LIVESTOCK DEVELOPMENT NOTES: NO. 12

PRACTICAL MANAGEMENT SYSTEMS FOR BACKYARD AND SMALL SCALE LAYER CHICKEN PROJECTS: PART 1 - COMPLETE FEEDING SYSTEM.

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ABSTRACT

A guide to better management of layer chickens for maximum production and profitability using a complete feeding system is outlined. Examples of development cash-flow for a deep litter system and a cage system are also presented.

Key words: *layer chickens, backyard farming, complete feeding system, deep litter system, cage system*

INTRODUCTION

Backyard or small scale egg production ventures are not only satisfying side activities but are also profitable businesses if managed correctly. This is particularly so when considering the less tapped road-side markets available in and around small and large urban centres in Papua New Guinea. Large scale producers could not service these markets because of their unpredictability, but have tapped into them now and then when there is excess production.

These markets can be well serviced by backyard or small scale egg producers, as seen in other developing countries such as Indonesia and the Philippines. However, for these projects to be successful a well coordinated and technically sound extension service is required. This article intends to provide some advice and information on better ways in looking after layer chickens as a business.

TYPE OF CHICKENS

There are two types of chickens which can be used for this project:-

- *Egg producing hybrids or types*: These are specifically bred egg producing birds and can be purchased from Ilimo Farm (Port Moresby), Highlands Products (Lae) and Christian Leaders Training College (Mt. Hagen). These type of chickens are also available from Australia and New Zealand but one would have to obtain an import permit in bringing these type of chickens into the country.

- *Australorps* (black chickens): These are dual purpose chickens supplied previously by Labu but are no longer available. The current stock available is an Australorp - Rhode Island Red cross and is available from Niugini Table Birds (Lae), and is sold as unsexed.

The Australorp chickens consume more feed and produce less eggs than the hybrid chickens. However, because they are heavier than the hybrid chickens, they command a higher sale price for both males when they reach 14-16 weeks of age and the females at the end of laying. It is important that all the chicks ordered have their beaks trimmed and are vaccinated against Fowl Pox and Marek's diseases.

MANAGEMENT OF THE PROJECT

The Deep Litter System

This system can be used throughout the growing and laying periods or during the growing stage of the cage system birds.

Housing: The house can be built using bush materials with deep drainage all round the building and adequate overhang to keep rain water out. The roof of the house must be water proof. It is possible to build houses which will last long using bush materials. Sago or kunai leaves are good for the roofs. While bamboo, pitpits and sago blinds can be used in walling the house instead of wire nettings (Figure 1).

commencement. It is important that the roof of the house should be high enough to allow good ventilation to prevent heat stress. That is heat stress causes drop in egg production and increases incidence of wet droppings. Roofs about 1.8 m high at the eaves should be sufficient for native material houses. Corrugated iron roofs should be much higher, at least 2.5 m high at the eaves.

