NEW MANAGEMENT METHODS PAY
WITH
POULTRY IN ORISSA

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ANIMAL HUSBANDRY DEPARTMENT
ORISSA
# NEW MANAGEMENT METHODS PAY WITH POULTRY IN ORISSA

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Contents may be republished in full or in part provided full acknowledgement is made.
This booklet has been prepared for the Expanded Nutrition Project in Orissa. This project is a joint operation of the State Government, UNICEF and F. A. O. of the United Nations. It aims at improving nutritional standards for people in the State, particularly in regard to the supply of protein foods. Included in the project is a poultry development plan to increase egg and poultry meat production, and to popularise the consumption of these products. A further object is to indicate the possibilities of expansion of private poultry-keeping as an economic venture and to encourage the establishment of small but viable units by the people.

The new practices, which are described in this booklet, have been tested on the Government farms and poultry centres and proved successful. If they are adopted widely and carried out carefully, the production of poultry products in the State can be increased manifold at a comparatively low cost. The feeding and handling methods outlined between the main, two aims, firstly to make use of the existing facilities so as to produce low-cost poultry feed and secondly to reduce the labour-cost involved. This useful booklet has been prepared by the F. A. O. Poultry Production and Management Adviser of the F. A. O.-UNICEF team assisting the project, Mr. Allan A. McArdle, and the Poultry Development Officer of the Animal Husbandry and Veterinary Services Department of the Orissa Government, Shri J. N. Panda. It is hoped that those who are interested in poultry-keeping will find this booklet instructive and helpful in the solution of practical problems and in the setting up of economic poultry units.

NEW CAPITAL
The 18th January 1961

M. RAMAKRISHNAYYA
Development Commissioner, Orissa
Firstly—The former practices of people mixing their own frequently unbalanced feed, or managing to obtain a balanced ration by dint of considerable inconvenience and work with feeding the birds several times a day, plus the labour of cleaning out sheds daily, did not make poultry an attractive proposition. Egg returns were frequently too low in relation to cost of feed, and returns were not sufficient give an adequate return for this and the labour involved. The new methods have completely altered the approach. The Government, through its Animal Husbandry and Veterinary Department, have established a system of mixing balanced feed for their own centres and also for supply on cost basis to private operators. Due to bulk buying, coupled with the correct balancing of the ration being prepared, this is making feed available at 25 per cent less than former costs on ordinary basis, and these feeds are giving increased laying results. They have the great advantage of being used as dry feed, which means that with a suitable type feeder—and the all mash ration—birds need only be given the feed once a week.

Secondly—This has been combined with the introduction of a housing system new to Orissa—that of keeping birds inside a shed without giving any run at all. This is by using what is termed the deep litter system. This has been shown as very successful. The birds and eggs are safer than with shed and yard or open range system, and the laying results are excellent, when sufficient space is given for the birds. The shed is not cleaned out for a year and remains in sanitary condition. This has completely changed the technique of handling poultry with labour being greatly reduced.

Thirdly—This has been combined with a further innovation—that of cross breeding between the pure breed improved lines. This has further increased poultry profits because the cross bred progeny are easier to handle, and lay many more eggs than the purebreed lines they are bred from—due to hybrid vigour—and at no extra cost.

Fourthly—The new housing methods result in a by product being obtained with the poultry kept in this way which will have a very considerable impact on sections of our agriculture in this State.
Due to the keeping of the birds on this deep litter system (explained in the booklet) a dry compost action occurs, and as a result a valuable organic fertilizer can be obtained, which, by the time the shed is ready to be cleaned out at the end of the year, has increased in value to about 3 times that of cattle manure and a quantity of approx. 1 ton or 1000 kilos can be obtained per year from each 40 birds housed in this way. The combination of these four points, which are covered in Part I, is giving a marked stimulus to poultry keeping here, where correctly used (like all parties in agriculture there are certain rules to follow) and this booklet gives a guide to the use of these methods, combined with the use of management points set out in Part II. As a result of these new practices it need no longer be a matter of “keeping” poultry they can “help to keep” the villager, householder or larger type operator. The Poultry population in Orissa was listed in the 1956 Statistics Census (reference “Poultry Development in India”, Halbrook E. R., Ram Tulsa) as just over 5 million of which about half would probably be laying birds. The estimated consumption of eggs in the state was about 12 per person per year: this is a higher figure than the general average for India. The Poultry industry is one which can be of increasing value to the State. With only a moderate increase to 6 million layers and coupled with the use of the new husbandry methods, in a short period, food supply can be considerably expanded, and the total industry value could increase from the present estimated 4 crores of rupees to over 10 crores of rupees for eggs, meat and value of agriculture fertilizer produced, and this can be much further expanded in the future.

A. Mc A.
J. N. P.

Foot-note—This booklet gives basic information as a guide for students, villagers, householders and small commercial operators alike. For those desirous of gaining further information on various breeds, feeding background, also larger scale commercial practice of poultry production the reader is referred to—

“Poultry keeping in India” (Naidu. P. M. N.)
Indian Council of Agricultural Research Publication.

“Poultry Management and Production”
Australian Agricultural and Livestock Series.

(Mc Ardle Allan. A.)
SUMMARY

A brief summary of the main points in this booklet—

1. A basis for assessing economics of poultry in Orissa for the villager, householder or larger commercial operator is given as a ready reckoner—a payable margin exists on present production basis possible with good management, when the net price of one dozen eggs can buy 12 lb. of balanced poultry feed (or when the price received for one egg equals the price of poultry feed per lb.)

2. Balanced feeding rations which are efficient for chickens and egg producing stock, and at the lowest cost possible with present feeds available, are set out. These are at present being made available at cost through Government sources. A special concentrate mixture for villages to use in conjunction with birds on range is also being supplied at cost. Suggestions are given for villagers on using of local foodstuffs for poultry.

3. Intensive housing deep litter practice for poultry is described. Small unit pens are indicated as giving the best result. This method of keeping poultry is safer and more efficient than with bare floor houses with yards or birds on open ranges. It reduces the area needed for poultry very greatly and labour with cleaning out sheds to only once a year. It is giving very good results where handled correctly. Plans of houses suitable for these purposes ranging from houses of local materials to large sheds of solid construction are given.

4. Cross breeding of poultry between improved lines is discussed, and indicates that a much higher laying result is possible than with the pure breeds. The introduction of male birds from these crossed lines to villages for up-grading purposes with local desi stock has advantages which are outlined.

5. Built up deep litter is being shown as of considerable help to agriculture. When handled correctly the deep litter build up, on a dry compost basis in the intensive sheds, gives approx. one thousand kilos or one ton of fertilizer from each forty birds in a year. This fertilizer has an estimated value three times that of cattle manure, and 3 hens can provide equivalent value of fertilizer to that obtained from one average type village cow.

6. Some management points covering incubation, rearing of stock, meat production, culling, roosting, nesting, feeding, and watering needs for poultry and how to prevent diseases are given.

7. The value of eggs in the diet, and marketing needs, is discussed.

8. The new methods are cheap, simple and easy to introduce. They only mean that rules for a different way of using the poultry shed, and mixing the feed, need to be followed. Correct use can double the former returns obtained with poultry here.
Reference is made to publications for complete information on many of the aspects dealt with the references being "Poultry-keeping in India" (Naidu P. M. N.) (Indian Council of Agricultural Research Publication) "Poultry Management of Production". (Australian Agricultural and Livestock Series. Mc. Ardle Allan A.).
PART I

ECONOMICS OF POULTRY IN ORISSA

Costs based on the Orissa Expanded Nutrition Project and Government and private farm results under conditions in this State

For the private operator wishes to run poultry as

* a village or household operation.

Or

* a sideline unit on a farm.

Or

* a commercial operation as a means of livelihood.

then

the costs and returns given are an average guide.

Note—Costs and returns are given on per bird basis. This makes it easy to check for any number of birds. When the new management methods as set out in this booklet are used with the raising of chickens, and the handling of the layers combined with the correctly balanced feed it will be possible for careful operators to show better returns than those given when the same prices apply for eggs and birds sold. THE NEW METHODS ARE CHEAP, SIMPLE AND EASY TO INTRODUCE. THEY ONLY MEAN THAT YOU FOLLOW THE RULES FOR A DIFFERENT WAY OF USING THE POULTRY SHED AND MIXING OF THE FEED. WHEN USED CORRECTLY, THIS CAN DOUBLE THE RETURNS WITH POULTRY HERE.

A Ready Reckoner — The whole basis of profit or loss with poultry is feed used to produce a dozen eggs. To convert an American measure for checking as to whether a payable margin exists for poultry, and using Orissa costs and likely level of production, (ninety eggs in 7 months and 140-150 eggs in 12 months for pullets) a good profit can be made when the net price of one dozen eggs will buy 12 lb. of balanced feed, or 1 egg will buy 1 lb. feed. This covers for all costs.

Costs

Cost of housing investment—If constructing own laying houses with cement floors and dwarf walls, asbestos roof etc. purchasing material and engaging skilled labour, should erect all the plant for approximate rupees 15 per layer carried. This would construct sheds which would be regarded as having a life of 30 years. (If we approach this question from a complete business basis then we would allow 10 per cent depreciation on the plant, and maintenance allowance. This would be $1\frac{1}{2}$ rupees per bird per year. This is quite a heavy allowance, many operators may consider that they would not allow as much). For a villager if a shed was made with a rammed earth floor set on a well drained spot and a well made thatched roof results could be quite good and investment costs could be only 3 to 5 rupees per bird.
Cost of rearing the pullets—Raising pullets after buying as day old chickens at ½ R. each, making allowance for possibly some loss on the cockerels when sold at a few months of age, (but they may show a slight profit) and feed eaten will be about Rs. 5 total cost per bird (with the operator supplying his own labour of caring for the growing birds).

Some allowance for General working expenses—For a commercial unit electric power, transport charges incidental repairs to plant and contingencies must be allowed for on a strictly business basis, and would be well covered by 1½ rupees per bird. The villager or sideline operator or householder in the city would not incur direct expense to any extent for these items would possibly only have to allow ½ R. per bird, or less, per year.

The Feeding cost for layers for 7 months period—Based on the consumption at the centres, and at the Government farms, where this has been carefully checked, this will not exceed, on present cost of ingredients, 1 R. per month when using the prepared all mash feed available. For 7 months lay this means Rs. 6—Rs. 7 per bird. The villager using the concentrate mixture would only spend about ½ R. per month provided the birds had good range. If he kept them intensively to gain all the valuable manure he could keep it down to ¼ R. per month with grains of his own available, if not, and he used the full feed, his costs would be the same as set out.

RETURNS

Money received for eggs and birds—When obtaining the rate of lay as for the Orissa project of 90 eggs in 7 months, then at 2 rupees per dozen this would give Rs. 15 (many of the Government centres obtained higher lay than this, at least a dozen eggs more in which case it is Rs. 17). Sales of birds when finished laying, where the sale of the stock at end of the 7 month period is carried out, (after deducting 15 per cent for normal mortality, which means that you can expect to loss 3 or 4 birds from 24 birds over a year) could bring about Rs. 4 per bird.

