

TECHNICAL GUIDE FOR EGG PRODUCTION

INTRODUCTION

In Botswana the poultry industry plays an important role in rural socio-economic development and improving the standard of living of people through poverty alleviation and creating employment opportunities. The Poultry Annual Report indicates that the poultry industry offered employment opportunities to 3000 people, the majority of whom are women.

The annual consumption of table eggs per person increased from 44 to 67.2 (57.2%) during 2004 to 2006. Subsequently, the population of laying hens increased from 310 259 to 330 000 (6.36%) and employment rose from 2142 to 2381(2004/2005 and 2005/2006 Poultry Annual Reports). It was estimated that egg production increased by 51.44% and over 220 000 hens were slaughtered as spent hens, yielding 270.9 tonnes of chicken meat.

Prerequisites for establishing egg production project

Before setting up a project, one should have;

Land: Adequate land to house poultry structures and for carrying out various farm operations.

Water: Adequate clean water is needed for consumption and cleaning within the poultry project. So it is imperative to identify a reliable source of portable water.

Skills and experience: Basic training and experience in poultry management is essential for running a poultry enterprise.

Capital: A source of potential funding for acquiring inputs and equipment needed to run the project. Requirements and policies of financial institutions ought to be known prior to loan acquisition.

MANAGEMENT PRACTICES

In egg production, the aim is to produce as many table eggs as possible over the laying life of the hen. The success or downfall of egg production is determined by the management practices used.

Labour

The manager should be experienced and have basic training in poultry management. A poultry house which accommodates 1000 and 2000 hens will require 1 and 2 poultry attendants respectively. Casual labourers will be required during cleaning and restocking.

Loan Summary	
Scheduled Payment	P72,861.87
Scheduled Number of Payments	7
Actual Number of Payments	7
Total Early Payments	P0.00
Total Interest	P124,112.81

Total Payment	Principal	Interest	Ending Balance
P72,861.87	P43,917.85	P28,944.02	P342,002.41
72,861.87	47,211.69	25,650.18	294,790.72
72,861.87	50,752.56	22,109.30	244,038.16
72,861.87	54,559.00	18,302.86	189,479.16
72,861.87	58,650.93	14,210.94	130,828.23
72,861.87	63,049.75	9,812.12	67,778.48
67,778.48	62,695.09	5,083.39	0.00

EGG PRODUCTION PROJECTIONS

Enter Values	
Loan Amount	P385,920.26
Annual Interest Rate	7.50 %
Loan Period in Years	7
Number of Payments Per Year	1
Start Date of Loan	1/1/08
Optional Extra Payments	P -

Lender Name:

Pmt No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment
1	1/1/09	P385,920.26	P72,861.87	P0.00
2	1/1/10	342,002.41	72,861.87	P0.00
3	1/1/11	294,790.72	72,861.87	P0.00
4	1/1/12	244,038.16	72,861.87	P0.00
5	1/1/13	189,479.16	72,861.87	P0.00
6	1/1/14	130,828.23	72,861.87	P0.00
7	1/1/15	67,778.48	72,861.87	P0.00

Production systems

There are two main production systems in Botswana. That is laying cage and deep litter systems.

a) Laying cage system

Here hens are kept throughout their productive life time in cages. However, this system requires high capital investment. As such, they are strictly commendable for use by commercial egg producers. The stocking density depends on the hen's body size and weight. It is 3 to 5 hens per cubicle. That is, the heavier the hens the fewer they would be per cubicle. In a laying cage system, hens do not have contact with droppings which reduces infections. Feeding, providing water, egg collection, removal of litter and cleaning are easier for the poultry attendants to perform.

b) Deep litter system

Here hens are confined in a house with floor space of 8 to 10 birds/m² to ensure free movement. The floor should be covered with a 5cm to 10cm deep litter of grain husks (maize or rice), straw, wood shavings or a similarly absorbent (but non-toxic) materials. Wood shavings are highly recommended for use since birds cannot eat them.

