Livelihood Improvement of Small and Marginal Farmers Through Integrated Approach of Broiler Rabbit Production in North-east India

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Abstract

As an alternative to broiler chicken, rearing rabbits for meat and fur skins is gaining momentum now a days because of the fact that the meat from rabbit is low in cholesterol and the most delicious. Rabbits were reared as laboratory animals till 1970. Commercial aspects of rabbit rearing started after the import of exotic rabbits during 1970s by CSWRI, Indian Council of Agricultural Research for the first time in our country. Rabbits are the only 'Micro livestock' suitable for rearing by small farmers and landless agricultural laborers with simple housing in their backyards and can be fed with forages, agricultural by-products and kitchen wastes. In fact backyard rabbitries are best suited for our country to increase the per capita income and per capita animal protein availability.

1. Introduction

Integrated farming in simple term is a combination of crop and livestock farming through which the resources are managed economically in order to have a steady income through the enterprise. In an integrated farming system a farmer's main concern is to arrange continuous flow of income without any fellow month possibly through a process of recycling. Therefore, a farmer prefers to keep few livestock so that the crop waste, grain residue etc, can be converted into either milk meat or fiber or at the same time soil nutrient can be increased through the animal excreta. Therefore, livestock also play a major role as component in sustainable agriculture.

Among the livestock, the potentiality of rabbit as a meat animal has recognized in India long back and was introduced in North Eastern Hill Region by ICAR Research Complex two decades ago. This region as a whole has identified as a meat-consuming zone and people are usually free from any kind of taboo regarding the consumption of meat. This factor created the scope for exploring the possibilities of introducing the rabbit, as a micro-livestock in this region and ICAR is pioneer worker in this field. The domestic rabbit developed from the European wild rabbit (Orystologes cuniculus). The raising of rabbit for meat received special impetus during World War II. Rabbit have a number of characteristics to make them suitable meat producing livestock.

2. Potentialities of rabbit farming

2.1. Small body size

There are number of advantages of small animals. They require a small space, which can be easily constructed. They can be reared either in portable hutch or cages. They require a very small amount of feed. The capital investment to start a rabbitry is very meager. The small body size provides a small carcass that can be consumed by a family in one meal, eliminating the need for meat storage.

2.2. Small generation time and high reproductive potential

The reproductive efficiency of rabbit is much higher than any other domesticated animals. Rabbit attain puberty at the age of 6-7 months they have very short gestation period (30-32 days). As they are induced breeder, they have ability to breed at any time of the year. A rabbit can produce 4-5 litres in a year, i.e about 25-30 kits rabbit^{-1} year^{-1}.

2.3. Utilization of non-competitive feeds

Rabbit can be successfully raised on absolute feed like kitchen waste, fodder leaves, edible weeds, grasses, tree leaves, vegetables

waste etc, which is non-edible for human consumption. It can be conveniently raised on high forage and low cereals because rabbit can utilize forage protein directly and more efficiently. Therefore, they are considered most efficient converter of forage to meat.

2.4. Rapid growth

Rabbit can reach market or consumable size much faster than larger livestock and it can be compared with broiler chicken. At 90 days a rabbit reaches a size of 1.5 kg to 2.0 kg.

2.5. Production of high quality meat and by-product

Rabbit meat has found to be very delicious and one of the choicest meat in European countries. Rabbit meat is rich in protein (20.8%) and low in fat, cholesterol and calories value.

Besides meat rabbit also provides the pelt (fur) an important by-product at slaughter. These fur skins are utilized for preparation of cap, jacket, hand glove etc, the rabbit excreta is useful manure for crops and kitchen garden. Whereas, Angora rabbit produces 750 to 1 kg of fine old rabbit^{-1} per which brings a good amount of price.

Table 1: Nutritive values of different meats

Meat	Protein %	Fat %	Moisture %	Calories (Kcal kg^{-1})
Rabbit	20.80	10.20	27.90	795
Chicken	20.00	11.00	67.60	810
Veal	18.80	14.00	66.00	910
Beef	16.30	28.00	55.00	1440
Pork	11.90	45.00	42.00	2050

2.6. Others

Unlike poultry, rabbit do not have the disease like Ranikhet, therefore, the risk of entire flock/ population being swept away due to such disease is almost nil. They can be reared in different agro climatic condition except for Angora, which can be reared only in cold climate.

3. Breeds of Rabbit

There are about 89 internationally recognized breeds. The common breeds reared in India are New Zealand white, Soviet Chinchilla and Gray Giant and New Zealand White and Soviet Chinchilla for NEH Region in particular. The productive and reproductive performance of New Zealand white and Soviet Chinchilla are better than any other broiler breeds.

