Pre-Feasibility Study

QUAIL BREEDER FARM AND HATCHERY
(80,000 Quail Eggs)

Small and Medium Enterprises Development Authority

Ministry of Industries & Production
Government of Pakistan
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1. EXECUTIVE SUMMARY

The Quail Breeder Farm and Hatchery unit is a project of the livestock sector which aims to serve the poultry sector's quail bird demand in Pakistan. This project is proposed to be set up in Lahore, the second largest city of Pakistan. Quail breeder birds would be purchased each year and reared under specific conditions for egg laying. The fertilized eggs would then be artificially incubated in a setter/incubator for 15 days and then placed in hatcher for 3 days for hatching process. At the end of this 18 day incubation period, quail eggs hatch to produce day old chicks (DOC). These DOCs can be sold to quail meat farmers who demand DOCs for raising and slaughtering to sell in the meat market.

An exclusive quail market segment has lately been growing within the poultry meat sector to cater to health conscious meat consumers. Quail meat is renowned for being rich in vitamins, essential amino acids, unsaturated fatty acids and phospholipids, which are vital for human physical and mental development. Compared to broiler, quail meat is a rich source of dietary protein. Not only is its protein content higher but moreover its 'bad' cholesterol level is lower than chicken or red meat. In addition to individual consumers, quail meat is also sold directly to hotels and restaurants inside the country. Approximately, one out of every ten broiler chicken consumer opts for quail meat. The poultry sector has demonstrated a robust growth of 8-10 percent annually, evidencing its inherent potential.

The total initial cost for setting up the quail unit is estimated at Rs. 5.426 million. The project is proposed to be financed through 50% debt and 50% equity. The project NPV is projected around Rs. 12.585 million, with an IRR of 47% and a payback period of 3.02 years. The legal business status of this project is proposed as 'Sole Proprietorship'.

The unit would run at 60% capacity in the first year of operation, maximum capacity (100%) is attained in fifth year of operation. The proposed project capacity of the hatchery unit (incubator plus hatcher) is 80,000 eggs. Two hatchery machines, each of 40,000 egg incubating capacity along with 5,000 egg hatching capacity are proposed in the project giving a maximum egg capacity of the incubating unit as 80,000 eggs and hatcher unit capacity as 10,000 eggs at any given time. The total incubation process period for quail egg is 18 days; the process is divided into 15 days in incubator and 3 days in hatcher. The project is based on the capacity of the hatcher unit that is 10,000 eggs per batch of 3 days.

2. INTRODUCTION TO SMEDA

The Small and Medium Enterprises Development Authority (SMEDA) was established with an objective to provide fresh impetus to the economy through the launch of an aggressive SME support program.

Since its inception in October 1998, SMEDA had adopted a sectoral SME development approach. A few priority sectors were selected on the criterion of SME presence. In depth research was conducted and comprehensive development plans were formulated after identification of impediments and retardants. The all-encompassing sectoral development strategy involved recommending changes in the regulatory environment by taking into consideration other important aspects including finance, marketing, technology and human resource development.

SMEDA has so far successfully formulated strategies for industries such as horticulture, including export of fruits and vegetables, marble and granite, gems and jewellery, marine fisheries, leather and footwear, textiles, surgical instruments, transport, dairy etc. Whereas the task of SME development at a broader scale still requires more coverage and enhanced reach in terms of SMEDA's areas of operation.

Along with the sectoral focus a broad spectrum of business development services is also offered to the SMEs by SMEDA. These services include identification of viable business opportunities for potential SME investors. In order to facilitate these investors, SMEDA provides business guidance through its help desk services as well as development of project specific documents. These documents consist of information required to make well-researched investment decisions. Pre-feasibility studies and business plan development are some of the services provided to enhance the capacity of individual SMEs to exploit viable business opportunities in a better way.

This document is in continuation of this effort to enable potential investors to make well-informed investment decisions.

2 PURPOSE OF THE DOCUMENT

The objective of this pre-feasibility study is primarily to facilitate potential entrepreneurs in project identification for investment. This pre-feasibility may form the basis of an important investment decision and in order to serve this objective, the document/study covers various aspects of project concept development, start-up, and production, marketing, finance and business management. The document also provides sector information and international scenario, which have some bearing on the project itself.

The purpose of this document is to facilitate potential investors of Quail Breeder Farm and Hatchery Unit by providing them a macro and micro view of the business with the hope that the information provided herein will aid potential investors in crucial investment decisions.

This report is based on the information obtained from industry sources as well as discussions with businessmen. In the financial model, since forecast/projections relate to the future periods, actual results are likely to differ because of events and circumstances that do not occur as expected.

3 PROJECT PROFILE

3.1 Opportunity Rationale

There has been an increasing pressure on the livestock sector to meet the growing demand for high-value animal protein. The world's livestock sector is growing at an unprecedented rate and the driving force behind this enormous surge is a combination of population growth, rising incomes and urbanization.

In the last ten years, the little known Japanese quail [*Coturnix Japanica*], commonly known as "*Bater*", has been introduced in the progressing poultry industry of Pakistan as an alternative avian species to mitigate chronic protein deficiency among the population. The Japanese quails are contributing to broiler and layer type commercial quails. Quail has also been identified worldwide as a laboratory animal because of its salient characteristics that include rapid growth, early sex maturity, short generation interval and prolificacy in egg production.

An exclusive quail market segment has lately been growing within the poultry meat sector to cater to the quality conscious meat consumers. Quail meat is not only regarded as a restaurant delicacy but is also consumed in reasonable quantities by the public due to its affordable prices. Approximately, one out of every ten broiler chicken consumers opts for quail. To fulfil the demand of quails at farm level, there is a need to develop quail breeder and hatchery farm.

According to the Agriculture Statistics of Pakistan the per capita consumption of poultry meat is increasing at a rate of 4% per annum. The introduction of the Japanese quail has opened a new path and an alternative for poultry farmers. Initiatives are being taken at industry level such as training quail farmers to introduce Quail farming as a source of income and means of alleviating poverty by creating employment opportunities especially in the rural areas.

Livestock products not only provide high-value protein but are also important sources of a wide range of essential micronutrients, in particular minerals such as iron and zinc, and vitamins such as vitamin A. For a large majority of people in the world, particularly in developing countries, livestock products remain a desired food for nutritional value and taste. The existing daily availability of protein quantity per capita in Pakistan derived from animal sources including beef, mutton, poultry and fish combined amounts to 11 grams. This is far less than the recommended daily dietary protein allowance from animal source of 26 grams according to the World Health Organization standards. Quail meat, compared to other animal sources is high in protein with essential amino acids, low in fats and cholesterol and high in vitamins and minerals. In addition to its high nutritional value Quail meat also has a unique taste.

3.2 Project Brief

The Quail Breeder Farm and Hatchery is a project of the livestock sector, in which day old chicks (DOCs) are produced from fertilized eggs of quail breeders reared on the farm. The unit is proposed to cater to the demand of quail meat farmers' for production of DOCs. Quail breeder flock would be bought and reared on the farm and their fertilized eggs artificially incubated for 18 days in a Hatchery machine on the same premises to produce DOCs. These DOCs are sold to farmers in rural and peri-urban areas directly as there is an increasing trend to include quail meat in diet as rich source of protein.

The proposed project initiates with the purchase of around 3,361 quail breeders in year 1, having 30% male and 70% female quail birds. This size of the flock is increased at a rate of 10% every year going up to 5,601 quail breeders in year 5. The eggs produced would be placed in the hatchery machine batch-wise. A total of 121 batches are assumed per year, these batches will be placed in the hatchery machine every 3 days. The size of the batch would increase with the size of the breeder flock.

The breeder flock would be purchased according to the required egg production per batch. In year 1, the proposed breeder flock would lay eggs that fulfil 60% of the total capacity; the remaining 40% of the hatchery machines' capacity would be rented out to other farmers who require incubation services. Increasing the size of the breeder flock at a rate of 10% every year would eventually utilize 100% egg capacity of the hatchery machines and rental services would no longer be offered.

After 18 days of incubation of fertilized eggs DOCs will be produced; these DOCs would be sold immediately to farmers.

The project's specific requirement of temperature and humidity control in hatchery and feeding, drinking and lighting system for breeder flock would be monitored regularly. After every 12 months, new breeder stock would be reared to produce continuous supply of fertilized eggs. The previous breeder flock would be sold to farmers for slaughtering. Two days would be spent in proper cleaning, washing, white washing, disinfection and fumigation prior to the arrival of new flock. During flock rearing, strict measures for bio-security should be observed at the unit.

