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Review Article

ROLE OF FEEDING IN IMPROVING THE PRODUCTIVITY OF GOATS

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Abstract: Goat production has been an integral part of rural farming system since many decades and act as a primary source of income for livelihood of poor farmers and landless labourers. Supplementation of goats with balanced concentrate mixture, cultivated green and dry fodders and mineral cum salt lick during different physiological stage of productive life cycle.

Introduction

Goat production has been an integral part of rural farming system since many decades and as a primary source of livelihood for poor landless villagers of India. In rural areas, feeding small ruminants is mainly dependant on grazing on the available wide variety of vegetation such as grasses, legumes, herbs, shrubs, tree leaves and agricultural by-products. In urban areas, primary feeds include concentrate and dry fodder. Productivity of goats under commercial farming system has been observed to be fairly good on account of availability of optimum nutrition. The nutrition of goats is the most important factor affecting performance. Poor nutrition results in lower rates of production, often defined by growth, lactation and reproduction. It also affects the immune system and the ability of an animal to fight disease. In many animal production systems, approximately two-thirds of improvements in livestock productivity can be attributed to improved nutrition. In economic terms, feed cost accounts for about 70% of the total cost of livestock production.

METHODS OF REARING GOATS

There are mainly five systems of rearing goats.

1. Tethering - Goats are usually tied with a rope to a tree or on a peg and they will be able to browse from the surroundings.

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2. Extensive production - This system can be adopted if grazing land is available where goats are allowed to browse on free range.

3. Intensive production - This method is suitable in urban areas where there is scarcity of land. In this method, goats are confined exclusively in sheds and fed on leaves/grass and concentrates.

4. Semi-intensive - In this system the goats are allowed to go out of the shed for a few hours daily.

5. Integration with cropping system - In this case goats can be allowed to browse under plantation crops. It ensures increased fertility of land by return of dung and urine and controls the weeds. The manure output from an adult goat per day varies from 0.5 to 1 kg.

Feeding Habits of Goats

Goats prefer to consume a wide variety of feedstuffs. Goats are more selective and browse more, especially under extensive conditions. The selectivity of goats is reduced under intensive management. Goats prefer to eat feed at a height of 20–120 cm. They have the ability to stand on their hind legs for long periods and can even climb trees in order to reach parts of trees they prefer. They also have mobile upper lips and tongues that enable them to consume leaves between thorns.

Feeding

From the 2nd week onwards, an easily digestible concentrate mixture of high nutritive value (kid starter) with a minimum of 20 per cent digestible crude protein (should not contain urea) and 70 per cent of total digestible nutrients and good quality fodder may be offered to kids. As the kids start consuming more and more of these, the quantity of milk may be reduced correspondingly. Milk feeding can be completely stopped after the third month. Examples of kid starters are given below:

INGREDIENTS	RATION 1	RATION 2	RATION 3
Yellow Maize	-	-	30.7
Wheat/Maize	-	20	-
Wheat/Maize/Jowar	30	-	-
Deoiled groundnut cake	12	-	-
Gingelly cake	-	14	-
Soyabean meal	-	20	44
Horse gram	30	20	-

Rice polish/Wheat bran	15	15	-
Wheat bran	-	-	22
Dried unsalted fish	10	8	-
Mineral mixture	2	2	2
Common salt	1	1	1
Vitamin AB_2D_3 (g/100kg mixture)	25 g	25 g	25 g
Lysine	-	-	0.20
DL – Methionine	-	-	0.10

Feeding schedule

Goats consume more dry matter (upto 5-7% of their body weight) when compared to sheep and cattle (2-3% of body weight). Almost the whole of the dry matter requirement of an adult non producing goat can be met by the consumption of the forage (grass/tree leaves). Adult goat can be maintained on good quality forage like jack leaves alone if they can be fed adequate quantities of the same (3-4 kg). When roughage supply is limited, some concentrates (around 0.25 – 0.50 kg) have to be given for maintaining adult stock. Adult goats may be fed a mixture of oil cakes, brans, grams and grains as concentrate part of the ration supplemented with salt and mineral mixture. Unconventional feeds such as dried tapioca leaf, rubber seed cake, tapioca starch waste etc. can be incorporated in the concentrate mixtures of goats. Concentrate mixtures which can be fed to cattle can also be used for feeding of goats. Pelleted concentrate feeds have the advantage over dry mash in reducing respiratory troubles caused by the dust/powdered feed. Succulent fodders like tree leaves (e.g. Jack tree, Poovam, etc.), cultivated fodder grasses like Guinea, Napier, Para, Congo Signal etc. and leguminous fodders such as cowpea, lucerne and subabul are palatable and are fed to goats. Apart from tree leaves and grasses, agricultural by products such as plantain leaves, dry fodders such as hay and ensiled fodders are also eaten by goats. When dry fodder such as hay is fed, the quantity required will be about 25-30 per cent of the green fodder. Depending upon the quantity and quality of fodder available for feeding, the concentrate allowance to the different classes of goats can be reduced.