Litter provide insulation from the floor and soaks up moisture from the droppings. It also helps to prevent damage to the birds' legs due to slippery surfaces. Usually old litter is renewed when replacement stock arrives. It is advisable not to re-use old litter. After old litter has been removed out of the house, the floor should be cleaned and disinfected.

This guideline will focus on the laying cage system.

Laying period

Egg producers buy chicks at point of lay, which is between seventeen (17) to eighteen (18) weeks old. At this age, few hens will start laying eggs immediately.

However, at around the 21st week, majority of the hens will start laying eggs through to 44 weeks (11months) old after which the flock will be replaced. Should egg-laying start when hens or pullets are too fat or before they are fully physically and sexually mature at 20 weeks or five (5) months of age, the overall performance during the laying period will be affected resulting in fewer eggs produced.

Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
504,570.00	555,027.00	610,529.70	671,582.67	738,740.94	812,615.03	893,876.53	983,264.19
1,444,070.00	1,999,097.00	2,609,626.70	3,281,209.37	4,019,950.31	4,832,565.34	5,726,441.87	6,709,706.06
170,962.57	188,058.83	206,864.71	227,551.19	250,306.30	275,336.93	302,870.63	333,157.69
54,559.00	58,650.93	63,049.75	62,695.09	0.00	0.00	0.00	0.00
279,048.42	308,317.24	340,615.24	381,336.39	488,434.63	537,278.10	591,005.91	650,106.50
19,941.19	19,941.19	19,941.19	19,941.19	19,941.19	19,941.19	19,941.19	19,941.19
259,107.23	288,376.05	320,674.05	361,395.20	468,493.44	517,336.91	571,064.72	630,165.31
18,302.86	14,210.94	9,812.12	5,083.39	0.00	0.00	0.00	0.00
240,804.37	274,165.11	310,861.93	356,311.81	468,493.44	517,336.91	571,064.72	630,165.31
36,120.66	41,124.77	46,629.29	53,446.77	70,274.02	77,600.54	85,659.71	94,524.80
204,683.71	233,040.35	264,232.64	302,865.04	398,219.43	439,736.37	485,405.01	535,640.51

Health and common diseases

Disease prevalence varies from one area to the other. The problems that may trigger disease conditions are direct sunlight on egg trays or nests, poor ventilated houses and very high temperatures in and outside the poultry house, which may weaken egg shells resulting in poor egg quality.

Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
504,570.00	555,027.00	610,529.70	671,582.67	738,740.94	812,615.03	893,876.53	983,264.19
313,950.75	345,128.99	379,425.05	417,150.71	458,648.95	504,297.01	554,509.87	609,744.02
190,619.25	209,898.01	231,104.65	254,431.96	280,091.99	308,318.03	339,366.67	373,520.17
72,861.87	72,861.87	72,861.87	67,778.48	0.00	0.00	0.00	0.00
293,225.13	430,261.28	588,504.07	775,157.54	1,055,249.53	1,363,567.56	1,702,934.22	2,076,454.39

In Botswana the most common disease to layers is Newcastle Disease. Layers are bought at 18 weeks of age and are assumed to have been vaccinated against most diseases. Therefore, it is advisable for farmers to request for a vaccination history from the suppliers when purchasing the stock. Where Newcastle Disease (NCD) is reported, hens should be vaccinated with Lasota or NCD vaccine mixed with drinking water once during the laying period. If there are no cases of disease reported hens can still be vaccinated at the 40th week for prevention.

Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
333,891.94	365,070.18	399,366.24	437,091.90	478,590.14	524,238.20	574,451.06	629,685.21
10.65	11.71	12.88	14.17	15.59	17.15	18.86	20.75
31,357.24	31,168.48	30,996.88	30,840.87	30,699.05	30,570.12	30,452.92	30,346.36
1,600.37	1,590.74	1,581.98	1,574.02	1,566.78	1,560.20	1,554.22	1,548.78

dozens/ yr
hens

Summary of Profit and Loss

				Year 0	Year 1	Year 2
Returns (Sales)				27,500.00	453,300.00	458,700.00
Cumulative Benefits				27,500.00	480,800.00	939,500.00
Operational (variable costs)				64,223.36	141,291.38	155,420.52
Loan Repayment Principal				43,918.85	47,211.69	50,752.56
Gross Benefits (PBDIT)				-80,642.20	264,796.93	252,526.92
Depreciation				0.00	19,941.19	19,941.19
Gross Benefits (PBIT)				-80,642.20	244,855.74	232,585.73
Loan Repayment Interest				28,944.02	25,650.18	22,109.30
Gross Benefits (PBT)				-109,586.22	219,205.56	210,476.42
Taxation (15% of PBT)				-16,437.93	32,880.83	31,571.46
Net Benefit Flow (PADIT)				-93,148.29	186,324.73	178,904.96

Summary of Cashflow

				Year 0	Year 1	Year 2
Total cash inflow				413,420.26	453,300.00	458,700.00
Total cash outflow				385,920.26	259,839.76	285,606.90
Net cashflow				27,500.00	193,460.24	173,093.10
Loan repayment				72,861.87	72,861.87	72,861.87
Cummulative cashflow				-45,361.87	75,236.51	175,467.75

Summary of Breakeven

				Year 0	Year 1	Year 2
Total cost				385,920.26	279,780.95	305,548.09
Average price per dozen				8.00	8.80	9.68
Breakeven dozens per year				48,240.03	31,793.29	31,564.88
Breakeven flock size				2,462.01	1,622.62	1,610.97

Average breakeven						
Eggs				32,548.19	dozens/ yr	32,549
Flock size				1,661.15	hens	1,662

Mortality

Under good management, mortality will range between 5 to 10%.

Records management

Relative to records management, each project should have a record book on which information on the number of stocked live birds, slaughtered and deaths are recorded. Record keeping helps the farmer to budget accurately and make informed decisions about the project.

The following records should be adequately kept.

- all feeds consumed and purchased
- number of hens purchased
- deaths and causes
- vaccination and other veterinary requisites expenses
- labour and other variable costs
- number of eggs collected daily
- number of eggs sold and used for home consumption
- number of eggs damaged and
- water and feed intake daily

It should be noted that water and feed consumption records are excellent indicators of flock health.

MARKETING ISSUES

Market survey

A proper market survey is essential as that will enable the farmer to identify the current and emerging markets where eggs can be sold at a higher price.

Marketing

Marketing activities include among others grading, quality, promotions, packaging and value adding. These activities are essential as they will lead to selling large volumes of products as quickly as possible resulting in the farmer making a lot of profit.

Grading: Eggs should be graded by size and labeled according to weight. During selection and grading, care must be applied to ensure that weight is uniform to avoid disqualification.

Recommended egg sizes

- Size 1 egg weighs not less than 65g
- Size 2 egg weighs less than 65g but not less than 55g
- Size 3 weighs less than 55g but not less than 45g
- Size 4 egg weighs less than 45g

Quality: Farmers should always ensure that their products are in good quality before they start selling them. The rate at which quality deteriorates depends on various factors like direct sunlight on egg trays or nests, improper feeds, poor ventilated houses, very high temperatures and poor management. The quality of an egg deteriorates even faster

Annual Depreciation							
Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
540.00	540.00	540.00	540.00	540.00	540.00	540.00	540.00
2,160.00	2,160.00	2,160.00	2,160.00	2,160.00	2,160.00	2,160.00	2,160.00
144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00
94.50	94.50	94.50	94.50	94.50	94.50	94.50	94.50
1,760.00	1,760.00	1,760.00	1,760.00	1,760.00	1,760.00	1,760.00	1,760.00
7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00
935.00	935.00	935.00	935.00	935.00	935.00	935.00	935.00
7,128.00	7,128.00	7,128.00	7,128.00	7,128.00	7,128.00	7,128.00	7,128.00
179.69	179.69	179.69	179.69	179.69	179.69	179.69	179.69
1,400.00	1,400.00	1,400.00	1,400.00	1,400.00	1,400.00	1,400.00	1,400.00
810.00	810.00	810.00	810.00	810.00	810.00	810.00	810.00
19,941.19	19,941.19	19,941.19	19,941.19	19,941.19	19,941.19	19,941.19	19,941.19

