international
egg foundation

helping to improve
nutrition, health and education

SAMPLE PROJECT PLAN

August 2017

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Introduction

The International Egg Foundation (IEF) was established by the International Egg Commission (IEC) to work as an independent charitable foundation. Operating in the truest sense of sustainability, our purpose is to increase egg production and egg consumption in developing countries, to provide undernourished infants, children and families with an independent, sustainable, high quality protein supply.

In many regions of the world diets are short of, or completely lacking, high quality protein; many diets are based mainly, or entirely, on starch such as maize. Protein is vital for a healthy diet: the human immune system needs high quality protein to function efficiently. Protein increases people's natural immunity to diseases and significantly enhances a person's natural response to vaccinations. Just a small amount of high quality protein also helps brain development in infants, mental concentration and muscle development in children.

The IEF is committed to working with foundations and organisations around the world to help ensure that high quality protein is accessible to everybody.

Project Plan

This plan is developed from the practical experience of establishing a commercial egg project for a total of 5,000 egg laying hens, complete with an egg boiling operation. The aim of this Project Plan is to stimulate ideas and help others in the formulation and preparation of their own individual business plans, with the ultimate goal in assisting in the increased production and consumption of eggs in areas with limited access to high quality protein. Each plan needs to be tailored to the individual situation taking account of local factors including, local risk factors to the laying hens, the most appropriate housing systems, availability of feed, water and veterinary assistance.

This plan outlines 5 key elements in establishing a commercial egg project:

1) Set-up of farm and plant,

2) Farm and plant operations,

3) Funding,

4) Timelines and

5) List of outstanding questions

Farm and hard-boiled eggs plant set-up

The project is designed to provide children with approximately 1,200 dozen hard boiled eggs per week.

1. Farm description and set-up

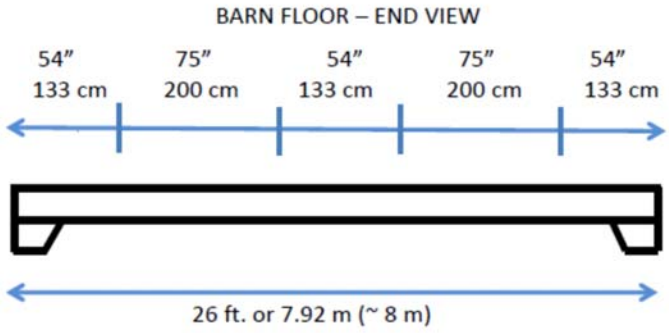
This project has 5,000 laying hens, housed in 2 barns of 2,500 birds each, with a possibility to expand over time with additional barns. For planning and costing purposes, we are also considering an additional 750 hens housed under free-range conditions. The recommendation is to consider this type of production during the next stage of this project, as free-range production will require more poultry management skills and provide more uncertainties in terms of productivity.

a. Site identification

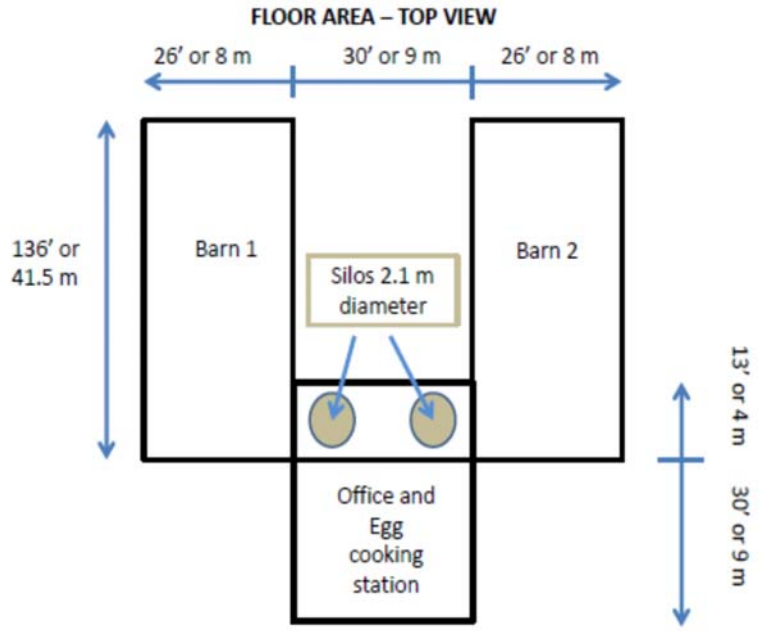
The site needs sufficient space to accommodate barns - an area of about 33 meters x 50 meters (108 ft. x 164 ft.) is required to install two barns, feed silos and provide some access space to the barns and the feed silos. The site selected should allow the expansion of the project with additional barns of similar dimensions and/or a free-range area (~ 3-4 sq. m per hen or 0.6 hectare for 1,500 hens).

