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PRACTICAL MANAGEMENT SYSTEMS FOR BACKYARD AND SMALL SCALE CHICKEN LAYER PROJECTS: PART II - CHOICE FEEDING SYSTEM.

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ABSTRACT

A guide to better management of layer chickens to improve production and profitability using a choice feeding system is outlined. The wisdom of choice feeding, and the factors involved in the preparation and presentation of feeds using the feeding system are also discussed.

Key words: *choice feeding, laying hens, backyard farming,*

INTRODUCTION

As stated in PART I, small scale poultry egg production is a viable business if managed correctly (Bakau *et al.* 1998). Using conventional methods of feeding birds with commercially formulated complete rations is one option, but there is another method which is just as good as the conventional method and is easy and more appropriate to use. This method is called choice feeding and is ideal for conditions such as those we have in Papua New Guinea, particularly in year-round high temperatures.

THE WISDOM OF CHOICE FEEDING

Before the fowl was domesticated and developed extensively for commercial use, it sought its feed sources to supply all the nutrients for growth, maintenance and reproduction by scavenging the territory it lived in, usually covering a large area. A free range fowl retains this ability to find feed sources. What it eats from the wild tends to consist of seeds, nuts, fruits, earthworms, insects, bugs, snails, pieces of coral, limestone, shells etc.. We now know that the fowl has very few taste buds and its desire to eat is driven by the need to satisfy its energy appetite. When this has been satisfied, it seeks to satisfy other appetites, most notably, protein, vitamins, minerals and other appetites. Hence, when the fowl covers a large area in search of seeds, nuts and fruits it is actually trying to satisfy its energy appetite and it eats earthworms, insects and bugs for it's protein appetite. These feeds also contain variable amounts of vitamins and minerals, usually in very low amounts and therefore the fowl has to eat a lot of other feed sources, such as succulent green grasses and shells to obtain the vitamins and minerals it requires. For the laying hen however, besides having to satisfy energy and protein appetites, it has to also satisfy its calcium appetite, an important requirement for egg production.

The digestive tract of the fowl therefore is designed to cope with such feeding behaviour. When the fowl finds food it eats it quickly, filling up the gizzard, and then stores the excess in the crop for later use. Whole food has to stay in the gizzard for some time to be grounded into fine particles before it passes down the alimentary tract. When this process is disturbed, as is the case when pre-ground feeds are offered, the gizzard in particular will shrink in size and become paler in colour, as the gizzard muscles become thin because of the lack of activity. This is a common feature in modern chicken production because ground feeds are used. Interestingly, evidence to date suggest that fowls with shrinking gizzards are more susceptible to coccidia, organisms responsible for causing coccidiosis, than those with more muscular gizzards. Present compounded poultry feeds (complete grounded and mixed feeds) are by no means the ultimate or appropriate for the fowl. Rather they are made more for our convenience than for that of the fowl. These feeds are made for the average performing birds, not catering for the low and high performers. In other words, the low performing birds are wasting the feed while the high performers can not get enough and therefore are producing below their capability.

This is not likely to happen in a choice feeding system, as the system allows the birds to eat according to their need to maintain their body functions and to grow and reproduce. Another important aspect about the system is that it allows the birds the opportunity to adjust their feed intake when the temperature increase beyond the comfort zone of 20 to 25°C. This is a particularly important consideration in rearing poultry in areas of high temperature, such as those we experience in Papua New Guinea. In such environments, choice fed birds are able to reduce their energy intake to avoid being "cooked from inside" but continue to maintain their protein intake, and thus maintain growth. This does not happen when the birds are reared on a complete feeding system. In this system the birds simply crowd around water troughs and do not eat until later in the day when the temperature drops to the comfort mark.

In many ways, the choice feeding system utilizes the natural feeding behaviour of the fowl by not limiting the fowl's ability to choose. That is the fowl is now presented with a method of feeding which is nutritionally and economically advantageous.

MANAGEMENT OF THE PROJECT

Any type or strain of chicken can be reared using this system of feeding. The type of houses, feed and water troughs, perches, nests and other basic management considerations are essentially the same as those used in a complete feeding system. The differences are:

- The bird needs to be trained early to recognize the different types of feed that will be offered throughout the life of the bird. Similarly, it should be trained early to distinguish how these types of feed will be presented to it, usually as separate energy or protein sources, so that it can develop appropriate feeding behaviours.

