

practicable for other countries may be or may be made to be so for us also? At least there is a case for the immediate institution of nitrogen research laboratories in which chemists and electrical engineers should work in close collaboration and co-ordination and tell us definitely what the position is.

For the convenience of our Readers, we reproduce below the summary of the Presidential remarks made by Major Howard, Chief Engineer for Hydro-electric Development and which was published in a previous number of this journal (Vol. xx, No. 11 P. 449).

Ed. M. A. J.

Chairman's Concluding Remarks. Rao Bahadur B. Viswanath's enthusiastic advocacy has made me wonder whether there is any one else present in South India who would be able to present it so well as he. He has brought out very clearly the deficiency of nitrogen and how it is imminent on us to produce nitrogen. But to me the problem is how much to produce, how to go about it and how to make the people use the product that is manufactured. In my opinion the best process to be adopted here is the Arc process. The problem is also economic and must be interpreted in a much wider sense than the merely scientific. We have, at the start, to decide on giving a national orientation to this enterprise if it should be any economic success later on. What exactly I mean by nationalizing such industries can be illustrated by referring to Japan, and Italy, where great strides have been made in scientific progress on account of the Government taking a chief hand in such enterprises. I can also quote to you the instance of Egypt where two million pounds have been sanctioned for the erection of hydro-electric works on the Nile and another two millions for the manufacture of fertilizers. I am perfectly sure because they are state-undertaken that even this vast expenditure will be justified in bringing useful returns.

I am not very sure of Pykara being a suitable site. It is not merely from economic considerations but because also that it is not particularly suitable. Nearer to us we have Mettur, an ideal site in my opinion. It is not very safe to take our figures from Norway. Norway was the first to start nitrogen fixation electro-chemically and the figures are of pre-war days. Power in Norway is produced at £ 2 a kilo-watt a year. The Nitrogen Fixation Committee's finding is that this would be equivalent to £ 4 at present. We can produce at Mettur easily at and that with profit.

One thing however we must bear in mind and that is the competition from foreign markets. The Agricultural Commission went into this and it was this that made them argue against electro-chemical projects in this country. In the early stages at least, therefore, we must start with protection from the Government and in my opinion that is the only economic solution. I am in sympathy with the lecturer not merely sentimentally but also practically.

STUDIES IN POULTRY-KEEPING

Part I. SOME ADVANTAGES IN POULTRY-KEEPING.

By R. W. LITTLEWOOD,

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and H. NARAHARI RAO,

Poultry Manager, Hosur.

Eggs and poultry for meat are the primary edible products for those who use them in their daily diet. During recent years the demand for poultry products has considerably increased, especially in places near towns. In such places people take so keen an interest that they are becoming specialised in poultry keeping.

Some people keep fowls for hobby, some for the sport of cock fighting and some to realise profit out of them. The subject of this short note is for those who want to keep fowls for profit. Fowls can be reared for home use also, and when there is a chance to realise a little profit from this branch of work there is no reason why greater attention should not be paid to it.

The birds are docile and easy to manage; therefore one's wife or children can look after them whilst the men are employed in their fields.

Poultry keeping is within the scope of everybody and even a small farmer can keep a few fowls with advantage. People even in big cities and towns with some available space at their disposal can maintain a few birds. This system is generally termed as "backyard poultry keeping". With a little attention, good accommodation, and proper feeding, this eventually becomes a source of a small income.

A good hen when fed and kept properly will eat about Rs. 0-5-0 worth of food in a month and will lay eggs worth about Rs. 0-11-0. So, by keeping 30 hens one can earn about a profit of Rs. 11-0-0 a month or Rs. 130 a year with a little trouble. Is not this income equal to the value of a crop?

It is distinct advantage to keep fowls in a small way in conjunction with general farming. The birds utilise enormous quantities of waste products, grains, and vegetables that are on the farm.

