taken to preserve them. Hot sun will fade and mar the colour of plumage; wind and rain will crease and redden the purity of earlobes; dry soils will bleach tinted shanks. The protection of exhibition birds throughout the year from the evil effects of the elements is, therefore, a matter that demands all the care and skill of the fancier. Pens of grass should be kept well-mown, and this is especially important where breeds with heavy foot-feather are concerned. Their houses and sheds should be bedded with the cleanest short chaff or similar litter. A large supplementary run in which

birds can be allowed exercise at the owner's discretion is always useful. It is inevitable that throughout an exhibition fowl's life somewhat unnatural conditions should prevail, at the same time every effort must be made to minimise the effects, if breeding operations are to be carried out successfully.

The exhibitor of large-combed breeds, such as Leghorns or Minorcas, knows well with what difficulties he has to prevail in this direction. Over-heated brooders, too much animal food, or too forcing a diet, often produce in a promising cockerel an over-developed comb, which falls to one side. Prevention is vastly better than cure, but sometimes it is necessary to remedy the evil by comb-guards such as are sold by poultry specialists for the purpose.

The colour of a comb being mainly an indication of a fowl's health it follows that in the show pen this is an important point. A regular and liberal supply of green food will often improve a dull-coloured comb, and sometimes an iron tonic is beneficial. When, however, a dark comb is due to liver disease, or other serious ailment, much more active measures must be taken before the bird can be considered fit for the show pen.

Breeds possessing large, white earlobes need careful and special treatment to maintain this point in perfection. Penning the birds in a dark run will help to bleach weatherstained lobes, and the careful application of milk and water wash, followed by a drying and dusting with violet powder should effect improvement. The restoration of lobes that have become much creased, stained or reddened is, however, almost an impossibility.

The shanks of all exhibition fowls, but more especially the yellow-legged breeds should receive occasional attention. A wash with warm soap and water, and the application of a little sulphur ointment, helps to keep the scaly-leg parasite at bay.

The exhibitor who has but small space at his command should weed out at an early age all chickens unlikely to develop into good birds, but a novice should not rely

on his own unaided judgment, since many a champion in the show pen has given but slight indication of the merit he was to develop.

The tyro must be warned against the deplorable practice of over-exhibition of a good bird. If the fowl is intended for the breeding pen, such a policy is disastrous. The tax upon a fowl's system when the bird is sent from show to show, is great, and is certain to exercise a very ill effect.

About a week or ten days before the show, it is advisable to pen fowls in a show cage and subject them to a little training. A stroking at occasional intervals with a judging stick helps to accustom an unshown bird to that implement. If the fowl is given a little food at the same time, it will become tame, and show to the best advantage. This taming is important, and, if not attended to, show day may find a fowl, which fully merits honours, in a cardless pen. Obviously a judge cannot be blamed for passing a shy, frightened fowl, whose ruffled plumage and terrified contortions, when the judging stick is introduced into the pen, give him no chance to determine its quality.

The question of colour-feeding for fowls is a vexed one. There seems little room for doubt that some exhibitors have improved their buff-plumaged fowls by the use of feeds containing cayenne and colouring matters such as canary fanciers use. On the other hand, various difficulties attend the use of colour feeds, and certainly in many cases more harm than good has resulted. Then, too, a colour-fed fowl is unsafe to breed from. The novice, therefore, who follows the example of hundreds of experienced exhibitors, and does not attempt to improve the colour of his birds in this manner, exercises commendable caution.

As regards the final treatment of fowls that are to be despatched to the show, little can be said. At that juncture serious faults cannot be remedied, and beyond a general process of furbishing up nothing can be done. White and light-plumaged fowls certainly are usually

washed first, and the skill and dexterity with which this is done is important, since the appearance of a fowl can be considerably improved. The feet and shanks of all breeds should be cleansed, the comb and wattles put in order and wiped over with a little salad oil, and the plumage smoothed with a silk handkerchief. These things being done, nothing remains but to send off the fowl in a strong exhibition hamper, to which a reversible label, containing the return address, has been securely attached. The straw in the bottom of the hamper should be thoroughly crushed to render it soft and yielding in order that no damage may befall the plumage of the fowl.

Competition being of the sternest order nowadays, little surprise need be felt by the beginner if first efforts are fruitless. They should not, however, be regarded as wasted. The experience afforded should in the end bring success, none the less appreciated for the delay.