Poultry Manure—built up deep litter sales—This is a very valuable side line product for sale or for use on the farm and thus saving equivalent cost of fertilizer (its properties are covered in the section of deep litter). Possible production is about 50 to 60 lb. per bird per year. Twelve birds can give about 6 cwt. (or about 8 maunds) which would be worth on suitable market basis about Rs. 2½ to 3 per bird. Now to bring all these costs together.
SUMMARY AS BALANCE SHEET PER BIRD

WITH COSTS RANGING ACCORDING TO WHETHER VILLAGE OR HOUSEHOLDER operation or Commercial Operator

<table>
<thead>
<tr>
<th>Costs Per 7 Months Period</th>
<th>Returns Per 7 Months Period</th>
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<tbody>
<tr>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Cost of housing—allowance for interest 7 months lay</td>
<td>15 R-17 R.</td>
</tr>
<tr>
<td>and Depreciation $\frac{1}{2}$</td>
<td>$1\frac{1}{2}$ R.</td>
</tr>
<tr>
<td>Cost of rearing the pullets (without Sale of bird labour)</td>
<td>4 R.</td>
</tr>
<tr>
<td>5 Rs.</td>
<td></td>
</tr>
<tr>
<td>Allowance for working $\frac{1}{2}$ $1\frac{1}{2}$ R.</td>
<td>Manure sale .. 2$\frac{1}{2}$ R.-3</td>
</tr>
<tr>
<td>Expenses etc.</td>
<td></td>
</tr>
<tr>
<td>Feed cost of layer for 6-7 R.</td>
<td></td>
</tr>
<tr>
<td>7 months total Costs .. 12-15 R.</td>
<td>Total Returns .. R. 21$\frac{1}{2}$-24R.</td>
</tr>
</tbody>
</table>

Margin over costs in 7 months according to allowances made varying from Rs. $6\frac{1}{2}$—12 average about Rs. 9 per bird.

12 MONTH Operation

If birds kept for 12 months another 5 months (with extra care taken over the hot months) the lay may be about another 4 to 5 dozen eggs. Egg prices are usually a little lower at this time so returns could be about 7-8 R. and feed cost about 5 R. so another 3 rupees per bird could be possibly made (as other charges remain the same).

Comment—So we have the situation, when these egg and feed prices apply, that, for an investment cost ranging from 3 R to 15 R. and up to 30 R under contract conditions per bird housing, apart from 5 R. per bird to raise the stock before returns start, (most of rearing cost recouped when the birds sold at end) where we could expect (1) a villager to clear Rs. 50 to Rs. 75 over the 7 months from 12 birds (including the value of the deep litter fertilizer (6 Cwt.) (2) a sideline operator with 60 birds to clear about Rs. 400 to Rs. 600 R. (3) Commercial operator with only 200 birds could possibly clear about Rs. 1,200 to Rs. 2,000. This number would not take a great deal of labour with ready mixed feed and deep litter intensive housing practice. Many more birds could be handled by an efficient operator.

Further comment on these costs and returns—Even if returns for eggs were less, say $1\frac{1}{2}$ R per doz. and other returns were also below these examples, the careful operator could still show a margin of Rs. 4 to 5 per bird. This is still a reasonable return for and in relation,
to, the investment made. In effect Rs. 5 to Rs. 15 per bird capital cost for housing can be nearly cleared in one or two years operation. This represents good return for investment labour and management.

To summarise. With correct management and use of the new practices, it is possible to make from Rs. 4 and up to Rs. 12 per bird according to prices received. The investment, according to whether home built of local materials to sheds designed to last 30 to 40 years, and whether built by self or by contract, can range from Rs. 3 to Rs. 30 per bird.

The villager or household wishing to run poultry for home supply of eggs and fertilizer only—A villager or household may wish to handle poultry—say 12 layers—just to provide eggs for his family (instead of selling eggs) and manure for his land. He could build his small intensive pen 8 Ft × 8 ft. (of local materials earth floor split bamboo sides and thatched roof over hanging well on all sides to stop rain driving in (See plan given) and his cost would be very low. He would have to out lay about 50 R. by the time he raised the pullets and then should get at least 1½ dozen eggs a week (but could probably get about 3 doz.) for home use for a feed cost of 1½ to 2½ rupees per week if he bought nearly all the feed. With small reject grains available to use with the concentrate mixture this might be only ½ to 1 rupee per week. At the end of the year he should get back or have value of about 40 R. for the birds for meat and have about 6 cwt. (8 maunds) worth about 25 to 35 rupees—of valuable built up deep litter fertilizer. So his total expenditure for the year would be just over 1 R. per week, after crediting the sale of the birds and value of the fertilizer. For this he can obtain about 1½ dozen eggs and possibly 3 dozen eggs per week.

Alternatively—he can use free range in its simplest form, and have some eggs, birds and fertilizer, or even make 2 or 3 rupees per bird with a night shelter and use of concentrate mixture only. See plan of night shelter.
THE SUPPLY OF BALANCED POULTRY FEED IN ORISSA AND HOW IT WORKS

The 12 to 16 ingredients (according to supply of different grains, lucerne or clover meal and fishmeal or meatmeal at competitive prices.) are assembled as the Government Centres. After crushing as necessary, the balanced rations are mixed in the UNICEF mixing plant—under supervision—being prepared according to the formulae shown in the booklet.

Prepared balanced all mash or concentrate feed—distributed to the block centres and dispensaries and in turn to the Expanded Nutrition Centres, and also extra supply is made available to private operators at cost price.

Placed in dry form in waste saving feeders for the poultry—refilling only once a week—if a large enough feeder used.

RESULT

(If handled correctly—and with intensive sheds using deep litter practice).

<table>
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<th>40 LAYERS PRODUCE IN YEAR</th>
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<td>5,000 eggs (285 Kilos or 625 lbs.)</td>
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Why should feeds be balanced for Poultry? This is one of our most important subjects with poultry, but many people give it very little attention. Because of this they get very poor results with their birds—they just throw them some grains and then say it is not worthwhile keeping poultry—do not get enough eggs to pay for feed. They are quite right when poultry are fed that way. They may have been told by a poultry officer “you should balance your feed” but because of their experience with feeding the grains may say that it will cost more money. They do not realise that many of the suitable protein rich extras in this State are just as cheap as many of the grains, and their inclusion at the right level does not make the feed cost more, but it can double the number of eggs. (One experiment in Australia with birds of same breed, same hatching reared the same way, and put into 8 groups on each treatment gave the following results. 8 groups on grains only, and green feed when available in natural season, averaged 90 eggs per bird in a full year. They nearly paid for their feed. 8 groups on a feed of grains and protein added to balance correctly, and green feed provided, and with total feed cost no more averaged 180 eggs per bird in a full year. These showed a good margin of profit. The same situation can apply here. Unless the feed is balanced as we term it—this means it has the right proportions of ingredients needed in it (just like a motor car must have the right proportions of air and petrol in the engine to make it work correctly and economically) then a great deal of the feed is just wasted it is not used to produce eggs.

How to work out feeds needed—We will give you an example of how to work out the main item which is usually missed with poultry feed—the correct protein level. There are many other things needed also. Of course it is admitted that if birds had green pasture available to roam or all year they will get the Vitamins A and B2 from the greenfeed and if plenty of sunshine they would get the Vitamin D3.

They could get hard grit from the river (to help the gizzard grind the feed) and they could get calcium from bones broken up and lying about. They could get some animal protein from the manure of the cattle and extra needed protein if they found meat lying about plus some snails, white ants, and so-on. If all these ideal conditions prevailed they could get by and do quite well but how often does it happen this way? and for how long in the year? So we make a feed, and remember it does not cost more than the good quality grains, which contains all the things we need. When you thing of the items just mentioned, and they are only some of those needed—you can realise that the statement often made “half the breeding goes down the throat” (in the feed given to the bird) is very true.

Even when you obtain good birds, they cannot lay the eggs they are capable of unless they get the right feed—just as a plant cannot grow well unless it has water the right soil and fertilizers.
Now we will deal with the example we spoke of earlier—protein (if you are a keen student of this feed question, and would like to know how to deal with vitamins minerals energy and so on in a similar fashion then you can find it in "Poultry Management and Production" published in the Australian Agricultural and Livestock Services).

How to check protein level—Taking a feed with grains only as an example a medium size bird eats about 1 maund feed in a year of grains (Whether maize, wheat kulthi and so on).

80 lb grain multiplied by the average percentage level of protein in the grains of 10 per cent or 10 parts in 100 parts. \(80 \times 10 = 800 \) parts with 80 lb. which means 10 parts or 10 per cent protein in each 1 lb. Now poultry need 15 per cent protein or 15 parts in feed to produce eggs (please accept this—it has been proved many thousands of times and all your poultry officers will tell you the same).

So how do we get this level?

You will already probably have arrived at the answer—we must add something which has a higher level of this protein we need. Well now to give us this we have in this country—we are most fortunate-plentifully available at a reasonable price an excellent vegetable protein ground nut meal. (The only thing it lacks is a particular type of protein we need in a poultry ration-animal protein—but we only need a little. We can get it by adding a little fishmeal or milk powder, or birds intensively housed get it from the built up litter, so it does not affect cost much when we put a little only in for this purpose-about 3 to 5 lb in 100 lbs.) Now the ground nut meal contains about 45 per cent protein level so now let us take the multiplication again. We still only went the 80 lb of feed so we will replace some of the grain with the groundnut meal. Now let us look at it on this basis.

\[
\begin{align*}
68 \text{ lb Grain} \times 10 \text{ per cent protein (or parts per 100)} & = 680 \\
12 \text{ lb groundnut meal} \times 45 \text{ per cent (or parts per 100)} & = 540 \\
\text{80 lb with total of} & = 1220 \\
\end{align*}
\]

This gives when we divide it \((1220/80)\) 15\(\frac{1}{4}\) per cent or parts of protein per lb. in the feed. This is sufficient, and the cost will be no more than with grains.

An easy rule to remember—Here is a handy "ready reckoner" or rule which you can tell your friends after having worked out this little problem. The ground nut meal and the grains weigh much about the same as one another, and notice that we took out about one part or portion in six of the grains, and replaced it with one part or portion of ground nut meal. So if your friends have laying birds running about the village picking up what feed they can just tell them this and you will make it possible for them to get more eggs so they will
thank you: instead of feeding all grains give one handful of groundnut meal with every five handfuls of grain and this will help to balance their feed and give them more eggs, at no extra cost (Where the meal is available readily).

Now we have worked out some feeds for raising chickens, feeding layers and for layers on range or with grains free choice. These feeds are balanced correctly in all respects, and if fed without any thing being left out will make it possible for you to get all the eggs your birds are capable of laying. These feeds will save all your feeding worries. They are at present to be supplied at cost through the Government.