- Protein sources are usually presented in the form of a protein concentrate mixtures, which will also contain vitamins, minerals and other supplements e.g. amino acids, fatty acids or antibiotics.

- In the case of layers, besides the energy and protein sources, an additional calcium source has to be provided.

- There is no need to grind or pellet cereals such as sorghum, millet or wheat. However, it is still recommended to crack hard maize seeds.

Training of pullets

Modern pullets are produced in artificial environments, having being hatched in incubators and brought up without the mother hen's care and training to survive in adult life. With this in mind, the most important aspect of reaping the benefits of using a choice feeding system is to train the pullets early to distinguish the different forms and types of feed that they will be eating throughout the rest of their lives, as if they have been reared naturally.

The time when chickens learn the most is from one day old to about 14 weeks of age. Thereafter, they do not learn well and therefore it would be unfair if one was to expect benefits from using the feeding system when the birds were not allowed the opportunity to learn before they reach 14 weeks of age.

Choice feeding training involves no complicated formulas or procedures. All that is required is to place before the chickens two sets of diet; one being mainly an energy source and the other being mainly a protein source. The latter also provides minerals, vitamins, amino acids and other minor nutrients. The protein concentrate supplement is likely to be unchanged but it is possible to change the energy feed sources. If that is to be the case, then, allow the birds a minimum of 14 days to eat each of the different types of energy feeds the birds are likely to eat throughout their productive life. Once the birds begin to develop the desired feeding pattern, usually when they eat at least twice as much energy feeds as protein concentrate supplement, both feeds can be added together in a feed trough without having to offer each source separately.

This is practically possible with whole cereals or chipped and dried root/tuber crops. It would not be possible with wet (boiled) feeds, as such feed when mixed with dry protein concentrate will make the concentrate go bad within a short time.

Feed troughs

Since the bamboo is naturally partitioned, it is an ideal type of feed trough to use in training the birds to develop the desired feed pattern. Cut out a straight section of bamboo with at least 4 to 6 internodes between the two ends. This will be sufficient to construct 5 to 7 troughs, sufficient to cater for 20 to 50 pullets respectively.

Secure along one side of the house the feed troughs and along the other the water troughs. Or,

alternatively, construct a length wise support structure in the centre of the house and secure the bamboo feed and water troughs on either side of the structure. Such support structure can be made from planting small posts, adequently distanced to support one cut-out bamboo length. If gutter troughs can be obtained, they can be also used and should be arranged in a manner similar to the bamboo troughs.

Preparation of feeds

Tuber/root crops such as cassava, sweet potato and taro kongkong should be chipped into small pieces, boiled or dried before they can be given to the birds. Young birds particularly can not handle big clumps of these feedstuffs. Whilst cereals, such as sorghum, can be offered without having to ground them but, for maize they should be cracked if they are dry as the young birds will have problems in eating them.

Presentation of feeds

During the early period of rearing the pullets, before they commence laying, at least 3 out of 5 or 4 out of 7 troughs should be filled with the energy feed sources and the reminder with the protein concentrate supplement. However, when the pullets commence laying, the middle trough should be emptied and filled with oyster chips instead. The other 2 or 3 troughs on either side of the trough containing oyster chips will now be filled with protein concentrate and energy sources either seperately or in a sequence. Ensure the troughs are cleaned every second day if boiled (wet) feeds are used.

The same applies if gutter troughs are used. Partition the troughs so that different sources of feed can be offered and maintained separately until the pullets develop the appropriate feeding behaviour, consuming about 2-3 times more energy feed sources to protein concentrate. Thereafter there is no need to worry about the feed mixing, as the birds have already learnt to distinguish the feeds and will eat accordingly.

Feeding of pullets

As mentioned earlier, the pullets can be choice fed as early as one day old or later, but not after they are over 14 weeks of age. If the pullets were to be choice fed from day one, then there is no need to buy commercial pullet starter and developer feeds. But if free choice is started later, then these feeds have to be purchased and fed to the pullets as outlined in Part I (Complete feeding system).

