# LIVESTOCK PRODUCTION SYSTEM OF TRIBES IN ATTAPPADY AREA OF PALAKKAD DISTRICT

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**MANNUTHY, THRISSUR - 680 651**
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**MUHAMMAD ASLAM M.K.**

**Thesis submitted in partial fulfillment of the requirement for the degree of**

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**Department of Livestock Production Management**
**COLLEGE OF VETERINARY AND ANIMAL SCIENCES**
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## DECLARATION

I hereby declare that the thesis entitled **"LIVESTOCK PRODUCTION SYSTEM OF TRIBES IN ATTAPADY AREA OF PALAKKAD DISTRICT"** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

**Mannuthy**
**27-02-2009** **Muhammad Aslam M. K.**

## CERTIFICATE

Certified that this thesis entitled **"LIVESTOCK PRODUCTION SYSTEM OF TRIBES IN ATTAPADY AREA OF PALAKKAD DISTRICT"** is a record of research work done independently by **Muhammad Aslam M.K.,** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

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We, the undersigned members of the Advisory Committee of **Muhammad Aslam M.K.**, a candidate for the degree of **Master of Veterinary Science** in Livestock Production Management**,** agree that the thesis entitled "**LIVESTOCK PRODUCTION SYSTEM OF TRIBES IN ATTAPADY AREA OF PALAKKAD DISTRICT"** may be submitted by **Muhammad Aslam M.K.**, in partial fulfillment of the requirement for the degree.

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***Muhammad Aslam M.K.***

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# *Introduction*

# 1. INTRODUCTION

*"I will give you a talisman. Whenever you are in doubt, or when the self becomes too much with you, apply the following test. Recall the face of the poorest and the weakest man whom you may have seen, and ask yourself, if the step you contemplate is going to be of any use to him. Will he gain anything by it? Will it restore him to a control over his own life and destiny? In other words, will it lead to 'swaraj' for the hungry and spiritually starving millions? Then you will find your doubts and your self melt away."*

(Mahatma Gandhi)

Livestock production is the vital sector which acts as a major source of income to the impoverished rural households throughout the world. Livestock not only provide people with food, income, traction and fertilizer but also act as catalysts that transform subsistence farming into income-generating enterprises, allowing poor households to join the market economy. The increasing contribution of livestock and related industries in poverty reduction is very well recognized while crop farming faces challenges. But, rapid depletion of natural resources, especially common property resources had seriously affected the poor, marginalized and landless people who have depended on these resources for their livestock and their own livelihood.

The Imperial Gazetteer of India, 1911, defines a tribe as a "collection of families bearing a common name, speaking a common dialect, occupying or professing to occupy a common territory and is not usually endogamous though originally it might have been so" (Hunter, 1931). India has the second largest tribal population of the world next only to the African countries, as two hundred and fifty tribal groups live in isolated regions and constitute 8.2 percent of the total population of the country (Anon., 2008a). They differ considerably from other races in language, culture and beliefs in their myths

and customs. The characteristics like primitive traits, geographical isolation and distinct culture, shy of contact with community at large and economic backwardness isolate them from others. Most of the tribal communities are living in remote corners of the country and in hilly forest regions.

The tribal people in their traditional settings are well aware of the values of conserving social, cultural and biological resources. Since generations, they have developed and accumulated knowledge and effective device and methods for conservation, protection and preservation of such value systems. They have evolved means and options in the form of indigenous knowledge and practices such as indigenous animal health care practices that have minimal dependence on external input.

Tribes constitute about 1.14 percent of the total population of Kerala (Anon., 2001a). Attappady is the largest tribal settlement area of Kerala. Tribesfolk of Attappady is the most backward among vulnerable ethnic groups of the state. They have traditional economy depending mainly on land, livestock and forest. Till 1950s, Attappady was considered to be a closed system without any human intervention from outside. Thereafter, a massive immigration of people from the plains to these areas occurred, in search of land for cultivation and for starting plantations. The non-tribesfolk, from Tamil Nadu and from the rest of Kerala, who entered into these areas, adopted the own cropping systems they had been practicing in plains.

Introduction of different styles of farming to the area unknown to its original inhabitants distorted and ruined the low-technology agriculture of indigenous people. In-migrants from the low land who were socially and technologically more advanced than the natives overpowered and dispossessed them. As a result many tribal households lost their land before the ‘land hunt’ strategy of non-tribes folk. (Velluva, 2004)

Various government and non-government organizations (NGO's) have implemented many projects to improve the livelihood strategy of tribesfolk, but hardly succeeded to fetch any result. Now more than 55 percent of the tribes are working as agricultural wage labourers and the remaining depend on forest and livestock for earning survival requirements. Those households that manage to secure a livelihood from their land and livestock are less likely to be poor than those dependent on agriculture wage labourers (Agarwal, 1994). But, nowadays more and more tribal individuals are deserting livestock husbandry due to lower earnings. This may be due to a lack of knowledge of modern cropping and animal husbandry practices besides unawareness about marketing opportunities.