4. Housing

Several factors may be considered before selecting a site for construction of rabbit house. A shaded and elevated area is preferred for easy drainage of unused water from rabbit farm. Shaded area is preferred to reduce the heat stress on rabbit, as it is very sensitive to high temperature. Location should be free from excessive moisture, smoke, fume, dust and other pollutants and have easy access of water and electricity. Place should be protected from predators i.e. dog, jackal, cat etc which are enemy of rabbit. Rabbit may be maintained in the: -

Table 2: Productive and reproductive traits of New Zealand White and Soviet Chinchilla rabbit

Traits	Broiler Breeds	
	NZW	SC
Litter size at birth	6.34±0.37	6.79±0.41
Litter size at weaning	5.24±0.27	5.00±0.27
Litter weight at birth (g)	225±2.81	202.56±2.34
Litter weight at weaning (kg)	2.35±0.18	2.41±0.21
Individual weight at 90 days (kg)	1.70±0.22	1.80±0.13
Individual weight at 180 days (kg)	3.14±0.21	2.97±0.16
Post weaning body weight gain (g)	21.81±0.33	25.44±0.41
Age at first kindling (days)	201.95±2.77	213.70±1.8
Inter-kindling intervals (days)	83.10±1.20	85.20±1.76
Max. number of crops year^{-1}	4.3±0.18	4.0±0.16

1) Indoors cage system.
2) Indoor low cost housing system.
3) Indoors flour system.
4) Outdoor hutch system.
5) Outdoor semi-open system.

All the housing system has some advantages and disadvantages

4.1. Indoor Cage System

Cages can be kept on wooden or concrete rack in a row in closed RCC house having asbestos or tina roof. Cage size varies depending upon breed page of rabbit. Cage must be large enough to provide space for movement. The material normally used for making cage is galvanized wire mesh having thickness 14-16 gauze. Grid opening must be large enough to allow forces to pass through. Cage may be made either square or rectangular. They may be made single or in a multiple for two or three. Wood should not be ease for making cage because rabbit chews and consumes it and moreover it absorbs urine,

water. So, it is difficult to clean.

4.2. Indoor low cost housing

This house is of Kaccha floor, thatch roof, bamboo wall. As low cost and locally available material are used hence cost of housing is low. Racks are made up of pinewood and cages are of galvanized wire mesh. This type of house is comfortable both during summer and winter lent durability are less.

4.3. Indoor floor system

In this system like fowl an area of 150 sq ft (15 ft x 10 ft) is shaded with asbestos where wall is made up of brick up to the height of 2.50 ft above it wire net fencing is given up to 4-5 ft. Animals are kept over clean dry litter made of saw dust. Feed and water are provided by feeder and water as usual. The main disadvantage in this system is that there is less control over feeding, breeding and management.

4.4. Outdoor hutch system

It may made up of iron or wood with G.I welded mesh floors asbestos or tina roof. If frame is made of iron, durability and cost will be more as compare to wooden structure. Generally, the dimension of hutch is 1.50 x 0.75 x0.50 m^3. It can be divided into five compartments hence a dimension of 0.75 x 0.30 x0.50 m^3. So, 3 weaners, 2 growers or 1 finish or, 1 adult can be kept. Hutches can be kept under tree shade to reduce heat stress and during summer paddy straw or thatch grass may be given over the roof to keep the hutch cool.

4.5. Outdoor semi-open hutch system

This is a semi intensive system of management. Hence, an area of 150 sq ft (15 x 10 ft) is covered by wire mesh/net. One or two hutches should be kept for night shelf of rabbit. Open area is kept for roaming and green grass roughage i.e. Congo Signal, Guinea grass can be planted/grown for grazing the animal which meet at least 50% of dry matter requirement. Feeder and water should be placed for providing concentrate feed and clean drinking water time to time. System breeding hygienic management and prevent of disease is a problem in this system.

Floor space requirement of different age groups are varied. For weaners 30-60 days) 1 sq ft, for grows (60-90 days) 1.5 sq ft, for finisher (90-180 days) 2.0 sq ft for adult (above 180 days) 2.5 sq ft and for nursing mother 3.5 sq ft floor space are required for maximum growth and production. In cage system, the individual cages are 60 x 75 x 45 cm^3 and for kindling cage size is 75 x 90 x 45 cm^3. For kindling purpose, a nest box is required with the size of 60 x 30 cm^2 in floor area with 30 cm height up to half-length and toppers to 15 cm length. The balloon of the nest box should have no of small holes to allow for passing down of urine etc of the kits.