b. Barns

Each barn will be 8 m x 42 m (26 ft. x 164 ft.), oriented to get the prevailing wind flowing through the length of the barn. The frame of the building should use the most cost effective material, likely wood. The buildings will be open-sided with some side curtains available to keep temperature suitable during cold nights. The sides of the barns should be proofed against wildlife and birds, using either a mesh or a galvanized “stucco wire” to protect the birds and the eggs against from potential predators and diseases.



A buffer space of 9 m (30 ft.) should be present between the two barns as we anticipate that each barn will house birds of different ages.



At the end of the two barns, a small building (dimension 9 m x 9 m or 29 ft. x 29 ft.) will be built on the same concrete slab supporting the silos. This building will serve various purposes (see section 2 for more details).

For the free-range barns, each unit will be designed to accommodate 750 hens. Considering a recommended density of 9 hens per sq.m, the footprint for the barn will be ~ 84 sq.m or 8 m wide x 10.5 m long (26 ft x 34 ft). A concrete floor is also recommended (diagram not drawn). Openings, 1 m wide x 0.45 m high (39" x 18") should be spaced evenly along both sides of the building, or 3 openings per side.

c. Equipment

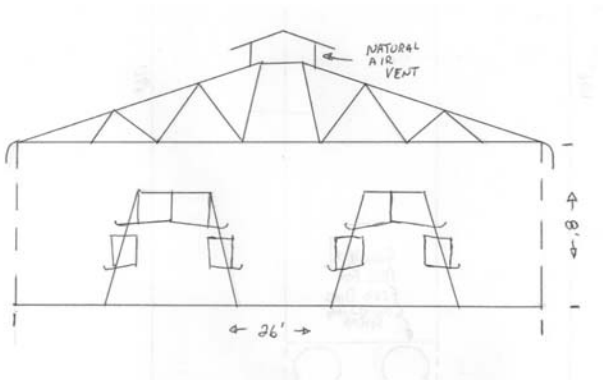
Colony systems are easier to manage in terms of disease control and welfare of the birds (environment better controlled, protection from predators).

The system proposed is commonly used in the Southern African region and rely mostly on manual labour which presents two advantages for the project: 1) provides employment opportunities and 2) protect the welfare of the birds in case of power shortage.

In order to prevent feeds from spoilage due to inclement weather or rodents, we are proposing to install two feed silos, holding each a maximum of 5.5 metric tonnes or sufficient feed for about 15-18 days. However, we recommend to have feed delivered every week to 10 days, to guarantee the optimum quality of the feed given to the laying hens. Feeds constitute about 70% of the total cost of production and an extra investment to safeguard the freshness and quality of feeds is relevant (bulk feeds are also cheaper). The silos will be installed on a concrete base, located at one end of the barn.

Feed will be conveyed from the silos to the barns via an auger system, requiring a power unit.