The present study mainly focused on an intensive appraisal of the animal husbandry practices of tribesfolk of Attappady with special attention to breeding, feeding, housing and health care activities. It also aimed to identify and come up with a set of recommendations for formulating future strategies to strengthen the livestock production, thereby strengthening the livelihoods of these tribes.

The specific objectives were to:

a. study the livestock production system prevailing in the tribal area.
b. analyze the economics of tribal livestock production system.
c. identify the areas of scientific intervention in the system to improve its efficiency.
d. evolve a long-term strategy for sustainable livestock production.

# Review of Literature

# 2. REVIEW OF LITERATURE

## 3.1 IMPORTANCE OF LIVESTOCK IN RURAL DEVELOPMENT

Livestock can be an indispensable part of the livelihood systems of poor rural and urban populations in developing countries. Majority of the people living in extreme poverty are rural depending completely or partially on raising livestock. Livestock contribute to the sustainable livelihoods and security of the rural poor in many ways; as natural capital (meat, milk, wool, hide, rangeland, and pasture); source of financial capital (cash, saving, credit, insurance, gifts, and remittance) and social capital (traditions, wealth, prestige, identity, respect, friendship, marriage dowry, festivity).

Gopalakrishnan and Lal (1988) opined that there is an imperative need for the development of integrated livestock production in rural areas involving improvement of genetic make-up, adequate nutrition, health programme, institutional credit facilities and an efficient marketing system.

The rural poor should be motivated to adopt the improved dairy practices. Well planned and regular training programmes may be organised for them. Extension workers and agencies should contact these people more often to persuade them to increase their adoption level of dairy farming practices and provide facilities like supply of good quality semen, concentrates for balanced feeding and improved seeds of fodder crops. (Sheoran and Kumar, 1998).

According to Edmonds *et al.* (2006), Indian economy's strong growth in recent years has given new impetus to long-standing efforts to develop the country's poorest rural areas. Success in rural development efforts in the

country is vital to maintain support for economic reforms and sustaining the nation's growth.

The non-availability of pasture land and culture change are the major reasons for the decline of the pastoral economy and majority of the rural people have given up their traditional occupation, and entered into other jobs. (Mahendrakumar, 2006).

Ali (2007) reported that contribution of livestock to rural employment witnessed declining trends in recent years. This is an emerging issue which needs to be tackled urgently by providing adequate common property resources to ensure them sufficient livelihood opportunity.

### 3.1.1 Tribes and Livestock

Most of the tribal people in Kerala are traditionally engaged in agriculture and animal husbandry activities. They have agrarian economy and depend on primary occupations like cultivation, livestock, hunting, fishing etc.

Intodia and Sharma (1993) reported that there was a wide technological gap in the knowledge of tribal farmers about improved farm practices which indicated poor extension services in the area. They demanded that in tribal areas, high priority should be given for the dissemination of knowledge about improved farm technology. For this purpose, a comprehensive educational programme has to be worked out to improve the knowledge of tribal farmers and better understanding about improved farm technologies.

In tribal areas, livelihood pattern is holistic in nature, i.e., the three major components of livelihood -agriculture, forests and livestock- are

intricately interdependent on each other. The livestock is dependent on green leaves obtained from forests as fodder and the cultivated land is dependent on animal dung used as compost, apart from animals being used for ploughing. (Samal *et al.*, 2003)

The primary occupation indicated by seventy percent of the tribal respondents was cattle rearing (Nandakumar, 2004; Oladeji *et al.*, 2006)

Ranganekar (2006) reported that the livestock management system of tribal people is different from non tribal farmers. Their production system is low input low output system.

Indigenous knowledge is found to be socially desirable, economically affordable and sustainable and involve minimum risk to rural farmers and producers. Nowadays the scientists are seriously examining whether traditional practices of farmers have any answers to the problems of modern agriculture. (Karthikeyan *et al.*, 2006)

Raising the productivity of tribes in agriculture, horticulture, animal husbandry, forestry, cottage, village and small industries and provision of employment in all seasons will go a long way in reducing the incidence of poverty. (Panda, 2006)

The tribes are dependent mainly on agriculture, forests and livestock. But the dwindling forest resources have jeopardized the agriculture and livestock productivity due to shrinking of water resources and poor fuel and fodder supply. The small, marginal, fragmented, un-irrigated and mono crop agriculture holdings and low productive livestock population do not offer adequate opportunities for their livelihood. These factors, therefore, compel

them for migration to nearby towns for subsistence, leaving their productive assets idle. (Anon., 2008b)

## 3.2 SURVEY

Arunachalam and Thiagarajan (2000) studied the constraints in rural livestock farming in Tamil Nadu. Selection of the farmers was made by stratified random sampling technique. Three hundred farmers were interviewed in person with the help of tested questionnaire. The state of livestock farming was studied with respect to the farmers' perception of the prevalence of constraints such as breeding, feeding, health care and marketing of livestock products.