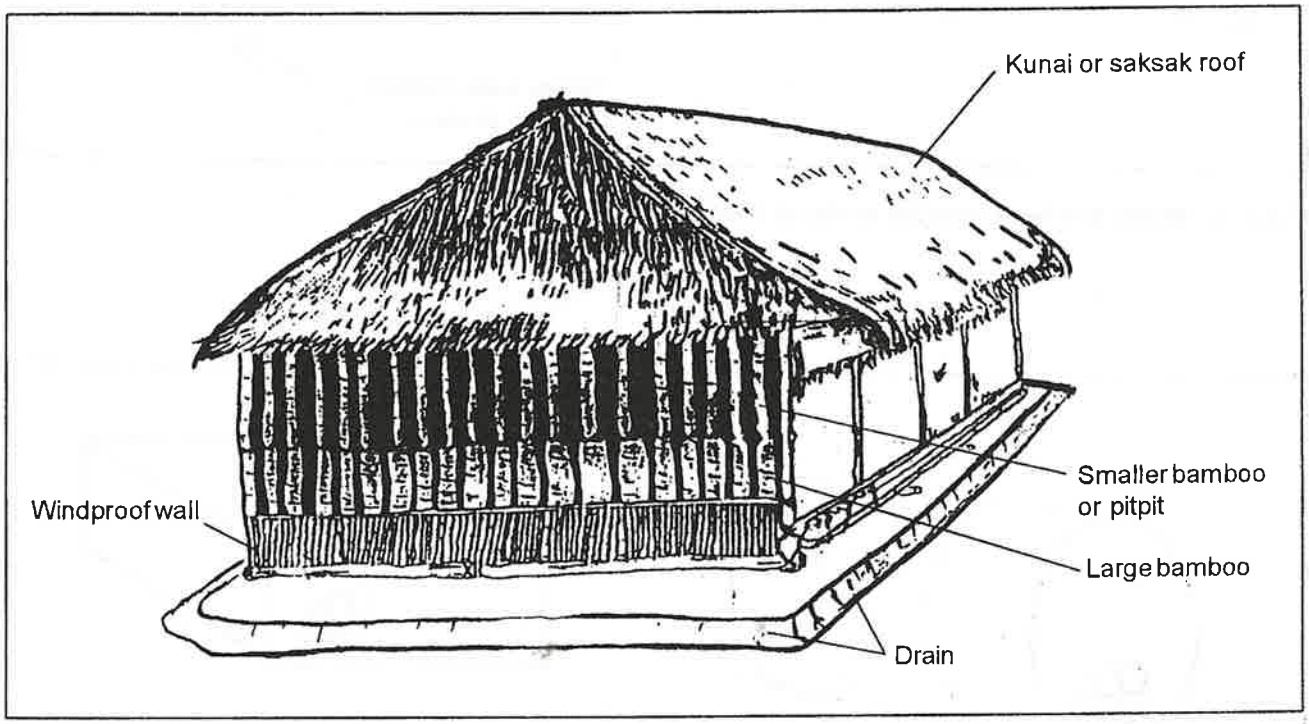

Figure 1. **A native material house suitable for housing layer chickens.**

Native material houses are cool and are more suited for Papua New Guinea conditions than houses with iron roofs. The only problem is that bush material houses require frequent maintenance and have short life span (only 4-5 years).

The size of the house should be adequate to house the required number of adult hens. Allow 3 m^2 for every 10 hens or 0.3 m^2 floor space for each hen. An extra space of about 0.5 m^2 should be allowed for water and feed troughs. A house measuring 3 x 6 m is adequate for 50 hens. Projects using the deep litter system will require two houses. The first will be for housing the first stock while the other will be used to house the incoming replacement stock. The second house can be built later but must be erected within the first year of the project's

Feed and Water Troughs: Suitable feeding and drinking troughs should be ready before the chickens arrive. Bamboo troughs are cheap and easy to make. Use small size bamboo troughs for young chicks, especially when the chicks are in the brooder. For the waterers, put some stones in the bottom to prevent young chickens from drowning or getting wet. For bigger birds, use big strong bamboos and split a section between the two internodes with a width about the length of a match box. The opening should be made big enough for the head of an adult hen to reach feed or water (Figure 2).

Construct sufficent number of feed and water troughs to reduce the workload in refilling them. Ideally, the troughs should be arranged along both sides of the

