I. INTRODUCTION

Poultry production is the fastest growing sector of Indian agriculture having long history of backyard farming. It has been transformed into a full-fledged industry in order to cope with the higher demands for valuable animal proteins (eggs and poultry meat) by an ever increasing human population. Even though India has emerged as the fourth and fifth largest producer of eggs and poultry meat, respectively in the world, the per capita availability is just 40 eggs and 1.2 kg poultry meat as against the ICMR (1995) recommendations of 180 eggs and 11 kgs of poultry meat (Johri and Shrivastava, 2005).

Importance of backyard poultry production has been globally recognized to overcome some of the worsening problems like poverty, hunger and malnutrition in developing countries especially in India (Singh, 2002). But however, the rural small-scale poultry, mainly managed by women (Aparna Kolte and Swaroopa Rani, 2008) is confined to the economically weaker and tribal people who rear the birds under traditional scavenging system. Backyard poultry production system involves no expenditure for chicks, feed and medicine including vaccine. That apart, the backyard rearing is within the reach of an ordinary farmer who with minimal input can manage independently, skillfully and successfully.

Over 90 per cent of families engaged in backyard poultry keep an average of 10 to 15 adult desi fowls (Aseel / Kadakanath / Naked neck / Frizzle breeds) per family under free range system. Such hens lay about 40 to 60 eggs each weighing 35 to 45 gms (Khan, 2002) and hatch the chicks by natural brooding. Locally available grains in the
farm-yard, insects, pests, worms as well as leftover house hold kitchen waste are the food for birds by scavenging (Ramappa, 2002) to fulfill the nutritional requirements for maintenance/production, while sometimes, the owner provides supplemental feed. These birds do not require elaborate housing facilities and only during night hours they take shelter inside a coop or provided with a bamboo baskets. The method of rearing, brooding, breeding and management of these birds is based on the experience handed down from the elder family members (Herath, 2008). Nevertheless, popularity of native fowls is decreasing day by day for being poor egg producers, slow growers, having broodiness, smaller body and egg size as well as of late sexual maturity.

Some of the constraints which need proper appraisal for the success of free range or semi intensive poultry production are lack of improved germplasm suitable for village conditions, inadequate supplementation of balanced feed to the birds besides natural resources and also lack of technical know-how (Johri et al., 2002; Singh, 2005). Despite a drastic increase in the import of high yielding strains from across the world, the local fowls still retain preference by local people, especially in the tribal and rural sectors, mainly due to its believed special capabilities such as adaptability to unfavorable environments and resistance to tropical diseases apart from benefiting economic as well as nutritional status of the farmers.

Currently the poultry industry has about 60,000 farms under intensive system with the strength of 215 million layers and 1600 million broilers growing at the rate of 5 to 7 per cent and 10 to 12 per cent per annum, respectively. With this growth rate, there will be 245 million layers and 2500 million broilers by 2010 AD (Sharma
and Chatterjee, 2006). These commercial farms are concentrated more in urban and semi-urban areas although 70 to 75 per cent of the population of the country lives in rural areas. They contribute about 60 per cent of poultry meat and 56 per cent of egg production. In order to meet the deficiency gap in these sectors, adequate and sustained efforts will have to be made to improve the production efficiency of the rural poultry which has been responsible to produce 40 per cent of meat and 44 per cent of egg requirement in the country (Bujarbaruah and Gupta, 2005). Therefore, there is ample scope for development of backyard poultry in rural and tribal areas, which in turn can contribute substantially to raise the overall per capita availability of poultry products.

In that direction, the hybridized broilers have sustained the higher demands for animal protein requirement. Provision of the necessary inputs like efficient breeding stock, feed ingredients, feed additives and vaccines for such activity is beyond the scope of a rural folk. Nevertheless, for the much-needed rural population, attention had been focused to develop special genotypes to suit to the village conditions (Reddy and Rajendiran, 2002). These synthetic birds developed were given to many Non Government Organizations and State Animal Husbandry departments who are involved in rural upliftment programmes. Their propagation has been effected through:

- Supply of the **hatchable eggs** to the **farmers** to brood and hatch the eggs using the local hens and the hatched out chicks are then reared in conventional manner as that of local desi fowl.
Supply of **one-day-old** chicks to the needy farmers (individual or community/cooperative basis) to grow under certain specified managemental environment to eventually get distributed amongst the beneficiaries.