110,473.00	121,520.30	133,672.33	147,039.56	161,743.52	177,917.87	195,709.66	215,280.62
15,972.00	17,569.20	19,326.12	21,258.73	23,384.61	25,723.07	28,295.37	31,124.91
14,374.80	15,812.28	17,393.51	19,132.86	21,046.14	23,150.76	25,465.84	28,012.42
0	0	0	0	0	0	0	0
2,168.38	2,168.38	2,168.38	2,168.38	2,168.38	2,168.38	2,168.38	2,168.38
0	0	0	0	0	0	0	0
162,929.37	177,011.35	192,501.52	209,540.72	228,283.83	248,901.26	271,580.43	296,527.52

10,312.50	22,687.50	24,956.25	27,451.88	30,197.06	33,216.77	36,538.45	40,192.29
121,939.20	268,266.24	295,092.86	324,602.15	357,062.37	392,768.60	432,045.46	475,250.01
20.00	44.00	48.40	53.24	58.56	64.42	70.86	77.95
16.20	35.64	39.20	43.12	47.44	52.18	57.40	63.14
2,250.00	4,950.00	5,445.00	5,989.50	6,588.45	7,247.30	7,972.02	8,769.23
3,000.00	6,600.00	7,260.00	7,986.00	8,784.60	9,663.06	10,629.37	11,692.30
711.31	1,564.89	1,721.38	1,893.51	2,082.86	2,291.15	2,520.27	2,772.29
1,357.62	1,493.38	1,642.72	1,806.99	1,987.69	2,186.46	2,405.11	2,645.62
170,962.57	188,058.83	206,864.71	227,551.19	250,306.30	275,336.93	302,870.63	333,157.69
333,891.94	365,070.18	399,366.24	437,091.90	478,590.14	524,238.20	574,451.06	629,685.21

Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
439,230.00	483,153.00	531,468.30	584,615.13	643,076.64	707,384.31	778,122.74	855,935.01
65,340.00	71,874.00	79,061.40	86,967.54	95,664.29	105,230.72	115,753.80	127,329.18
504,570.00	555,027.00	610,529.70	671,582.67	738,740.94	812,615.03	893,876.53	983,264.19

EGG PRODUCTION PROJECTIONS

Capital Investment/Fixed Costs

Item	Unit	Quantity	Unit Price	Year 0	Year 1	Year 2
Fence	metre	540.00	15.00	8,100.00	540.00	540.00
Poultry houses	m2	240	180.00	43,200.00	2,160.00	2,160.00
Store room	m2	16	180.00	2,880.00	144.00	144.00
Toilet	m2	11	180.00	1,890.00	94.50	94.50
Farm house	m2	32	1,100.00	35,200.00	1,760.00	1,760.00
Vehicle	van	1	70,000.00	70,000.00	7,000.00	7,000.00
Two tier starter cages	cage	2	4,675.00	9,350.00	935.00	935.00
Two tier follower cages	cage	18	3,960.00	71,280.00	7,128.00	7,128.00
Egg crate	crate	10	179.69	1,796.90	179.69	179.69
Tank	10,000 litres	1	7,000.00	7,000.00	1,400.00	1,400.00
Generator (back -up)	4.2 KVA 9hp	1	8,100.00	8,100.00	810.00	810.00
Total depreciation					19,941.19	19,941.19

Point of lay hens (pullets)	hen	2,000	41.50	41,500.00	91,300.00	100,430.00
Labourers	month	12	1000	6,000.00	13,200.00	14,520.00
Labour (Manager)	1/ month	12	900.00	5,400.00	11,880.00	13,068.00
Transport costs (material)	Trip	1	3,000.00	3,000.00		0
Insurance	%	2.5%	86,735.00	0	2,168.38	2,168.38
Electricity (installation) (solar)			7,000.00	7,000.00	0	0
Total investment/ fixed costs				321,696.90	138,489.57	150,127.57