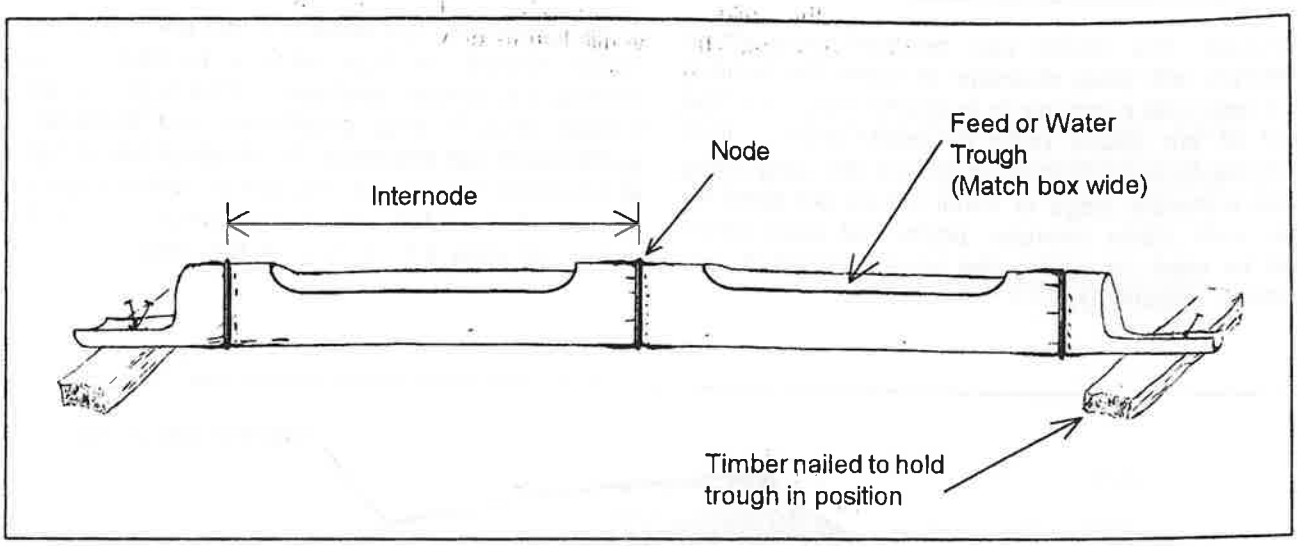

Figure 2. **Water and feed troughs made of bamboo.**

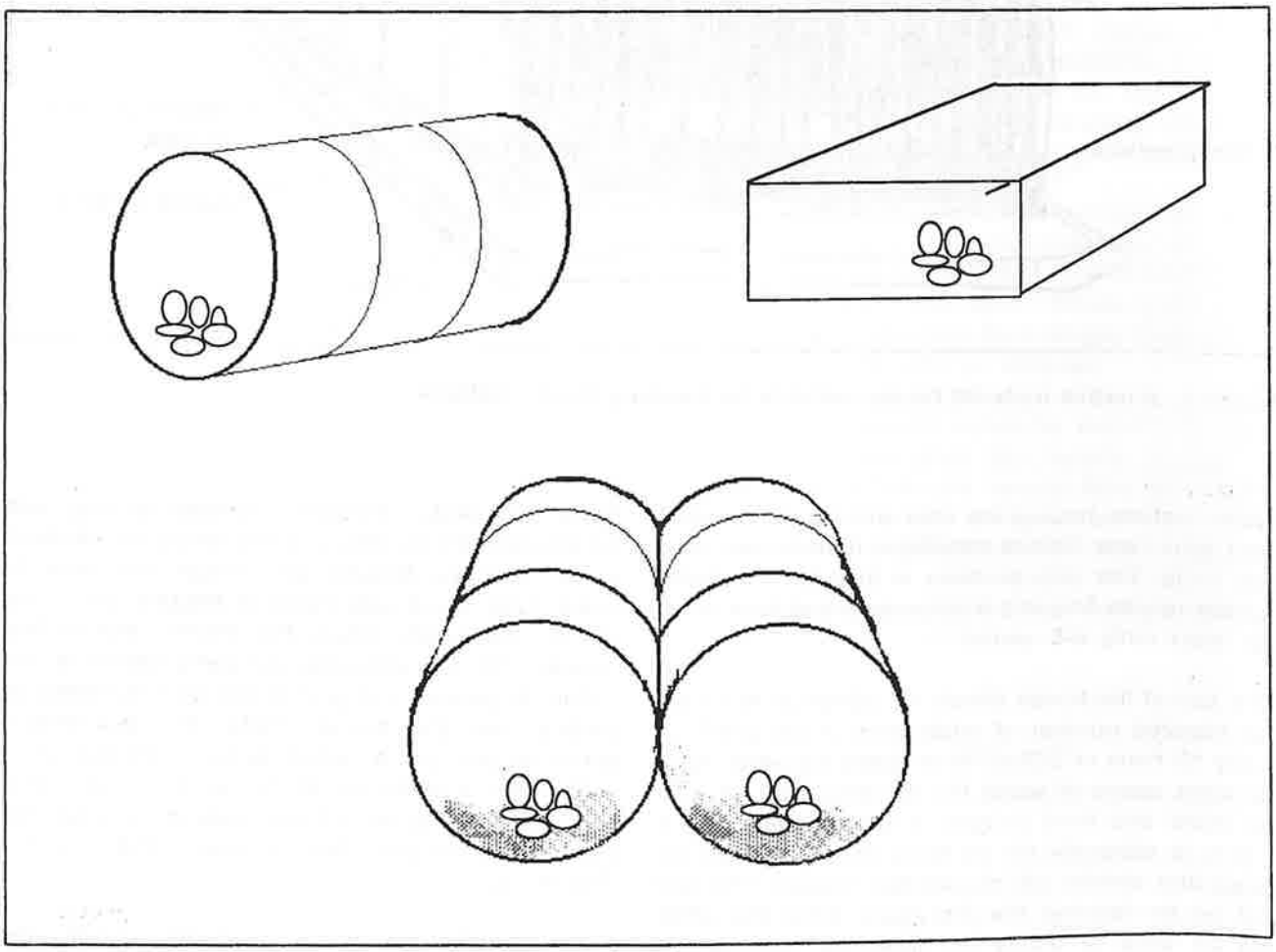

Figure 3. **Types of nests suitable