Supply of **hatchable eggs** to the Government sector (Regional Poultry farms in various states) who in turn hatch such eggs, rear the hatched out chicks and later distribute the grown up birds to prospective farmers.

Supply of **parent stocks** to the various Governmental Poultry farms that maintain such stocks and follow the chain of supply of hatchable eggs, day-old chicks or even the grown up birds.

A few genetic stocks have been developed recently for promoting rural poultry production and marketed under the names of Giriraja, Vanaraja, Gramapriya, Krishipriya, Krishna-J, Yamuna, Nandanum, CARI Shyam, Kroiler etc. They have given encouraging results under traditional backyard and semi-intensive system of poultry production with an improved productivity, adaptability and disease resistance. Nevertheless, the insufficient provision of feed/ingredients to such birds under rural house holdings, appear to limit the exploitation of full production potential. Hence, in semi-scavenging system, birds are let out into the field for scavenging during the day time and balanced supplementary feed of about 25-30g/bird/day (Jalaludeen, 2002) is provided during night hours.

In that direction, attention of scientists from Department of Poultry Science, Veterinary College, KVAFSU, Bangalore had been focused to develop a genotype akin to country fowl having different plumage patterns mainly to suit to the village conditions and named
as Swarnadhara to indicate its release during the Golden Jubilee year of Karnataka Statehood. Undoubtedly, the performance of today’s efficient commercial layers and broilers is mainly thrust upon the feeding practices since; it is the various nutrients per se that supports the functions of the body and be it maintenance, production or reproduction. In a way, Swarnadhara, though akin to desi fowl in terms of plumage and habitats, still possesses certain specific characteristics for which a critical approach has to be emphasized for augmenting nutrients especially to the breeder stock. Scanty work has been conducted to develop feed formulae for rural poultry but however, nutritional requirements established for feeding of poultry reared in intensive system are used with caution as model to formulate the feeds for rural poultry based on the potential of growth or egg production (Elangovan, 2006).

The challenge of feeding the breeders relates to tempering their growth potential in order to realize adequate reproductive performance because, there is a negative correlation between growth rate and reproduction. Energy, calcium and protein or amino acids are the critical nutrients for the breeders. Whereas energy is the most critical of all nutrients, and undoubtedly balancing supply with needs often means the difference between good and average breeder performance (Leeson and Summers, 2000). In most situations, variable managerial conditions influence energy needs and so it is important to relate all other nutrients to energy level. In hot climates for example, the bird will eat less and so nutrients, such as amino acids, will have to be increased accordingly. Whereas, birds grown on the floor, rather than in cages, will eat more feed and so amino acid levels can be reduced (Leeson and Summers, 2005).
Though Swarnadhara birds can perform better even on scavenging, yet it is pertinent to provide them better nutrition for effective multiplication. In order to multiply a large number of chicks suitable for village conditions, the productive performance of parent flocks should be stepped up. Hence balanced rations suitable under different situations are quite essential during all stages' to exploit the genetic potential of breeder stock. The nutrient requirements of light breeds have been extensively documented and recommended for various age groups and production phases. But however, the normal requirement of energy and protein for the Swarnadhara birds may differ from that of Leghorn type breeds. In this context, a comprehensive study for optimization of energy and protein requirements for Swarnadhara birds at starter as well as grower stage on one hand and the same with the variable calcium and phosphorus levels during subsequent laying phase would provide them appropriate feeding standards.

Presently, Swarnadhara female parent stock by and large in respect of energy as well as protein during all the stages is fed according to BIS (1992) specifications of poultry. But however, this type of feeding regimen is making the bird to put on more weight which is undesirable one for the laying birds.

In this direction, attempts have been made to optimize the nutrients' density of a ration and in particular the energy and protein contents with following objectives:

1. To observe the interacting effects of energy and protein at different levels on growth pattern during growth phase and production performance in laying phase.
2. To determine the optimum levels of energy as well as protein for Swarnadharas birds at different stages.

3. To assess the effect of variable energy and protein vis-à-vis calcium and phosphorus levels on egg quality characteristics.

4. To study the pattern of fertility and hatchability of eggs from Swarnadharas hens fed variable levels of energy and protein.

5. To find out the economic feasibility.