After you have dealt with these we will give you some further hints on how to adjust feeds for different prices of grains if you wanted to mix your own, or for people who want to use some of the products which may be around the village. This may help if the correct feeds are not available, or if you want to use different grains with for example the concentrate feed.
Bulk feed mixing is the basis of the Government Poultry feeding scheme in Orissa. The use of the feed mixers is coupled with hammer mills to coarse crush the grains and meal-ready for use. Correctly balanced efficient completed all mash feeds, ready for use as dry feed without grains being feed and which will give maximum egg production are being distributed, as well as a special concentrate feed for village use. They are available at cost price, with contract bulk buying, thus making balanced feed available below the price at which poultry operators could buy and mix their own feeds.
EFFICIENT FEEDING RATIOS FOR POULTRY IN ORISSA

These following rations form the most economical feeds with current prices for products available in Orissa. Adjustments can be made with grains when available at competitive prices. The rations are given for chickens, laying and breeding stock as complete feed. Only green feed is needed in addition. A special concentrate type ration is also given which can be used by the Villager with birds running at large, or by the larger poultry man who has grains available on his farm. In this case he can get quite good results even without crushing the grains to make a full mixture. He puts the concentrate in one feed hopper and the mixture of grains in the other. The birds then balance their own feed—they only need to have green feed given to them. In the future we hope to have supplies of lucerne or clover meal and will include it at all times in the concentrate and the full ration. At present it can only be done in special cases. It will then be quite possible to handle birds without any green feed and a free choice feed hopper filled up once a week. The rations are to be provided at present at cost by the Government. (As the poultry industry expands it is expected that private firms handling poultry feedstuffs may become interested in selling prepared rations based on the formulae given here. Where prices are kept reasonable and efficiency of the rations maintained with Government checking as to mixing and inclusion of stipulated ingredients only and at correct levels, this can be expected to provide a satisfactory service). These costs are very much lower than if people mixed in the ordinary way because of the Government buying by contract in bulk quantities, and the efficiency of the feed for the birds due to its correct balancing for the purpose. The overall saving is more than 25 per cent on the former basis with poultry feed. If costs can be lowered further the savings will be passed on—occasionally meat meal may be available to include in place of fishmeal and so on.

These rations have been formulated by the authors to assist you. In brief—

(1) Use the balanced breeders and layers all mash rations as dry feed and no grains to be given, for adult birds—giving some greenfeed daily as the only addition. (as lucerne or clover meal supplies become available we will be able to include in the feed and save the need for daily greenfeed.) Greenfeed and lucerne meal level. 25 adults birds should have 1 gallon measure (4 ½ litres) of green feed daily. Chaffed if grasses, clover or lucerne. Spinach or cabbage leaves can be given whole. When lucerne meal or clover meal used in its place with the all mash or concentrate ration add 5 lb, and if possible 10 lbs. to the mixture. (A suitable way to give green feed is in a suspended wire-netting basket or one made of woven bamboo with openings in the sides).

(2) Use the concentrate mixture for adult birds when running on good range with ample pickings or intensively with free choice of grains and green feed given daily (This also may be altered in the future as for the all mash when lucerne or clover meal available.)
(3) For chickens day old to 6 weeks use the balanced ration as a complete feed but give green feed also. Adjust for 6 to 18 weeks growing stage by adding crushed grain or giving a little grain. (For meat raising see Footnote under Chicken Ration).

Footnote—Keep all feeds as fresh as possible or they lose value and efficiency. Weekly or fortnightly mixing is suggested.

Mixing of feed—Should an operator wish to use a mixer to prepare his own feed, one can be made cheaply and efficiently from a 44 gallon drum. A central axle-welded to the drum at each end where it passes through it finishes in a handle. The drum is set horizontally and turns on two wooden posts in the ground. The tops of these each have a half circle to carry the axle. A piece is cut out of the side of the drum, and a lid fitted—held by wing nuts for easy removal. The feed ingredients are placed in even layers, and turning at 30 revolutions per minute for about 5 minutes mixes 200 lbs. dry feed—enough for 100 birds for a week.
Village birds give more eggs for less cost with a concentrate feed

For the villager who does not want to use the complete ration because his birds run on range this type of ration makes possible very cheap feeding. The birds combine this with feeds available in the fields and around the village etc. to make a balanced feed. Many more eggs are laid by birds given this than when some grain only is thrown to them. Only 1 oz per bird each day (3/4 lb. for 12 birds) is needed. The cost on the basis quoted would be about Rs. 1/4 per bird each month. This cost is less than the grains usually given, but gives the increased eggs because the ration is better balanced. (The mixture can be available/at all times, to save putting out the needed quantity each day).

The concentrate feed consists of high protein ingredients, together with enough vitamins and minerals to meet the full needs of birds for these. It makes up 1/4 of their feed by weight. They can pick up the other 3/4 on good open range, but if range is dry and bare, then cereal grains locally available need to be given. Some rice bran can be used also-usually available in the village at an economic cost. The overall production will not match birds under intensive deep litter conditions on the complete all mash feed, but will show payable margin of improvement on results with range birds given grain only.

Note—This will make an efficient ration if the concentrate is placed in one feeder and possibly combined with rice bran grains are placed in another. The birds can mix their own feed reasonably efficiently. The only addition then is green feed.
CONCENTRATE FEED MIXTURE

USE AS DRY FEED (CAN BE GIVEN AS MEASURED QUANTITY DAILY OR PLACED IN A NON-WASTE FREE CHOICE FEED HOPPER)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Weight (lb.)</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground nut meal</td>
<td>15-(\frac{1}{4})</td>
<td>Can replace 25 per cent—50 per cent with meatmeal if available at competitive price.</td>
</tr>
<tr>
<td>Fishmeal</td>
<td>2-(\frac{1}{2})</td>
<td>Can replace with limestone grit.</td>
</tr>
<tr>
<td>Shell grit</td>
<td>3</td>
<td>If unavailable replace with 1 lb. fishmeal and 1 lb. shell grit (but use if possible).</td>
</tr>
<tr>
<td>Bonemeal</td>
<td>2</td>
<td>Use 1/8 inch metal screenings or fine gravel or spar中共 sand with fine portion sived out.</td>
</tr>
<tr>
<td>Hard grit</td>
<td>1-(\frac{1}{2})</td>
<td></td>
</tr>
<tr>
<td>Salt</td>
<td>(\frac{1}{4})</td>
<td>If unavailable can replace with shark liver oil, but contains much less D-3 and lacks B-2. (Also mix weekly when oil used and add (\frac{1}{2}) lb. bonemeal or shell grit).</td>
</tr>
</tbody>
</table>

* Vitamin A, D-3 and B-2 supplement. (to give 1625 A 300 D-3 and 1 p. p. m. B-2 in total ration per lb. sufficient with birds on good range with green pasture and some sunshine available).

** Complete concentrate mixture 25 lbs. On basis of costs to Government in 1960 mixed for Rs. 3\(\frac{1}{2}\) for 25 lbs.

This quantity is sufficient for a laying bird for 12 months when given as a supplement to birds with good range conditions or birds with grains free choice plus green feed daily.

** When good quality lucerne meal or clover meal available add 5 lb. to mixture to give total weight of 30 lb. can then be used without green feed. (Add 10 lbs. to give 35 lbs. if readily available).

* When birds housed intensively double vitamin supplement level also increase fishmeal by 2\(\frac{1}{2}\) lb. to 5lb. (double level) and reduce ground nut meet by same amount. Also if fed with all maize (or maize and wheat) add 1/4oz. manganese sulphate to the mixture.
BALANCED CHICKEN RATION

(To be used for Day old to 6 week old chickens only and fed dry. Also feed green feed daily or add 4 lb. lucerne meal to the mixture instead).

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>33</td>
</tr>
<tr>
<td>Ragi</td>
<td>10</td>
</tr>
<tr>
<td>Rice bran</td>
<td>24</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>5</td>
</tr>
<tr>
<td>Fish Meal</td>
<td>5</td>
</tr>
<tr>
<td>Ground nut meal</td>
<td>19</td>
</tr>
<tr>
<td>Dried Brewers grain</td>
<td>3</td>
</tr>
<tr>
<td>Bone meal</td>
<td>2</td>
</tr>
<tr>
<td>Hard grit</td>
<td>1</td>
</tr>
<tr>
<td>Vitamin A, D 3 B 2 Cal/Phos. base supplement (to give 3250 A, 600 D 3 and 2 p. p. m. B 2 in the mixture per lb.)</td>
<td>½</td>
</tr>
<tr>
<td>Complete ration</td>
<td>100 lb. (45 kilos)</td>
</tr>
</tbody>
</table>

This feed, on average prices to the Government in 1960, is mixed for about Rs. 12 per 100 lb.

COMMENTS

(1) Adjusted for higher protein basis and lower calcium level needed for chickens as compared with the laying and breeding ration.

(2) for pullets six weeks to 18 weeks old use the above mixture but with the addition of 24 lbs. of crushed grains (and 1 lb. shellgrit).

(3) A similar effect, if it suits the operator can be obtained by using the above mixture right through to 18 weeks but feeding ½ oz. grain daily per pullet from 6 weeks to 18 weeks of age (and giving a little shellgrit).
An operator can raise a pullet to laying stage for 20—22 lb. (10 kilos) of this feed.

**FOOT NOTE**

*Meat raising costs*—For raising cockerels for meat purposes take day old cost, and add cost of 12 lb. feed when raised to 3 months on this ration. To 6 month stage take day old cost plus cost of 28-30 lbs. feed to give a guide to costs *without labour*. FEED. For this purpose use the above mixture to 8 weeks of age, then as for (2) for 8 to 12 weeks stage. If raising cockerels to the 6 month stage then from 12 weeks to 24 weeks their feed can be the layers all mash ration. This will be quite efficient for the purpose.

**HOW TO CALCULATE VALUE OF SOME DIFFERENT GRAINS ALSO PROTEIN FEEDS AS A GUIDE**

If you could buy maize at Rs. 15 per maund and some one came with wheat Rs. 15 you might buy it instead for poultry, but it would not be quite an equal value “buy”. It has only 89% of the energy of the maize so it would be of equal value for poultry at Rs. 13.35 per maund because the birds would eat slightly more. A reasonable guide which is fairly close for feeds with a fair amount of fibre is the weight for any given measure. For example wheat bran only weighs about 2/5 of the weight of the maize by measure, and its energy value runs in about the same proportion that is 2/5 of maize. So if maize was Rs. 15 then if wheat bran was over Rs. 6 it would be costly more than maize because the birds would eat so much more. Paddy; if you had some on hand which you wanted to use for poultry would probably, for many samples, only run about just under two-thirds of maize in energy for poultry so, if maize Rs. 15 per maund then paddy would be dearer at over Rs. 10 per maund. Of course do not try and use all wheat bran for example if it was very cheap because the fibre level in the feed would be far too high only use bran up to about 30 per cent *maximum in the feed*. (Wheat bran could replace rice bran by half—not more in the ration given unless manganese sulphate added).