for use in layer chicken production.**

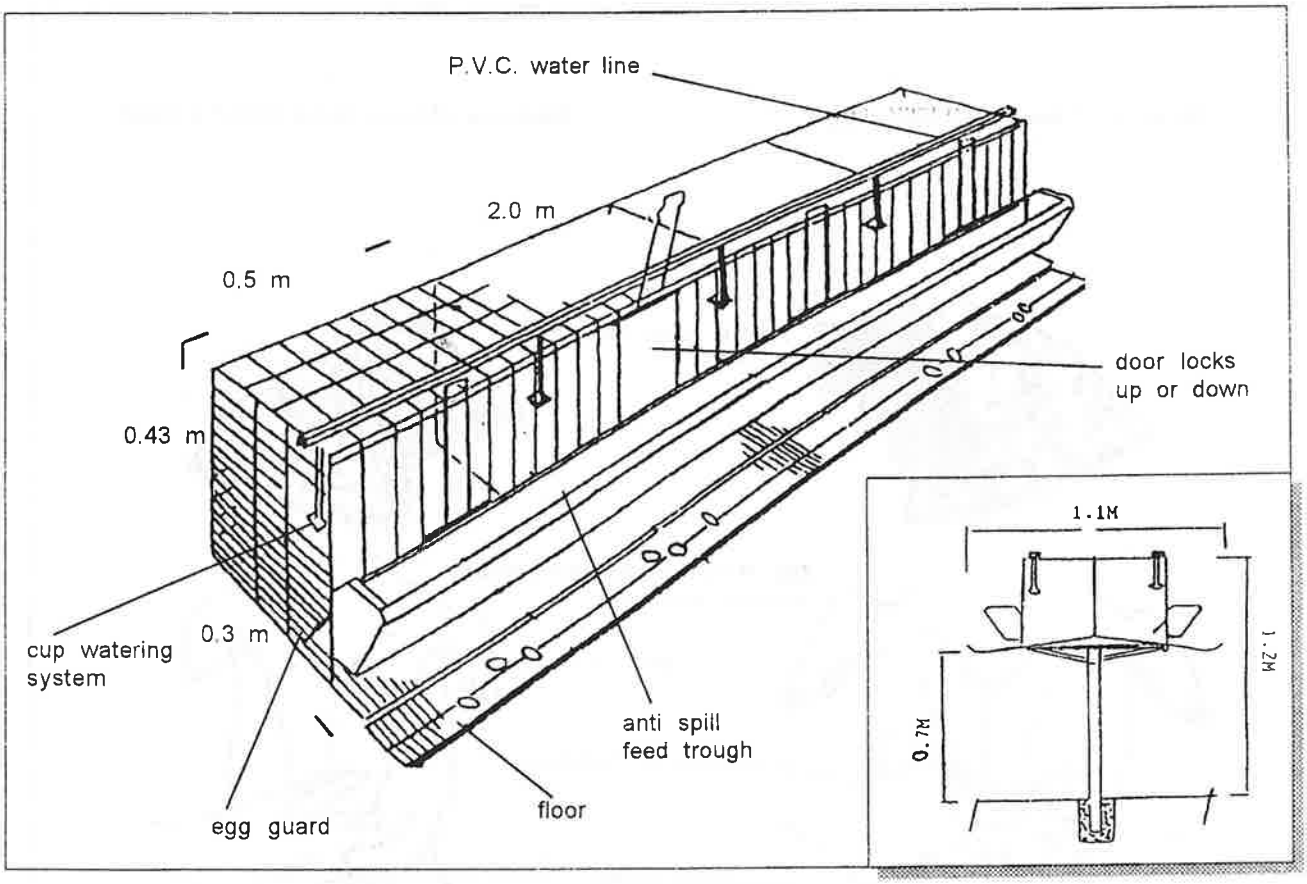

Figure 4. **A back to back single cage unit suitable to accomodate 16 - 32 hens.**