Feeding schedule for different categories of goats

Category of goat	**Approximate body weight (kg)**	**Quantity to be fed per day**	
		Concentrate (g)	**Green fodder (kg)**
Growing (6-12 months)	15-20	300-400	1-2

Adult goats	25-30	200-300	2-3
Breeding bucks	30-40	400-500	3-5

Water requirement

Goats should be provided unlimited access to fresh, clean water. Goats are among the most efficient of domestic animals in their use of water, approaching camel in their low rate of water turnover per unit of body weight. Goats appear to be less susceptible to high temperature stress than other species of domestic livestock. In addition to a lesser need for body water evaporation for maintaining comfort in hot climates, they can conserve body losses of water by decreasing losses in urine and faeces. Factors affecting water intake in goats include lactation, environmental temperature, water content of forage consumed, amount of exercise, and salt and mineral content of the diet.

FEEDING DIFFERENT CLASSES OF GOATS

The amounts of energy and protein or amino acids supplied to the animal determine productivity. Both energy and protein must be supplied in sufficient quantities and balanced to meet requirements and optimize feed utilization. Energy in ruminants is largely supplied by volatile fatty acids (VFA) that arise from the rumen fermentation of all types of organic matter, though the majority comes from carbohydrates. The principal way of increasing VFA energy is to increase intake and/or the rumen degradability. This can be accomplished by supplementation with a nitrogen source or, in the case of poor quality roughages, urea treatment. Some guidelines for feeding different groups of animals are indicated below.

- **Adult breeding males:** Adult males used for breeding need to be well-fed to maintain their body condition for mating. Breeding males need to be supplemented beginning two weeks before start of breeding. They shouldn't, however, be allowed to become too fat. Breeding males need to be supplied with plenty of water and allowed to exercise. Supply of good pasture is enough when not being used for breeding.
- **Dry breeding females:** A dry female that has recently been weaned from her kids can be maintained on good quality pasture or fed good quality hay depending on her body condition at weaning. Flushing is the practice of feeding the doe so that she starts to gain weight about two weeks before breeding. Flushing may increase kidding percentage and embryo survival.
- **Young, replacement females:** Young females selected for breeding need extra feed for growth so that they will be large enough and in good shape for breeding.

- **Pregnant females:** Pregnant females need feed to support the growth of the foetus. They shouldn't be fed to become too fat. Females that are too fat will have trouble kidding.
  - **Lactating females:** The requirement of these classes of animals is similar to females in late

pregnancy. Their rations should generally contain 14–16% crude protein. They have high requirements for milk production. They should receive:

  - The level of concentrate should be higher for high milk producers. An allowance of concentrates at the rate of one third of the amount of milk produced is necessary.

Group of Animals		**Grass/crop residues**	**Legume supplementation**	**Concentrate** (g/head/day concentrate) *Example, 49% bran, 15% Ground nut oil cake (GNC), 15% Cotton seed cake and 14% Soyabean meal), 1% limestone and 1% salt*
Adult breeding males		Free choice	Upto one part legume for every 4-6 parts of grass/residue.	250gm
Dry breeding males		Good quality pasture / hay (based on physical condition at weaning)	--	Flushing
Young replacement females		Free choice	Upto 1 part for every 3 parts of grass/residue consumed.	250 – 300gm
Pregnant females	Early	Free choice	One part legume for every 3 parts grass/residue.	200gm
	Late	Free choice	One part legume for every 3 parts grass/residue.	250–400 gm
Lactating females		Free choice	One part legume for every 3 parts grass/residue.	250-300gm
Young kids before weaning		Free choice	As much as are available	Free choice
Weaned kids		Free choice	Free choice	Initially, 70 g/day of concentrate feed and the amount can be increased as they grow.