You can also check the protein feeds for price e.g. if fishmeal was Rs. 25 per maund (with 50 per cent protein level) and groundnut meal with 45 per cent protein level) was Rs. 15 per maund then naturally use as much of the groundnut meal as possible. You would only have to put about 3 to 4 per cent of the fishmeal in a mixture—the balance could then be made up with ground nut meal to give you the required level of protein (as example going back to the 80 lb. mixture before we would put 3 lb. fishmeal in place of 3 lb. ground nut meal, and leave the other 9 lb. ground nut meal and would then have the mixture balanced O.K. for protein level *and* animal protein). We have given these few examples mainly as a guide for the buying of grains if you wanted to feed them with the concentrate mixture (where you give it as ¼ of the feed (1 oz. per bird per day) and the balance from *good range* or you give 3 oz. of
grains per bird per day or give them free choice in a hopper. (Because of this energy factor we have spoken of birds do not eat more than their correct needs 4 oz. per day (if the feed is as formula with 4-5 lb. birds. Larger birds need more—also more eaten if low energy grain substituted) even if it is given free choice when the feed has been correctly balanced—if it is not they will eat much more than they need to try to maintain their bodily needs and lay eggs also).

There are many other factors also for example if maize and paddy were an equal buy on energy basis you would take the maize because it is the more palatable grain for poultry which all makes it look rather complicated. Because of this it will be a very much better proposition to obtain the completely balanced and prepared feed ready for use in dry form, through the Government sources. Your block or dispensary centre can be contacted about advice on the supply. You will realise that it is being supplied at cost of ingredients and mixing only, and because of buying in big quantities it is supplied much cheaper than you could possibly buy in small quantities and mix it yourself—even if you could get all the ingredients—and one item left out upsets the balance and reduces the egg laying. When making comparisons about feed remember to refer to the few hints given on energy basis and so do not compare bran cost only with the complete cost of feed or some item of that nature. The cheapest food for poultry is often the dearest because it does not give payable results—instead it only shows a loss. (If you are really keen on further checking the various energy levels—comparative cost basis and so on then refer to the publication mentioned before—"Poultry Management and Production").

FOR THE VILLAGE

A few extra hints for a villager who wants to collect local ingredients and can do it regularly and does not mind the extra work involved.

(It is possible—if all needed ingredients can be readily obtained—to mix a balanced feed which gives good production—it has been done in Orissa.)

THE GUIDE

1. Obtain waste grains if possible enough to give about 3 oz. for each bird daily so with 12 birds you need to have about 2½ lbs. of grains (try and pick grains which the birds like). The grains can be partly replaced (up to half) by rice bran.

2. Obtain enough protein sources around the village such as

(a) Meat from dead animals or alternatively meat offal if available. 12 birds would need about 1 ½ lbs. of meat or small fishes or frogs or snails daily to balance their feed. These can be boiled and fed in the feed.

Note—if you have an extra supply of meat over then try and preserve it. Cut it into thin strips, dip into salt solution, and hang in the sun to dry-keeping away from flies. This can then be kept and when to be used cut it up and soak in water. Feed a about one-third to half of weight above (½ lbs. for 12 birds daily).
If you mix feed dry this dried meat can be used ground up without any soaking.

(b) If enough meat, fishes frogs or snails cannot be obtained daily—Suppose only \( \frac{3}{4} \) lb. was available for 12 birds then it will be necessary to supplement from other sources for example.

(1) Add about \( \frac{1}{2} \) lb. to this of white ants—these can be dug out of the big mounds around the village and jungle.

(2) or use cowdung fly maggots. These can be grown by making small pits and filling with manure and kept damp. A little flour sprinkled will help. Supply for the birds usually available at about 7 days. These have been used to supplement feed as with the white ants.

(3) Other supplements (1) Mango kernels can be crushed and used as 10 per cent of the feed (2) Damaged fruits can be used as 10 per cent to 20 per cent of feed.

(4) Any waste from cooked foods can be included in the feed.

(5) Green feed sources—Green feed at the rate of about \( \frac{1}{4} \) gallon measure (2\( \frac{1}{2} \) litres) only need be given for 12 birds, if not running on good pasture. Some village supplies may be Dub grass, cabbage and radish leaves, tender leaves of trees chaffed up trees such as tamarind Papaya, agisti etc. water hyacinth (Jagal or Chingudia Dal) Wild sag, leaves of cow pea, Mung or Biri crops.

(6) Also provide crushed bones and some fine gravel from the river.

In brief, 12 birds will need about 2\( \frac{1}{4} \) lb. grains, 1\( \frac{1}{2} \) lb. meat. (Meat offal is a good protein source and when it is available fresh and every day it can provide a balanced feed capable of giving very good production. It has to be fed with wet mash each day. Labour and adequate regular supply is the main problem) or snails, frogs etc. or some meat plus white ants etc. and other supplements plus greenfeed—in all 3 lb. to 4 lb. of feed daily on the lines set out.

**FOOT NOTE FOR THE VILLAGER**

Desi poultry run in the village with good range and pickings, even though they lay only a small number of eggs, show a profit because they do not cost money for feed. (The important thing with poultry always is not the number of eggs they lay but what it costs for each dozen eggs). However, advantage can still be taken of these conditions, but more eggs obtained by balancing the local feeds as above. Better still if about 3R a year is spent on each bird by giving the concentrate feed it could mean an extra 5 R to 6 R worth of eggs. So, if using the village range system get more eggs and money by using balanced or concentrate feed.
Which if well made will work as well as an expensive shed view of shed as from each side except small entry door in one side about 3½' × 2' ft.

Scale 10 m.—1 ft.
ALTERNATIVE TYPE SHED FOR 12 BIRDS FOR VILLAGER

A NIGHT SHELTER

Birds are run on range during day and are given roosting quarters shelter at night. Concentrate feed is to be given daily.
NIGHT SHELTER FOR 12 BIRDS—ROOSTING ONLY

4 ft. long × 3 ft. wide × 3 ft. high (from floor level) Legs about 1½ ft. long. Roof weather proof. Roof sloping down from 3 ft. to 2 ft. at edge above floor level. (A basket or 2 kerosene tin nests can be placed inside for laying. A water pot can also be placed inside near front—also a tray to give concentrate feed—or can be given on the ground near the shelter)

USE AS GROUP LAYING CAGE

Foot Note—This type shelter with slatted floor could be used as a group laying cage for 10 birds (although the intensive deep litter shed is suggested for easier handling under village conditions plus more comfortable quarters for birds and the valuable built up deep litter fertilizer available.)

It should be kept under shade and the following rules observed

(1) the all mash balanced ration used, or the concentrate mixture—plus double level vitamin supplement and fishmeal—in one feeder and grains in another feeder. Also green feed daily (Leaves of cabbage or spinach can be given whole—if long grass cut into small pieces to stop crop-binding). Carefully balanced feeding is needed for bird in cages.

(2) Birds to have top beak cut back (about halfway) to stop feather eating and cannibalism in group cages (This can be used for floor birds also)

(3) The birds or the shelter to be sprayed with water frequently in hot days (they cannot cool themselves as with litter on the floor)

(4) Not to be used as a breeding pen because fertility results will be poor.

(5) Check birds for lice (dust with D. D. T. if found) and spray shelter for red mites as needed.
This is one of the most important features in the new developments with poultry in Orissa. As explained in the introduction the new method of housing inside keeps birds safer also the eggs—the shed can be locked against any intrusion. This means that the 50 per cent loss of Poultry which has been quoted as the result of predatory animals can be entirely avoided. In addition the valuable poultry manure is all saved and its value increases three fold over the twelve months—and losses due to outside exposure are prevented (this is covered in the section on deep litter practice).

Plans of sheds—Plans have been prepared and are shown in this booklet of the some of the various types of houses in which deep litter can be worked. They range from one constructed almost entirely of local materials for the villager in which the costs would be very little above labour only (may work out at much less than 4 R per bird for all the housing cost) to gable roof structures with cement floors and heavy construction (at possibly R 15 per bird cost with own labour plus skilled labour engaged) up to contract erection to detailed specification (at possibly up to Rs. 30 per bird) The point is, that although the better type houses will last much longer, results in all types can be quite good according to the management of the birds.

Size of pens—Designs are given for small unit pens of 10 birds and for pens holding up to 100 birds each. Laying results in the small unit pens can be expected to be about 2 dozen eggs per bird per year more (the extra production mainly in the difficult months) than in the large groups, because of the reduction in “stress” factors in small groups, and less need for specialised husbandry skill. Labour is not a factor of great importance between the two as with the new practices of (1) automatic weekly feeding (2) automatic watering if a ballcock is used (3) deep litter only needing cleaning once a year—the routine of tending poultry has become a minor thing compared with 4 or 5 daily feeds, to be prepared and given and cleaning out sheds each day. The large type pens are very suitable for rearing chickens, as are also the small pens. They all work with the deep litter system.

FITMENTS IN PENS

There are certain necessary fitments in a pen—some of which have been left out by people—and they have not had good results because of these omissions.

The needs for these are briefly

Roosts—These must be provided—birds sitting on nests, on top of the wall or on the floor cannot give of their best, and you are likely to have respiratory troubles with birds—so provide 8 inches of roost space for each bird—have the roosts about 18 inches apart—and set
about 2 to 3 feet above the ground. The cheapest method is to hang them from the roof. The roost can be round or square (3 inches × 2 inches on edge) about 2 inches thickness is desirable.

**Water-supply Daily or Automatic**—This is of vital importance. It is referred to under Management points. It must be available at all times—The waterer kept clean (rinse it out once a week) and be close to the birds and cool. See illustration on plan for village shed on how to set it up to stop water spilling into the litter. Of course, if you are building up the concrete wall you do not worry—just include the water idea shown in the plan and you have an excellent waterer which will last as long as the shed and for no cost. It can be made automatic by just enlarging it a little at the end and putting in a low pressure valve to control the level—this can run from an ordinary small tank or drum.

**Feeder**—This is very important. If shallow open feeders are used—birds can waste more than they eat and all the profits will be gone (they will spill it into the litter—makes it expensive litter and it is no better for the purpose of fertilizer). *So prevent the waste.* It is quite easy. If you have a wooden V. trough—add two lips about 2-3 inches wide at right angles to the two sides of the V so that the feeding opening left is only about 2 inches each side of the centre rail, and it will stop the waste. Suspend the feeder so that it hangs with the feeding opening 10-14 inches above floor (If you put a landing rail each side—set out about 4 inches—then you can hang it about 2 feet above the floor—the birds will hop up and feed. Saves any chance of rats getting at it. If you are going to make a wooden feeder, you can do it from ordinary case wood. Make it about 8 inches wide, then two sides 6 inches high—at top put two 1½ inches lips, one on each side then tack a 1 inch wide piece right down the centre of the top—and with the ends closed you have a waste saving hopper. To arrange the feeding rail take two pieces of wood 20 inches long, nail them under the feeder near each end so that 6 inches project each side—then nail a piece of 2 inch. × 1 inch. timber on to these at each side of the feeder with the inner edge 4 inches from the feeder. Then hang the feeder with wires (put the wires on to the cross pieces) and it is complete. Length of feeder according number of birds allow a feeder 5 feet long both sides for 50 birds. Alternatively you can buy very suitable round hoppers (see small unit pen plan).