house, with one side for feed and the other for water. To allow ease of removing and cleaning the troughs, make short troughs using sections with 3 to 4 inter-nodes. Nail or tie the troughs onto a piece of flat timber to hold them in position to reduce spillage. To prevent wet conditions under the water troughs, it is best to have the troughs over a patch of coarse gravel below. The gravel patch should be slightly higher than the surface of the deep litter - deep litter should not be put on top of the gravel.

Perches: Chickens prefer to sleep and roost high above the ground. A limb of a tree with some small branches will make a good roost for the birds. The important point, however, is to make sure that the roost is positioned clear from the feed and water troughs. This is to prevent the droppings from falling into feed and water. The litter under the roosts should be turned regularly to mix with the droppings.

Nests: For production of clean eggs and to prevent breakage and the habit of egg eating, nests should be provided. Nests can be made of bush materials, old wooden boxes or old 20 litre drums. One 20 litre drum is sufficent to cater for 6 hens. When single compartment nests are used, they should be 25 cm high with a strip of timber, 6 to 8 cm wide, nailed at the front lower part of the nests to prevent the eggs from rolling out. A single nest of this type can cater for 4 hens. Commune nests can also be used. They can be made from bush materials too. They should measure 50 cm wide and 2.4 m long with two holes on each side for the hens to enter and leave. Construct a removable top to allow ease of egg collection. One such nest can serve between 35 to 40 hens. Clean bedding material such as dry kunai grass, wood shavings or coffee hulls should be put inside the nests. Figure 3 shows some of the type of nests that can be used.

Brooding: Day old chickens can be brooded in the same house as described above. There are a number of ways in looking after young chicks. The easiest way is to construct a small room with woven bamboo or sago and covering it with old juke bags, leaving a small gap about 30 cm wide at the top