**Aspects of the Poultry-farming Question**—To most people the phrase "poultry-farming" seems to conjure up a vista of glorious summer meadows, bright with the golden and silver glory of buttercups and daisies, meadows over which flocks of healthy fowls range. In the background, thoughts of well-filled egg-baskets, and the pleasant occupation of throwing yellow grain to the birds, complete the prospect with its allurements. It would seem absurd to point out that fowls are not inevitably healthy, that the summer months are succeeded by those of autumn and winter, in short that the life of the poultry-farmer is far from being an ideal one. Yet many are apparently totally blind to these things. Indeed few subjects are enveloped in such a maze of misconception as is the subject of poultry-farming. To those in whose ears ring the optimistic phrases of so-called experts the British hen is hailed as the goal of the fortune hunter; to others poultry-farming spells the last resource of the weak of intellect to whom no profitable occupation is open. That both sides are

wrong must be obvious to those who can think. Poultry-farming affords no man the chance of making a fortune, neither is it a foolish and profitless business. For thousands of those who seek an outdoor livelihood, poultry-farming is one of the few possible occupations at which a fair income may be made. What the extent of that income may be depends almost entirely upon the characteristics and abilities of the poultry-farmer himself. Much as the vagaries of the weather may affect him, he is not at the mercy of the elements like the farmer. Luck need scarcely be considered as a factor in success. What the poultry-farmer sows nine times out of ten he will reap ; and if it be a poor or a plenteous harvest, to him alone can credit or blame be imputed. Doubtless the failures of many of those who would go "back to the land" are responsible for a prejudicial and far-reaching effect. Yet the success of such persons would surely be more of a matter for wonder than their failure. In ninety cases out of a hundred the man who has essayed poultry-farming without success, has committed several cardinal errors—errors of surprising magnitude and folly. The average British hen is incapable of paying rents, labour bills, and all other expenses, the while she leaves a wide margin for profit. Certainly each individual hen on a farm should be capable of paying her keep with all other expenses and leaving a small profit over. Only foresight, knowledge, and common-sense, however, can secure that tiny margin of profit which amounts in the aggregate to the poultry-farmer's income. Knowledge above all is needed. Ay ! there's the rub. The poultry-farmer *must* know his business. Poultry-keeping is in itself almost a science, and an extensive practical and theoretical knowledge of all its intricacies is essential to success. Coupled to this the poultry-farmer must have some natural business ability. He must have common-sense, perseverance, and a head for details. Are these qualities in the possession of everybody ? Is it a matter for wonder, then, that hundreds have failed to make a livelihood



from fowls? The man who will be so foolish as to risk the whole of a little capital upon poultry-farming, knowing nothing of poultry-keeping, having nothing wherewith to support himself while he establishes the farm, can only blame himself for his own egregious folly. Does a doctor attempt the cure of bodies without a previous study of medicine, or a builder the erection of houses before acquainting himself with the elementary details of his craft? Does a business man launch out into commercial activity without sufficient capital even to live upon? Yet the unsuccessful poultry-farmer, who has committed these follies, imputes his failure to anything but his own ignorance or stupidity.

It is indeed obvious that the would-be poultry-farmer must have sufficient capital to live upon during the first twelve months, since during this initial period his expenditure will far exceed his receipts. Again he must have sufficient capital to lay out an up-to-date and workable plant, to stock his farm, and to meet an occasional emergency. Houses, sheds, brooders, incubators, scores of yards of netting, bone-cutters, barrows, bins, stakes, tools, a few agricultural implements, and a host of small items, will be absolutely necessary. With the utmost economy, with the cheap purchase of many appliances second-hand, and with the home construction of many necessaries, one hundred pounds will not go such a long way in initial expenditure. That sum, at all events, may be regarded as the minimum which can be spent upon equipping a poultry-farm of any dimensions. It can easily be understood, therefore, that when an additional hundred pounds is put to this for living and working capital, the sum of £200 is by no means too much for the poultry-farmer to start operations upon. It should be clearly understood that the occupation of poultry-farming is hardly open to the man with no other possessions than health and a pair of strong arms. That is to say, if he would be his own master. To those, however, who are possessed of capital to the extent of or beyond the amount mentioned, a fair living should

be assured, this, be it understood, premising that the poultry-farmer is not only well up in all the details of a none too easy trade, but also finds the work congenial.

Upon this latter head a few words may well be spent. As has been mentioned previously, the occupation of poultry-farming is not all *couleur de rose*. Indeed, the work is occasionally hard, and at all times exacting. Fowls need no less attention upon Sundays and holidays than upon week-days, and the poultry-farmer, who works single-handed, will indeed have an unenviable and ceaseless routine of labour before him. Much of the work, too, is far from fascinating, and this has much to do with the disillusionment of many people who could not fail to find such labour irksome and uncongenial. In addition the vagaries of the English climate greatly increase, during most months of the year, the poultry-farmer's discomfort. Come rain or snow, storm or shine, the work of the farm must proceed in unbroken regularity; stock have to be fed, eggs collected, young chicks attended to, brooder lamps trimmed and filled. Work that is simple enough in fine weather becomes unpleasant, distracting and difficult under other conditions. Yet neglect or postponement of duties inevitably brings disaster.