**Nest**—See the plan for small unit pens for how to make these from 4 gallon tins. One is needed for about every 6—8 birds. Alternatively 50 birds can use a 44 gallon drum. It is put on its side—suspended about 18 inches above the floor—an 8 inch circular hole is cut in the middle—also 6 or 8 ventilation holes at each end at the top—not the bottom or the 5 or 6 inches of nesting material to be placed in will spill out. This is based on colony nest principle—the only addition is a landing rail in front of the nest entrance.

**Litter on floor**—This is dealt with in the deep litter section
Intensive housing deep litter practice for poultry is described. Small unit pens are indicated as giving the best result. This method of keeping poultry is safer and more efficient than with bare floor houses with yards or birds on open ranges. It reduces the area needed for poultry very greatly and labour with cleaning out sheds to only once a year. It is giving very good results where handled correctly. Plans of houses suitable for these purposes ranging from houses of local materials to large sheds of solid construction are given.

Cross breeding of poultry between improved lines is discussed, and indicates that a much higher laying result is possible than with the pure breeds. The introduction of male birds from these crossed lines to villages for up-grading purposes with local desi stock has advantages which are outlined.

Built up deep litter is being shown as of considerable help to agriculture. When handled correctly the deep litter build up, on a dry compost basis in the intensive sheds, gives approx. one thousand kilos or one ton of fertilizer from each forty birds in a year. This fertilizer has an estimated value three times that of cattle manure, and 3 hens can provide equivalent value of fertilizer to that obtained from one average type village cow.

Some management points covering incubation, rearing of stock, meat production, culling, roosting, nesting, feeding, and watering needs for poultry and how to prevent diseases are given.

The value of eggs in the diet, and marketing needs, is discussed.

The new methods are cheap, simple and easy to introduce. They only mean that rules for a different way of using the poultry shed, and mixing the feed, need to be followed. Correct use can double the former returns obtained with poultry here.
Shed can be built 40 to 60 or 80 ft. long and 20 ft. wide each pen 20 ft. End walls solid, Wire-netting divisions

Roof normal construction with rafters and purlins to carry asbestos sheets, floors and dwarf walls (Cement Construction)
Shutters 4' x 3' hinged at top opening out with expanded metal behind.

End Walls Solid

8-inch cloths suspended 1½ ft above floor

5' Feeders floor

14'

Each pen for Raising Pullet
- 200 to 12 weeks or 120 to lay stage
  (use Roots)

Raising meat birds
- 250 to 12 weeks
  (no Roots needed)

Laying Shed
  (use Roots)

Both too birds according humid or dry areas of the State

Netting divisions

Nests - see Small unit plan or use
  Colony nests or 2-4 gal drum nests

Note: Provide small trap door from
  pen to pen for stock grading necessary

Type II with lean-to roof Plus weather shutters
Cheaper construction with roof structure
(With 25% less lumber and covering and much less building labor)
also more ventilation space for summer periods

Shutters are 2½ feet suspended from floor

Doors 6½ x 2 feet

Dwelling wall 1½ feet

Shutters 4' x 3'

Nests

Ground Plan

Scale

Double Scale

Front View

Inset Shutters (double scale)

Danger Sheet

3½ inch x 3½ inch

Laminate

Weather Sheet

15°

18 mm gap

2½ ft

8½ ft

3½ ft

8½ ft

OR

Round feed hoppers

Shutters 4' x 4½ wide

Roosts are 2½ feet suspended above floor

Roosts

Nest
will be much less with reduction of radiated heat (Where some pressure of water is available for a sprinkler on the roof or hose with holes to allow a trickle over the roof the temperature will be greatly reduced inside the shed.)

**Important Note**—In the small unit pens or the large pens when layers are only kept for 7 months (August--February) then the same pen can be used to raise the pullets from March to August. This saves another shed. Where running birds for full year provide rearing space in addition. One extra shed for every two sheds of layers works out right can raise to 12 weeks then culling of the layers make extra space needed.

**Adapting a shed**—Where one has a shed already and **provided** it has sufficient windows (or doors which can have an inner or outer attachment of wire netted door for ventilation) to allow cross ventilation, it can be adapted for deep litter. It will need only **shutters**, (You can replace these with gunny bag or metal screens if wished but shutters are best as they still permit partial ventilation. The 3" x 3/4" slats forming the shutters run across horizontally can be slightly inclined as in house shutters if desired but should not really be needed although a neater job,) as shown on the plans in this section, to be put from the windows to stop rain driving in. If a thatched roof then if necessary extend it as shown for the village shed. Door if at ground level will need a 12 inch board nailed across inside to stop litter going out. Water can be arranged as shown for the village shed (wooden surround inside of the wall will work as a temporary arrangement—quite good or it can be served quite well by 15 inches of a 44 gallon drum placed in the corner with the slats over the top. and arrangement for water spillage to go out through a drain hole. Set the water pot in the middle of the slats. Nests refer to plans. Roosts refer to plans (if windows are 3 ft. from ground and opposite one another then easy to fix by just putting a rail from one to the other for a roost if more needed to give the required space then the next one 18 inch centre away from it.) The litter addition has been explained so an ordinary shed can be adapted quite satisfactorily. So rain protection ventilation roosts water nests litter can be arranged in an ordinary shed with a little adaptation at **very low cost**. Feeders can be of any type desired. See plans and general text on feeders (page 25) This has already been done in many places in Orissa with very successful results where the litter is handled correctly and the birds are on the correct feeds. The items dealt with in this section give a sufficient guide when combined with the plans to make possible construction of the sheds. Alternate materials can be used (the plans indicate this); the main thing is the area of shed and protection against rains—and ventilation. The materials used will not critically affect results if they are weather proof particularly on the roof.

**Note**—These same sheds and adaptations can be expected to apply for most other parts of India. Climatic conditions are generally similar from very hot summer to humid wet monsoon period.
Plans for large farms—No plans of farm layouts are given here as the individual sheds cover up to 100 birds. The Government farms can be inspected where sheds and adaptations are demonstrated. For several lay outs of farms of 100—500 bird size, and also 1,000 or more the operator who wishes to handle these larger numbers of poultry can obtain complete detailed information on the items discussed in this section, and the basic thoughts behind housing needs for poultry, in “Poultry Management and Production”. The layouts shown are suitable for this area. The only adaptation needed is increased ventilation for the sheds to suit Orissa conditions as shown in the sheds here by increasing side ventilation.
IMPROVED LAYING STOCK

DESI BREEDS

The local or desi breeds of poultry which have been mainly kept in the villages have many attractive features. They are very pleasing in appearance, and are adapted to the difficulties of surviving in the presence of predatory animals, being multicoloured and very active which helps them to protect themselves against their enemies. They are well adapted to the local climate and environment and to living off the land, and the females are excellent as setting hens and as mothers for the rearing of chickens. For details of the various types and illustrations see “Poultry Keeping in India” (Naidu). Also they are very choice birds for table purposes, having attractive appearance and flavour when prepared for eating. There are two points only which they lack and are necessary now-a-days if they are to help the income of the villages to a greater extent and there are (1) the number of eggs they lay in relation to cost of feed, (2) the size of the eggs.

It is difficult to carry out extensive breeding work with them, and this has posed a problem which has been tackled vigorously by the Government through the Animal Husbandry and Veterinary Department and progress has been made.

Improving by introducing pure breed lines—This has been by the introduction of White Leghorn and Rhode Island Red male birds from improved lines (some of these are from the T. C. M. import of 30,000 chickens to India in 1958) to the village each year to maintain a steady upgrading and an endeavor made to remove desi males. This means that the progeny between the pure breed males and desi females will be improved stock giving more eggs, and because they are automatically bigger birds (because when a large breed is mated with a small breed the resultant stock is about half way between in size) then the eggs are automatically bigger because egg size to be controlled by the body size of the birds laying the eggs (there is what is termed a very close “correlation” existing).

A further stage—crossbreeding improved lines—We have now introduced a further stage in this upgrading of stock work. Certain problems have shown up with some of the pure breed males in the villages—they find it rather difficult to acclimatise themselves when delivered at full grown stage, also being all one colour they stand out rather clearly, and are an easier prey to predatory animals. So we are now adopting the practice of mating the two improved pure lines together to produce cross breds which have advantages which we will enumerate. Also if the cross bred birds are sent to the village at half to two thirds grown stage, when they are easier able to adapt themselves and are quicker in their movements than the fully grown adult pure bred males, their survival level is expected to be very much higher. A further point of value is that they are adaptable to climatic variations and will do well in all areas of the State.
Advantages of the crossbreds—These have many advantages over the pure breeds some of which are as follows:—

* Crossbreds grow quicker than pure breeds particularly up to the 12 week old stage, and being stronger and more vigorous, are easier to rear than pure breeds.

* They are multicoloured and can thus handle village conditions better than white Leghorns in particular, and coupled with being more vigorous can be expected to have a much higher survival rate.

* The birds when finished for laying, and the young cockerels at 3 months old (or as fully grown birds at 6 months) make very much better table birds.

* For the commercial or sideline producer and of course for the villager also they have the great advantage of having been shown to lay about 1 to 1½ dozen eggs per year more than the pure breeds from which they are bred. This means more eggs for no cost.

(This has been established as proven as the result of work of the Council for Scientific and Industrial Research Organisation Poultry Research Centre in Australia, and also the results of egg laying tests and surveys held there. The majority of all poultry operators now have cross bred flocks on their farms because of the increased lay obtained. It can be readily seen from these advantages (and trials in India have shown similar results) that the introduction of cross bred males to flocks outside the Government Centres will further increase the returns of Poultry Operators and the overall production of eggs in the State (as well as those of the commercial operator using the cross bred pullets from the matings between the two improved lines).

How to improve and maintain the pure lines here—It has to be recognised that the performance of crossbreds is not just because they are crossbreds—it depends upon the grade or standard of the two lines mated to produce the progeny—just as with other lines of stock the better the parent lines the better the results from the crossbred progeny. So breeding work will be carried on at the Government Farms to maintain and gradually improve the pure lines on correct modern breeding lines without the problem of inbreeding arising. These require the facilities of sufficient numbers of small unit pens to enable sufficient families of progeny to be tested to gain accurate information and these will be provided. The techniques used will follow the now proven sire family breeding scheme system (for the student desirous of complete information on this refer to "Poultry Management and Production" also C. S. I. R. O. Bulletin No. 21 (Australia) "Breeding Poultry for Higher Egg Production") The efficiency of this system has been shown by the very high laying figures obtained in the Random Sample Tests now being run in Australia, by those entrants (and the C. S. I. R. O. stock) whose stock have been bred and improved in performance by the use of this easily handled but most efficient breeding method.
White leghorn males are mated with Rhode Island Red females (or the reverse mating) to produce cross breds from these two improved lines. This is done on the Government farms or centres. The cross breed eggs or chickens are available through the block centres and dispensaries situated throughout the State. The cross bred pullets are hardier than the pure breeds and lay more eggs (up to 1½ dozen more eggs in a year). The cockerels fit in better with local conditions and are better table birds, than the pure improved lines from which they are bred. The cross bred progeny pullets or cockerels can be easily identified by the mixtures of coloured feathers showing among their plumage as compared with the parent lines being all one colour.
Future needs—If the Poultry industry should expand greatly, a very considerable number of improved type chickens are called in addition to the large numbers produced by upgrading local by crossing with the males from these lines, a further adaptation breeding practice can be used if the supply of pure breed and cross stock for mating was insufficient to meet the demand.

