TECHNO-FEASIBILITY, SOCIO-ACCEPTABILITY AND ECO-VIABILITY OF RABBIT FARMING IN INDIA - A REVIEW

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ABSTRACT

Rabbit as meat producing animal is new in India, particularly in NEH Region. Hence an effort was made to highlight the potentiality of rabbit farming and its techno feasibility in the agro climatic condition of NEH Region, acceptability of rabbit meat and other products by the people of this region and economic viability based on the data generated in the rabbit research farm of this institute and in the field level for the last ten years. It revealed that rabbit farming is highly remunerative, ecofriendly sustainable enterprise to pave the way for self-employment.

Rabbit was first domesticated in Africa and was first considered as food in Asia 300 years ago. There are 38 recognized breeds and 87 established varieties in the World (Mahajan, 1986). In India rabbit was first introduced in the year 1977 by CSWRI, Avikanagar, Rajasthan. It was introduced in NEH Region by this institute as meat producing animal in the year 1985. While human population growth in the developed countries is stabilizing, population is still increasing rapidly in all the developing countries in Asia, Africa and Latin America. As the land is limited and per capita productivity of land has some threshold limit, so to maximize food production in developing countries like India all reasonable options must be considered and evaluated. Rabbit might be the potential micro livestock in the smallholder subsistence type integrated farming system in developing countries. Large ruminants cannot solve the widespread shortage of meat, as they require too much space to landless and marginal farmers. Small animals like sheep and goat require pastureland, which is also limited due to urbanization. Pigs and poultry compete with human beings for food. So rabbit is the most promise and therefore at present more emphasis has been given on its production in our country. Lebas et al. (1986) reported that world rabbit production was one million ton of carcass with an annual consumption of 200 gram rabbit meat per head per day. Highest production was in undivided USSR (210 thousand tons) and highest meat consumption was in Hungary (4kg/head/year). The biggest import market is in Italy (16000 tons) indicating the high demand of rabbit meat and high meat consumption. Main exporter country of rabbit meat is China (25,000 tons).

Following characteristics of rabbits would make them suitable as meat producing micro livestock in developing countries like India.

Small Body Size: They require small amount of feed and use inexpensive, easily constructed house. Small body provides small carcass that can be consumed by a family in one meal eliminating the need for storage, so rabbit may be termed as “Biological Refrigerator”. Mature body weight of Soviet Chinchilla breed of rabbit varies from 3.5 to 4.0 kg. Mature body weight of New Zealand White breed of rabbit varies from 4.0 to 5.0 kg. Mature body weight of Gray Giant breed of rabbit varies from 4.0 to 4.5 kg. Mature body weight of White Giant breed of rabbit varies from 4.5 to 5.5 kg.

Short generation interval and High reproductive potentiality: Rabbits are induced ovulator and breed within 24 hours of kindling. Gestation period is only one month. So it is quite feasible to obtain 5-6 crops in a year from a doe. On an average they produce 6-7
kits per litter. So one doe in a year can produce 30-40 kits. e.g. SC, NZW, CW etc. breed of rabbit can produce 35-40 kits.

**Potential for Genetic Improvement:**
There is high degree of diversity in the rabbit's genetic resource pool. Mature body weight varies from 2-6 kg, while there is much variability in traits i.e. maternal ability, fecundity and resistance to heat stress. Thus it is possible to make rapid improvement in performance by selection through use of breed diversity. Rabbits are genetically very flexible which make them adaptive and productive in a wide range of production system. Because of short generation interval rapid selection process can be made. The heritabilities of growth and carcass traits are moderately high, so rapid improvement of these traits can be made (Nahardeka and Das, 1992).

**Rapid Growth:** Average daily gain varies from 20-40g/day in temperate region depending on breeds. No other animals reach consumable size at so fast rate excepting poultry. It is reported that because of quick growth and high prolificacy a rabbit doe produce more meat per unit live weight per year (Sreemannarayana, 1991; Das et al., 2002).