The amount of protein concentrate and energy feed source consumed will depend on a number of factors, including;

- stage of pullet growth,
- environmental temperature,
- length of training the pullets receive,
- nutrient content of the feeds,
- texture and palatability of the feeds,
- anti-nutrient content of the feeds.

Shown below (Table 1) are the approximate amounts of energy feed source and protein concentrate supplement each pullet will consume during different stages.

Table 1. **Approximate intake rate of energy feed source and protein concentrate suppliment of pullets in the growing and laying stages**

Stage	Age (wks)	Energy (kg)	Protein concentrate	Grit (kg)	Total (kg)
Growing	0-20	9	3	0.1	11.1
Laying	21-74	27	9	2.0	38.0

During the laying stages, green feeds such as sweet potato leaves can be also offered, as they help improve the yolk colour. Grit, in the form of very small stones, can be added when the pullets are young, but it is not necessary when the pullets have started to lay eggs and when limestone or oyster shell chips are being used as a calcium source.

BUDGET FOR A 50 LAYER PROJECT

Basic Assumptions

1. A deep litter system will be used. Two identical bush material houses will be built, each measuring 3 x 6 m. A K100 per house is required to cater for other necessary items. One house will be built first and the other within the first 12 months. The houses will last 5 years.
2. Brooders, waterers and feeders will be made from bush materials.
3. Day old pullets - K1.20 each
4. Mortality, 0-20 wks, 10%: 21-74 wks, 12%
5. Cost of feed;
   - Energy feed sources, self grown and prepared at no cost,
   - Protein concentrate, based on meat and bone meal, soya bean meal and rice bran at 39 toea/kg,

- Calcium source, self provided at no cost.

6. Egg production - 190 eggs/hen (deep litter)
7. Cost of transport of feed - 3 toea/kg
8. Wholesale egg prices (ungraded) - K1.80/dozen.
9. Sale of spent and cull hens - K4/hen.

Details of estimates for the cash flow (Kina)

Capital Expenses

2 sheds at K100 each 200

Annual Running Costs First year

Protein concentrate (0 - 21 wks) 3kg x 39t x 50 pullets 59
Protein concentrate (21 - 74 wks) 4.5* kg x 39 x 45 pullets (*Feed for 6 months only) 79
Total feed cost 138
Cost of transport of feed 353 kg of protein concentrate at 3t/kg = K10.59 11
Cost of 50 day old pullets at K1.20 each 60
Other associated costs 20
Total first year running costs **229**

Second and subsequent years

Protein concentrate (0 - 21 wks) 3 kg x 39t x 50 pullets 59
Protein concentrate (21 - 74 wks) 9 kg* x 39t x 45 pullets (*Full year) 158
Total feed cost 217
Day old pullet cost 60
Transport cost - 555 kg of protein concentrate x 3t/kg x 3t/kg 17
Other associated costs 30
Total second and subsequent years running costs 324

Annual Returns

1. First year - 45 hens x 100 eggs = 4500 eggs or 375 dozens at K1.80/dozen 675
2. Second and subsequent years - 45 hens x 190 eggs = 8550 eggs at K1.80/dozen 1283
3. Spent hens - 40 hens at K4.00/hen 160

Total annual returns **2118**

Development cash flow

	Year 1	2	3	4	5
Receipts					
Sale of eggs	675	1283	1283	1283	1283
Sale of spent hens	-	160	160	160	160
Total cash receipts	675	1443	1443	1443	1443
Capital expenses					
Sheds	200	-	-	-	-
Total capital expenses	200	-	-	-	-
Runing costs					
Feed	138	217	217	217	217
Transport	11	17	17	17	17
Day old pullets	60	60	60	60	60
Other cost	20	30	30	30	30
Total runing cost	229	324	324	324	324
Annual cash surplus	246	1119	1119	1119	1119
Cumulative cash surplus	246	1365	2484	3603	4722

The project has a cash surplus from the first year onwards. With half of the feed being self-provided, the cost of feed is markedly less and thus increase return rates. Note that the same can be realized even using a cage system, despite the additional cost for the cages. That is, the costs of the cages will be offset from increased recovery of eggs when cages are used.

FURTHER READING

BAKAU J.K (1988). Free choice feeding of poultry: A method of feeding suggested for village, backyard and semi - commercial poultry production. *Harvest* 13: 6 - 9.