While the priority for the project is to go with natural ventilation, the design of the barns should accommodate the installation of 6 to 8 typical Poultry houses fans (1.2 m diameter or 48”) placed throughout the barn to ensure good air floor and guarantee the well-being of the birds under hot or humid weather conditions. An engineer will be hired to finalize the design of the building to maximize the benefit from natural ventilation and address the positioning of fans for optimum air flow.



In nature, egg production is triggered by increasing day length and conversely egg production decreases and stopped when the length of day light is reduced. The use of artificial lighting should be considered for a number of reasons and the wire of the barns should be ready for a series of evenly spaced light bulbs (decision will be taken at a later date whether to install them or not).

d. Access to services

Each barn will need to have access to potable water (Well water with filtration or UV treatment) and electricity. A power generator is recommended in case of power outage. A portable air compressor will be useful for clean-up at the end of the production cycle.

e. Manure management

A brown laying hen will produce on average about 116 g of fresh manure / day, meaning ~580 kg for a 5,000-hen farm. Annually, this represents about 220 metric tonnes, which can be reduced to about 70 metric tonnes after drying (manure at 25-35% moisture).

f. Mortality management

Dead birds will be removed daily from the barns. An incinerator should be built and used to burn on a daily basis the dead birds. This practice will reduce the risks of spreading diseases and scavenging of dead birds by wildlife.

2. Hard-boiled egg plant set-up

a. Building

A small building, 9 m x 9 m (30 ft. x 30 ft.), will be located at the end of the barns, using the same concrete slab prepared for the feed silos. The building will be divided into 4 rooms:

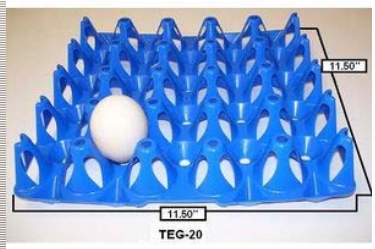
- Office space and change room, 3 m x 4 m (10 ft. x 13 ft.) - record keeping, equipment, spare parts, medicine cabinet and small tools, etc…);
- Storage space for the unprocessed shell eggs, 3 m x 4 m (10 ft. x 13 ft.). The area will easily allow the storage for 3 days of production for up to 10,000 hens or 2,450 dz. eggs. Pallets, 1.25 m x 1 m (4.1 ft. x 3.3 ft.), can hold approximately 900 dz. eggs each;
- Hard boiled eggs production area, 5 m x 9 m (16.4 ft. x 29.5 ft.);
- Storage space for processed hard boiled eggs, 3 m x 4 m (10 ft. x 13 ft.). The area will allow storage for 3 days of production or 3 pallets;

Eggs will be collected daily and brought for storage on the “raw side” of the building. Depending on the needs and supply, these eggs can be used for the HBE operations, donate as shell eggs to employees or sold to a local egg producer for grading and packaging.

b. Equipment

With 5,000 laying hens, we can expect the need to boil a maximum of 194 cases (15 dz) per week, realistically likely 180 cases at the most. Such volume can easily be handled through manual operation, especially since the hard boiled eggs will not be peeled on site.

Two large stainless steel vessels will be used (dimensions 1.5 m x 0.5 m and depth of 0.7 m – 59" x 20" x 28") to each accommodate 3 metal wire baskets (dimensions for a basket: 0.35 m x 0.35 m x 0.4 m or 13" x 13" x 15"). The two stainless steel vessels should be manufactured locally along with wire baskets as they are typical baskets used for the transportation of egg cartons to retail stores. Plastic egg trays will be used to keep the eggs secured inside the metal baskets.