To turn to the reverse side of the medal, however, much of the work of poultry-farming is interesting and pleasant to a degree. The open-air life is healthy, and the mysteries of breeding, of incubation, of the wonderful and rapid growth of young life, dispels monotony, and offers unending fascination to the thoughtful. Room for original research and scientific experiment exists, scope indeed for all the talent and skill of man.

The poultry-farmer who would best justify the title should not ignore other branches of industry that may be worked in connection with his feathered stock. To some people a poultry-farm appears to lose its claim to the name when this is done. But the reasons why the term poultry-farm should be construed so narrowly are

difficult to find, if indeed any exist. Be that as it may, many a poultry-farmer finds it of mutual benefit to himself and his land to raise hay or cultivate good fruit trees. Bees, pigs, etc., can also be kept, or the fattening off of sheep undertaken. These subordinate branches are undoubtedly of the greatest help in bearing the burden of rent for many acres, and in no way do they interfere with or displace the poultry. To disregard them is undoubtedly a serious mistake. Most of the large poultry-farms in England devote special attention to the instruction of pupils. At such places knowledge of the up-to-date and best appliances, and the general routine work on a farm, can best be obtained, and an excellent training thus gained at a small cost. If the pupil places his services at the disposal of the poultry-farmer the premium is usually lowered, since the labour, unskilled as it may be, is of some value.

Certainly, the prospective poultry-farmer must obtain some kind of practical experience. Theoretical study is indeed of little value unless thus supplemented, and no man should be so mad as to start a poultry-farm with only a few hazy ideas obtained from reading books on poultry. Six months, or at least three, on an extensive poultry-farm would impart sufficient knowledge to make that vital difference between success and failure. Such matters as the suitability and value of foodstuffs, the details of artificial incubation, the care and control of stock, the signs and prevention of disease, the marketing of produce and methods of economy must all be thoroughly understood before a practical farm can be run with success.

A few farms in England are run entirely with a view to the instruction of pupils, and at such establishments hatching, rearing, fattening and other branches of poultry work are carried on irrespective of season. Chief of these is the farm at Theale, in connection with University College, Reading, and some half-dozen courses take place during the year. Examinations are held at the close of each, and certificates of merit granted. Most,

if not all, of the County Council Poultry Lecturers hail from this farm, and possess one or other of its certificates.

Upon the best mixed utility and exhibition farms pupils have unrivalled opportunities of learning all details connected with the running of such establishments, and in addition ideas can be gained as to what affords the best opening, and in which direction fields for enterprise exist. Much that is learnt at these farms cannot of necessity be taught at places which exist solely for the instruction of pupils, and the converse of this also holds good. The man, therefore, who wishes to base his training upon a firm foundation cannot do better than take two courses comprising each kind of education. The extra outlay would be more than compensated by the gain in knowledge.

It is well for the poultry-farmer in embryo to have some idea of the particular line to which he proposes to devote himself, so that during his apprenticeship he may pay particular attention to anything connected with it. Undoubtedly poultry-farms which make a speciality of exhibition birds pay as well as any. The best show specimens fetch large prices, and eggs for incubation sell well, while even mismarked pullets are worth as much as average utility stock. It should not be forgotten, however, that the expenses of a big establishment for breeding show stock are heavy, that it takes time and skill to establish a name in the Fancy, and that profits are proportionately slow in appearing. Other poultry-farms do well over high-class utility stock, day-old chicks, eggs for incubation and consumption, and table fowls. Layers bred on the recording nest system fetch good prices, and the males are greatly in demand for improving the laying qualities of other stock. A good strain of layers, however, is not built up in a day, and a poultry-farm conducted on these lines would earn little the first eighteen months. Farms devoted entirely to the raising of flesh and eggs for table are few in number in England. The general farmer is

most advantageously situated for such enterprises, and he it is who is usually concerned in them.

Nearly all first-class farms combine several branches, and find that by dovetailing them in, economy and in consequence increase of profit is obtained. The sale of young surplus stock for Surrey and Sussex fatters is found remunerative on many farms, and this seems capable of extension. Surplus utility cockerels, which find no sale for breeders, are utilised as table birds, and so on. The rent of land at 20s. to 30s. an acre should not prove too heavy a burden for the poultry-farmer, but of recent years a new method has come largely into use. For a small annual payment the farmer allows the poultry-farmer to run birds on his land, the value of the manuring which the land receives being taken into account when estimating the poultry-farmer's indebtedness. In this way an unlimited amount of fresh untainted ground is at the poultry-farmer's disposal, and in many circumstances the method is of much mutual benefit.