This is known as criss cross breeding (The process was discussed in a paper by F. Skaller “Heterosis from Criss cross breeding in Poultry” in Proceedings of the 10th world Poultry Congress Edin­burgh 1954 pp. 1959-64).

This method can maintain but not increase the initial gain from crossing of the two pure breeds, and is useful when pure breed females are short in supply. The crossbred females are used from each generation being alternately mated in each year with a White Leghorn then a Rhode Red Island male then a White Leghorn then Rhode Island Red and continue in this way. This also means a higher number of chickens for a given number of females—because of the higher laying rate of cross breds. By these means that a relatively small number of pure breeds are needed for males only principally, and the females are taken from progeny bred from the crossing. This enables multiplication of large numbers of stock under these conditions if a shortage of pure breed stock exists as only about 10% of males are needed as compared with the number of females, required for breeding replacement stock each year. Efficient and sound upgrading of local stock will also be obtained by using the “crisscross males” bred in this way from the improved lines. The procedure then is the normal one with upgrading me hods being used in India. They are mated with desi stock in the same way as crossbred males—or pure breed males—in the first year. In the second year a supply of these crisscross males would be mated to the females from the first year mating. This is again repeated in the year. By these various means a very high level of improved lines can be introduced in the villages. About 75% of improved blood lines in stock can be introduced in only 2 years and tremen­dou multiplication achieved of stock capable of high level production after only 2 or 3 years of mating in this way even with only limited soured of improved lines.

Foot note—When suitable Australorps are available to mate with White Leghorn (both ways as with R. I. R. above) one of the best crossbred lines possible can be produced.
DEEP LITTER USE

A NEW HOUSING PRACTICE TO HELP WITH POULTRY IN ORISSA

The first and natural question to ask is what is this deep litter? Well many people are quite well acquainted with the compost system used for agriculture, and that a bacterial action works with this to produce the final compost mixture used for aiding the growth of crops. This deep litter we talk of can be regarded as a type of dry compost (some have called it “Compost” litter) so naturally like all compost it takes some time to build up hence our term built up deep litter.

This sounds fairly simple, and some people deciding to adopt this deep litter system (because they had heard it saved cleaning out the sheds) have just done this and nothing else. The water got into the shed—this did not worry them—also they put about 50 birds in a shed with 50 sq. ft. and it just became a horrible smelly mess and they said “this deep litter business does not work,” and gave it away as a new fangled idea which was no good. Well, like all practices, whether it is planting a crop or cultivating a field there are certain correct rules and times for doing it a certain amount of seed for a given area and so on, so it is reasonable that we apply just that line of thinking to an approach which is new in a particular area such as deep litter practice in this State—the use of which is one of the most marked advances in husbandry practices with poultry in recent years.

BASIC RULES NEEDED

1. Do not have too many birds in the pen— one bird for every 4 and preferably 5 square feet of floor space.

2. Provide sufficient ventilation to enable the litter to be kept in correct condition.

3. Keep the litter dry—This is very important. One of the first steps will have to be take care about the water drinking vessel. Put it on a grill from under which water can drain to outside the shed or have birds drink through an opening to a water trough outside. Water pots slopping over the shed means poor litter conditions. This is very important. If the litter gets soaked it upsets the whole process and would have to start over again. This means that in the monsoon season the shed will need weather screens set at an angle to still allow for the ventilation needed but which prevent the rain driving on to the litter. Another way would be a shed with very wide hanging eaves sloping down to give full protection.

4. Stir the litter regularly :—Turning the litter over (just like digging in a garden) about twice but at least once weekly. This is very important in maintaining a correct build up of deep litter.
This new practice of keeping birds inside on deep litter is safer for the birds and eggs preventing all losses due to predatory animals, etc. The laying results of the birds are excellent, being better than with birds given houses and yards, when they have the required 4 to 5 square feet floor space per bird. With prepared balanced all mash feed available they need only be fed once a week. The labour of handling them is greatly reduced as the sheds are kept in sanitary condition—when the litter is handled correctly—and sheds only being cleaned out once a year.
These are the four main rules and they are really not very hard to comply with—particularly when all the benefits you can get by its correct use are considered. It is also necessary to remember that the pen is not to be cleaned out the litter is left to accumulate, (there will be no objection able smell at all with litter handled correctly) more will be said on this later.

**How is deep litter to be started— and when**

This is another natural question. You can use many materials as a medium for starting the build up in a pen. It can work quite well with a wide range but use organic materials if possible. The cost and ease of obtaining can be your main guide. Suitable dry materials are straw, *paddy straw needs to be cut into 2 or 3 inch, lengths* sawdust, leaves, dry grasses, ground nut shells, broken up maize stalks and cobs, bark of trees and cattle manure. A sufficient quantity to give a depth of about 6 inches in the pen should be used. When the litter has built up it would be very difficult for any one to say what material was used to start. The next question may be what is the extra medium used to convert these materials into built up litter. Nothing else has to be added. The droppings of the birds gradually combine with the materials used to build up the litter (the bacterial action commences as a result). When a pen is not over crowded, these can be regularly absorbed and correct condition maintained, if stirring and even distribution is kept up. In about 2 months it has usually become deep litter, and by 6 months it has become built up deep litter. At about 12 months old stage it is fully built up, and has its greatest value for agricultural purposes. (Extra litter materials can be added to maintain sufficient depth—in fact during the year it is quite in order if some built up litter is wanted for the garden then take out portion of it and put more litter materials back into it, and in a fairly short time it will be incorporated in the built up litter).

**When to start it**—This is very important. The deep litter pen should be started if at all possible when the weather is dry, and is likely to remain so for about 2 months. Longer is desirable. This enables the build up to be in operation before the wet weather, and thus these weather conditions can be coped with. It will be very difficult to start during the wet period. If it was necessary because of circumstances to do this then “borrow” some built up litter from a pen in operation and mix this with the material as a “starter”.

**Points on care of litter**—Some times the litter may get damp—excessively wet conditions or too many birds, and often can be brought back into good condition with a drying agent by mixing it into the litter, with thorough stirring, about 1 seer of superphosphate for every 15 square feet of floor space. This will also improve and maintain the value of the litter for agricultural use. When this is not available hydrated lime but never quicklime has been used at the same level. If the pen is handled correctly with the right number of birds for a given space, ventilation is sufficient, and the litter is regularly stirred, plus protection from direct rain, it should hold its condition quite well.
The advantages to be gained by using built up deep litter practice.

There are advantages which cover a wide range of the various aspects of handling poultry including husbandry care, safety of birds, food supply, disease control, labour saving and the valuable fertilizer available for increasing of profits with poultry and agriculture.

Husbandry care—Poultry in a shed with a bare floor have a very uninteresting life. Once they have eaten their feed they have nothing to do and then often start vices such as feather picking. If they run out into a small bare yard it is no better (of course, if they have good open range, safe from animals and with plenty of insect life, green pasture etc., and only use their house for sleeping in at night then they will be well occupied and will do very well, provided they have additional feed designed to correctly balance their diet, but it is not often that such good conditions are available for the full year). With built up deep litter in the pen birds have a source of constant occupation. They continually scratch in the litter and dust bath in it. It also acts as a great help to them to counteract weather extremes. When the weather is hot they burrow into it which cools them because litter keeps a relatively constant temperature and is much cooler than the surrounding air. It is advisable to also spray the litter lightly when it gets very hot—helps the birds and the litter does not work properly if it is too dry—it may be too dusty in this case. When the weather gets cold it is also used by the birds to keep themselves warmer than on a bare floor. This is a valuable feature of deep litter use. Another point is cleaner eggs than with birds on bare floors as feet and feathers are kept in dry clean condition. So it acts as a help to good management of birds and by giving them a constant environment they are not affected by weather to the same extent as with birds running out side and hence better production is possible.

Safety of birds—Birds on range or even in a netted yard can be taken by wild animals flying birds and so on. When enclosed in a deep litter intensive pen which has wire netting or expanded metal or wooden slats for sides then the birds are safe. This can mean preventing what can be very discouraging losses.

The safety can also apply to the eggs laid by the birds. These can be collected by animals or birds if they are laid outside whereas they are much safer in a shed locked and enclosed on all sides.

Litter as a source of food supply—It may come as a surprise to learn that built up deep litter also supplies some of the food requirements of the birds. They collect Animal Protein Factor from deep litter and some work indicates that this could mean that birds obtained sufficient of this to enable a suitable feeding ration to be prepared with only a vegetable protein such as ground nut meal included in the feed. The level of vitamins such as riboflavin (of which milk powder is a valuable source) increase up to nearly three fold, according to experiments conducted. The combination of this and the Animal Protein Factor is necessary to good hatchability of eggs and early growth of chickens.
For fertilizer value on farms when built up deep litter practice used

This heap of deep litter, which has built up over 12 months represents the amount available from each 3 birds kept in an intensive shed. (When they are started with about 6 inches depth of material such as, for example, straw, sawdust, groundnut kernels.) It is equivalent for fertilizer value to the manure obtained from one average type village cow. The built up litter over one year with its dry compost action has become high in nitrogen value and for comparable weight has approximately 3 times the value of cattle manure for fertilizer use. This makes the by product from poultry kept in this way a great help to agriculture (1 ton of deep litter-available from 40 birds in a year is sufficient fertilizer for 1 acre of pasture or nearly ½ acre of intensively cultivated land).
So birds on well handled built up litter can produce good chickens even when the feed given them may not be as high in these factors as normally required. (Experiments in U. S. A. indicate that cattle have been successfully reared on feeds of which ground up deep litter formed a high proportion).

**Disease control**—Well managed deep litter kept in dry condition with no wet spots allowed around wateers has a sterilizing action. The level of coccidiosis and worm infestation is much lower with poultry kept on good deep litter than with birds (or chickens) in bare yards and bare floor sheds particularly where water spillage is allowed.