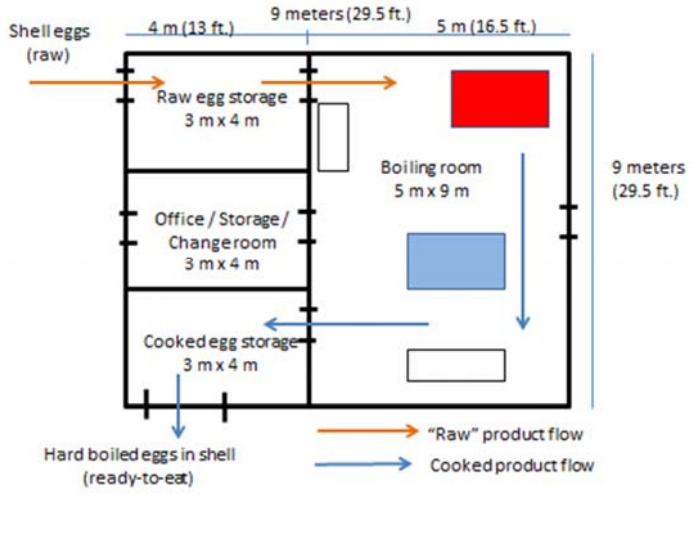


One of the large vessels will be equipped with an electrical coil to heat the water near boiling temperature. Alternatively, the vessel may be positioned on top of gas burners. The decision should be made based on the operational running cost. The second vessel will be equipped with cold running water (potable).

Building design should ensure that the natural airflow will dissipate the steam generated during the cooking step. A stainless steel table should also be available to load and unload the plastic egg trays. A sink for employees should also be available at the entrance of the boiling room.

c. Access to services

The building will need access to electricity and water. Raw eggs and cooked eggs should be kept at room temperature (~ 20C), in separate rooms (HACCP food hygiene principles).



3. Set-up costs

The costs presented below are preliminary and do not take into consideration any negotiation with suppliers and service providers for discounted rates or outright donations to the project. Some costs also will require some investigation locally as the best prices are likely provided by local suppliers and craftsmen.

a. Farm

Based on figures provided by a local producer and adjusting for a higher space per bird, we can estimate the cost of the barn (building and equipment) at US$ 20 / bird, meaning US$ 100,000 for the 2 barns.

A quote obtained from 2015, covering the housing, feed silos, feed and water lines, was as follows:

SDD cage model along with feed and water supply	ZAR 350,200
Silos	ZAR 54,000
12 m Flex auger system	ZAR 10,860
Estimated freight	ZAR 19,750
Insurance & Documents	ZAR 2,300
Total CIF	ZAR 437,110 (~ US$ 39,000)

A quote for the barns and fans should be obtained from local builders and equipment providers. A quote for the equipment required for the free-range barn should be obtained. Delivery of feeds for the free-range barn will be done manually, with the feed sources from one of the two silos.

b. Hard-boiled egg plant

A quote for the two stainless steel vessels, electric coil or gas burners and exhaust hood should be obtained locally.

Farm and hard-boiled egg plant operations

1. Farm operations

    a. Birds

        i. Birds at point of lay

Birds at point of lay may be bought from a local supplier. A contract covering birds at point of lay, feeds and services should be considered.

Before purchasing birds from a supplier, we would need at least to obtain the following information regarding the birds: detailed vaccination schedule, detailed feeding programme (% protein, calcium) and detailed lighting program used.

        ii. Feeds

Commercial feeds are required, either in bulk or bags. Bulk feeds are the cheaper option; the project and we need to investigate the availability and cost of both mash (usually cheaper but more wastage) and crumbles (better feed conversion). Commercial feeds with different protein levels are available and custom-made feeds are also an option.

        iii. Vaccines and supplements

The need to vaccinate during production will be based on the pullet vaccination programme and recommendations from local veterinarians and producers. There is often a need to vaccinate regularly for Newcastle disease (ND) and Infectious Bronchitis (IB) via water or spray.

Vaccine and vitamin supplement availability should be confirmed. Preferences should be given to international companies.