3.3 Proposed Business Legal Status

The business legal status of the proposed project can either be sole proprietorship or partnership. Additionally, it can also be registered under the Companies Ordinance, 1984 with the Securities & Exchange Commission of Pakistan. The selection depends upon the choice of the Entrepreneur. This Pre-feasibility assumes the legal status to be Sole Proprietorship.

3.4 Proposed Capacity[1]

The project is proposed to run at a capacity more or less dependant on the capacity of the hatcher unit installed in the hatchery machines.

The proposed project capacity of the hatchery unit (incubator plus hatcher) is 80,000 eggs. Two hatchery machines, each of 40,000 egg incubating capacity along with 5,000 egg hatching capacity are proposed in the project giving a maximum egg capacity of the incubating unit as 80,000 eggs and hatching unit capacity as 10,000 eggs at any given time. The total incubation process period for quail egg is 18 days; the process is divided into 15 days in incubator and 3 days in hatcher. The project is based on the capacity of the hatcher unit that is 10,000 eggs per batch, in which case, at a time 10,000 eggs can be placed in the incubator every 3 days. After 15 days in the incubator the eggs would be placed in the hatcher for 3 day hatching process.

The unit would run at 60% capacity in the first year of operation, maximum capacity (100%) is attained in fifth year of operation. A breeder flock of around 3,361 quail birds (2,353 female and 1,008 male birds) is purchased in the first year for laying fertilized eggs; the breeder flock purchased every year is increased according to the project capacity. The quail breeder is assumed to lay one egg per day; accounting for egg productivity of around 85%, a total of 2,000 eggs would be produced per day. Based on 3 days, 121 batches are placed in incubation each year. In Year 1, at 60% capacity approximately 2,999 eggs per batch, produced by own breeder flock, would be placed every 3 days in each machine, the remaining 40% of the space would be rented out to other farmers who require incubation service. At 100% capacity, by increasing the size of the breeder flock, egg production would reach approximately 5,000 eggs per machine and 10,000 eggs in total and rental facility would no longer be offered. Accounting for 90% hatchability in total, around 5,399 DOCs per batch are produced in first year and 8,998 DOCs per batch at 100% capacity are produced fifth year onwards.

In year 1, a total of 653,279 DOCs would be produced and sold. Additionally, a total of 484,105 eggs would be placed in the hatchery unit on rental basis in year 1.

3.5 Product Mix

This project would generate revenue from sale of day old quail chicks weighing between 6-8 grams at Rs. 9 per DOC. Moreover, hatchery rental facility would be provided in the first four years at a rate of 70 paisa per egg. Part of the revenue is also generated through the sale of adult breeders at the end of 12 months egg laying period.

[1] *For further clarification refer to Section 14.2 (Calculation basis) and Table 15-1 (COGS and Revenue calculation basis)*

4 FEATURES OF QUAIL

4.1 Japanese (Coturnix) Quails

Quail belong, along with chickens, pheasants and partridges to the Family Phasianoidea of Order Galliformes of the Class Aves of the Animal Kingdom. Species or subspecies of the genus *Coturnix* are native to all continents except America. One of them *Coturnix coturnix* or common quail are migratory birds of Asia, Africa and Europe. Several interbreeding subspecies are recognized, the more important being the European quail, *Coturnix coturnix coturnix*, and the Asiatic or Japanese quail, *Coturnix coturnix japonica*. One subspecies that commonly migrates between Europe and Asia was eventually domesticated in China. These birds were raised as pets and singing birds. The domesticated coturnix were brought to Japan from China in the eleventh century.

The first written records of domesticated quail in Japan date from the twelfth century. It is claimed that a Japanese Emperor obtained relief from tuberculosis after eating quail meat, and this led to selection of domestic quail for meat and egg production in Japan in the latter part of the nineteenth century. By 1910, the Japanese quail in Japan were widely cultured for their meat and eggs. Between 1910 and 1941, the population of Japanese quail increased rapidly in Japan especially in the Tokyo, Mishima, Nagoya, Gifu and Toyohashi areas. This period also represented a time of imperial expansion in Japanese history and domesticated Japanese quail were established in Korea, China, Taiwan and Hong Kong and later on spread to Southeast Asia.

The domesticated subspecies, *Coturnix coturnix japonica*, is called Japanese quail but is also known by other names: Common quail, Eastern quail, Asiatic quail, Stubble quail, Pharaoh's quail, Red-throat quail, Japanese gray quail, Japanese migratory quail, King quail, and Japanese King quail. Japanese quails are produced mainly for their eggs and meat. Chicks are reared in brooder cages from day-old to four weeks of age. They are fed 3 times daily with quail starter mesh. These are shifted to layer cages onwards till one year of age. They are housed in 5-tier layer cages and are fed with quail layer or breeder feed twice daily. Lighting is left on during the night to stimulate the birds to lay eggs.

4.2 Features of Quail Eggs

Quail eggs are renowned for being rich in vitamins, essential amino acids, unsaturated fatty acids and phospholipids, which are vital for human physical and mental development. Quail eggs can be included in the diets of children, pregnant mothers and geriatric and convalescent patients. Coturnix eggs are characterized by a variety of colour patterns. They range from snow white to completely brown. More commonly they are tan and dark brown speckled or mottled brown with a chalky blue covering. The average egg from mature female weighs about 10 gram (1/3 ounce), about 8 percent of the body weight of quail hen as compared to 3 percent for chicken eggs. The egg of Japanese quail contains 158 Cal. of energy, 74.6% water, 13.1% protein, 11.2% fat, and 1.1% total ash. The mineral content includes 0.59 mg calcium,

220 mg phosphorus and 3.8 mg iron. The vitamin content is 300 IU of vitamin A, 0.12 mg of vitamin B1, 0.85 mg of vitamin B2 and 0.10 mg nicotinic acid.

4.3 Features of Quail Meat

Nutritionally people eat poultry meat for its high content of quality protein and its low fat content. Quail and chicken meat is slightly higher in protein and slightly lower in fat as compared to beef and other red meats. When it comes to composition, quail's meat has some interesting properties, which might aid in its marketing. In terms of its basic composition in comparison with broiler meat, it has high protein content and relatively low fat content (when skin is removed, the figures for fat drop around 60% for quails and 80% for broilers raw meat). In terms of lipids, it has slightly more undesired saturated fats. However, it also has a higher content of the **good** polyunsaturated fatty acids. Looking at the minerals, we can see it is a significant source of phosphorus, iron and copper, while providing reasonable amounts of zinc and selenium. Vitamin-wise, it has high niacin (vitamin B3) and pyridoxine (vitamin B6) content. So, it has either the same or substantially higher amounts of minerals and vitamins when compared to broilers.

In terms of sensory properties, quail meat has good acceptance level among consumers. Surprisingly, scientists[2] have found even higher ratings (in their category "taste") for laying quails that are used for meat consumption after the laying period. In the case of the older birds, this is totally unexpected. This makes the use of layer breeds for meat consumption a viable and interesting solution for egg producers.

4.4 Coturnix Chicks

Young Coturnix are yellowish in appearance with stripes of brown and somewhat resemble turkey poults except for size. The newly hatched chicks weigh about 6 to 7 grams, but grow rapidly during the first few days. After three days flight feathers begin to appear and the birds are fully feathered about four weeks of age. Partial sexing is possible by three weeks of age by the cinnamon-coloured feathers on the breast of the male bird.

4.5 Adult Male

The adult male Coturnix weighs about 100 to 140 grams (3 1/2 to 5 ounces). The male birds can be identified readily by the uniform rusty brown/ fawn coloured feathers with light white spots on the upper throat and lower breast region. Males also have a cloacal gland, a bulbous structure located at the upper edge of the vent which secretes a white, foamy material. This unique gland can be used to assess the reproductive fitness of the males. The young birds begin to crow at 5 to 6 weeks old.

[2] *World Poultry Vol. 25 No. 2 – 2008 (http://www.worldpoultry.net/other-poultry/other-poultry/quail-meat--an-undiscovered-alternative-6930.html)*

4.6 Adult Female

Adult female quail are bigger than male quail and weighs from 120 to 160 grams (4 to 5 1/2 ounces). The body coloration of the female bird is similar to the male except that the feathers on the throat and upper breast are long, pointed, and much lighter black or dull grey and white spots on it. Also, the light tan breast feathers are characteristically black-stippled.

Laying starts at seven weeks, attaining 50% egg production at 8th week and reaches a peak of 80-85 percent from 12-24 weeks of age. Japanese quail continue to yield eggs up to the end of one year, and about 260 eggs are laid during that period. Adult mortality rate is minimal. In order to produce fertile eggs, the male quails should be reared along with the females at 6-8 weeks of age. The male to female ratio is 1:3.