**Good mothering ability:** Number of young per doe per year in rabbit is higher than all animals except fowls and turkeys (Table 1).

**Utilization of non-competitive food:** Rabbit occupies a midway between ruminants and non-ruminants. Rabbit does not compete with human food like pigs and poultry. Like ruminants rabbit can be successfully reared on ration containing as little as 20 % grains. Handa et al. (1995) reported that around 3.5 kg feed is required to produce one kg of body weight gain in rabbit. The ability of rabbits to convert cellulose rich roughage into meat efficiently will be of help in those countries where the food shortage is serious. As rabbit can be maintained on sole roughage diet unlike pig and fowl, so feed cost out of total rearing cost is 50% in rabbit, whereas in cattle and pig feed cost goes around 65 to 70% of total cost.

**Most efficient meat producing animal:** Cheeke (1987) reported that the ability of rabbit to use forage protein efficiently is related to the phenomenon of caecotrophy, in which the rabbit consumes the caecal content i.e. night soft faeces. This allows the efficient extraction of protein from the diet. Dickerson (1978) reported that rabbit requires only 105 Kcal energy to produce one gram of protein. The corresponding figures in pig, sheep, beef cattle, broiler chicken and turkey are 151, 427, 442, 80 and 87 Kcal energy respectively. Cook (1977) reported that production of one kilogram rabbit meat requires only one quarter of feed energy needed to produce same amount of beef. Sreemannarayana (1991) reported that energy and protein requirement in food per unit live weight gain is lower in rabbit than most other animals.

**Good carcass quality:** Compared with meat of other animal species (Table 2), rabbit meat is richer in protein, certain minerals like calcium and phosphorous, certain vitamins like nicotinic acid, calcium pantothenate. However, it has lesser energy and fat (Lebas et al., 1986; Das et al., 2002). Rabbit fat contains lesser stearic and oleic acid than fat of other species and higher proportion of polyunsaturated linolenic and linoleic acid, indicating its suitability to aged and cardiovascular patient. Dressing percent varies from 55-65 % excluding the weight of head. Tribal people consume head also. So in that case if we include the weight of head, dressing per cent will be 62-72 %. Rabbit meat is of high organoleptic properties i.e tenderness, juiciness and flavour. High moisture content and high water holding capacity ensures appreciable juiciness.
Table 1. Mothering ability of different species of animal

<table>
<thead>
<tr>
<th>Species</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Goat</th>
<th>Pig</th>
<th>Rabbit</th>
<th>Turkey</th>
<th>Fowl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young/mother/year</td>
<td>0.8</td>
<td>1.4</td>
<td>1.5</td>
<td>12</td>
<td>40</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Chemical Composition of Meat from different animal species

<table>
<thead>
<tr>
<th>Species</th>
<th>Energy</th>
<th>Water</th>
<th>CP</th>
<th>EE</th>
<th>TA</th>
<th>Ca</th>
<th>P</th>
<th>Fe</th>
<th>B-1</th>
<th>B-6</th>
<th>Niacin</th>
<th>Cal. Pani</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>195</td>
<td>66.5</td>
<td>20.0</td>
<td>12.0</td>
<td>1.0</td>
<td>12</td>
<td>195</td>
<td>3.0</td>
<td>0.10</td>
<td>1.5</td>
<td>5.0</td>
<td>0.45</td>
</tr>
<tr>
<td>Mutton</td>
<td>210</td>
<td>66.0</td>
<td>18.0</td>
<td>14.5</td>
<td>1.4</td>
<td>10</td>
<td>165</td>
<td>1.5</td>
<td>0.15</td>
<td>0.3</td>
<td>5.0</td>
<td>0.55</td>
</tr>
<tr>
<td>Pork</td>
<td>260</td>
<td>61.0</td>
<td>17.0</td>
<td>21.0</td>
<td>0.8</td>
<td>10</td>
<td>195</td>
<td>2.5</td>
<td>0.85</td>
<td>0.3</td>
<td>4.5</td>
<td>0.50</td>
</tr>
<tr>
<td>Chicken</td>
<td>200</td>
<td>67.0</td>
<td>19.5</td>
<td>12.0</td>
<td>1.0</td>
<td>10</td>
<td>240</td>
<td>1.5</td>
<td>0.05</td>
<td>0.5</td>
<td>8.0</td>
<td>0.90</td>
</tr>
<tr>
<td>Rabbit</td>
<td>160</td>
<td>70.0</td>
<td>21.0</td>
<td>8.0</td>
<td>1.0</td>
<td>20</td>
<td>350</td>
<td>1.5</td>
<td>0.10</td>
<td>0.5</td>
<td>13.0</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Production of fur skin: In addition to simply ensure cleaning of house and feeding of animals, rabbit also provides wool and fur skin - an important by-product during slaughter of rabbit. Pelt after processing is being utilized to produce different products like jacket, cap, bag, gloves etc. Large fur skin and white one is more priced due to advantage of dying (Nath et al., 2001). Soviet Chinchilla, New Zealand White, Gray Giant, White Giant, California White are dual-purpose breed producing meat and fur skin.