5. General Management of Rabbit

5.1. Breeding/Mating

Mating is done either in the morning or in the evening. The due is to be introduced to the buck for mating. If the doe is ready for breeding, will allow the buck to mount and successful service will take place with few minutes. After successful service, male will take down making a characteristic sound. The gestation period of rabbit is 30 days. Adequate care has to be taken before and after delivery and for mating date should be noted down properly. Pregnancy can be diagnosed by palpation method by experience hand. Quality of feed should be provided during last quarter of pregnancy for better litter size, litter weight and due should not disturb at this period. Around 20 days after mating, due should be kept in separate/individual cage with nest box and nesting. Before kindling, due generally prepares a bed by plunking fur from her body. However, it is necessary to put extra bedding material like saw dust/paddy straw.

5.2. Care of new born

During kindling assistance is not necessary and better to leave the new born undisturbed except checking the stillborn and should be removed quickly. Newborn kits are helpless because they are blind and devoid of hair during this time. They lie quietly inside the bedding material. The kits start developing hair on 4 days after birth and open their eyes after 10 days. Kits should be examined daily for health. Bedding material also be checked and replaced wet bedding. From the age of 10 days, kits start to come out from bed and around 21-23 days. Start nibbling at the feed given to the mother. At around 1 month, they start to take feed properly.

5.3. Weaning and care of the weaners

The young rabbits are separated from their mother between 42-45 days depending on their growth and capacity to eat. Before weaning, sex and tattooing is essential for proper recording of animals. Wean stage is very crucial because the animals are in stress condition due to their separation from mother. Sudden change of feed should also be avoided. Immediately after weaning, litter should be kept in-group and then gradually shifted to individual cage is necessary.

5.4. Sexing

The sex of young rabbits may determined a day or two following kindling. Restrain the kit on its back in the palm with its head facing towards us. Using fingers gently press the genitals, to expose the reddish mucous membrane; if it is a male kit the mucous membrane protrudes sufficiently to form a circle. If it is a female kit, the mucous membrane will protrude and form a slit that will have a slight depression at the end. Generally, the distance between the penis and anus is greater than the distance between the vulva and anus. Until the technique of

sexing rabbits has been perfected, it may be good to sex the kits at weaning.

5.5. Identification

Tattooing in the rabbit's ear makes a permanent system for identification. The inner side of the ear is cleaned with alcohol and perforated with a tattooing instrument. Tattoo ink or Indian ink should be rubbed over the spot.

5.6. Handling

They should be lifted gently by the scruff of their neck. They should be gently handled. They should not be lifted by their legs or ears alone. Broiler rabbits can be handled by firm and gentle grasping of their loin region upto 15 weeks. Other rabbits may be handled by grasping a fold of skin over the shoulder with one hand and placing the other hand under the rump to support the weight of the animal. While carrying, they need to be supported from the bottom. Care should be taken as not to startle the animals.

5.7. Sanitation

Cages should be cleaned with wire brush daily. Ammonia production should be minimized. Lime powder has to be sprayed underneath the cages. Adequate ventilation and close observation of rabbits are important. Isolate the sick rabbits immediately. Start the colony treatment if required.

6. Feed and feeding of rabbit

Rabbit is a monogestic animal but the presence of micro flora in the hindgut (caecum) and the habit of coprophagy make it capable of consuming a variety of feed. In aback yard, a few rabbit can be reared with the kitchen waste and other available forage but in the large scale balanced pellated rabbit ratio is essential.

Rabbit feed consist of roughages and concentrate. Roughage is consumed by rabbit to stimulate gut motility rather than as nutrient source. Proper proportion of fibers in diet will avoid gastro-enteric disorders. It is also useful source of energy to the rabbits for caecum fermentation. The young growing rabbits need 12-14% of fibers. On the other hand adult and anon-breeding rabbit can consume about 20-25% of fibers and too much green feeding may lead to diarrhea and bloat. Concentrates are balanced quality food, which is rich in protein and energy. They contain more than 18% protein and less than 18.5% fiber. The energy rich concentrates can be mixed 30-60 % in rabbit ration. However, the protein rich concentrates can be mixed 15-25% in ration according to age and production stages of rabbits.

6.1. Roughage feed resources

Large numbers of roughages feed resources are available in Northeastern part of India, which can be easily fed to rabbits. They legumes fodder such as cow pea, rice bean, soybean, pea and grasses like setaria, guinea, broom and congo signal even weeds like mikana can also be given to rabbit. Other sources of roughages feeds are cabbage, radish, carrot and oats. These feeds can be fed as such in fresh form or as hay. Even crop residue like groundnut and soybean straws can also be included to the extent of 10-25% in ration.

6.2. Feeding technique

Nowadays, the best form of concentrate feeding is in pellet form because it is easy to handle, storing and wastage is very less. Pellet should be 3-4 mm size and the length is bite more than diameter. Balanced ration can also be fed in mash form. In that case, small balls have to make with the help of molasses and water after thorough mixing. Few should be offered twice a day and sufficient fresh water should be given to the animal. Under commercial system, rabbits can be fed with concentrate feed along with 200 gms of greens day^{-1}. Generally concentrate feeding precedes greens (grass + forages) feeding. Concentrate feed has to be given in two divided doses. Rabbits generally eat more during night in summer. With the onset of winter, the requirement increases and the feeding shifts to day to time. However, regular timetable for feeding is advisable so that rabbits do not feel any stress due to the change in their daily routine. Sudden changes in feeds and feeding systems should be avoided. The rabbits must be fed at the same time every day. While offering green grass, it should be wilted for one day. Providing adequate fiber in the ration is a must to prevent enteric diseases and fur chewing.

6.3. Feeders and waterers

The feeders are made of galvanized iron sheets. They are 'L' or 'J' shaped and are arranged such that the feed can be poured from outside. The edges should be rounded off. The height of the feeders should be 5-7 cm above the cage floor to avoid contamination by urine, faeces and water. Hay feeders are attached to the outside of the cage. Aluminium bowl of 500 ml capacity or baked earthen bowls are used to contain the drinking water

Rabbit can be successfully raised/reared on roughage based feeding system in northeastern hilly areas, where natural roughage feed resource is available in plenty and that are non competitive to human feed.

Table 3: Daily feed requirement of different age groups of rabbit

Category of Animal	Age (days)	Amount of feed (g) day^{-1} $animal^{-1}$
Weaner	45-70	50
Grower	71-90	75
Grower	91-120	100
Adult	121-above	120

7. Rabbit as a component of Hill Agriculture

Rabbit can play an important complementary role in hill agriculture with disturbing other component of farming system. The role of rabbitry in Hill farming-

7.1. Soil enrichment

In hill farming farmers used matter in their field by purchasing or prepared FYM by decomposing weeds, farm by-products etc. Rabbit waste (faeces and urine) is very good organic manure and contains rich phosphorus and nitrogen compound which can replace nutrient loss from the soil and enhance the soil fertility. The nutrient point of view, the manure produced from rabbit excreta is the best among all the livestock manure.

7.2. Subsidiary income in Rabbit farming

Based on the expenditure involved on feed, labour, medicine and cage a production cost of ₹ 1.47 day^{-1} $rabbit^{-1}$ is worked out. With this daily production cost, a total amount of ₹ 70.56 has to invest to rear up to 90 days. Based on the body weight of two breeds of rabbit (NZW and SC) rear in Institute, the average cost benefit ratio up to 90 days is calculated.

Between the two breeds, SC rabbits are found to be little more economical for tribal purpose. In addition to this, the amount to be receiving from the sale of fur skin is extra income to the farmers. Moreover, if the labour component is provided free and bulk of feed supplement with crop residues, the profit may increase.

Table 4: NPK values of different livestock manure

Type of animal	% Nitrogen	% Phosphorus	% Potash
Dairy cow	0.57	0.23	0.62
Beef steer	0.73	0.48	0.55
Horse	0.70	0.25	0.77
Swine	0.49	0.34	0.47
Sheep & Goat	1.44	0.50	1.21
Rabbit	2.40	1.40	0.60
Poultry	1.00	0.80	0.39

Table 5: Cost Benefit ratio of Broiler rabbit

Breed	BD (kg)	DM (kg)	Rate (₹)	Rvd (₹)	Exp (₹)	Profit (₹)
NZW	1.70	1.02	200.00	204.00	120.00	84.00
SC	1.75	1.05	200.00	210.00	120.00	90.00

NZW: New Zealand white; SC: Soviet Chinchilla; BD: Body wt at 90 days; DM: Dresses meat; Rvd: Received; Exp: Expenditure

8. Conclusion

Rabbit rearing is the only way to produce delicious and quality meat from forages in a shorter duration with out much capital investment on small scale as well as large-scale production. Hence, extensive extension measures and departmental programmes are must for popularizing rabbit farming to give livelihood to millions of rural folk living below the poverty line and thereby improving their nutritional and economic security.