The increase of attention now devoted to the poultry-keeping industry, the unfailing demand for poultry flesh and eggs, and the continuous improvement in appliances and methods, all tend to the betterment of the poultry-farmer's lot. But to win a livelihood from fowls—as has been said before—the work must be found congenial, and a keen business instinct, allied to perseverance and knowledge, must be brought into play. Without these qualifications no man can honestly be recommended to take up poultry-farming.

**Some Aspects of Amateur Poultry-keeping**—How often does it not happen that some one or other of all the ills that poultry flesh is heir to befalls the fowls of the amateur, who has just started poultry-keeping, and is thereby tempted to relinquish in disgust a fascinating hobby.

For the first few months, perhaps, all has gone as merrily as the proverbial wedding bells. The egg-basket

has been regularly filled, the fowls have scratched in bright-combed comfort. Then, imperceptibly enough, disaster sets in. One by one the fowls cease to lay, and the egg-yield diminishes to vanishing point. In despair the poultry-keeper resorts to some form of spice. Once more, it may be, success seems to smile, and the egg-basket is called into requisition. But fowls, like other animals higher in the scale of creation, cannot make bricks without straw. The powerful spices and stimulants have the effect that a little thought might have foretold. The egg-organs of the birds, forced into work beyond their capacity, become weak and enfeebled, and general ill-health and debility of constitution set in. The germs of roup, tuberculosis, and liver disease find an easy entrance into a body so ill-armed against attack. Thus matters pass from bad to worse till in the end an epidemic ravages the fowl-run, leaving the unfortunate poultry-keeper to declare that most certainly "poultry do not pay."

Now to enquire into the further causes of such misfortune, which, it may be emphasised, is by no means exaggerated. In the first place it may be positively laid down that by common-sense, care and precaution, fowls can be kept, even in unfavourable circumstances, in perfect health with little trouble. But several points of cardinal importance must be borne in mind. Only fowls of indisputable healthiness should be introduced into a run; and to safeguard against the treacherous attacks of hereditary disease, the birds should come from the yards of a reputable dealer. Indeed, if fowls are to be kept at all, it is the wisest course to keep either pure breeds or good first crosses. It is courting failure and disappointment to house and feed weakling, degenerate mongrels of the type so often met with in amateur's runs. The in-bred, haphazard parentage of such creatures foredooms them to diseased and useless lives. But with well and cleanly bred stock no more is necessary than to feed, house, and water properly in order to attain full success.

As regards feeding it is more easy to go astray than many amateurs suspect, more especially in the matter of giving too much. It is impossible to lay down hard and fast rules as to quantity, but generally speaking, in confined runs two full meals a day are sufficient. But a better method is to give a half ration in the morning early, and to ensure exercise for the flock by allowing them to scratch for buried grain about eleven o'clock. The golden rule in feeding is never to allow a fowl to eat as much as it may care to. In a measure, fowls should always go hungry away.

The giving of greenstuff is a matter which demands no more than ordinary care. If it be supplied regularly few fowls will eat to excess; but an irregular supply by its intermittent action upon the bowels is often provocative of distinct harm. Next, and of equal importance, comes the question of housing. Many of the ills that fowls experience are due to faulty housing, and the amateur would do well to pay great attention to the matter. Efficient ventilation without draught is essential, and so is rigid cleanliness in the matter of removal of the manure, which should be done at least twice weekly, if no absorbent litter be employed. The walls of the house should be regularly limewashed in order to keep insect pests at bay. Overcrowding is always injurious to the birds' health, and an allowance of at least two square feet of floor space per bird should be made. It is a sure sign that sanitary perfection is not attained within the fowl-house if the slightest impure odour is detected. To sum up, it may be remarked that the prime needs of fowls in health are good food in the right quantity, pure water, exercise, well-ventilated and roomy houses, plus regular care and attention. An ailing bird should always be quarantined without delay; that barometer of fowl-health, the comb, should be watched sedulously, and if paleness, mauve, black or other ominous colour becomes apparent, immediate action should be taken. Keep an eye on the fowls' evacuations, and if dysentery, intestinal inflammation

or worms be discovered in this way, obtain prompt advice and treat accordingly.

Lastly beware of overcrowding the birds in a confined run. The correct number that may be kept in a limited space cannot always be easily determined, since many factors need to be taken into consideration ; but as a rough guide sixty to the acre will serve as a basis of calculation. Considerably more would be possible where removal of manure, either by natural or artificial means, took place ; and in some cases even a smaller number might be advisable.



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