The socio-economic profile, selection, training and constraints of dog keeping in central Kerala were studied by Vijayakumar *et al*. (2004). A multistage stratified random sampling procedure was used by them.

Kannan *et al*. (2006) assessed the socio economic status of Pig farmers in Kerala using a questionnaire and personal interview. The socioeconomic and educational levels of pig farmers and management practices like feeding, housing, breeding and marketing were analysed.

Nair (2007) surveyed the socio-economic status and management practices of the rabbit farmers of the Kamakshy panchayath of Idukki district, Kerala.

Rajaganapathy (2008) studied the socio economic status of the farmers and the livestock management practices of the farmers of industrial area of Kerala.

### 3.2.1 Socio-economic Status of Tribal Farmers

Kannan *et al.* (2006) reported that majority of the pig farmers of Kerala were in the age group of 31 to 50 and those with below 30 years age rarely engaged in pig husbandry activities.

According to Nair (2007), majority of the rabbit farmers in Kamakshy panchayat of Idukki were between the age group of 31 to 50 and majority was post matriculate. The average land holding of most of the farmers were above one acre.

The literacy rate of Attappady was reported as 57 percent (Anon., 2007) and as per the 2001 census that of Kerala state was 90.86 percent, (Anon., 2001c)

Rajaganapathy (2008) stated that 75 percent of livestock farmers of Palakkad district were between the age group of 31 to 50 and majority of the farmers had high school education. Seventy eight percent of the farmers had average land holding of one acre.

### 3.2.2 Livestock Ownership Details

As per a survey conducted by Purushothaman (2005), tribal households of Attappady area owned 3.00 ± 0.44 livestock units and income from livestock sector was only 0.04 ± 0.01 percent of the total income.

Velluva (2004) reported that average family wise ownership of cows and goats were found to be 2.85 and 6.15 respectively.

## 3.3 MANAGEMENT OF LIVESTOCK

### 3.3.1 Housing Facilities

Kokate and Tyagi (1991) reported that 95.5 percent of the tribal farmers possessed separate cattle shed for their animals whereas the rest 5.5 percent tied their animals in their house itself.

Podikunju *et al.* (2001) reported that problem of lack of money was expressed as first priority constraint by tribal farmers to manage the scientific housing for animals. This was followed by the problem relating to lack of knowledge about cheap and scientific housing methods.

Majority of the tribal farmers keep all animals in a single shed which sometimes leads to fight among them and pregnant animals are injured. In most animal sheds floor is Kacha type and all animals were tied with a chain or jute rope. (Meena *et al.*, 2007)

Avinasalingam *et al.* (2008) reported that 66 percent of the tribal farmers had separate cattle sheds whereas and the rest 34 percent kept their animals in open area.

### 3.3.2 Feeding Management

Kokate and Tyagi (1991) reported that 23 percent of the cattle belonging to tribal people survive on grazing alone. Majority of the tribal farmers provide paddy straw, grass and tree leaves to their animals in addition to allowing them for grazing. Only 22 percent tribal cattle owners fed their milch and pregnant animals with concentrates. Amongst concentrates, groundnut cake, linseed oil cake, etc. were common.

The traditional feeding systems, particularly in tribal areas, make maximum use of local resources like crop residues, tree leaves, pods, seeds, etc. (Pradhan *et al.*, 1991).

A study conducted by Komwihangilo *et al.* (1995) in Tanzania revealed that local trees such as *Acacia tortilis*, *Dichrostachys cinerea* and *Ecborium sp*. were utilized by farmers for livestock feeding as indicated respectively by 73%, 40% and 20% of the respondents. But the efforts of conserving many trees and shrubs were, practiced by only 12% of the respondents.

Rangnekar (2006) reported that most of the tribal farmers send their animals for grazing in the proximity of forests and keep the animals in the house only during night. Supplementary feed is given to productive animals only and it is home made mixture.

According to Rangnekar (2006), conventional approaches of advising livestock owners to use balanced concentrates, cultivate high quality fodder crops and feed according to recommended standards have not been very successful. It is found that small changes in traditional systems, using familiar materials and methods are more readily acceptable.

Chatterjee *et al*. (2007) informed that the use of ready mix concentrates was not common among tribal farmers and mineral mixture was fed by very few.

Kavatalkar *et al.* (2007) reported that none of the rural farmers adopted practices like enrichment of poor quality straws by urea due to lack of scientific knowledge. Chaffing of fodder was adopted by 67.4 percent farmers.

Kavana *et al*. (2007) studied that feed supplementation is important for dairy animals that rely on native grasses as basal diet in order to realize high milk yields along the eastern coast of Tanzania.

Farmers in hilly region are totally dependant on the locally available feed resources like oak tree leaves, unclassified grasses grown in the forest area for the feeding of their animals round the year (Meena *et al*., 2007)

According to Tolera and Abebe (2007), dry season feed problem was to conserve the excess forage during the rainy season in the form of hay.

Avinasalingam *et al.* (2008) reported that majority (56 percent) of the tribal farmers provided water to their animals twice a day. