Chapter-V

General Discussion

Japanese quail is similar to chicken in many physiological characteristics and differs from that of chicken in some other characteristics. The first written records of domesticated quail in Japan date from the 12th century. These birds were initially developed for song. The quail is not only useful for meat and egg production, but is being recognised as a very useful animal for research in the laboratory for its short generation interval, low feed space requirement and high rate of lay. Certain properties of *cortunix*, such as its ability to produce 3-4 generations per year, make it an interesting laboratory animal (Padgett and Ivey, 1959; Wilson et al., 1961; Howes and Ivey, 1961; Reese and Reese, 1962).
In Japanese quail (*Cortunix cortunix japonica*) the sexual development depends on the length of daily light period. If there is sufficient light, egg laying is continuous whereas insufficient light interrupt egg laying by the females. These findings are in agreement with the findings of Boon *et al.*, 2000. It is also known that auditory stimulation given during non-stimulatory photoperiod causes significant gonadal development in male and female quail (Mills *et al.*, 1997). The absence of sexual maturity in NDL group by the age of 13th weeks was accompanied by a significantly reduced testis weight and egg weight. The present work support the findings of Boon *et al.*, 2000, that photoperiod also affected sexual development: 6LD and 9LD birds did not reach sexual maturity at 71 days of age.

The results of food intake are also in agreement with the findings of previous workers (Stein and Bacon, 1976; Dunn and Sharp, 1990; Siopes and Pyrzak, 1990; Prabhakaran *et al.*, 1991; Classen *et al.*, 1994; Lewis *et al.*, 1996; King *et al.*, 1997; Wingfield *et al.*, 1997). The photoperiodic environment to which the birds are exposed to differ with the latitude and seasons. Therefore, a photoperiodic species may show latitude and season dependent photoperiodic adaptations. There are examples where the birds of same latitude breed at different habitats, and in the same habitat between different seasons. (Perito *et al.*, 2004; Caro *et al.*, 2005). Photoperiod is a powerful environmental agent capable of influencing the physiology of organisms and as such the manipulation of diverse artificial photoperiod schedules for rearing and productivity has become a common poultry practice. (Andrews *et al.*, 1990;
Lewis *et.al.*, 1992; Lewis *et.al.*, 1996a; Lewis *et.al.*, 1996b; Tucker and Charles, 1993). The present findings show a negative relation with the findings of Deaton *et.al.*, 1976 and Proudfoot and Sefton, 1978 which reported that performance is better under low light intensity because the chicks are less active and therefore loss of energy is less in exercise.

The general objective of poultry nutrition is to maximize the economic production performance of birds. Adebowale *et.al.*, 1998; Oyediji 2001 reported that feeding poultry alone accounts for not less than 70% of the cost of production depending on the region & season of production in poultry industry. In the present study the finding of proximate composition of the branded feeds, sold by the feed suppliers can meet the nutrient requirements of poultry. The present work show slight different finding from the work of Uchengbu *et.al.*, (2009) that the crude protein values of all the commercial feeds ranged from 18.50 - 21% for starter diets and 18-19% for finisher diets and the crude fibre values of 4.40-5.55% for starter broilers and 5-5.55% for finisher broilers. The present work supports the findings of Elizah *et.al.*, 2010 that the proximate chemical analysis of the four diets indicate a crude protein range of the starter feed from 21.01 CP in Vital feed to 25% CP in Surrey J feeds. The finisher feed however consisted a crude protein range from 19-20% CP in vital feed to 22% CP in Surrey J feed.

In support to our findings are the report of Bangbose and Tewe 1976 who recommended 23% and 19% CP levels for starter and finisher, (Kekeocha, 1984) crude protein levels of 23% CP for starter and 20% CP for finisher
(Moris *et.al.*, 1992). The present work is also in agreement with the findings of previous workers (Arotupin *et.al.*, 2007) where moisture content ranged from 8.19 to 9.78%, ash 7.87 to 13.61%, fat 1.19 to 3.43% whereas crude fibre and protein has a slight difference to our findings 2.60 to 10.30% and 12.03 to 22.03%.

Besides protein, carbohydrates, fats, vitamins, many other elements form a part of the quails nutritional requirements. The deficiency in calcium and phosphorus and improper balance between the two elements would also retard growth. A maximum of 0.74% of Ca was found in Maharaja starter followed by 0.71% in Samrat layer mash, 0.65% in Samrat grower, 0.62% in Samrat starter and Amrit crumble finisher, 0.61% in Samrat broiler finisher and 0.60% in Maharaja layer mash. These findings are slightly higher than the findings Carew *et.al.*, 2005 where the values are 0.23% broiler finisher, 0.33% pullet grower, 0.5% in layer mash, but comparably lower than Nidup and Wangchuk 2007 where 1.03% Ca in Samrat starter, 0.90% in Samrat finisher, 1.00% in standard Nutrient requirement in Starter, 0.90% in Standard Nutrient requirement in Finisher, 0.86% in Karma starter and 0.75% in Karma finisher. In the present study, phosphorus and Magnesium have a lower significant value (Carew *et.al.*, 2005; Nidup and Wangchuk, 2007). Content of potassium is more or less similar (Nidup and Wangchuk, 2007). The calcium and phosphorus content in the present study have lower values with previous findings (Uchengbu *et.al.*, 2009).
Insufficient availability and high cost of nutritionally balanced poultry feeds are the major impediments in increasing poultry production from North Eastern Region of India. In Nigeria, the domestic fowl is the major protein source providing both chicken meat and egg supply from chicken, relatively underutilised poultry species are now under focus e.g., Japanese quail, duck, guinea fowl and ostrich.

Japanese quail is also considered as one of worldwide importance among the laboratory animals. Feeds for quails are not yet introduced in India. So, there is need to formulate feeds for quail if quail farming is to be introduced on larger scale. In order to have a good economic return in poultry production, the best solution is to take full advantage of unconventional locally available cheap feed resources (Agunbiade et al., 2003).

Some locally available feed ingredients in Manipur include maize, rice bran, rice, sesame cake, snail and fish waste. They were collected and biochemical analysis was done for proximate analysis for feed formulation. Maize is a main source of energy for broiler chicken because it contains considerable amount of digestible nutrients (Cowieson A.J. 2005). The chemical composition and nutritive value of various maize cultivars are variable. It is necessary to analyse chemical composition of the feed before feeding to check the appropriate constitution of the nutrients (Kurniewicz et al., 2000 and Cowieson A.J. 2005). Iken et al., 2002, reported that the mean protein content was 10.8%, 11.1% and 10.5% respectively for the Improved White Dent (IWD), Improved Yellow Flint Dent (IYFID) and Local flowery
which support the present work. The fibre value observed in the present study was lower than the average value of 9.5% reported by Watson, 1987. Starch has been reported to be the major carbohydrate in maize (Wilson, 1987). Rice is one of the important cereal crops. Rice polishing is a by-product of rice milling and is the cheapest source of energy and protein for poultry feeding. It constitutes about 10% of paddy and is available in large quantities in major rice growing areas of the world (Houston and Kohler, 1970). Rice polishing has great potential as an ingredient in poultry feed with inclusion level varying from 25 to 40% (Singh and Panda, 1988). It is a good source of protein, energy, vitamins and minerals (Saunders, 1990). According to Anjun et.al., 2007, protein content in different rice varieties ranged from 7.80 to 8.80% showing highest value of protein content in Sarshar and lowest in Irri -9 varieties. Previous workers Malik et.al., 1979; Choo and Sadiq 1982; Rao and Reddy 1986; Ghazi 1992; NRC 1994; Nadeem 1998; Lessen & Summers 2001 reported the crude protein value ranged from 11.45% to 14.97% which is higher than the present study (8.72%). The present results showed wide variation of chemical composition of rice. It might be due to the differences of varieties of rice polishing used for feed or processing condition (Rao and Reddy, 1986). It is reported that polishing time and pressure affect the quality characteristics of rice grain. Moreover, adulteration can also affect the result.

Rice bran is a powdery fine, fluffy material that consist sheath of kernels, in addition to particles of pericarp, seed coat, aleurone germ and fine starchy endosperm. Rice bran is rich in B-vitamins and tocopherol and its
nutrient density and profiles of amino acids and fatty acids are superior to cereal grains. Both rice bran protein and fat are of relatively high biological value (Khan, A.D. 2004). Previous studies reported that rice bran is a rich source of fibre and considerably high protein and fat content (Hu et.al, 2009). The present work support the work of Razzaque et.al., 2008 in protein and lipid values (CP 11.32%, lipid - 4.5%) but ash and fibre is significantly higher than our values, (ash 17.02, crude fibre - 14.2%). Begum et.al., 2008 also reported the presence of crude protein 10.80%, ash 5.35% and fibre 15.00%. Pichaporn et.al., 2009, reported the presence of Protein (13.17%), fat (20.36%), carbohydrate (32.37%), ash (11.12%) and fibre (11.39%) in rice bran whereas in the present study the percentage is comparable for protein (11.49%) carbohydrate is higher (76.68%) but ash and fibre are significantly lower than their values (ash 4.8% and fibre 3.4%).

Sorghum (Feterita), groundnut cake, sesame cake and wheat bran are considered as the main source of energy and protein in poultry diets in Sudan (Babiker et.al., 2009). Jacob et.al., 1996 concluded that the same sunflower cake and sesame cake are high yielding protein source in layer diets. Lee et.al., 2005 reported that sesame seed is composed of 45-50% lipid, 15-20% protein and 10-15% carbohydrate. Mamputu and Buhr (1995) revealed that sesame meal is considered as an important source of protein 47.1% which is higher than our findings (36.05%) whereas Kaneko et.al., (2002) reported that sesame meal contained 52.9% crude protein. But according to Babiker et.al., 2009, values of protein (43.86%), fibre (8.65%), ash (14.65%) and minerals are
higher than our values. These variations might be due to variety of soil types, season of growing and harvesting, type of storage and method of processing.