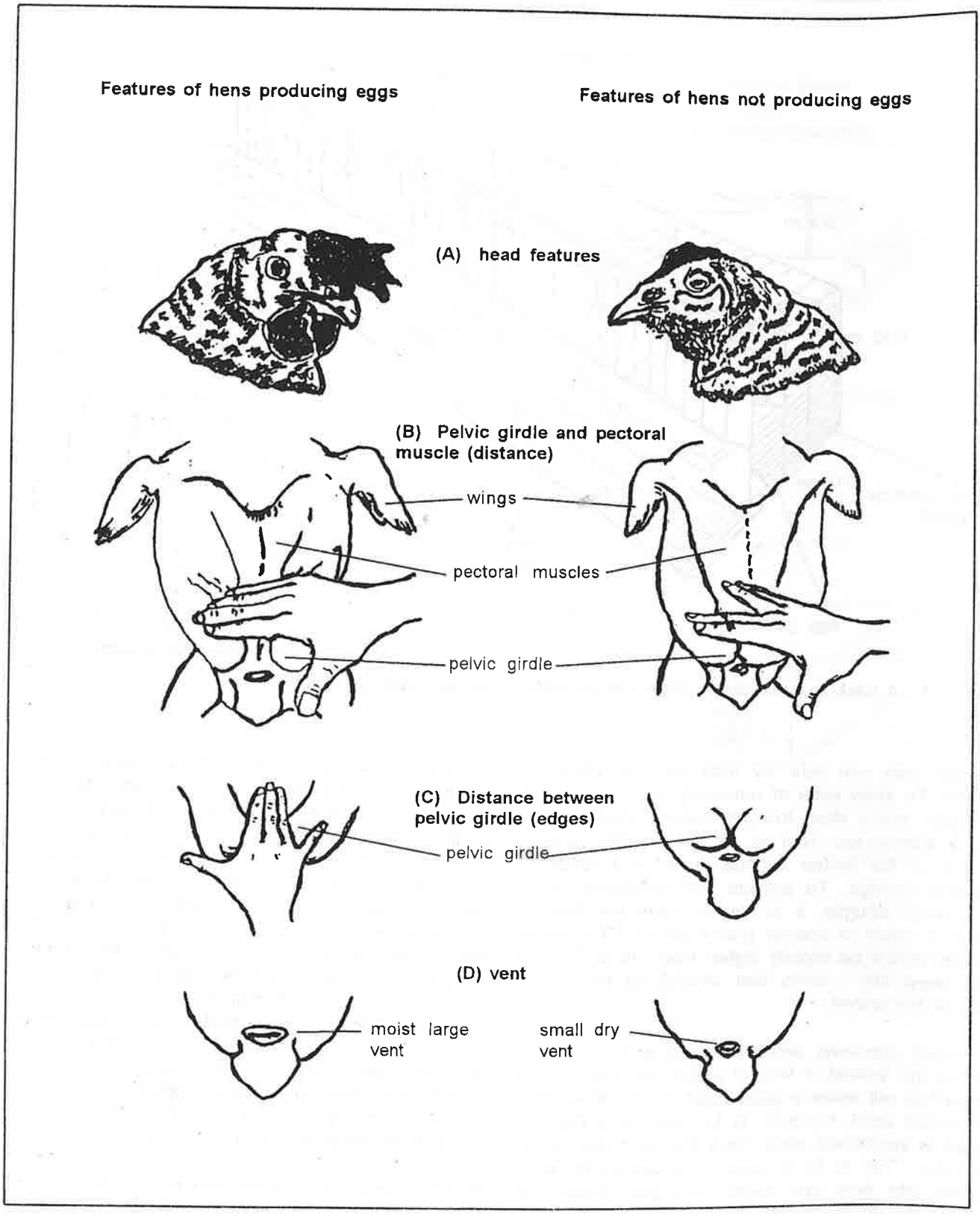

Figure 5. **Some features of hens that are producing eggs (left) and those not producing eggs (right).**

for ventilation and light. The size of the room depends on the number of day old pullets ordered. A room measuring 60 x 60 cm is good enough to brood 10 pullets, or 1m2 room to accomodate about 30 pullets. One kerosene lamp can provide enough warmth for 20 chicks or 2 for 50 chicks. When such heat sources are used, they should be placed directly under the opening (gap) at the top of the brooder. A small bamboo feed or water trough is adequate for 20 chicks to eat or drink out of it, or two for every 50 chicks in the brooder. Always make sure that the lamp (heat source) does not go out, particularly during the nights. In the coastal areas, the lamp(s) should be kept burning continously for the first 7 days, and then only during the nights for the next 7 days. In the highlands, however, a further 7 nights of additional heating is necessary because of the cold temperatures during the nights.

Alternatively, secure an empty cardboard box (tin fish, beer carton, etc.) and make a few holes in it. During the day, leave the chickens in the small room as mentioned above and give them feed and water. During the night, put the chickens in the box and close it. Leave the box in the small room or if the nights are very cold (highland areas), carry the box inside the house where people sleep. In the morning, put the chickens back in the small room and give them feed and water. Continue doing this until the chicks are ready (2-3 weeks later) to fend for themselves.

It is important to note that young chickens can go without feed and water for up to 24 hrs, and will make up for this when they are available. Whereas, when the young chicks are subjected to a cold stress for only 2 hours, many of them will not cope well with the shock and will die, even when the warmth is restored.

The Cage System

The husbandry practises are essentially the same as those used in the deep litter system, especially at the age (up to 20 weeks of age) when the pullets are about to lay their first eggs. It is only during the laying period that certain practises will differ slightly. The house for the cage system although is basically the same as that for the deep litter system, the roof has to be a bit higher (about 2.5 m at the eaves) because the cages are raised above the ground. The size of the house also depends on the number and size of the cages required. The type of the cage shown in Figure 4 is a back to back single type cage system. Such a cage, about 1.2 m long, can accomodate between 16 to 32 hens in the four compartments. Note, always allow 2 m width under the eaves for a single row cages and 3.5 m for two row cages. The initial cost of buying the cages and erecting them is high, but the cage system is easier to manage and the increase in egg recovery should offset the cost of the cages in the long run.

FEEDING

In a complete feeding system, compounded (or commercial) feed are fed during both growing and the laying periods. Different types of feed are fed at different stages of the pullets growth. Table. 1 shows the different types of feed and the amount of each feed the birds would consume.