Production of high quality wool: Angora wool forms a special sector in the international wool trade. It is of very high quality and is used to make woolen garments like shawl, sweater, blanket etc. Angora wool is characterized by low friction coefficient, which renders softness. As it is long and medullated, her ce it is lighter than the wool. An adult rabbit produces 750-900 g wool in a year whose costs in international market is around Rs. 900/- per kilogram. German Angora, Russian Angora and British Angora are wool breed producing wool as product and meat is available as byproduct during slaughter.

Easy management: Aged person, small boy or a lady can manage it. Labour requirement is also very less i.e. one labour is sufficient to manage 150 rabbits. One has to simply ensure cleaning of house and feeding of animals.

No religious taboo: There is no religious sentiment against consumption of rabbit meat among non-vegetarian population.

Less disease prone: Unlike poultry there is no risk of getting the population swept away by diseases RD, GD, fowl cholera, fowl pox. Only fatal disease in rabbit is coccidiosis, which can be controlled by regular deworming in each and every month (Das et al., 2001).

Rabbit manure: Rabbit manure is rich in nitrogen (2.91%), phosphorous (1.94%), potassium (1.70%). Hence it is very much valued and there is great demand among the vegetables growers. It is estimated that 50 adult rabbits can produce 5-7 kg manure per day.

Available rabbit breeds in NE region
There are number of internationally recognized breeds, out of which five breeds are commonly found in this area namely NZW, SC, WG, SA, GA etc.

New Zealand white (NZW): It is organized in USA. This breed is famous for prolificacy, maternal performance, fast growth, which make it ready for slaughter at 90 days. They are large in size with white fur. An adult buck weighs 4.0-4.5 kg and an adult doe
weighs 4.5-5.0 kg. This is the most popular breed in commercial rabbitries. The average litter size at birth and weaning is 6.51 and 5.83. The weight at slaughter varies from 2.2-2.5 kg.

Soviet chinchilla (SC): This is originated in Europe. It is for meat and furskin production. This rabbit is fairly large and light gray in colour. They mature early and have good meat to bone ratio. Adult buck weighs 3.5-4.0 kg. The average litter size at birth and weaning is reported to be 6.63 and 6.05. The weight at slaughter varies from 2.0-2.4 kg.

White giant (WG): This is very large breed having white fur. An adult buck weighs 4.5-4.8 kg. An adult doe weighs 5.0-5.4 kg. This is also used for meat and skin production. The average litter size at birth and weaning is 7.47 and 6.20. The weight at slaughter varies from 3.0-3.4 kg.