**Labour saving**—This is one of the really big features of deep litter usages. Cleaning out poultry pens daily—or weekly—means quite a lot of work. The use of deep litter practice has now shown that this work is wasted, unnecessary and quite uneconomic. With correct conditions observed with well managed litter there is no need to clean a pen out for a whole year the only attention is the regular stirring and adding some material as needed (The depth need not be more than 9 to 12 inches at any time) This means that poultry can be handled with very little attention to the housing side of it. “Cleaning out the poultry pen” need not be the continual job which it has been—once each year can be enough when it be handled as it should be.

**The valuable fertilizer available from deep litter use**—This is a valuable economic factor with deep litter. In some parts of the world, possibly Australia in particular, farmers have started poultry as a sideline chiefly to get this fertilizer. The level of nitrogen in fresh manure is about 1 per cent, but on well built up deep litter in operation for about a year checks have shown that it averages out around 3 per cent nitrogen. It also contains about 2 per cent phosphorus and 2 per cent potash. Its value is about three times that of cattle manure and its balance for agricultural use is much better. (Note—unlike fresh poultry manure deep litter can be used immediately for agriculture use. Also do not leave it heaped for a period out in the rain or it will lose value.) These items are mentioned but in addition it contains trace elements etc. and the combination makes it one of the most valuable organic fertilizers.

Forty birds of medium size and housed in a shed of 160—200 sq. ft. produce in one year about 1 ton of deep litter. This is enough to supply the full fertilizer needs of about 1 acre of pasture or nearly \( \frac{1}{2} \) acre of intensively cultivated land. For this reason it has been eagerly sought after by gardeners, orchardists, agriculturists and so on.

An idea of its value can be given on a set basis, and it would not be hard to check for local value by adjusting the price to compare with those charged for local supply of the usual type fertilizer.

* If sulphate of ammonia (20 per cent nitrogen) was worth Rs. 350 per ton then deep litter would be worth per ton for this factor about Rs. 50.
* If superphosphate 22 per cent phosphorus is worth Rs. 130 per ton then deep litter would be worth per ton for this Rs. 12.

* If sulphate of potash (48 per cent potassium) worth Rs. 360 per ton then deep litter would be worth for this Rs. 15. On the basis of these prices a ton of deep litter would be worth Rs. 77 for this factors without any allowance for the other “build up” features for soil. The extra value of this most valuable feature, because of the bulk for the soil etc. is usually decided by market demand. An estimate thus indicates a total of about Rs. 75 and up to Rs. 100 per ton when these basic rates rule and it can be obtained from 40 birds. It can be a valuable extra profit feature with poultry.

**Summary**

1. Deep litter is a dry compost litter and the build up has to carried out correctly to give desired results.

2. Basic points are (1) do not overcrowd birds (2) give sufficient ventilation (3) keep the litter dry (4) stir the litter regularly.

3. The build up should be started a few months before the wet season and many types of material can be used e.g. straw, sawdust, leaves, groundnut kernels.

4. Advantages are—

   (1) better conditions for and less vices with poultry

   (2) birds and eggs are safe with enclosed conditions.

   (3) Part of the feed requirement for birds come from the deep litter.

   (4) Some diseases are controlled by its action.

   (5) Labour is reduced to cleaning out once a year and stirring as required instead of daily cleaning out of pen.

   (6) The value of deep litter—3 times that of cattle manure—and with about 1 ton available yearly per 40 birds is high and can be a marked factor in increasing the profit margin with Poultry.

Foot-note—Deep litter can be very successfully used for raising chickens also. It will build up in the same manner. Less space is needed and a fairly high level protein mash is fed. For the details see the portion dealing with raising of chickens.

Reference—For further and detailed information on deep littler practice reference can be made to “Poultry Management and production” (McArdle) Australian Agricultural and Livestock Series.
PART II

SOME POINTS ON INCUBATION

Only a few points are given on incubation because this is a more specialized operation than general handling of Poultry; also it is hardly worth while taking the trouble of running a very small incubator (it is as much work as a big one) as compared with getting the eggs hatched. In Orissa the Government, through the Animal Husbandry and Veterinary Department at the present phase of development provides free and efficient incubation services for Poultry keepers at the block centres and dispenseries. This is a very helpful facility to aid the expansion of the Poultry industry. (Complete information in detail is available in "Poultry Management and Production" the publication previously referred to and the same techniques of incubation apply in most countries.)

SOME POINTS ON ELECTRIC INCUBATORS

* House in a good insulated room. Check machine for condition and the thermometers for accuracy before starting. Have an electrician check the machine each season.

* Run the machine at an even 100°F as closely as possible set: eggs of good size and shell texture only and from correctly fed breeding stock.

* Maintain 83°-84°F on the wet bulb thermometer during setting period 1–18 days (for hen eggs) and 90°–95°F during the last 3 days hatching period. Correct humidity is important.

* Turn eggs at regular intervals at least twice daily and use care in turning.

* Check ventilation requirements of your machine.

* Arrange schedule of loading to hatch as many chickens at a time as possible to avoid many small batches of chickens upsetting brooding schedules.

SOME POINTS ON SMALL KEROSENE INCUBATORS

* Operate the machine in a good well ventilated room with ample circulation of fresh air without draughts.

* Check machine carefully before use for working condition particularly capsule and thermometer for accuracy.

* Have the lamp in good condition without leaks and never fill to the top of the lamp only 7/8th full (or you will be likely to have a fire).

* Run the machine at 103°F with the bulb of thermometer level with the tops of the eggs and keep it as constant as possible up to 104°F or a little over in order at the later hatch stage.
* Adjust the setting of the damper or sleeve control on the lamp carefully when the machine is run at its correct temperature prior to putting the eggs in the incubator.

* Set only good quality eggs not over 7 days old is best

* Turn the eggs twice daily morning and evening (more often if wished). Try and turn at the same time each day. (The tray of eggs can be left out longer in the later stages) Do not fix the lamp before turning the eggs doing this with oily hands can adversely affect growth in the eggs and mean poor hatches (When turning it is a good plan to bring some of the corner eggs to the centre of the try and vice versa).

* Have sufficient humidity if wet weather tray may not need filling until last 4 days, but in dry weather keep it full right through.

* Cease turning at 18th day and do not open machine until hatch is over, and chickens are well dried out for careful transfer to the brooder.

(if the machine has a nursery tray have this ready at 18th day stage).

* Do not expect every egg to hatch (you can check with a light for fertility at 19th day stage the air cell should be about one quarter to one third of the egg and the rest of the egg showing dark). It is also possible to check the eggs at 7 days—the germ can be seen developing in a fertile egg, but the infertile egg shows clear.

If you hatch 66 chickens from every 100 eggs set you are doing quite a good job. Normal hatching times here are September/October to February/March. These periods give best results under conditions in Orissa.
REARING THE PULLETS

REARING THE PULLETS TO LAYING STAGE ON RANGE OR INTENSIVELY AND A WORD OR MEAT RAISING

This is an important part of poultry management and your success which will be reflected in the rate of lay you get with your birds when they are fully grown.

WHAT YOU WILL NEED FOR THE PURPOSE

Correct feed—This is vital to success. Many deficiency problems will arise if the feed is not correctly balanced for the specific purpose. The ration set out under “Feeding” is efficient. You can mix or you can obtain it ready mixed on this formula. (Store it carefully by putting in a drum) Have feed close to the chickens at first in feed and water vessels that they cannot get into. The feed should be in dry form and available at all times. There is no need to mix wet feed for the chickens—just give green feed in addition.

A Warm Brooder for the first few weeks—These can be of many types—battery brooders (wire floors and 3 or 5 floors of chickens one on top of the other) or floor brooders of various sizes. All of these can be electric or kerosene heated. Another electric type is infrared lamps. No controls needed and efficient where power reliable. The kerosene types can range from one for a few chickens being only a hurricane lamp under a hover, up to large hover brooders big enough to take 500 chickens as a time.

Certain requirements are common to nearly all the brooders. These are—

(1) Sufficient heat—The temperature at the edge of the hot portion of the brooder, so the chickens can adjust their heat as they wish by moving in and out under the hover, should be 95°F the first week being reduced about 5°F each week thereafter until heat is dispensed with at 4 and up to 6 weeks. A thermometer is used, but a good is guide the appearance of the chickens—they usually spread put nicely in a circle when their conditions are right.

(2) Ventilation—Should be sufficient when the air smells “Sweet” conditions are usually about right.

(4) Space—This is most important. On wire floors to 1 month 6 chickens per square foot; to 6 weeks 4 to the square ft. to 8 weeks only 2 to the square foot. On the ground or floor on litter, which should be finely chaffed straw or saw dust about 3 inches deep, allow ½ square ft. per chicken to 4 weeks; 2/3 square ft. to 6 weeks; 1 square ft. to 8 weeks (but it is much better to start with the 1 square ft.) when first placed in the brooder do not let them roam too far. Have a guard around the brooder which only lets them go about ½ feet from the heated portion at the start gradually increase the area as they grow.
Water—It is important and often neglected that the water be arranged so that chickens (of any age) can get their supply, but that at early stages they cannot get into it or you will have chilled chickens (they can handle this by the time they are half grown) and that the water does not spill around the floor. This creates wet unsanitary conditions which quickly lead to coccidiosis in particular and heavy chick losses. It is easy to avoid—set the water so that they drink through a grill (or have a waterer with a small drinking lip) and have it on a wire covered frame with water spilled dropping underneath, or set, in the early stages, waters on sharp sand in shallow boxes which absorbs the spillage. It is most important that this precaution be taken.

A Cheap but efficient cold brooder—Under village or household conditions a cold brooder with a small detachable wire netted run has been successfully used. With the help of the cold brooder villagers or householders can successfully rear chicks without broody hens.

A cold brooder is rather like an ordinary box with roof forming a gable. The size can vary according to number of chicks. A size of 2 ft. × 1½ ft. × 1½ ft. will be large enough for 15 to 20 chicks. One side of the roof should be hinged so that chicks can be placed in or taken out by opening the roof, and the inside of the brooder can be cleaned. At the bottom of one side wall, a small 6 inch shutter with closing arrangements should be provided which can be kept open during the day to allow the chicks to go out to the run and come in at their will. During the night, it will be closed to conserve heat inside.

To make the cold box brooder—Paddy straw is soaked in water for about one hour and then allowed to dry. Before it loses moisture completely it should be beaten with a wooden peg so that the fibre will be in a suitable condition. The whole of the inner surface of the brooder box is packed with a thick layer of treated straw. A gunny bag lining is then provided and nailed firmly over this to the box sides. The wooden surface on the outside, the layer of straw, and the gunny bag lining will act as insulation. Eight small pipes ⅜ inch. to 1/3 inch. diameter made of tin or bamboo should be fixed in the side walls 6” above the floor for ventilation purposes. These pipes will pass through the gunny bag and straw to the outside of the box. Similar ventilation holes numbering four should be provided high on the sides near the roof. Gunny pieces should be hung here and there from inside roof and these can nearly reach the floor, particularly in front of the ventilation holes, so that the air will have to circulate before it reaches the chicks. This will provide cosy conditions and makes it possible to brood the chickens without providing heat. Finely chaffed straw is placed on the floor of the brooder inside over the wooden bottom of the box. As the chickens get bigger—after 2 or 3 weeks—the shutter can be left up at the side at night also, but see that they are safe from animals, cats etc.