Operational/ variable costs

Egg carton bundles	170*12 egg carton	242.65	85.00	10,312.50	22,687.50	24,956.25
Layers mash	50 kg bags	1693.6	144.00	121,939.20	268,266.24	295,092.86
Stress pack	100g	2	20.00	20.00	44.00	48.40
Newcastle vaccine	1,000	2	16.20	16.20	35.64	39.20
Protective clothing	persons	3	1500.00	2,250.00	4,950.00	5,445.00
Transportation costs	month	12	500.00	3,000.00	6,600.00	7,260.00
Water	1000l	254040	0.01	711.31	1,564.89	1,721.38
Electricity	month	12	85.00	510.00	1,122.00	1,234.20
Total				64,223.36	141,291.38	155,420.52
Total Costs				385,920.26	279,780.95	305,548.09

Revenue				Year 0	Year 1	Year 2
Eggs				27,500.00	363,000.00	399,300.00
End of lay hens					54,000.00	59,400.00
Total				27,500.00	453,300.00	458,700.00

after it has been laid. The above factors may weaken and crack egg shells resulting in poor yolk quality.

Promotions: Advertising is essential for the success and growth of poultry businesses as it will help farmers to successfully identify and attract potential customers as well as build good relationship with them. As such, it is advisable for farmers to promote their products so that they will appear to be different to others and appeal to as many people as possible. This will increase the demand for their produce.

Packaging: Packaging is important for the profitability of poultry business. Targeted packaging will increase egg sales.

Land: The farmer should secure land for egg production project. An assessment on the suitability of the plot for egg production should be conducted. It is advisable not to locate a poultry project close to rivers or streams as this may result in the pollution of water by chicken drops during rainfall periods. A land measuring 150m x 120m will be required to accommodate 4 poultry houses measuring 15m x 8m each, 8m x 4m manager's house, 3.5m x 3m toilet and 4m x 4m storeroom. However, for a starter project, it is advisable for the farmer to start with 2 poultry houses for 2000 hens. The recommended distance between the houses is 50m to 100m and 1m between sidewalls and cages.

FIXED ASSETS

Key farm assets required in egg production are as per the attached Appendix 1. However, it should be noted that some assets may not be necessary for the project. Some can be hired from other farmers instead of purchasing them. For example, if it is cheaper to hire transport for the project, it will be better off not to purchase a farm vehicle. Materials required for structures and buildings can be sourced from hard-wares and stores specializing in selling agricultural products/inputs. However, it is advisable to note that prices for the required items vary greatly depending on where and when they are purchased.

Equipments and tools

It should be noted that replacement of equipment and tools for poultry projects occurs periodically as and when needed. For example, pipes used for water reticulation and egg crates are plastic made. Therefore, they may need frequent replacement as they can easily break or be eaten by rats. In this guideline, replacement costs were estimated as annual depreciation for the varying items and facilities.

Poultry house

In Botswana, a house with open sides is recommended for poultry production. Open sided house is important for the health of the flock as it controls climatic condition as it allows air renewal and supply of oxygen. The house also allows air movement and promotes improved heat loss by evaporation and convection. In addition, curtains are recommended for use as they will assist to control air movement and temperature.

Operational costs (P)

Egg cartons	.85.00
Layers mash	.144.00 / 50kg bag
Stress pack	.20.00 / 100 g
Newcastle vaccine	.16.20 /1000 vaccines
Protective clothing	.500.00 / person/ yr
Transportation costs	.500.00 / month
Water	.5.60 / 1000l
Electricity	.85.00 / month
Labour wages / P/ month	.500.00
Manager/ P/ month	.900

Loan

Institution	.CEDA
Interest	.7.5%
Repayment period	.7 years
Amount (Yr 0 total cost)	.385,920.26

Farm assets and development costs (P)