- **Young kids before weaning:** Newborn kids should be supplied with colostrums within the first hour after birth. Colostrum helps protect them against diseases due to its content of antibodies and high nutritional value. Hay, water and protein supplements should be placed near the lambs/kids so that they start to eat and drink. Young ones can begin to consume other feeds at about six weeks of age. They should be fed the best quality feeds available to help them grow and get them accustomed to eating feeds other than milk.
- **Weaned kids:** Weaning involves removing young ones from the milk diet to other forms of feed. This separation can be stressful. Kids are very vulnerable to disease and growth depression at the time of weaning unless they are weaned on to high quality feeds.

INTENSIVE FEEDING OF GOATS

Intensive feeding of goats can be categorized into two systems:

(1) Production of conditioned animals

This system is intended for the supply of animals of acceptable condition to the slaughter houses for ultimate export. These animals may also go into a finishing operation targeted at supplying the local market.

(2) **Finishing:** This is the process of feeding goats to slaughter weight with adequate finish (fat deposit). This targets the local market, which has high demand for fatty animals. The operation of large feedlots by export slaughter houses is becoming feasible. The principal functions of such feedlot operations are to assemble large numbers of goats, often with different backgrounds, and produce a homogenous product. The following guidelines will serve these operations and also small farmers that want to fatten smaller numbers of goats.

Advantages of fattening

- Technically, it is quite simple and within the capabilities of small farmers to implement; moreover, the results are highly visible. This helps ensure farmers' confidence in the technique. Other techniques such as feeding to boost reproductive performance are less convincing, because the farmer may not be sure that the extra feed resulted in any benefit.
- Benefits can be realized within a short period unlike other animal production activities.
- Fattening generates income that is eagerly sought by farmers.
- Fattening is generally profitable, because the value per kilogram of live weight increases as both weight and condition increase.

FATTENING SYSTEMS

Traditional systems: Farmers generally condition their animals and market them. This feeding operation takes a very long time, because it is generally based on low quality feeds. It

is also associated with huge fluctuations in the weights and conditions of the animals depending on feed availability. Several improved traditional systems are in use, but they are not widespread.

These fattened animals fetch very high prices.

Agro-industrial by-product-based fattening: Fattening using agro-industrial by-products such as sugar-processing by-products is feasible in places where valuable feed resources such as molasses and corn (grain and residue) are widely available. Protein sources like oilseed cakes can be purchased from nearby processing plants, and/or forage legumes can be grown in the area. Brewery by-products are also available from the brewery to serve as protein sources.

FEEDING MANAGEMENT OF FINISHING GOATS

- The fattening program should be started after the necessary feed supplies are secured. Underfeeding and incorrect timing are the most common causes of failures in fattening activities.
- The objective in a fattening operation is to convert as much of the feed to body tissue as possible. It is thus necessary to minimize the movement of animals during the fattening period. They should be allowed only limited exercise.
- The animals should have shelters that protect them from adverse environment. The shelter need not be expensive and can be made of locally available materials.
- The success of a finishing operation depends on the first two weeks after arrival of animals. They may have travelled long distances and will be stressed, hungry and thirsty. It is recommended that the following guidelines be followed during this period.
- Right after arrival, rest the animals for a few hours in a dry, clean, sheltered area with access to fresh water. Then offer grass hay or mixed grass–legume hay.
- Hand-feed salt during the first two weeks, then provide trace mineral salt in a separate feeder. Afterwards, these supplements can be mixed in the complete diet, but salt should continue to be provided *ad libitum* (free choice).
- Animals should have feed available at all times including evenings. If there is no feed left in the morning, feed supply for the following day should be increased.
- Adjust the animals to the fattening concentrate diet over a two week period by feeding the concentrate after the animals consumed enough roughage to provide bulk. Gradually increase the intake of the diet every two days, while providing free access to the basal roughage diet.

- Drench for internal parasites and treat for external parasites before the start of the feeding operation. This will improve feed utilization and performance.
- Sort the animals by weight/size and feed in uniform weight groups.
- Cull non-performing animals.
- Feed for 90–120 days. The length of the feeding period depends upon the desired animal condition. What is desired for the export market may be just conditioning without the amount of fat desired by the local market. Thus, animals for export can be sold at a time when the desired condition is attained.
- Water should be available at all times. Inadequate water supply will affect performance.

FEEDING MANAGEMENT

Feeding goats is both a science and an art. While diets are scientifically formulated, experience in the feeding and management of small ruminants is important in gaining optimum feed utilization. Feed should be stored and used as carefully and economically as possible. Proper care should be taken during storage and handling to avoid spoilage and loss; in feeding techniques and livestock management to avoid wastage; and in ensuring that different types of feeds are used in the context of a balanced feeding system. Some principles and applications of feeding management of goats are presented below.