4.7 Preservation Methods

The shelf life of quail eggs and meat can be enhanced by preserving the products as egg and meat packed in plastic pouches. Quail meat and eggs are easily perishable due to their high water content and bacteria, moulds or yeasts cause spoilage, supported by enzymes. The methods employed include deprivation of water and sometimes oxygen, excess of salt, increased acidity or extreme cold or heat.

The modern quail meat will be welcomed as a meat variety of superior quality, tenderness and flavour. Considering the changing demands of avian meat consumers, the industry is striving to produce quails weighing 200 grams at marketing age (28 days). This modern variety of quail can be used for the production of cutlets, fingers, noodles, soup powder and egg puff. It is not an exaggeration to state that quails will occupy a considerable portion of the poultry market in the days to come.

5 CRUCIAL FACTORS & STEPS IN DECISION MAKING

Before making a decision, whether to invest in this project or not, one should carefully analyze the associated risk factors. SWOT analysis can help in analyzing these factors which play an important role in decision making.

5.1 Strengths

- Quail hatchery unit helps to strengthen the entire quail cluster in any specific region it's established in.
- Having its own breeder flock, the business is not dependant on outside sources for egg production, therefore providing an uninterrupted supply of eggs.
- The production of DOCs goes on for 365 days a year, without any days off.
- The machinery and equipment required for the project is easily available in the local market.
- The DOCS are sold on cash basis making liquid cash easily available.

5.2 Weaknesses

- A percentage of revenue generation in the first four years is dependant upon rental services offered to other farmers.
- Negligence in maintaining optimum temperature and relative humidity of hatchery can lead to wastage of the entire batch of eggs causing a loss.

5.3 Opportunities

- Due to quail meat's high nutritional value, its demand is increasing among the health conscious class consequently increasing the demand of DOCs.
- There is a wide gap between demand and supply of quail DOCs, creating an opportunity for new investors.
- Quail is blessed with the unique characteristics of fast growth, early sexual maturity, high rate of egg production, short generation interval and shorter incubation period that make it very suitable as an alternative farming animal.

5.4 Threats

- In summer when there is less demand, production of quail is higher and in winter demand is more and production is less.
- Seasonal variation in demand remains a major problem causing fluctuation in DOC sales price.
- Quail feed prices have been increasing in the past years and is expected to increase in the coming years.
- Increase in utility prices has a major bearing on the project.

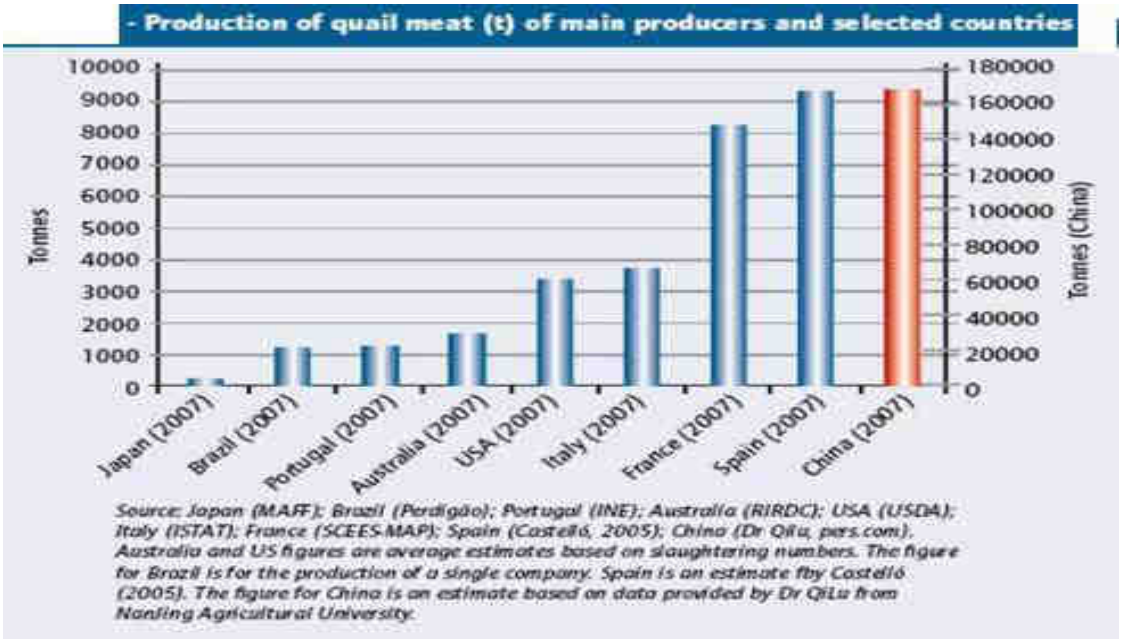
6 CURRENT INDUSTRY STRUCTURE

6.1 Global perspective[3]

Currently, China, France, Spain, Italy, and USA are the largest producers of Quail, with other countries far behind. Commercial quail farming is also quite popular in Japan, Korea, Singapore, Hong Kong, Germany, UK, etc. However, some initiatives to foster production were launched in places as different as India, Australia and Canada. These regions are either trying to tap into some local advantages in production, or have an eye on a specific export market. According to data, China is the largest meat producer having around 80 million quail housed exclusively for this purpose producing between 146,000 to 190,000 tones per year.

[3] *World Poultry Vol. 25 No. 2 – 2008 (http://www.worldpoultry.net/other-poultry/other-poultry/quail-meat--an-undiscovered-alternative-6930.html)*

Figure 1 World Top Ranking Quail Meat Producing Countries



In France, data from 2006 points to production of 8,197 tonnes. Over the past few years the number of birds housed fluctuated around 9 million. According to the French Customs, the country also exports more than it imports (1644 and 1504 tonnes respectively), but the largest portion of the trade is restricted to Europe. Belgium and Germany are the main importers of French quail, and Spain is the major exporter to the country.

In Italy, official data from the past 6 years indicates that slaughtering figures remained between 20-24 million birds i.e. 3,300-3,600 tonnes carcass weight having exports about 600-650 tonnes per year. Similarly, In Australia, 6.5 million quails were slaughtered

In USA, Census of Agriculture reported that 1,907 farms sold over 19 million quails producing around 4,011 tonnes. Georgia is the largest producer, followed by North Carolina, Texas and Alabama. In addition, the country also imports quail meat, with the main supplier being Canada.

In Canada, the State of British Columbia alone produced 2 million quails per year. The country slaughtered about 10.5 million game birds, and a "sizeable" proportion of it was said to be from quails. A substantial portion of such production goes to the US, particularly California. In 2007, Canada exported 628 tonnes of quail to the US.

India is another possible player-to-be, and the government is giving incentives for quail production, given some of the advantages it presents (smaller costs, less area and requirements needed, fast growth cycle and returns, etc.).

In Brazil, one company (the giant Perdigão) has ventured into the commercial business. In 2007, the company processed 1,200 tonnes of quails, but it has been

experiencing growth of about 10% per year. The majority of the production supplies the domestic market. Exports go mostly to the Middle East. Egypt is another country with similar figures where data is restricted to a single company, Moussa Quail Farm, which claims to slaughter 6 million quails per year.

6.2 Local perspective[4]

Livestock accounts for 52.2 percent of agricultural value added, contributes around 11.5 percent to GDP and affects the lives of 30 – 35 million people in rural areas. It is highly labour intensive and if proper attention is given to this sector, it will not only absorb more rural workforce but also help alleviate rural poverty in Pakistan.

Poultry sector is one of the most vibrant segments of agriculture sector of Pakistan. This generates employment (direct/indirect) and income for about 1.5 million people. Its contribution in agriculture value addition is 4.8 percent and livestock value addition is 9.8 percent. Poultry meat contributes 24.8 percent of the total meat production in the country. The current investment in poultry industry is about Rs. 200 billion. Poultry sector has shown a robust growth of 8-10 percent annually which reflects its inherent potential. The production of domestic/rural and commercial poultry for last three years is given below:

Figure 2 Domestic/Rural & Commercial Poultry

Table 2.23 Domestic/Rural & Commercial Poultry

Type	Units	2008-09[1]	2009-10[1]	2010-11[1]
Domestic Poultry	Million No's	76.22	77.35	78.51
Cocks	"	9.32	9.58	9.84
Hens	"	36.11	36.76	37.42
Chicken	"	30.79	31.02	31.25
Eggs[2]	"	3611	3676	3742
Meat	000 Tons	100.41	102.40	104.43
Duck, Drake & Duckling	Million No's	0.61	0.59	0.56
Eggs[2]	"	27.42	26.28	25.18
Meat	000 Tons	0.83	0.80	0.77
Commercial Poultry				
Layers	Million No's	28.42	30.41	32.54
Broilers	"	448.55	493.40	542.74
Breeding Stock	"	7.99	8.39	8.81
Day Old Chicks	"	468.51	515.36	566.89
Eggs[2]	Million No's	7620	8137	8690
Meat	000 Tons	550.00	603.47	662.18
Total Poultry				
Day Old Chicks	Million No's	499	546	598
Poultry Birds	"	562	610	663
Eggs	"	11,258	11,839	12,857
Poultry Meat	000 Tons	651	707	767

Source: Ministry of Livestock and Dairy development

1 ; The figures for the year 2008-09, 2009-10 and 2010-11 are statistically calculated using the figures of 2005-06.
2 : The figures for Eggs (Farming) and Eggs (Desi) are calculated using the poultry parameters for egg production.