Angora: This breed is used entirely for fine wool production. Meat is obtained as by product. They are white in colour and requires very less temperature having a range 2-5°C. Therefore, this breed is suitable at high altitude where temperature exists in that range in most time of the year. The adult buck weighs 4-5 kg. They produce wool three times a year with an average of 750-800 g per adult animal (Bujarbarua et al., 1996).
Performance of rabbit in NE region:
Rabbit farming has become popular in village level in the states of Meghalaya, Manipur, Nagaland and Sikkim. The performance of meat type breeds i.e. NZW and SC is moderate to high depending on the feeding and housing condition (Das et al., 2002). In village conditions the average daily gain up to the age of 90 days was found to be 12-15 gram. Average litter size at birth and weaning were found to be 5.21 and 4.76 respectively in NZW. But in organized farm performance was better. However performance of Angora rabbit was not good due to higher ambient temperature. The optimum temperature for good growth of meat breed is 10-15°C and optimum temperature for wool breed is 0-5°C. Rabbits are mostly maintained in cage and hutch system of housing. As space requirement is less i.e. 1-3 sq ft per rabbit, so housing cost is less. Regular cleaning of house and bimonthly cleaning of feeder and waterer is needed to keep stock healthy.

Socio economic condition of NEH region and its suitability for rabbitry: The NEH Region has been identified as meat consuming zone due to non-vegetarian food habit of majority of the people. Since, most of the areas in this region are hilly, small animals are favoured more than large animals. Sheep is not suitable animal in this region because of high humidity. Being hilly region, grazing area for goat and sheep is also limited. As population density of pig in NE region is higher than national level, pig is animal of choice in this region. But piggery involves huge capital investment due to higher housing and feeding cost. Therefore broiler rabbit production is a choice to meet the needs of local people, which is gaining popularity in this region. Arrangement of regular demonstration, training, farmer’s fair, doordarsan programme, wide circulation of leaflets, folder to educate mass is going on in this institute and other institutes also to popularize rabbit meat and rabbit farming.

Feed availability for broiler rabbit production: Rabbit is basically herbivorous, single stomached, animal. The commonly used cereals are maize, ragi and rice, which are available in this region. Ground nut cake, til oil cake, linseed oil cakes are commonly used and are available in this region. Grasses both in fresh and dried form are important feed for the rabbit. Fresh dub grass (Setaria palmifolia) having DCP 6% and TDN 48% can be fed to the adult rabbits. Dried and ground stylo (Stylosanthes hamata) - a legume found in this region can be fed up to 25 % of DM in the ration. Congocignal grass (Brachiaria ruziensis, CP 12%), guinea grass (Panicum maximum, CP 8%), para grass (Brachiaria mutica, CP 11%) are available and can be fed to rabbit satisfactorily (Yadav, 1994 and Das et al., 2003). Milkana- a common weed in NE Region having CP content 13 % can be fed to rabbits. In hilly region terrace risers can be utilized for production of oat fodder (Avena sativa), rice bean (Vigna umbellate), cowpea, barseem (Trifolium alexandrinum), thin Napier that are good source of rabbit nutrition. Studies indicated that rabbit can consume significant amount of tree leaves i.e. guava, mango, banana, mulberry, groundnut leaves etc. Yadav, 1994 reported that in NZW rabbit DM intake from mulberry leaves (Morus alba) is around 56 g/d., whose DCP and TDN content are 14 and 59 %. In a study Das et al. (1999) reported that 25 % DM can be supplemented through groundnut leaves (Arachis hypogaea) whose CP content is 15 %. Different roots like carrot and sweet potato can be fed to rabbit. Different vegetables like cabbage, squash leaves, mustard leaves can be fed to rabbit successfully.

Economics of production: Based on data available at Rabbit Research Farm of this institute, economic analysis was done and it
revealed that from a unit of ten rabbits, a net return of Rs. 400 in a year is possible from a rabbit, provided labour is supplied by the family of farmer, litter size per doe is six, at least four crops are available from each mother, kindling rate is 90 %, mortality rate is 5 %, selling price of meat is Rs. 100/- per kg, selling price of skin is Rs. 15/-, at least 50 % rabbit are sold live @ Rs. 150 per animal.

REFERENCES