Table 1: **Type of feeds the pullets and the hens consume at different stages of production**

Age in Weeks	Type of Feed	Protein (%)	Feed Consumption (kg/pullet or hen)
0 - 6	Pullet starter	20	2
6 - 22	Pullet developer	15	8
22 - 74	Laying crumbles	16	45

Although these feeds provide most of the nutrients, whenever possible, green feeds (e.g. leucaena and kaukau leaves) should also be provided to improve the color of the yolk. Extra calcium in the form of chipped oyster shells should also be provided, especially during the period when egg production is very high (25 to 40 weeks of age). Give extra calcium in a separate trough or sprinkled on top of the feed if the birds are reared in cages. Sand or very small stones should also be given because they help in grinding feed into fine particles which helps in the digestion process.

MEDICATION

Caged birds are not frequently medicated compared

to those in a deep litter system. However, if the deep litter is kept dry, the chickens vaccinated (against Marek's and Fowl Pox diseases) and good management practises are followed, there should be less problems with outbreak of serious diseases. It is, however, advisable to keep a small quantity of coccidiostates and deworming medicines, as they may come handy from time to time. Drugs for treating these diseases are available and can be purchased from the local suppliers (e.g. Farmset Pty Ltd). Always follow the manufacturer's recommendations carefully when using these drugs, or if possible, consult a veterinarian even before buying the drugs.

EGG PRODUCTION

The hens will start laying when they are about 22 weeks of age. If good management practises have been followed during the rearing period, all the pullets will be uniform in size, weight and maturity and will start laying about the same time. Make sure that the nests are provided or the pullets transferred to their laying cages 2 weeks before they commence laying. The number of eggs laid will be few at first but will increase rapidly until the birds reach their peak, at around 30-32 weeks of age. After peaking, the egg numbers will remain constant for a while before declining and about 74 weeks of age increasing number of hens will cease to lay.

CULLING AND STOCK REPLACEMENT

When the hens reach about 74 weeks of age their egg production rate declines that it is not economical to keep them any longer. To continue with the project, a replacement stock should be purchased as one day old when the first batch of pullets are 52 weeks or 12 months old. A second house is needed to raise these pullets. When the replacement birds reach laying stage (about 22 weeks old), older birds should be culled or sold.

Culling or removing from the flock unproductive birds is an important process in the management of layer flocks. This is because hens that are not laying eggs will cost a lot of money in feeding them; as a hen eats about 30 kg of feed in a year.

Hens which are not laying eggs throughout the laying period should be culled immediately. This should be employed when the hens are about 28 weeks of age; the time when the hens are just about to reach their peak egg production. A hen that is laying eggs will look active, the comb and wattles are large and bright red in colour, the breast muscles are full and round, the distance between the two pelvic bones is about 2 or 3 fingers wide and the vent is large and moist. Hens that look pale with small pale comb and wattles, thin V shape breast muscles, narrow distance between the two pelvic bones and small dry vents are not laying eggs and therefore should be removed from the flock. Figure 5 shows the general characteristics of body conformation of hens which should or should not be culled.

The developmental cash budgets (see Appendices A-C) show that the projects will generate cash surplus after the first year of operation in deep litter and cage systems, respectively. The annual return rates are small but slightly higher in the cage system.

FURTHER READING

BAKAU, W.J.K, R. E. ABDEELSAMIE and **W. E. NANO** (1997). Practical financial and record keeping procedures in managing a chicken project. *Harvest* (1&2): 34-38 *Livestock Development Notes No: 8.*

Farming Notes No. 29. *Poultry: Australorp Chickens*. Department of Primary Industry, Port Moresby, 1982.

Appendices

BUDGETING

Projecting the cost and income of a layer chicken project is an important part of any business and should be done before "a toea" is even spent (see Bakau *et al.* 1997).