Material transportation	3,000.00
Houses	1,100.0 m ²
Poultry structures	180.00 m ²
Fencing	15.00 m
Electricity (installation)	7,000.00
Vehicle	70,000.00
Two tier starter cage	4,675.00
Two tier follower cage	3,960.00
Egg crate	179.69
Generator (back -up)	8,100.00
Pullets @	41.50
Insurance	.0
Price inflation	1.1 %
10,000 litre tank	7,000 l

Depreciation (straight line method)

Houses	20 years
Poultry structures	20 years
Fencing	15 years
Vehicle	10 years
Generator (back -up)	10 years
Cages/ crate	10 years
10,000 litre tank	5 years

The design and size of the laying house is determined by the size of the flock purchased or kept, the cost and the climatic condition of the locality.

Layers of the same age should be housed together to enable the farmer to prevent potential problems like high risk of continuous infection, administer different schedules for different types of vaccines, feeds and follow the right method of lighting.

Two poultry houses each measuring 15m x 8m will be required to accommodate 20 cages. This means that each house will accommodate 10 cages (1 two tier starter cages + 9 follower cages) for a flock size of 1000 hens. A cage will have 20 partitions will accommodate 5 hens each.

It is advisable to put up the building across prevailing winds, which is always from south to north position. This allows air to circulate into and out of the building. In Botswana, poultry house orientation should be from east to west position.

Concrete floor and spacing: A concrete floor is highly recommended as it assists in controlling parasites like mites and is easy to clean. In addition, it is advisable to provide adequate floor space for each hen as that is essential for its growth, health, productivity and general well being. Congestion of chickens will lead to an increase in mortality, thus resulting in low production.

Sidewalls: It is recommended that sidewalls be made of corrugated iron or bricks. In addition, sidewalls should incorporate an adjustable roll-down reinforced curtain for use during cold weather and at night. The height of a sidewall should consist three (3) layers of bricks or measure between 25cm to 70cm. A wire mesh of 25mm will be used to close the open space between the sidewall and roof gable.

Shape of roof: Practically poultry houses built should have gable roof, with pitch varying from 25 cm to 30cm. An overhang of 40cm to 50cm helps to protect the inside from windy rains and affords interior shade.

Length: The length of the house should be 15m long enough to accommodate cages for 1000 hens.

Width: The width of an open side house should not exceed 8 meters. A house wider than this will not provide ample ventilation during hot weather.

Height: The distance from the concrete floor to the roofline should be 3m to accommodate the height of the laying cages, which is 2.5m x 2.5m each. Houses with roofs lower than this would cause too much heat and poor ventilation.

House temperatures: Excessive fluctuations in environmental temperatures are detrimental to productivity and efficiency. As such, the recommended ideal house temperature should range between 21°C and 30°C. With low temperatures, more feed will be consumed resulting in large egg sizes. High house temperatures will reduce feed consumption and will result in small egg sizes.

Egg production is closely related to changes in day length. As such, a 1 hour light to the day length of 6am – 7pm during the 20th week should be provided. The lighting period needs to be increased by 30 minutes every week till it reaches a total of 17 hours (sunlight + artificial light) of light per 24 hours. A decrease in day length can cause hens to produce few eggs.

Production

Average egg production	.275 eggs/ hen/ yr
Total eggs	.41,250.00 dozens
Damages/ breakages	.5% total eggs/ yr
Total eggs (incl. damages)	.39,187.50 dozens
Eggs/hen/year	.20 dozens
Mortality of initial flock	.10%
Number of end of lay hens	.1,800
Feed/ hen/ day	.0.116 g
Water/ hen/ day	.0.348 /
Stress pack	.100 g / 1000 hens
Newcastle vaccine	.1 vaccine/ hens
Bundle for egg cartons	.170 (12 eggs cartons)
Dozen eggs @ P	.8.00
End of lay (spent) hens @ P	.30.00
Labour months/ yr	.12
Labourer/ house	.1