Fish meal still constitutes a substantial part of feed formulated for diverse poultry birds that are commercially cultivated globally. One of the main conventional sources of protein for poultry birds is fish meal. It is known to possess good amino-acid profile and high essential mineral. Halley and Soffe, 1988 reported that fish meal contains between 59-72% crude protein. These findings are higher than the present work (C.P. 40.26%). Despite the high nutritional composition, quality and availability, fish meal is still relatively expensive specially to small scale farmer (Tacon, 1994).

In the present study, fish meal has protein (40.26%), lipid (17.34%), fibre (1.90%), ash (19.50%), carbohydrate (14.99%) which is in agreement with the findings of Suresh 2007. In the works of Adesehinwa et.al., 2005, the value of protein (66.70%) in fish waste higher than our findings whereas fibre (1.00%), ash (18.60%) exhibited almost same. Begum et.al., 2008 also reported the presence of crude protein (61.20%), ash (4.32%) and crude fibre (0.65%) in fish meal. Fish meals vary in their nutrient composition depending on their sources, species, method of processing and storage (Wessels and Moodie, 1975).

The high cost and scarcity of fish meal in formulated feeds has led to the use of other protein sources such as earthworms, insects, snail, mussels, periwinkle, lizard, maggot, frog and plants. Mollusca have been ranked the
second largest phylum in the animal kingdom having about 100,000 living species (Odaibo, 1997). In Manipur, the resource of snail is vast that a person can hand pick at least 2.5 kg live snail from agricultural fields. The *Loubuk tharoi* (*Vivipara bengalensis*) is a common snail in Manipur and abundantly found in agricultural field. The protein content of this snail in whole body both shell and meat is 19.10%. In the work of Suresh, V.R. 2007, snail meat consists of crude protein, crude lipid, crude fibre and ash at 57.2%, 4.2%, 1.8%, and 8.1% respectively. The findings of Baby *et.al.*, 2010, show lower percentage of protein and carbohydrate however ash is significantly high. This may be due to the fact that the shell of snail has hard and highly calcified structure.

The mineral content of snail is also variable when compare to the finding of Babolola and Akinsoyinu, 2009; Baby *et.al.*, 2010. In the present study, Ca 493mg/100g, Mg 261.00mg/100g, Zn 29.00mg/100g, Fe 63.00mg/100g, Cu 0.5mg/100g, Co 2.50mg/100g, Mn 14.5mg/100g, Ph 4.25mg/100g and K 180mg/100g was found in the snail.

The difference in protein, lipid, fibre, ash, carbohydrate and mineral content might be due to the habitat of the species, difference in species, method of processing and different techniques employed for analysis. Feed plays a very important role in the economy of poultry production. Most of the poultry farmers depend on commercial feed for their stock.

The formulated feeds, starter type I, type II, type III and layer mash type I, type II, and type III, which consisted of type I as snail as main protein source,
type II as til cake as main protein source and type III which has fish waste as main protein source. Among all the feeds the animals which fed with starter type III and layer mash type III has got highest body weight and better egg laying performance during the experimentation period.

Adesenwa et.al., 2005, reported that local fish waste (LFW) can be used to replace imported fish waste (IFW) in a broiler finisher diet, without any adverse effect on the performance of the birds and gain to the farmer. Fish wastes are a rich source of protein. Many scientists over the world have investigated fish silage in animal feed and have used fish silage products (Bertullo, 1975; Durairaj, 1976; Disney et.al., 1977; Jensen, 1977; Gregoire and Boucher, 1988; Stone 1989; Machin, 2000). In the present study, formulated feed shows a very cheaper and economically better alternative feed when compared to the branded feed.

The quality of meat in general and especially poultry meat is an extremely complex notion that can be assessed from different points of view. Nutritional value of meat can be assessed on the basis of parameters such as content and compositions of protein, content of amino acid, content of fat and also from the content of saccharides, mineral substances and vitamins. Matusovicova, 1986 and Suchy, et.al., 2002, reported that the chemical composition of poultry meat differs significantly, the differences in chemical composition were found in between the white and red muscle tissue. Steinhauser et.al., 2000, claimed that proteins are the most important components of meat from nutritional and technological aspects. Nancy and
Clum, 1997, reported the presence of protein as 64.9% in male and 71.6% in female in whole body. These findings support the present work. The quail powder which contains fish meal as a main protein source has highest protein content (64.05%). However, according to Simeonovova (1999) breast muscles contain approximately 22% proteins, while in thigh muscles, which contain more fat, approximately 17.20% of protein was found.