Quail farming was introduced in Pakistan during early seventies with the introduction of breeding stock of Japanese quail on commercial lines with good genetic potential,

[4] *Economic Survey of Pakistan 2010-2011 (http://www.finance.gov.pk/survey/chapter_11/02-Agriculture.pdf)*

having improved growth rate, FCR, fleshing ability resistance against diseases and vitality.[5] There are about 3,000 quail farms in Pakistan out of which 250 breeding and hatchery farms are in and around Lahore. The DOCs are available in market for Rs. 8-10 on advance booking primarily. Quail eggs are also easily available in the market. Around 50,000 to 100,000 birds are consumed daily. In summer consumption is less and in winter consumption is more. Major clients in Lahore are Super stores, Food Street, Tollinton Market, and various 4 and 5 Star Hotels.[6]

In quail business, farmers get day old quail chicks from hatcheries. These hatcheries maintain their breeder farms, or in some cases, purchase their hatching eggs from breeder farms. These breeder farms depend on producers of parent stock. Similarly, Poultry feed mills are major players in the poultry industry, producing specific formula feed mix. Quail breeder feed consists of rich protein elements like grains, gluten, and soybean meal. The major component of cost of production in this business is for feed.

7 MARKET ANALYSIS

Quail meat is a good source of animal protein available in the country as compared to broiler. Quails are sold to traders and whole seller markets in urban areas. Quail meat is also sold directly to hotels and restaurants inside the country. The time required for rearing quail birds is lesser than that for large animals or broilers. Also, the consumption of white meat is increasing due to growing health consciousness in masses.

The marketing of chicken follows traditional channels of distribution. Generally, broilers are distributed in the market through middlemen (Arti) and wholesalers. The role of Arti is to identify a farm and negotiate prices. In some cases, the middleman provides day old chicks and other farm inputs (feed, etc.) to broiler farmers and proposes to buy back mature birds from them. Most demand comes from Multan, Karachi, Gujranwala, Lahore and Islamabad. The trick in marketing is awareness of quail supply and demand, which will determine the selling price.

Birds are transported to urban market and are sold to retailers or market-street poultry shops. Birds are sold on live-weight basis. The time spent in transporting broilers from the farm to retail shops is brief. Although collection and handling of birds has improved with the use of loader vehicles, but it is an established fact that greater the distance between poultry producer and consumer, the more complicated is the marketing system, which includes collection, handling and transportation to consumers or processing plants.

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[5] *Pakissan report – June 2011*
http://www.parb.gop.pk/Downloads/PARB%20approved%20projects%20promise%20doable%20outcomes.pdf

[6] *All Pakistan Quail Breeder & Traders Association. President, Syed Asad Ali Rizvi*

7.1 Major Players

Major players of Quail farming sector are given in the table below:

Table 7-1 Major Players

Company Name:	Nizam Poultry Breeding Farms and Hatchery
Owner:	Dr. Fazal Ahmad
Address:	Canal Road, Harbanspura, Lahore.
Contact no.:	0423-6544865, 0333-4487069, 0300-4437034
Company Name:	Gold Pak Poultry, Breeding Farms & Hatcheries
Owner:	Mr. Shahzad Ahmed
Address:	4-A Faisal Park, Main Road, P.O, Baghbanpura, Lahore.
Contact no.:	042-6862812, 042-6815967
Company Name:	Sadat Quail Breeding Farms & Hatchery
Owner:	Mr. Syed Asad Ali Rizvi
Address:	Near Sozo Water Park, Jallo, Lahore.
Contact no.:	0300-4727214, 042-5069105, 042-6582013
Company Name:	Al-Maida Quail farm
Owner:	Mr. Aamir Jamal
Address:	Ring Ravi Road, Lakho Der Village, Lahore.
Contact no.:	0300-941 9681

8 FARM MANAGEMENT

Farm input required for a unit includes farm equipment (cages, hatchery unit, egg refrigerators etc), electronic fixtures and other consumer items (feed, vaccines & medicines, clean drinking water, electricity etc.).

8.1 Proposed quail farm

The breeder quails of good genetic worth would be purchased from a private farm. A flock of 70% female, 30% male would be bought every year. The birds would be settled in 5 tier cages. The cages are required to be equipped with a proper feeding and nipple drinking system, monitored by the concerned staff.

After one year, a gap of 2 days is required for the preparation of farm to receive the new flock. During these days, proper cleaning, washing, disinfection and fumigation would be performed prior to the arrival of new flock. During flock rearing, strict measures for bio-security should be observed at the unit.

The following practices are suggested to be performed under the supervision of an expert. This shall protect the flocks from 80% of the diseases and improve farm management:

- Sanitation and disinfection program strictly followed during and after the completion of one year cycle. Automatic drinkers and feeders should be checked on regular basis for the functioning.

- Quail breeders should be given enough space according to their age as less space could give rise to different complexities.
- Feed should not be stored for long time as it would lose its nutrition and there is a chance that feed would get fungal and can prove to be poisonous to quail chicks.
- On quail farm it should be strictly prohibited for employees to keep free range chickens or any other bird so that disease spread is avoided.

8.2 Housing and Management of Quail Breeders

The system of housing would be a cage system. The cages would be kept in closed farms. A concrete floor is essential, and the building should be fulfilling basic requirements, not only to deter rodents and other pests but also to provide drought-free and well-ventilated, sheltered accommodation. Canvas-cloth is sometimes hanged over on both sides of the house to prevent direct sunlight into the cages. The quails should not be exposed to direct sunlight.

A 5 tier high cage system is required. Each unit is about 6 feet in length and 1 foot in width, and subdivided into 5 subunits. The birds stand on sloping slatted wire mesh floors. The droppings fall into pull-out trays/conveyor belt. Front and rear of cages are closed by slats. Long narrow feed troughs are placed in front of the cages and PPC water troughs are placed at the back of the cages. The eggs roll out under the feed troughs and are collected twice daily, once in the morning and once in the evening. Commercial egg layers are usually housed in colonies of 10-12 birds per cage. For breeding purposes, male quails are introduced in the cages in the ratio of 1 to 3 females. In Egg Production, cage specifications are very important for maximum production.

- Easy to transport and move with powerful block system and lockable wheels
- Automatic watering system with high Capacity reservoir and automatic nipples
- Inclined cage bottom for moving eggs to the cage front
- Feeding boxes throughout the tiers
- Manure trays for each tier

8.3 Lighting Management

It has been proved through experiments that light has more importance than temperature in stimulating quails to lay eggs. A dim light is enough to maintain wakefulness and social activity in the flock. Electric bulbs of 40 or 60 watts may be used in colony pens. For the light to be effective it must be turned on before dark and calculated to go off after the day has been extended to 14 or 16 hours. Control of the light may be by a time switch.

8.4 Practical Feeding

Nutrition is one of the most important factors required to maintain quails in good physical condition and to obtain normal growth and egg production. Since feed constitutes 60-70% investment at the farm, for deriving maximum benefit out of quail farming it is necessary to feed a balanced ration which will have all the nutrients in necessary proportion. There are several forms in which a balanced ration may be fed to quail - all dry mash, pellets or crumbs. In tropics usually dry all mash feeding system is being used.

The local farmers may use the quail starter and layer diets for their growing and laying quails and supplement them with high protein ingredients, such as soybean meal and skimmed milk. Fast early growth is achieved with high-protein diets. Japanese quails, which mature at 5 to 6 weeks of age, respond favourably to higher dietary protein concentration. These high protein starter feeds will give quick development to growing birds and bring earlier and more consistent laying process to hens. When there is deficiency of vitamins and minerals in the female quail breeders, the chicks obtained from their fertile eggs are usually lean with weak legs. To prevent this, the breeder females should be provided with optimum minerals and vitamins in their feed

The feed required up to 6 weeks of age is about 500 g per chick, and thereafter it is about 30 g per bird per day. During the laying period, birds require about 3 kg of feed per kilogram of eggs at maximum. For birds just prior to maturity, the dietary requirements are similar, except for calcium and phosphorus. A diet containing 1.25 percent total phosphorus and 3.50 percent calcium is recommended; this may need to be increased to 3.9 percent. In hot weather when quails eat less food but still require calcium to maintain egg production, broken oyster-shell or limestone grits may be

given ad lib. It is better to give high protein and high vitamin feed during summer. Feeding should be done during the cooler parts of the day to promote feed consumption.