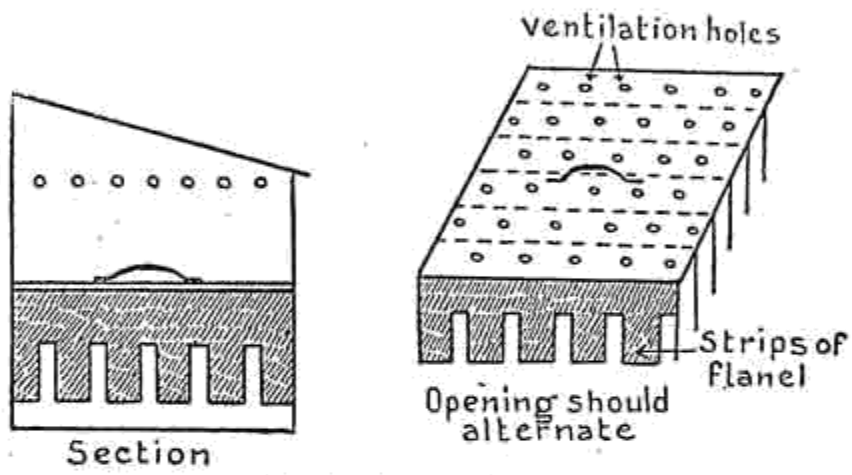
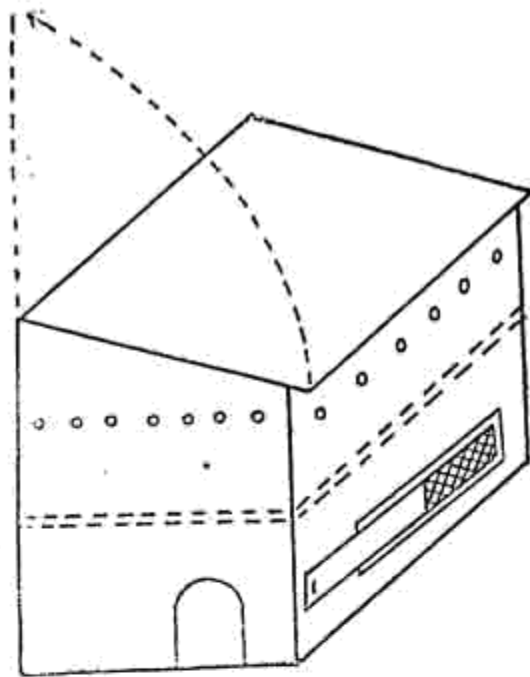
The birds can be put on the stubbles i. e., a newly harvested field and the fowls will eat the shed grains which would otherwise go to waste, thus converting all the waste material into edible product.

The birds eat the insect pests and grubs that may not be noticed by us in the fields and so assist to eradicate the pests which might damage the succeeding crop.

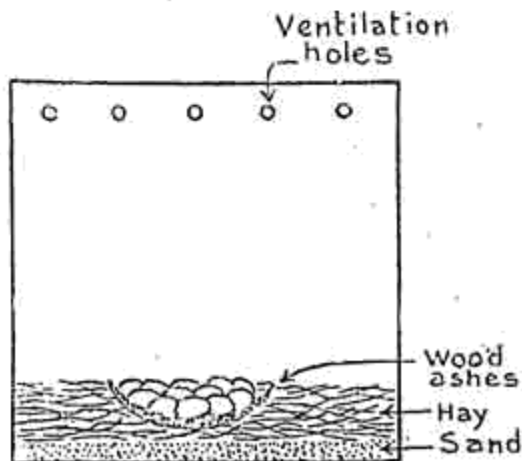
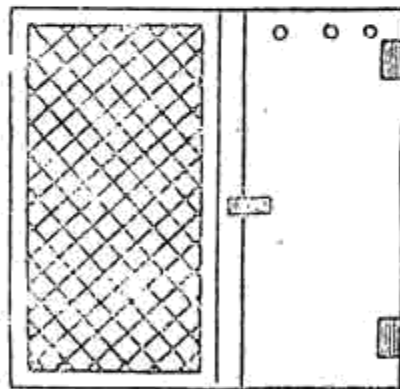
In the case of a young crop the birds can be let into the fields when the crop is a foot high. They will get plenty of worms, insects, etc. which would otherwise do a lot of harm to the growing crop. By this system, the birds get an unlimited range and so the food bill for the birds can be reduced considerably. Poultry manure is very valuable

Poultry keeping as a side line to agriculture does really help the farmer in a variety of ways; so before deciding as to how this should be started, consult the Deputy Director of Agriculture, Livestock, Hosur Cattle Farm P. O. who will give all necessary help and advice.

At the Livestock Research Station, Hosur, there is a Poultry Section which maintains birds of imported and indigenous breeds. It is managed by trained men who are in a position to give advice to the visitors. The natural and artificial methods of incubation, artificial feeding and rearing of chickens, breeding and feeding of breeding hens,



FOSTER MOTHER



different systems of housing the birds etc. are all practised. Visitors are always welcome.

There is a great demand for birds and setting eggs and the farm supplies the needs of the public at a very low rate, as they become available. The breeds maintained are:—

1. White Leghorns,
2. Rhode Island Reds,
3. Light Sussex,
4. Black Minorcas,
5. Chittagongs,
- and 6. Country birds.

The results for last year give the number of eggs laid in the pullet year by selected birds in each breed, as follows:—

Breed	No of hens.	Average egg yield in pullet year	Highest individual yield	Lowest individual yield
White Leghorns	12	184	236	158
Rhode Island Reds	9	157	181	135
Light Sussex	6	143	196	109
Black Minorcas	3	149	167	118
Chittagongs	3	134	149	116
Country (Tellichery)	5	110	141	85

Part II. BROODING AND REARING OF CHICKS

The brooding and rearing of chicks is an important branch of poultry-keeping, in as much as, it is the nucleus round which the whole enterprise has to be built. This may be classified as "Natural" and "Artificial". Towards achievement of success in this line one requires eternal vigilance, patience and attention to the smallest details.