Budget for a 50 layer chicken project

A. *Basic Assumptions*

(1) Deep litter; 2 identical houses will be built, each measuring 3 x 6 meters. Native materials will be used except for some items, costing K50.00 per house. One house to be built first and the other within the first 12 months.
(2) Cage units; costs of the houses are the same. In addition, cost of the cages and installation of K70.00 per unit housing 24 birds; 2 units are required.
(3) Life span of the houses - 5 years.
(4) Brooders, waters and feeders to be made from bush materials. 2 lamps will be purchased costing K10.00
(5) Cost of day old pullets including freight, vaccination against Fowl Pox and Marek's diseases and beak trimming - K1.20 each.
(6) Type and quantity of feed to purchase are as shown in the Table 1. Cost of feeds are as follows:
- Pullet Starter 42 toea per kg
- Pullet Developer 37 toea per kg
- Laying Crumbles37 toea per kg

(7) Cost of transport of feed - 3 toea per kg
(8) Mortality rate estimated at 10% during pullet stage and 1% per month (12%) during the laying period.
(9) Egg production is estimated at 190 eggs/hen on deep litter and 210 eggs/hen in cages.
(10) Wholesale price of eggs at K1.80 per dozen for ungraded eggs.
(11) Sale price of spent hens - K4.00 each.

Capital Expenditure

Deep Litter	2 Shed at K50.00 each	K100
	2 Kerosene Lamps	K 10
Total capital expenses (deep litter system)		K110
Cages	2 cage units at K70.00 each	K140
	50 Gallon tank	K100
	Hand pump	K 20
Total capital expenses (cage system)		K260

Annual running costs

First year

Pullet starter (2kg x 42 toea x 50 pullets)	K 42
Pullet developer (8kg x K0.37 x 50 pullets)	K148
Layer crumples (25kg* x 37 toea x 45 hens)	
* feed for 6 months only	
Total feed costs	K606
Cost of transport (1625 kg of feed @ 3 toea/kg)	K 50
Day old pullets (50 @ k1.20/bird)	K 60
Kerosene (14 liters @ 60 toea/litter)	K 8
Medication	K 20
Total first year running costs	K744

Second and subsequent years

Pullet Starter (as above)	K 42
Pullet Developer (as above)	K148
Laying Crumbles (45 kg* x 37 toea x 45 hens)	K749
* full year feeding	
Total Feed Cost	K939
Cost of feed transport (2525 kg x 3 toea/kg = K75.75)	K 76
Day old Pullets as first year	K 60
Kerosene	K 10
Medication	K 20
Total second year running costs	K1105

Annual returns

First year

Deep Litter 45 hens x 100 eggs* = 4500 eggs	K675
* 6 months egg production	
Cage 45 hens x 120 eggs* = 5400 eggs	K810
* 6 months egg production	

Second and subsequent years

Deep Litter 45 hens x 190 eggs* = 8550 eggs	K1281
40 hens cull at K4.00 each	K160
* full year egg production	
Total	K1441
Cage 45 x 210 eggs* = 9450 eggs	K1422
40 hens cull at K4.00 each	K160
* full year egg production	
Total	K1582

B. *Developmental cash flow (Deep litter system)*

	Year				
	1	2	3	4	5
Receipts					
Sale of eggs	675	1281	1281	1281	1281
Sale of culls	-	160	160	160	160
Total cash receipts	675	1441	1441	1441	1441
Capital expenses					
Sheds	100	-	-	-	-
Lamps	10	-	10	-	10
Total capital expenditure	110	-	10	-	10
Running costs					
Feed	606	939	939	939	939
Transport	50	76	76	76	76
Day old pullets	60	60	60	60	60
Kerosene	10	10	10	10	10
Medication	20	20	20	20	20
Total running costs	746	1105	1105	1105	1105
Annual cash surplus (Deficit)	(181)	336	326	336	326
Cumulative cash surplus (Deficit)	(181)	155	481	817	1143

C. Developmental cash flow (Cage system)

	Year				
	1	2	3	4	5
Receipts					
Sale of eggs	810	1422	1422	1422	1422
Sale of culls	-	160	160	160	160
Total cash receipts	810	1582	1582	1582	1582
Capital expenses					
Sheds	100	-	-	-	-
Lamps	10	-	10	-	10
Cages	140	-	-	-	-
Tank	100	-	-	-	-
Pump	20	-	-	20	-
Total capital expenses	370	-	10	20	10
Running costs					
Feed	606	939	939	939	939
Transport	50	76	76	76	76
Day old pullets	60	60	60	60	60
Kerosene	10	10	10	10	10
Medication	20	20	20	20	20
Total running costs	746	1105	1105	1105	1105
Capital & Running costs	1116	1105	1115	1125	1115
Annual cash surplus (Deficit)	(306)	477	467	457	467
Cumulative cash surplus (Deficit)	(306)	71	538	985	1452