Figure 3 Suggested feed Composition Japanese Quails

Name of ingredient	Level of inclusion (kg)		
	Quail Starter Mash (0-2 weeks)	Quail Finisher Mash (3-5 weeks)	Quail Layer Mash (>5 weeks)
Maize/corn	35	38	42
Pearl millet/sorghum	14	14	15
Peanut meal (SE)	15	13	8
Soya bean meal	25	20	12
Sunflower meal (SE)	-	6	8
Dry fish	8.5	6.5	6
Mineral mixture	2.5	2.5	2.5
Shell grit	-	-	6.5
Total (kg)	100	100	100
Vit. AB_2D_3 (g)	10	10	10
Manganese sulphate (g)	5	5	5
Choline chloride (g)	-	-	50
Trace mineral mixture (g)	250	250	250

When the ration contains only plant protein, supplemental methionine and lysine may be beneficial. The main feed ingredients of quail feed are Corn, Soybean, Canola, Sunflower meal, Rape seed meal, Lime stone etc. There are indications that these are the first limiting amino acids for Japanese quails. Feed for laying quail should contain 19 percent crude protein with 2 650 M.E. Cal/ kg.

It is important to obtain fresh feed and it should be stored in covered containers with tight fitting lids in a clean, dry, cool area free from animals and vermin. Feed stored longer than 8 weeks is subject to vitamin deterioration and rancidity, especially in hot humid tropics.

8.5 Disease Prevention and Control

The prevention of disease in Japanese quail depends on continuous and conscientious application of fundamental principles and practices of quarantine and sanitation. Although, they are comparatively more resistant to infectious diseases than chickens yet may be affected from diseases such as fowl cholera, coli-bacillosis, enteritis and mycotoxicosis. More deaths (up to even 20-25 percent) occur due to managerial errors, especially failure to provide optimum temperature in extreme weathers, improper feeding and watering management etc. Good management will reduce the danger of disease.

The first prerequisite to a successful disease-prevention program is that infection-free stock be used as the foundation flock. Immediately on arrival, the birds should be placed in facilities well isolated from birds of the farms and held for an observation

period of 2 weeks. They should be observed daily for signs of illness, and when disease is noted, immediate steps should be taken to obtain a diagnosis, and treatment be given. The second rule is to separate quail breeder flocks from other quail.

Sanitary management practices are the best guarantee against disease. Equipment, such as cages, feeders, water drinkers and tools should be cleaned and sanitized frequently. Every effort should be made to screen out wild birds, rodents and vermin that might introduce disease. Dead birds should be removed immediately upon discovery. In theory, Japanese quail, as a cousin of the fowl, is expected to be susceptible to most of the same diseases that affect domestic poultry. Nevertheless, disease is not much of a problem on well managed quail farms. Japanese quails appear to be hardier than chickens and with proper management, serious mortality should not be a problem. Hence, proper management of quail chicks, disinfecting farm premises, providing clean drinking water and feeding quality concentrate feed will prevent disease outbreaks in quail farms.

8.6 Incubation Process

8.6.1 Pre-incubation Egg Care

Successful quail propagation begins in the pre-incubation period. Eggs should be collected twice daily and more frequently in hot weather. Special care must be taken in collecting and handling quail eggs for they are thin-shelled and break more easily than chicken eggs. If egg collection is delayed, the eggshells may get damaged or crack because of the frequently moving and active birds. Japanese quail eggs can be stored at room temperature for 5-7 days during normal seasons.

Eggs should be of a uniform size as extremely large or small size eggs have low hatchability. Eggs held for incubation should be kept in a cool, clean, dust-free room at a temperature of 14 + 3ºC (55 + 5ºF) and 70 + 10 percent relative humidity. Eggs should be stored large end up and they should not be held for more than 12-14 days before being placed in the incubator. The eggs set in the incubator must be clean. Eggs to be incubated should not be washed; if cleaning is required, it should be done with a clean abrasive or sandpaper. The egg is mostly water and quail egg dehydrates more rapidly. Eggs stored in PVC bags may be stored for a longer period of time (14-21 days) and the hatchability rate would be higher than from unpackaged eggs stored in low temperature.

8.6.2 Artificial Incubation

Quail eggs can be incubated successfully in standard size commercial incubators. Quail eggs will hatch successfully if they are placed in an incubator in any position except with the large end down. The incubator should have a fan to provide adequate air circulation because the developing embryos use oxygen and give off carbon dioxide and heat. Little ventilation is needed at the beginning but the requirement increases as incubation progresses. The machine should be equipped to allow automatic turning of all eggs through an angle of 90 at least 4-6 times per 24 hours. Turning regularly is particularly critical in early incubation to prevent the embryos

from adhering to the shell membrane. Lack of turning during the first 3 to 4 days will produce some malformed embryos and may have other minor defects. Turning may be discontinued after 14 days.

Fan-ventilation incubators should be set at 37.5 + 0.3 ºC. If the temperature of the incubator exceeds these recommendations many embryos may die. During the hatching period temperature should be lowered 0.5 ºC. A relative humidity of about 60 percent is satisfactory during incubation and should be raised to about 70 percent during the hatching period. The incubation period is 16 1/2 to 18 days and may range from 16 to 18 days depending upon temperature, humidity and genetic variability. The developing eggs may be transferred to a separate hatcher on 15th day of incubation. It takes 10 hours from piping to hatch, and an additional 5 hours for drying the chick. Then the quail chicks are ready to be distributed to other farmers or to go into the brooder for rearing.

8.6.3 Automatic Incubator / Hatchery Controller

The latest microprocessor technology is employed in incubator controller system with high intelligence and measurement accuracy (±0.1°C). During the process of incubation, temperature control, over-temperature alarm and egg turning are automatically done by the controller. The control panel is easy to operate.

9 MANPOWER REQUIREMENTS

The following table below shows Human Resource requirement and the proposed annual salary for administrative and operational needs of the project:

Table 9-1 Manpower Requirement

Description	No.	Monthly Salary (Rs.)	Annual Salary (Rs.)
Farm Manager/ Purchaser/Accountant	1	25,000	300,000
Labour - Breeding	2	9,000	216,000
Labour - Hatchery	2	9,000	216,000
Driver	1	9,000	108,000
Guard	2	9,000	192,000
Total	**8**		**1,032,000**

10 FARM MACHINERY & EQUIPMENT

Various types of farm equipment are needed for feeding, drinking, handling the birds and for egg artificial incubation and hatching process. List of farm equipment proposed is given in table below:

Table 10-1 Machinery Details

Description	Unit	Unit Cost (Rs.)	Total Amount (Rs.)
Breeding & Raising			
Cages per bird cost (incl. drinkers, feeders etc)	5,601	150	840,214
Air coolers	4	10,000	40,000
			880,214
Hatchery			
Egg storage refrigerator	1	40,000	40,000
Hatchery machine (Incubator + hatcher)[7]	2	1,000,000	2,000,000
Generator (25 kVA)	1	578,550	578,550
			2,618,550
Misc equip (egg trays, chick boxes etc)			**50,000**
Total Machinery Cost			**3,548,764**

11 OFFICE EQUIPMENT AND FURNITURE

Following tables present the office equipment and furniture/fixtures proposed for the unit:

Table 11-1 Office Equipment

Description	Unit	Unit Cost (Rs.)	Total Amount (Rs.)
Computers	1	30,000	30,000
UPS (2 kVA)	1	30,000	30,000
Computer printer (s)	1	15,000	15,000
Telephones	2	1,500	3,000
Fax machines	1	15,000	15,000
Total Office Equipment			**93,000**

Table 11-2 Office Furniture and Fixtures

Description	Unit	Unit Cost (Rs.)	Total Amount (Rs.)
Tables	2	5,000	10,000
Chairs	12	2,000	24,000
Misc. Furniture			10,000
Fans	4	2,500	10,000

[7] *Quotation received from Rayvet Incorporation (Mr. Hanif Rajput)*

Lighting bulbs for breeder	193	25	4,825
Exhaust fans for breeder	4	2,500	10,000
Total			**68,825**

12 VEHICLE

Vehicle requirement for transport of quail breeder and DOCs to and from the farm is given in the table below.