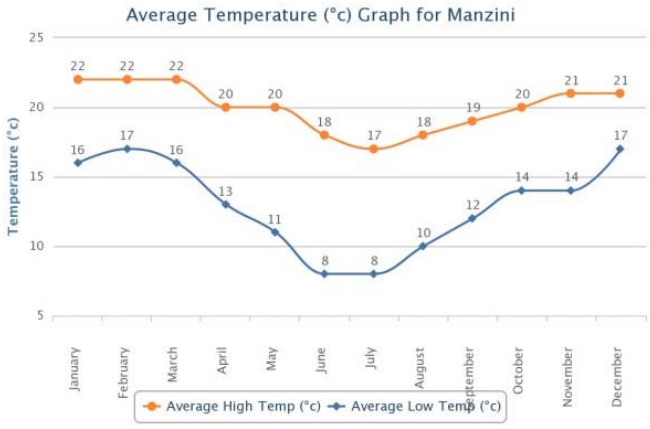
b. Farm staff

It is suggested to have one person per barn, with a roster of 4-6 trained employees to cover week-ends and holidays.

i. Main Tasks

Manual feeding of the birds (3-4 times per day)
Check the automated water system and frequent purging of water lines during hot months
Observe general health and well-being of birds; remove any mortality
Collect the eggs
Gather and record production record (feed consumed, number of eggs produced, overall weight, high and low temperature, mortality)
Remove manure (2-3 times per week)
Bird weight check

Average temperatures for each region will indicate if side curtains should be used only during the colder months to ensure that the temperatures inside the barns remain at 15-20 C. Birds will tolerate colder temperatures but will consume more feeds to maintain their body temperature.



One of the most important criteria to control is the length of day light as a decrease will trigger a reduction in egg production. The supplier of the birds at point of lay should provide the detailed lighting schedule and the length of day light used during the week prior to delivery. The same length should be used throughout the egg production cycle. Typically, birds are raised to about 14 hours of daylight. The shortest day lengths in the southern hemisphere are in June - July (10 hrs 30 mins) and the longest day lengths are in December-January (13 hrs 50). Assuming birds were raised on 14 hours of day light, birds should be given about 3 ½ extra hours of light during the colder months to maintain a constant day length of 14 hours.

Sunrise and Sunset Calculator tables are available on the internet to facilitate the computation of the length of extra light required:

https://www.timeanddate.com/sun/

If no artificial light is provided, we should ensure pullets are raised to a maximum of 11 hour of light prior to transfer to the layer facility.

ii. Training plan

A training program will be designed for farm workers. Breeder guides are available and do provide some valuable guidance on bird management. Partnership for training of farm workers will be ideal.

Another option for training will be to recruit some volunteers within the egg farming community through IEF at key steps during the first cycle of production: before the arrival of the first flock and during the first 2 weeks of production, at the end of production and during cleaning and disinfection of the barn.

iii. On-going technical support

On-going technical support can be provided through a number of ways:

- Service contract;
- Hiring of consulting veterinarian;
- On-site support from IEF;
- Email communications;

We suggest that a qualified person reviews, on a weekly basis, the production records to monitor progress and identify any correction required in the feeding and management of the hens.

2. Hard-boiled egg plant operations

a. Hard-boiled egg process

i. Production flow

Under commercial conditions, eggs would be stored for 1-4 days prior to boiling to facilitate the peeling process (easier and better yield). Since hard boiled eggs will be distributed with their shell intact, the tempering of the eggs is not necessary.

Clean shell eggs will be placed on the plastic trays (30 eggs per tray) and 6 trays will be loaded inside each wire basket (180 eggs or 15 dz per basket). Eggs with traces of manure or blood should be segregated and washed later on, before placing them on the plastic trays. Three wire baskets will be placed in the vessel containing water near boiling temperature (96-97C) and be kept for 15 minutes. Wire baskets will then be removed and placed into the second vessel, containing cold running water. The rapid cooling is designed to stop the cooking process and ensure a nice interface between the egg white and yolk. A longer cooking time may yield some discoloring of the yolk and white, which is critical for commercial operations but much less for this project.