Natural brooding and rearing. In the above method, man has taken advantage of nature's lessons and employed hens to brood and rear chicks provided they do not extend to an unwieldy number.

On being hatched out the baby chicks require, on first opening their eyes to light, absolute rest as they have had enough exertion in their hard struggle to wriggle out of the eggs. They should not be let out till they become active enough, and show a tendency to leave the nest.

A clean coop should be prepared and kept ready to receive the newly hatched out chicks which have to be transferred with the mother hen. Whatever be the nature of these coops, the principles of cleanliness, freedom from damp and protection from extremes of weather conditions, should never be overlooked.

The mother hen should have free access to a dust bath which should have some disinfectant powder mixed in it to prevent lice etc. getting on to the chickens, which would worry them and reduce their condition resulting in their growth being stunted and consequently their turning out to be an economic failure.

The rearing capacity of a hen luckily exceeds her hatching capacity; taking advantage of this fact, a good mother can be made to foster from 15 to 20 chicks including those hatched out about the same time, from other hens. She knows by instinct the principles of rearing chicks and so, all that we have to do is to see to the importance of cleanliness, proper feeding, and protection from enemies such as hawks, kites, rats, mangoos, snakes etc. A small wire run will serve this purpose.

Inclemency of weather conditions affects the general health of the little chicks to a considerable extent, so, the following precautions are the more important of those which should never be neglected, in the selection of the place for the run. (1) Adequate sunlight, (2) Prevention of humid surrounding, such as wet grass patches, flooring etc., (3) Cold winds and draughts.

Artificial method of rearing. In intensive poultry farming, incubators have to be used to meet the large demand for chicks and recourse has to be taken to artificial brooding and rearing.

The natural way of rearing chicks has a distinct advantage, in that, it relieves us of a considerable portion of our responsibilities in attending to such details as the mother hen can do. When however the number becomes unwieldy, we have to necessarily depend on some mechanical contrivance that would successfully replace the mother hen providing the chicks all the comforts such as warmth, ventilation and space which she herself would have been in a position to give. "Foster mothers", "Brooders" and "Hovers" serve the above purpose.

The "Foster Mother" or "Brooder" is practically nothing else but a box in the chicken chamber which is heated by oil, coal or electricity, the temperature of which is adjusted by the flame in the case of oil.

The "Hover" is a cone shaped piece of metal with a lamp in the middle, stands over the chicks like a canopy and the heat is radiated down below.

There are several types of Foster Mothers and Brooders in the market and this aspect of the question depends on the magnitude on which a farm is run.

For small farms, where 50-60 chicks are reared at a time "Fireless Brooders" can be easily made locally at a small cost. Fireless brooders" are those which have no lamp burning in them. The main principle is to conserve the heat generated by the chicks themselves.

Description of "Foster Mother". For a unit of 35 chicks, take a packing case with the following dimensions 3' long, 1'-9" broad and 1'6" deep. The lid of the box should be shaped like a lean to roof. Just below the lid, ventilation holes should be provided in a row. Chicks generally crowd in the corners and so the four corners should be rounded off with a strip of wood. About 10 inches above the floor of the box, there is a cardboard roof on a wooden frame which fits on ridges and to which are suspended a number of flannel strips as per sketches—the opening alternating. The floor of the box should have some litter in the form of chopped dry grass etc. The side of the box should have a ventilator 9" x 3" with a shutter which can be kept open or closed as necessity arises.

The number of chicks should be reduced as they grow older and in size: First week 35 to 40 chicks, Second week 30, Third week 25, Fourth week 20 and so on.

In this kind of brooder, care has to be taken regarding floor space. Too many chicks must not be put into this; otherwise they will be overcrowded and they will not thrive well and may start cannibalism.

This kind of Foster Mother is very good for the districts of this Presidency except Hill Stations.

Another kind of "Foster Mother" or "After Mother" as it is called is to get a box with a dimension of 4' x 3' x 2'. The inside of the box is lined with wire-netting and the space between the wire netting and the side planks should be filled in with hay, straw or dry grass. As the chicks grow older the material can be thinned gradually till at last the whole lot of it is removed. The idea is to conserve as much warmth as possible during the early part of the chick's life and gradually lower the inside temperature as the chicks grow older. The chicks can remain in this "After-mother" from 5 to 8 weeks.

Feeding. Experience shows that mortality amongst chicks is greatest between the first and the third weeks; so all endeavour should be made to push them through this period successfully. At this stage of life, apart from adequate warmth and other comforts already mentioned, the ration of the chicks must be so regulated as to give them a good start in life to develop into vigorous birds.