Table 12-1 Office Vehicle

Description	Unit	Unit Cost (Rs.)	Total Amount (Rs.)
Suzuki Ravi	1	586,000	586,000
Car body work			105,480
Registration fee (2% of Rs.586,000)			11,720
Total			**703,200**

13 LAND & BUILDING

13.1 Land and Building requirement

Most suitable location for opening quail farm can be suburban and rural areas around the major cities of Punjab and Sindh. Setting up a farm at an isolated place will minimize the risk of disease.

Proximity of the farm to the city enables the farmer to have quick communication with the market for purchase of breeders, farm inputs (feed, etc.), and selling of DOCs.

The rented building proposed for the set up of this project covers approximately 0.58 kanal or 2,600 sq. feet (approximately 12 marlas). This area would be sufficient for installation of farm machinery and equipment. The area requirement details are given in the table below.

Table 13-1 Infrastructure Details

Description of Covered area	Area (Sq ft)
Admin	
Office	200
Guard room	80
Washroom	72
Breeding sheds	
Hall	1,200
Egg storage area	100
Hatchery (incubator and setter)	648
Store (feed & equipment)	100

Total constructed area	**2,400**
Open area	200
Total constructed area	**2,600**

13.2 Recommended Mode for Acquiring Land

In this particular pre-feasibility, it has been assumed that the building is rented; however, keeping future expansion in mind the entrepreneur may start the project on purchased land. The rent assumed in this pre-feasibility is around Rs. 18,000 per month for total area of 12 marlas.

13.3 Suitable Locations

The proposed project is assumed to be set up in areas such as Ferozpur Road, Multan Road and Shiekhupura Road.

13.4 Infrastructure Requirement

Decisions made about setting up a Quail farming unit needs to be well thought out, right from the selection of the site to the final stages when the birds are sold. The farm should be located at a place where transportation of birds and feed can be handled easily.

The entrepreneur should make sure that the following things are available at the farm site before setting up the farm:

- Electricity connection
- Clean water supply

14 PROJECT ECONOMICS

The total project cost is estimated around Rs. 5.426 million. The capital cost is estimated around Rs. 4.649 million and working capital of Rs. 0.777 million. The total cost, project returns and financial plan are given in the tables below:

Table 14-1 Total Project Cost

Account Head	Total Cost (Rs.)
Capital Cost	4,649,005
Working Capital Cost	777,757
Total Project Cost	**5,426,762**

Table 14-2 Project Returns

NPV (Rs.)	12,585,512
IRR	47%
Payback Period (Years)	3.02

Table 14-3 Financing Plan

Financing	Ratio	Rs.
Equity	50%	2,713,381
Debt	50%	2,713,381

14.1 Project Cost

Initial Investment	
Capital Investment	**Rs. in actuals**
Machinery & equipment	3,548,764
Furniture & fixtures	68,825
Office vehicles	703,200
Office equipment	93,000
Pre-operating costs	185,215
Training costs	50,000
Total Capital Costs	**4,649,005**
Working Capital	**Rs. in actuals**
Equipment spare part inventory	2,957
Raw material inventory	58,800
Upfront building rent	216,000
Cash	500,000
Total Working Capital	**777,757**
Total Investment	**5,426,762**
Initial Financing	**Rs. in actuals**
Debt	2,713,381
Equity	2,713,381

Project Returns		
	EQUITY	**PROJECT**
Net Present Value (Rs.)	7,693,163	12,585,512
Internal Rate of Return	59%	47%
Payback Period (Yrs)	2.73	3.02

14.2 Calculation Basis

Basis for Calculations			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
No. of Female breeders at full capacity			3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921
Starting capacity utilization	60%		60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Capacity utilization growth rate	10%			10%	10%	10%	10%	10%	10%	10%	10%	10%
Capacity utilization for the year	100%		60%	70%	80%	90%	100%	100%	100%	100%	100%	100%
Female breeders purchased per year			2,353	2,745	3,137	3,529	3,921	3,921	3,921	3,921	3,921	3,921
BREEDING												
No. of Male Birds	30%	birds	1,008	1,176	1,344	1,512	1,680	1,680	1,680	1,680	1,680	1,680
No. of female breeders	70%	birds	2,353	2,745	3,137	3,529	3,921	3,921	3,921	3,921	3,921	3,921
Total No. of Birds			**3,361**	**3,921**	**4,481**	**5,041**	**5,601**	**5,601**	**5,601**	**5,601**	**5,601**	**5,601**
No. of birds for feed consumption (extra 1%)			**3,394**	**3,960**	**4,526**	**5,092**	**5,657**	**5,657**	**5,657**	**5,657**	**5,657**	**5,657**
Breeder 6 weeks old cost per bird		Rs.	40									
Breeders mortality rate	3,260		1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Feed requirement per female bird per day		kg	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Feed requirement per male bird per day		kg	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Total feed requirement per day		kg	113.71	132.67	151.62	170.57	189.52	189.52	189.52	189.52	189.52	189.52
Weight per bag		kg	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
No. of bags per day		bags	2.27	2.65	3.03	3.41	3.79	3.79	3.79	3.79	3.79	3.79
Cost per bag of feed		Rs	1,700	1,785	1,874	1,968	2,066	2,170	2,278	2,392	2,512	2,637
Total feed cost per day		Rs	3,866	4,736	5,683	6,714	7,833	8,224	8,635	9,067	9,520	9,996
Vaccination expense per annum for breeders		Rs	2,000	2,200	2,420	2,662	2,928	3,221	3,543	3,897	4,287	4,716
EGG PRODUCTION												
Egg production percentage			85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Egg production per day per bird		egg	1	1	1	1	1	1	1	1	1	1
Number of eggs produced per day		eggs	2,000	2,333	2,666	3,000	3,333	3,333	3,333	3,333	3,333	3,333
Total number of eggs produced per year		eggs	729,894	851,543	973,192	1,094,841	1,216,490	1,216,490	1,216,490	1,216,490	1,216,490	1,216,490
Egg Time period in incubator/setter		days	15	15	15	15	15	15	15	15	15	15
Time lapse between batches (time period in hatcher)		days	3	3	3	3	3	3	3	3	3	3
Total incubation time period		days	18	18	18	18	18	18	18	18	18	18
Number of batches per year			121	121	121	121	121	121	121	121	121	121
Number of eggs per batch for hatchery			5,999	6,999	7,999	8,999	9,999	9,999	9,999	9,999	9,999	9,999
Number of eggs placed in hatchery per year		eggs	725,895	846,877	967,860	1,088,842	1,209,825	1,209,825	1,209,825	1,209,825	1,209,825	1,209,825
(Next 18 days production is taken in next year's process)												

HATCHERY											
Capacity	eggs	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
No. of eggs placed in hatcher per batch		5,999	6,999	7,999	8,999	9,999	9,999	9,999	9,999	9,999	9,999
Time required per batch	days	18	18	18	18	18	18	18	18	18	18
No. of batches per year		121	121	121	121	121	121	121	121	121	121
Hatchability	% of total eggs	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
No. of DOCs produced per batch		5,399	6,299	7,198	8,098	8,998	8,998	8,998	8,998	8,998	8,998
No. of DOCs produced during the year		653,279	762,179	870,958	979,858	1,088,758	1,088,758	1,088,758	1,088,758	1,088,758	1,088,758
DOC SALES											
Number of DOCs per batch		5,399	6,299	7,198	8,098	8,998	8,998	8,998	8,998	8,998	8,998
Number of batches per year		121	121	121	121	121	121	121	121	121	121
Sales price per DOC	Rs	9.0									
HATCHERY SERVICE											
No. of eggs placed in hatchery per batch		4,001	3,001	2,001	1,001	1	1	1	1	1	1
Time required per batch	days	18	18	18	18	18	18	18	18	18	18
No. of batches per year		121	121	121	121	121	121	121	121	121	121
No. of eggs placed during the year		484,105	363,122	242,140	121,157	175	175	175	175	175	175
Service charges per egg	Rs	0.700	0.805	0.926	1.065	1.224	1.408	1.619	1.862	2.141	2.463
Total annual revenue from Hatchery service		**338,874**	**292,313**	**224,161**	**128,985**	**214**	**246**	**283**	**326**	**375**	**431**

14.3 Revenue Generation

Revenue Generation										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
No. of DOCs produced during the year	653,279	762,179	870,958	979,858	1,088,758	1,088,758	1,088,758	1,088,758	1,088,758	1,088,758
Sale price per DOC	9.00	9.90	10.89	11.98	13.18	14.49	15.94	17.54	19.29	21.22
Revenue from DOC sales	5,879,511	7,545,572	9,484,733	11,737,719	14,346,455	15,781,101	17,359,211	19,095,132	21,004,645	23,105,110
Sale price per Breeder	45	47	50	52	55	57	60	63	66	70
Revenue from Breeder sales	151,239	185,267	222,321	262,616	306,386	321,705	337,790	354,680	372,414	391,034
Revenue from Hatchery service	338,874	292,313	224,161	128,985						