We estimated that we can process 9 cases per hour or about 60 cases per day, meaning a 3-day work schedule for the boiling operation.

ii. Storage and distribution

After cooling, the eggs with their shell still present, will be dried and stored at room temperature until distributed. Refrigeration is not recommended as moisture will coat cold eggs exposed to high temperature, potentially leading overtime to mould issues.

b. Plant staff

i. Food safety training

Some basic HACCP training may be required. Worker safety training will be also required since staff will be working with boiling water.

ii. Sanitation and preventative maintenance training

Proper sanitation at the end of production and inspection prior to starting production are critical steps towards good manufacturing practices. Raw eggs can be a source of contamination (Salmonella inside the eggs and other bacteria on the surface of the eggs) and therefore tools used to handle eggs before cooking should not be share with other parts of the food plant. Water used to wash dirty eggs should be discarded. Water used to cool the eggs after cooking may be recycled.

iii. On-going technical support

Technical support can be provided via email, “Skype” or other type of communications. Training and support can also be organized during visits of the project.

3. Operational cost

The draft 2015 operating costs for the farm is presented below:

Pullet	~ US$ 6.4-7.2 / bird
Feed	~ US$ 13.2 / hen/ year
[~ US$ 330 / tonne – Assuming an average consumption of 120 g/hen, ~44 kg/hen/year]	
Vaccines & electrolytes in water	~ US$ 2.0 / hen/ year
[assumes about 10 doses of IB and NCD at US$ 0.10/dose]	
Selling price of hen at end of production	~ US$ 3.0 / hen
Total estimated running cost:	~ US$ 19.4 / hen / year

A project with 5,000 hens would require annually a budget of ~ US$ 100,000, excluding salary for workers (maximum 2 workers for regular daily operations).

An addition of 750 hens under free-range conditions would require annually a budget of ~ US$ 18,000 or ~US$ 24.35 / hen / year [estimated feed consumption of 150 g/hen/day or ~ 55 kg/hen/year]

Pullet and feed cost should be negotiated with suppliers identified.

For the hard-boiled egg operation, the annual operational cost cannot be defined at this time but major items to consider are listed below:

Water, electricity	TBD
Chemicals for equipment cleaning and sanitation	~ US$ 300
Employees salary (3 staff x 3 days)	TBD
Estimated annual running cost	TBD

Important questions to address:

1. Price of birds at point of lay for 2,500 birds at a time, for a total of 5,000 birds per 60-week cycle, delivered on site;
2. Typical age of flock at end of production? - since they have an excellent resale value, birds may be sold earlier than 60 weeks of production;
3. Price of feeds with a yearly commitment to feed 5,000 hens - ~ 4,000 kg/week, bulk delivered;
4. Price of feeds as mash and pellets / crumbles (likely a better option if not cost prohibitive);
5. Possibility to buy back shell eggs and price offered?
6. Possibility to buy hens at end of production and price offered:
7. Selling of hens at end of lay system – Dealers? Organized network? Resellers;
8. Recommended vaccination schedule during production cycle?
9. Consulting veterinarian, visiting ~ every 6 weeks – contact information and possibility to use his services if need be? Cost for services?

Capital considerations:

1. Cost to bring water and electricity to barns?
2. Cost for concrete base and frame for barns and silos?
3. Access to workers to build two stainless steel tanks for HBE operation?
4. Cost of water? Electricity?
5. Farm and HBE employee cost / annum?

Project timelines and schedule:

Activity	Responsibility	Timelines
Raise funds for set-up cost and operational costs		
Order housing system and other equipment for barn		12-14 weeks lead time
First order of birds at point of lay		Confirm lead time required with supplier
Barn engineering and design		
Barn construction		
Equipment installation		
Training of farm staff		
HBE plant set-up		
Training of HBE plant staff		