A small detachable run 6 ft × 4 ft × 1½ ft. made of either wirenetting or bamboo jafree fixed to wooden frame should be used with the
The top of the run should also be covered to prevent chicks being taken by predatory animals or birds.

When chicks reach the age of 8 weeks they can be transferred to houses similar to those used for adults.

**NOTE—**Models of these cold brooders are shown at many of the dispensaries.

*After the brooder stage—The Growing stage outside rearing—* Chickens can be transferred—outside to range rearing quarters. They then only need a house which is a roof shelter—has a slatted floor—and the air can circulate underneath (in the climate in this State) Its really rather like a big umbrella—a shelter with 50 sq. ft. floor space would do for 60—80 chickens to full grown stage. It should have provision to lock them in at night or losses from wild cats and other predatory animals can be very high.

The big need is sufficient range. The correct thing but it is rarely given—is to provide 1 acre of range for about 500 young stock (10 square yards per bird). This then gives very good conditions—but with smaller yards it becomes a bare overstocked yard. Overcrowding never pays—the growth of the stock and number reared is heavily reduced. It is possible to get away with 1,000 to the acre on range if care is taken and extra green feed supplies are made available to them. So provide enough range if possible (unrestricted range is ideal if it is safe range) and see that the roosting shed gives about 2/3 square foot space per bird if you are keeping them there until nearly adult stage. (And do not forget to have plenty of feeder and water space, and both of them in the shade close by the shed. If you have no trees in the yard then make a thatch shelter).

*Intensive rearing—* Just as laying birds can be successfully kept inside in well ventilated houses on deep litter, so chickens can be very successfully reared in the same manner. The chickens are handled just the same way as for an ordinary floor brooder—temperature the same start with 3 inches of *fine* litter, waterer arranged so that no spillage occurs into the litter (important) shed well ventilated and the same feed ration is used.

For complete success it is by far the best that each lot be started with the space they are to finish with; then, the litter keeps an excellent condition, and no overcrowding troubles occur. So if raising 120 pullets to 12 weeks have 240 square feet space from the start. Add to the litter at about a month, have it 4 or 5 ins. deep, of finely divided material (as for hens dry chaffed straw, sawdust leaves, etc.), and keep it stirred regularly as for adult birds, and keep it dry. At the 12 week stage the numbers are broken down but much better if this could be done at 6 weeks, enough to allow 2½ to 3 square feet per pullet being raised. (Pullets can be provided with roosts in the shed at about 8-12 weeks stage to train them early) The brooder can be left in right up to about 6-8 weeks stage—only a little heat—just enough—or it may be cut
off—to keep the conditions nearly the same then no other “weaning” arrangements need to be made. (If you have moved them to this shed from a battery brooder then give a warm corner—some gunny bags tacked to a frame about 12 or 15 inches from the floor in the corner and see they go under this for the first few nights. This should be enough in our climate here). It is a very wise precaution when large numbers of chickens are being reared together to keep a small dim light burning at night. It stops them panicking or crowding into corners if frightened by animals, etc. So intensive rearing or complete open range not in between is best, and both will only be successful if *Correct space is given* *Correct feed used* *Water arranged correctly*. (The deep litter system, of course, also provides valuable manure of built up litter type: the layers can run on the same litter used for rearing them. About 6 cwt. of good fertilizer is available from 100 pullets reared intensively day old to laying stage).

*Raising cockerels for meat*—If you may have a market for meat then crossbred cockerels can be raised on deep litter to 12 weeks stage. At this stage they can be sold at a price which is reasonable, are a small bird to suit local preference, and can show a payable margin over costs. Use same feed as mentioned under feeding but can reduce space a little—in 240 square feet can raise 180 cockerels to 12 weeks, and would also give about 12 cwt. (3/5 ton) of deep litter manure. If wishing to carry to 24 weeks stage then give 3 square feet per cockerel or transfer to range. The Economics are shown under “Feeding” day old cost plus cost of feed used which can easily be checked and add about 10 per cent to cover incidental items (The subjects of meat raising, intensive rearing, also rearing sheds are covered in considerable detail with many examples in “Poultry Management and Production”).

Foot Note—A similar basis can apply with cockerels raised from the improved type cross bred cockerel crossed with desi birds. Of course, if good range available plus pickings, then even if these cockerels do not make the same weights they can show a profit as no direct costs involved.
A few reminders are given which will help keep your poultry laying at the best rate possible.

Replace stock each year—At least 8 birds out of 12. Poultry lay more eggs in their first year, and less in each year there after, so if the price for a hen is reasonable compared with cost of raising a pullet replace a high percentage annually.

Look after the feed—Do not keep too much on hand. It can go stale. The new prepared feeds supplied can be held up to a month because they contain special stabilized vitamins. Keep the feed in a drum (One 44 gallon drum holds enough feed for 24 birds for a month)—with a lid on it the feed keeps better—is quite safe from loss and spoilage with mice or rats and it saves encouraging these as with bagged feed.

Feeders—Must have good wide lips. The feeding space (measured across) need only be an opening of about 2 ins. and have it 10 or 11 inches from the floor. The length of feeding space needed is about 5 feet for 24 birds, and do not fill the feeder more than two-thirds full. This stops all feed wastage which can be costly with poor feeders—birds can waste more than they eat so, for example Rs. 10 to Rs. 12 to feed a layer for 12 months could become Rs. 24 and cuts out the profit margin.

Waterers—Must be set on a stand which has walls to divide it from the deep litter so that the spillage does not go into the litter (This applies with chickens too—set their waterers on a grill or on a shallow box of sharp sand which will absorb the spillage—this is important) The waterer must not be allowed to run dry or it will send birds into a "forced moult", and the water must be kept cool and clean. Also about 1½ feet drinking space is needed for 24 birds and it must be close by the birds at all times in the shed and shade (not across a hot yard).

Nests—Keep the material such as ricehulls and/or sawdust clean and 2 or 3 inches in depth—a solid bottom is best for the nest to ensure this and save breakages (which can start egg eating among birds).

Litter—Do not forget to stir the litter in the pen thoroughly once or twice per week.

Vermin—Do not forget to look at the roosts for red mites and on the birds occasionally for lice.

Culling—If you want to sell off some of the birds when getting near stock replacement time you can pick the non-layers as compared with the layers. Look at the comb dull in a non-layer bright in a layer. Check the pelvic bones just near the vent they will be about three finger widths apart in a laying bird but only one finger width in a bird not laying also the abdomen will be hard in the non-layer but soft and pliable in the laying bird.
Floor space and roosts—Do not forget 4 to 5 square feet per bird must be allowed with deep litter if it is to work correctly. Roosts should allow for 8 to 9 inches per bird space on the roosts and have the roosts 18 inches apart and about 2 to 3 feet above the floor (In a roosting only shed where birds run on safe free open range 1 square feet per bird will do).

Broody hens—Expect some in warm weather with heavy breeds. Cure by placing in a broody coop for few days. Slatted or wire bottom (or in pen without nests). Provide feed and water. Collect at first sign of broodiness or they take longer to cure.

HOW TO PREVENT DISEASE PROBLEMS

You must expect that some disease problems will arise but you can prevent many of them by the way you look after your poultry. If you do this properly then you should not have a lot of trouble. We won’t give a lot of information on disease because prevention is best. If you do have trouble then contact your Departmental Block centre or Dispensary quickly.

With the chickens—Firstly feed them correctly on the type of ration set out under “Feeding”—or you can expect many troubles due to deficiencies which will occur. Handle the chickens as set out under the rearing section. Keep their quarters dry—do not let water spill about—or you can expect to have heavy losses with Coccidiosis (they look droopy and usually have blood stained droppings with this trouble. If your chickens do get it contact the dispensary for suitable drugs—milk given to the chickens can help a lot to control it) Remember do not always blame the source of stock when troubles arise with chickens—most of the normal problems are due to the way they are handled.

With the growing stock—Give them the space set out under Rearing and feed them on the correct ration set out. If in addition you see that they are kept free of vermin both on the birds and in their quarters you should not have a great deal of trouble.

With the laying stock—See that they are given the correct space for the system you are using—4 to 5 sq. ft. per bird with intensive deep litter houses and birds not allowed outside; or 1 sq. ft. per bird if roosting quarters only used combined with safe open grassed range—not just a small bare yard. If a small yard only is used then give more space in the shed—would possibly be better to use the all intensive method. These housing arrangements must be combined with feeding on the correctly balanced rations as set out under “Feeding” or results will naturally be poor and your poultry cannot show you a profit or give you the number of eggs you expect.
PROBLEMS WHICH WILL ARISE IF NOT PREVENTED
PREVENT RANIKHET DISEASE LOSSES

It is absolutely necessary that you vaccinate your birds against Ranikhet disease in this country. A highly effective vaccine is prepared at I. V. R. I., Izatnagarh, and you only have to contact your dispensary or block centre. The Assistant Veterinary Surgeon or the Poultry Extension Officer will arrange concerning vaccination of your birds. If you do not go to this slight trouble and make contact you are very likely to find that all your birds suddenly die and you have lost out badly with your poultry.

YOU MUST VACCINATE AGAINST RANIKHET. THE SERVICE IS MADE AVAILABLE BY THE GOVERNMENT FOR YOU

Prevent Fowl Pox—You can also have the birds vaccinated against fowl pox. This can save heavy losses in egg production—birds affected with fowl pox will not lay many eggs while experiencing the effects of the disease so make contact as for Ranikhet—the service is available for you.

Pullorum disease—This is one trouble you should not have any bother with. The officers of the Animal husbandry and Veterinary Department have taken precautions to blood test all the breeding stock here of the improved lines, so this cause of heavy losses of chickens in the first few weeks of rearing has been guarded against.

EXTERNAL VERMIN CAUSE POOR HEALTH AND LOSSES WITH BIRDS

Check your birds to see if they have any lice on them—if they have use a D. D. T. dusting powder but if running out side and given a good dust bath they usually keep themselves clean of these (and they will dust bath just as well with good deep litter inside a shed). It is also important that you have a look at the roosts occasionally. If you see greyish markings and very small insects looking red in colour, they are redmites (the red colour because they are full of blood from the fowls); in some areas you might see black spots and larger insects full of blood; these would be tick. Tick cause heavy losses with poultry by giving them a fever and also as with redmites reduce their health by their blood sucking habits. You can kill both of these by thoroughly painting and soaking the roosts and timbers of the shed (also check nests) with kerosene. Check frequently. (if you can use a D. D. T. product then the effect will last longer than with kerosene).

Do not forget to check for these vermin occasionally they cause much loss of eggs and health with poultry as a result your poultry unit can become an unprofitable one.

Worms in Poultry—When birds are looking very dull and have loose droppings it might be due to worms. Check with your dispensary or block centre for suitable capsules or drugs for treatment.