14.4 Income Statement

Income Statement										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	6,369,623	8,023,153	9,931,214	12,129,321	14,652,841	16,102,806	17,697,001	19,449,812	21,377,059	23,496,144
Cost of sales										
Adult breeders purchase	135,779	166,329	199,595	235,771	275,066	288,820	303,261	318,424	334,345	351,062
Feed consumption of breeders	1,411,198	1,728,718	2,074,461	2,450,457	2,858,867	3,001,810	3,151,901	3,309,496	3,474,971	3,648,719
Vaccination expense	2,000	2,310	2,668	3,082	3,559	4,111	4,748	5,484	6,334	7,316
Direct labor	432,000	474,060	520,215	570,864	626,444	687,436	754,366	827,812	908,409	996,853
Machinery maintenance	70,975	74,524	78,250	82,163	86,271	90,584	95,114	99,869	104,863	110,106
Direct Electricity	863,517	949,869	1,044,856	1,149,341	1,264,275	1,390,703	1,529,773	1,682,750	1,851,025	2,036,128
Direct water & gas	24,000	26,400	29,040	31,944	35,138	38,652	42,517	46,769	51,446	56,591
Generator diesel expense	1,248,300	1,373,130	1,510,443	1,661,487	1,827,636	2,010,400	2,211,440	2,432,584	2,675,842	2,943,426
Total cost of sales	4,187,769	4,795,340	5,459,528	6,185,110	6,977,258	7,512,516	8,093,119	8,723,188	9,407,235	10,150,200
Gross Profit	2,181,854	3,227,813	4,471,686	5,944,211	7,675,584	8,590,290	9,603,882	10,726,624	11,969,824	13,345,944
General administration & selling expenses										
Administration expense	600,000	658,417	722,521	792,867	870,062	954,772	1,047,730	1,149,738	1,261,679	1,384,517
Building rental expense	216,000	237,600	261,360	287,496	316,246	347,870	382,657	420,923	463,015	509,317
Electricity expense	45,000	49,500	54,450	59,895	65,885	72,473	79,720	87,692	96,461	106,108
Travelling expense	127,392	160,463	198,624	242,586	293,057	322,056	353,940	388,996	427,541	469,923
Communications expense (phone, fax, mail, internet, etc.)	36,000	37,800	39,690	41,675	43,758	45,946	48,243	50,656	53,188	55,848
Office vehicles maintenance expense	60,000	66,000	72,600	79,860	87,846	96,631	106,294	116,923	128,615	141,477
Office expenses (stationary, entertainment, janitorial services, etc.)	42,000	46,089	50,576	55,501	60,904	66,834	73,341	80,482	88,318	96,916
Promotional expense	31,848	40,116	49,656	60,647	73,264	80,514	88,485	97,249	106,885	117,481
Depreciation expense	450,679	450,679	450,679	450,679	450,679	455,818	455,818	455,818	455,818	455,818
Amortization of pre-operating costs	37,043	37,043	37,043	37,043	37,043	-	-	-	-	-
Amortization of legal, licensing, and training costs	10,000	10,000	10,000	10,000	10,000	-	-	-	-	-
Subtotal	1,655,963	1,793,707	1,947,200	2,118,248	2,308,743	2,442,914	2,636,228	2,848,477	3,081,521	3,337,404
Operating Income	525,891	1,434,106	2,524,486	3,825,963	5,366,840	6,147,376	6,967,654	7,878,147	8,888,304	10,008,540
Other income (interest on cash)	72,464	142,837	300,191	512,024	804,453	1,205,361	1,705,586	2,288,692	2,965,471	3,763,047
Gain / (loss) on sale of office equipment	-	-	-	-	37,200	-	-	-	-	
Earnings Before Interest & Taxes	598,356	1,576,943	2,824,677	4,337,987	6,208,493	7,352,737	8,673,240	10,166,839	11,853,775	13,771,586
Interest expense on long term debt (Project Loan)	395,165	338,829	272,916	195,797	105,568	-	-	-	-	-
Interest expense on long term debt (Working Capital Loan)	36,732	-	-	-	-	-	-	-	-	-
Subtotal	431,898	338,829	272,916	195,797	105,568	-	-	-	-	-
Earnings Before Tax	166,458	1,238,114	2,551,762	4,142,190	6,102,925	7,352,737	8,673,240	10,166,839	11,853,775	13,771,586
Tax	4,994	260,004	637,940	1,035,548	1,525,731	1,838,184	2,168,310	2,541,710	2,963,444	3,442,897
NET PROFIT/(LOSS) AFTER TAX	**161,464**	**978,110**	**1,913,821**	**3,106,643**	**4,577,194**	**5,514,553**	**6,504,930**	**7,625,129**	**8,890,331**	**10,328,690**

14.5 Balance Sheet

Balance Sheet											
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
Current assets											
Cash & Bank	698,000	751,283	2,105,447	3,898,374	6,342,109	9,746,944	14,360,280	19,751,442	26,022,396	33,287,031	41,973,905
Equipment spare part inventory	2,957	3,260	3,595	3,963	4,369	4,817	5,311	5,855	6,455	7,117	-
Raw material inventory	58,800	75,631	95,296	118,196	144,790	159,631	175,994	194,033	213,921	235,848	-
Pre-paid annual land lease	-	-	-	-	-	-	-	-	-	-	-
Pre-paid building rent	18,000	19,800	21,780	23,958	26,354	28,989	31,888	35,077	38,585	42,443	-
Total Current Assets	777,757	849,975	2,226,117	4,044,491	6,517,622	9,940,382	14,573,473	19,986,407	26,281,357	33,572,440	41,973,905
Fixed assets											
Machinery & equipment	3,548,764	3,193,888	2,839,011	2,484,135	2,129,259	1,774,382	1,419,506	1,064,629	709,753	354,876	-
Furniture & fixtures	68,825	61,943	55,060	48,178	41,295	34,413	27,530	20,648	13,765	6,883	-
Office vehicles	703,200	632,880	562,560	492,240	421,920	351,600	281,280	210,960	140,640	70,320	-
Office equipment	93,000	74,400	55,800	37,200	18,600	118,694	94,955	71,217	47,478	23,739	-
Total Fixed Assets	4,413,789	3,963,110	3,512,431	3,061,753	2,611,074	2,279,089	1,823,271	1,367,453	911,636	455,818	-
Intangible assets											
Pre-operation costs	185,215	148,172	111,129	74,086	37,043	-	-	-	-	-	-
Legal, licensing, & training costs	50,000	40,000	30,000	20,000	10,000	-	-	-	-	-	-
Total Intangible Assets	235,215	188,172	141,129	94,086	47,043	-	-	-	-	-	-
TOTAL ASSETS	**5,426,762**	**5,001,258**	**5,879,678**	**7,200,330**	**9,175,739**	**12,219,471**	**16,396,744**	**21,353,861**	**27,192,993**	**34,028,257**	**41,973,905**
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable		128,307	156,340	186,976	220,420	255,582	269,071	283,307	298,335	314,203	308,945
Total Current Liabilities	-	128,307	156,340	186,976	220,420	255,582	269,071	283,307	298,335	314,203	308,945
Other liabilities											
Deferred tax		4,994	264,998	94,832	(539,087)	(1,486,724)	(2,837,493)	(4,399,542)	(6,200,566)	(8,271,501)	(10,649,285)
Long term debt (Project Loan)	2,324,502	1,993,112	1,605,386	1,151,746	620,988	-	-	-	-	-	-
Long term debt (Working Capital Loan)	388,879	-	-	-	-	-	-	-	-	-	-
Total Long Term Liabilities	2,713,381	1,998,106	1,870,384	1,246,578	81,900	(1,486,724)	(2,837,493)	(4,399,542)	(6,200,566)	(8,271,501)	(10,649,285)
Shareholders' equity											
Paid-up capital	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381	2,713,381
Retained earnings		161,464	1,139,574	3,053,395	6,160,038	10,737,231	16,251,784	22,756,714	30,381,844	39,272,175	49,600,865
Total Equity	2,713,381	2,874,845	3,852,955	5,766,776	8,873,419	13,450,612	18,965,165	25,470,095	33,095,224	41,985,556	52,314,246
TOTAL CAPITAL AND LIABILITIES	**5,426,762**	**5,001,258**	**5,879,678**	**7,200,330**	**9,175,739**	**12,219,471**	**16,396,744**	**21,353,861**	**27,192,993**	**34,028,257**	**41,973,905**