APPENDIX 1 EGG PRODUCTION PROJECTIONS

Summary of key assumptions of production

Project size

Initial flock	2,000 hens
Poultry farm length	150 m
Poultry farm width	120 m
Poultry houses . . . . .	.2
Poultry house length	15 m
Poultry house width . . . . .	.8 m
Store room length . . . . .	.4 m
Store room width . . . . .	.4 m
Toilet length	3.5 m
Toilet width . . . . .	.3 m
Manager's house length . . . . .	.8 m
Manager's house width . . . . .	.4 m
Hens / partition of cage . . . . .	.5
Partitions/ cage . . . . .	.20
Hens / cage	100
Starter cages/ house . . . . .	.1
Follower cages/ house . . . . .	.9
Flock size/ house	1,000

Feed requirements

The most important feed intake required to sustaining egg production, promoting health and growth in body weight is carbohydrates (energy) and amino acid, which come from cereal grains and vegetable protein respectively. The aim of egg producer is to convert a given amount of feed into as many eggs as possible.

Feed intake: As a guide the average feed intake range from 116g/bird/day and 118 g/bird/day. However, a hen will require about 1.8kg of feed to produce a dozen of eggs weighing 50-65grams.

On arrival, laying pullets will be given layers' mash. After 18 weeks only few hens will lay eggs. However, from the 21st week, 80 per cent of the flock will start laying eggs. A hen should lay between 270 and 280 eggs over a period of 12 months.

There are two feeding programs the farmer should consider in egg production. That is day- time and midnight feeding programs. It is highly recommended to feed hens during the night when temperatures are low. During day time, temperatures are high which inhibits proper feeding. However, care should be taken to avoid feeding hens with incorrect diet. Incorrect diet can cause bleaching of brown shell, mottling of yolk, poor shell quality and egg shape.

Water

Hens drink clean water about thrice the amount of feed they eat per day. Therefore, at point of lay they will require 0.348L per hen/day. As such, farmers should ensure that there is a reliable source of clean water.

INFRASTRUCTURE

Electricity/Gas: It is essential to establish a poultry project where electricity or gas is available. Electricity or gas is needed for providing light and heat to layers throughout the laying cycle.

Telephones: Telephone is vital means for marketing the product to the current or potential consumers wherever they are located.

Roads: It is advisable that a poultry farm should have good and easy access to tarred or graveled roads to minimize breakages. In addition, it will enable the farmer to transport inputs and outputs to and from the farm.

Market: Accessibility and availability of markets within the vicinity of the project is very crucial for the success of the project.

Variable Inputs

Variable inputs required in egg production are feeds, medication, protective clothing, casual labour, water and transportation. These variables, except labour, can be sourced from the Ministry of Agriculture, hard-wares and stores specializing in agricultural inputs.

Capital required

Establishing and running a project requires finance from the owners and/or various financial institutions and government programs. This guideline has assumed acquisition of a loan from Citizen Entrepreneurial Development Agency (CEDA) at

7.5% interest rate payable over a period of 7 years. The principal loan amount covers the entire project establishment and running costs for 12 months only. The guideline also assumes availability of land as owner's contribution, borehole drilling and equipping not included instead water will be fetched from a nearby source and stored in a 10 000 liters tank (see Appendix 1 attached).

The egg production financial projections (see Appendix 1) is an outline of the project key assumptions, a budget of all the project's requirement, summary of profit & loss, cash-flow and breakeven.

The key assumptions of production could vary from project to project and project location. They include the project size, production level, costs, prices and loan. The key assumptions are also the basis of the financial projections in Appendix 1. The budget of the entire project's requirement assumes that project establishment will be six months long and point of lay hens would be bought at the beginning of the eleventh month. They will start laying marketable eggs at the eleventh month. Therefore, the revenue for the eggs sold during year 0 would be for one month only. The first hens would be six months old at the end of year 0 and would be sold as spent hens during year 1.

The summary of Profit and Loss statement and cash-flow indicate that the project will be able to repay the loan during year one. The financial analysis of the project is based on a 2000 laying hens' capacity and would breakeven at an average of 1, 658 hens producing a total of 32,469 dozens a year.