They must be given sufficient food but not be overfed. There is no harm in their feeling slightly hungry which would keep them busy scratching about in search of food.

There are a few principles in nutrition, which must be observed in any system of chicken rearing. Rations for chicks should have necessary nutrients to produce sufficient heat and energy and to provide all that is necessary for growth.

The first feed for chicks should be some broken grain, finely cracked wheat or ragi or broken rice. If one can afford to get oatmeal, this is the best food for the first two weeks.

This should be fed on feeding boards within the easy reach of chicks. They should however, be taught to pick up their first food in the absence of the mother hen; this can be easily done by tapping the forefinger on the board; thus attracting the attention of the chicks to pick up the grains.

Hard-boiled eggs finely grated, mixed with bread crumps, should be given twice daily up to 2 weeks. Clean water should be available before them always. Skim-milk and butter milk are very good and can also be provided if possible.

Green-food. One important requirement for their growth is green-food and as such, this should be given when they are two to three weeks old. When the chicks have access for a free range on young grass, this need not be given.

FEEDING ROUTINE

Age of chicks.	Feed.	Drink.
Up to 36 hours.	No feed.	Keep them in warm brooder.
Baby chicks up to 10 days.	Oatmeal or groundoats or finely cracked maize or wheat or broken rice depending on the availability of the grain locally. 5 times a day: 6 A.M., 9 A.M., 11 A. M., 1 P. M. and 4 P. M. Feed sparingly & do not over-feed.	Clean water, Skimmilk or buttermilk diluted with water
10 to 20 days.	Grainfood as noted above; at 11 A. M. boiled eggs finely grated with shell, with bread crumps. White ants to be collected and given to them.	do.
20 days to 1 month.	Grainfood as noted above but cracked a little bigger. Leaves of vegetables can be hung before them for picking. Fine shell grit and charcoal should be available before them always.	Clean water, Skim-milk or Butter-milk diluted with water.
4 to 6 weeks.	Grain foods as noted above—feed 3 times bigger grain.	do.
6 weeks to 3½ months.	Shell grit and charcoal as above. Mash. <i>Stock Mash</i> . 30 lb. Wheat bran. 30 lb. Ricebran. 30 lb. Ragi flour. 10 lb. Groundnut cake. 10 lb. Fis meal. 3 lb. mineral mixture. 1 lb. Salt. Mix 2 parts of wheat bran to the above stock mash up to 2 months and 1 part up to 3½ months, and any green vegetables to be chopped and mixed with wet mash. Cooked rice and beef on alternate days for chicken after one month. Shell grit and charcoal should be available before them always.	do.

Drinking water:—Add Permanganate of Potash to drinking water to give it a light red colour and change the water as often as possible; use an earthen vessel and keep it always in shade.

Give the chicks fresh grain, ground each day in the sun.

Vices. Lack of sufficient space, overcrowding, underfeeding, want of mineral matter, leaving about the weaklings which are not able to hold their own, large variations in size of the in-mates etc. are the factors which are responsible for toe-picking and cannibalism. Most of the above are easily prevented with a little attention and care. Sexes must be separated as soon as recognised.

Perching. The chicks should be perched as soon as possible. They get better ventilation, there, than is obtainable when they are on the floor.

Conclusion. In conclusion, it must be stated that there is no hard and fast rule with regard to these little things and that common sense and experience alone play the most important part in the enterprise in turning out to be a success.

(To be continued)

FLUE CURING AND GRADING OF TOBACCO IN THE GUNTUR DISTRICT

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Introduction. Tobacco (*Nicotiana tabacum*) is a native of Mexico and Brazil (Watt 1908). It gained popularity all over the world by its gradual introduction and acclimatisation. The area under the crop in the Madras Presidency is 268,815 acres, of which the Guntur District contributes a third. The crop being an industrial one, is put to varied uses and is broadly classified into (a) cigar wrapper tobaccos (b) cigar filler tobaccos (c) pipe tobaccos and (d) plug tobaccos. Tobacco in the cured state is chiefly exported to the United States of America and is imported in the form of finished products like cigarettes; decoctions; active principles; medicines etc. Madras and Burma contribute their bulk quota in the export of manufactured cigars to Maldives; Straits; Ceylon and Arabia (Watt 1908.)

There are three distinct classes of persons connected with the tobacco trade viz., (1) cultivators (2) curers and (3) dealers. The present article is mainly confined to the work of the second class of people though the same embraces in a way the work done by the last-mentioned class of persons.

Of the three methods of curing tobacco, sun-curing; air-curing, and flue curing, the one mentioned last is gaining ground with the cultivators of this district as evidenced by the number of curing sheds or barns increasing every year. At present, the number is about 1400 in the Guntur District.