14.6 Cash Flow Statement

Cash Flow Statement

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating activities											
Net profit		161,464	978,110	1,913,821	3,106,643	4,577,194	5,514,553	6,504,930	7,625,129	8,890,331	10,328,690
Add: depreciation expense		450,679	450,679	450,679	450,679	450,679	455,818	455,818	455,818	455,818	455,818
amortization of pre-operating costs		37,043	37,043	37,043	37,043	37,043	-	-	-	-	-
amortization of training costs		10,000	10,000	10,000	10,000	10,000	-	-	-	-	-
Deferred income tax		4,994	260,004	(170,166)	(633,919)	(947,637)	(1,350,769)	(1,562,049)	(1,801,025)	(2,070,935)	(2,377,784)
Equipment inventory	(2,957)	(303)	(334)	(368)	(406)	(448)	(494)	(544)	(600)	(662)	7,117
Raw material inventory	(58,800)	(16,831)	(19,664)	(22,901)	(26,594)	(14,841)	(16,362)	(18,039)	(19,888)	(21,927)	235,848
Pre-paid building rent	(18,000)	(1,800)	(1,980)	(2,178)	(2,396)	(2,635)	(2,899)	(3,189)	(3,508)	(3,858)	42,443
Accounts payable		128,307	28,033	30,636	33,445	35,162	13,489	14,236	15,028	15,868	(5,258)
Other liabilities		-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(79,757)	773,552	1,741,890	2,246,566	2,974,494	4,144,517	4,613,336	5,391,162	6,270,954	7,264,635	8,686,874
Financing activities											
Project Loan - principal repayment		(331,390)	(387,726)	(453,640)	(530,759)	(620,988)	-	-	-	-	-
Working Capital Loan - principal repayment		(388,879)	-	-	-	-	-	-	-	-	-
Additions to Project Loan	2,324,502	-	-	-	-	-	-	-	-	-	-
Additions to Working Capital Loan	388,879	-	-	-	-	-	-	-	-	-	-
Issuance of shares	2,713,381	-	-	-	-	-	-	-	-	-	-
Purchase of (treasury) shares											
Cash provided by / (used for) financing activities	5,426,762	(720,269)	(387,726)	(453,640)	(530,759)	(620,988)	-	-	-	-	-
Investing activities											
Capital expenditure	(4,649,005)	-	-	-	-	(118,694)	-	-	-	-	-
Acquisitions											
Cash (used for) / provided by investing activities	(4,649,005)	-	-	-	-	(118,694)	-	-	-	-	-
NET CASH	698,000	53,283	1,354,164	1,792,926	2,443,735	3,404,835	4,613,336	5,391,162	6,270,954	7,264,635	8,686,874

15 KEY ASSUMPTIONS

Table 15-1: COGS/Revenue Calculation basis – Year 1

BREEDING	
No. of Male Birds at 60% capacity	1,008
No. of Female Birds at 60% capacity	2,353
Total No. of Birds at 60% capacity	3,361
No. of birds for feed consumption (extra 10%)	3,394
No. of Male Birds at 100% capacity	1,680
No. of Female Birds at 100% capacity	3,921
Total No. of Birds at 100% capacity	5,601
No. of birds for feed consumption (extra 10%)	5,657
Purchase price per Adult Breeder 6 weeks old (Rs.)	40
Breeders mortality rate	1%
Feed requirement per female bird per day (kg)	0.035
Feed requirement per male bird per day (kg)	0.030
Total feed requirement per day (kg)	113
Weight per bag (kg)	50
No. of bags per day	2.27
Cost per bag of feed (Rs.)	1,700
Total feed cost per day (Rs.)	3,866
Vaccination expense per annum for breeders (Rs.)	2,000
Gas and water expense per annum (Rs.)	24,000
EGG PRODUCTION	
Egg production percentage	85%
Egg production per day per bird	1
Total number of eggs produced per year at 60% capacity	729,894
Number of eggs produced per day at 60% capacity	2,000
Egg time period in incubator/setter (days)	15
Egg time period in hatcher (days)	3
Number of batches per year	121
Number of eggs (produced on farm) per batch for hatchery year	5,999
Number of eggs (produced on farm) placed in hatchery in year	725,895
HATCHERY	
Incubator/Setter capacity per machine	40,000
Hatcher capacity per machine	5,000
No. of eggs placed in hatchery per batch	5,999

Total time required per batch (days)	18
Time lapse between batches (time period in hatcher) in days	3
No. of batches per year	121
Hatchability	90%
No. of DOCs produced during the year at 60% capacity	653,279
No. of DOCs produced per batch at 60% capacity	5,399
DOC Sales	
Number of DOCs per batch	5,399
Number of batches per year	121
Sales price per DOC	9
Hatchery Service	
No. of eggs placed in hatchery per batch	4,001
No. of batches per year	121
No. of eggs placed during the year	484,105
Service charges per egg (Rs.)	0.7

Table 15-2 Expense Assumptions

COGS growth rate	5.0%	
Machinery maintenance	2.0%	% of machinery cost
Machinery maintenance growth rate	5.0%	
Operating costs growth rate	5.0%	
Travelling expense	2.0%	% of admin expense
Office vehicles maintenance expense	Rs. 60,000 per annum	
Office expenses	7.0%	% of admin expense
Promotional expense growth rate	0.5%	% of revenue
Building depreciation rate	5.0%	% of building cost
Machinery & Equipment depreciation	10.0%	% of machinery & equip. cost
Office Equipment depreciation rate	20.0%	% of office equipment cost
Furniture & Fixtures depreciation rate	10.0%	% of furniture & fixture cost
Office vehicle depreciation rate	10.0%	% of vehicle cost

Table 15-3 Economy Related Assumptions

Inflation rate	10%
Electricity growth rate	10%
Water price growth rate	10%
Gas price growth rate	10%
Wage growth rate	10%

Table 15-4: Revenue Assumptions

Annual DOCs Production year 1	653,279
Sales price per DOC	9
Hatchery service charges per egg (Rs.)	0.7
Sales price of Adult breeder (200 grams live weight)	45
DOC sales price growth rate	10%
Hatchery service charges growth rate	15%
Adult breeder sales price growth rate	5%
Production capacity utilization – Year 1	60%
Production capacity utilization growth rate	10%
Maximum capacity utilization	100%
Hatchery rental service capacity utilization – Year 1	40%
Percentage decrease in rental capacity	10%

Table 15-5: Cash Flow Assumptions

Accounts receivable in days	0
Accounts payable in days	30
Equipment spare part inventory (days)	15
Raw material inventory (days)	15
Hours operational per day for admin	8
Hours operational per day for plant	24
Days operational per year for admin	300
Days operational per year for plant	365

Table 15-6 Financial Assumptions

Project life (Years)	10
Debt	50%
Equity	50%
Interest rate on long-term debt (KIBOR + 5%)	17%
Interest rate on short-term debt	16%
Interest on cash in bank	10%
Debt tenure (Years)	5
Debt payments per year	1

16 ANNEXURE

16.1 Industry Experts

Prof. Dr. Muhammad Akram Project Director Contact no.: 0300-4238270 Avian Research & Training (ART) Centre, Uni. Of Vet. & Animal Sciences (UVAS), 23 Km, Ferozpur Road, Lhr.
Dr. Jibran Hussain Lecturer/ Farm Manager Contact no.: 0301-700 8767 Avian Research & Training (ART) Centre, Uni. Of Vet. & Animal Sciences (UVAS), 23 Km, Ferozpur Road, Lhr
Dr. Fazal Ahmad Farm Owner Contact no.: 0423-6544865, 0333-4487069, 0300-4437034 Nizam Poultry Breeding Farms and Hatchery Canal Road, Bridge Crossing Ring Road, Harbanspura, Lahore.

16.2 Machinery Suppliers

Company Name City: Tel:	Rayvet Incorporation (Mr. Hanif Rajput) Lahore 0333-4211435
Company Name: Address: City: Tel: Fax:	C & K Poultry Equipments Kamboh Brothers Poultry, Grain Market, Samundri Faisalabad. 041-3420581 041-3423581
Company Name: Address: City: Tel:	Neela quail breeding farm & hatchery (Mr. Kaleem) Joda pull, Lahore Lahore 0321-4664093

16.3 Tax deduction income slabs

Income Slabs	Tax Rate
	0.00%
100,000 – 110,000	0.50%
110,000 – 125,000	1.00%
125,000 – 150,000	2.00%

150,000 – 175,000	3.00%
175,000 – 200,000	4.00%
200,000 – 300,000	5.00%
300,000 – 400,000	7.50%
400,000 – 500,000	10.00%
500,000 – 600,000	12.50%
600,000 – 800,000	15.00%
800,000 – 1,000,000	17.50%
1,000,000 – 1,300,000	21.00%
1,300,000 and above	25.00%