Improving feed utilization and efficiency

- If livestock are to make the best use of feed, they must be healthy and correctly handled. Routine control of epizootic diseases and internal and external parasites are important to achieve efficient use of feedstuff.
- Feed animals based on their requirements. Both overfeeding and underfeeding result in feed wastage.

Adapting goats to new feeds and increasing consumption of less palatable feeds

Sudden diet changes, especially switching from a diet high in roughage to concentrate, should be avoided. Dietary changes should be gradual. The micro-organisms in the reticulo-rumen that help goats utilize feed require time for adaptation. The sudden introduction of a new feed can lead to scouring and loss of condition or even death in severe cases. A new feed or a feed that is not highly palatable should first be given in very small amounts with the quantity being increased progressively over a period of up to 15 days. There are, for example, observations that goats initially can refuse to consume some multipurpose trees and other feeds that have a strong smell. Some suggestions for use of new feeds are given below:

- Always present the new feed when animals are hungry.

- Mix new or less palatable feed with feeds the animals like to consume. The level of the new feed can be increased gradually. Mixing with feeds such as molasses or salt can shorten the adaptation period.
- If the above strategies do not work, one can try forcing the animals to eat the new feed or go hungry.

Feeding based on palatability

If a feed has high nutritive value, but low palatability, its dry matter intake will be low. Farmers cut and carry forage of different species, it is important to know forage palatability ranking. Some farmers are aware of this fact and make use of forage ranking effectively. They do this by offering the forage of the lowest palatability first and that with highest palatability last.

Provide fresh feed

Supplying fresh feed in smaller quantities more often will help stimulate consumption compared with offering larger amounts at one time.

Minimize wastage

- *Sanitation:* Under confined or tethered feeding situations, a clean and dry floor will mean less wastage. Feed that falls to a clean floor is more likely to be acceptable if offered again than feed contaminated by mud and faeces.
- Chopping: Feeding roughages in the chopped form reduces wastage and improves feed utilization.
  - Reduces selectivity.
  - Permits thick-stemmed material to be easily eaten.
  - Can increase consumption of unpalatable feeds.
  - Allows for mixing with other ration components.
- Poor feeding techniques:
- Provision of appropriate feeders: Feeding on the ground results in considerable feed wastage and contributes greatly to the spread of disease, especially internal parasites. If goats are able to stand in their feed or in their feeders, they will inevitably defecate and urinate in the feed. Feeders need to be raised off the ground and constructed in such a way to keep the animals out as much as possible. Provision of appropriate feeders also reduces competition. There must be enough space at the feeder for all goats to be fed easily without fighting. Young animals should be fed separately from older ones to avoid competition and trampling.

- **Feed racks:** Racks should be used wherever possible. Hay, crop residue, as well as cut green vegetation (if using cut-and-carry system), can most easily be fed in racks made with slatted sides and hung so that the feed is presented off the ground and at approximately head height. Galvanized metal racks are more durable than racks made of wood, but are more expensive. There should be enough feeder space for all animals to eat at the same time. Providing more than one feeder is a good option.
- **Provision of shades:** Appetite of animals will be depressed if the place where they are fed is hot and exposed to the sun. They will eat more in a cool and shady place than in a place exposed to direct sunlight. It is, therefore, advisable to locate feeders under the shade.

Conclusion

Intensive system of rearing of goats for meat purpose provides the highest return on investment to entrepreneurs. The kids under intensive system of rearing have more chances of receiving high protein and energy rich balanced diet. Therefore, intensive system of rearing is most suitable method for fattening kinds.

REFERENCES

[1] Banerjee, G.C. 1982. A Textbook of Animal Husbandry.Oxford and IBH publishing Co.

[2] Devendra, C and Burns, M. 1983. Goat Production in the Tropics. Commonwealth Agricultural Bureau.pp. 183.

[3] Gipson, T.A., Merkel, R.C., Hart, S., Williams, K. and Sahlu, T. 2005. Meat Goat Production Handbook. American Institute for Goat Research, Langston University, USA.

[4] http://www.esgpip.org/handbook/Handbook_PDF/Chapter%207_%20Nutrition%20and%20feeding%20of%20Sheep%20and%20Goats. pdf.

[5] Steel, M. 1996. Goats. The Tropical Agriculturalist Series. McMillan publishers, UK.Pp.152.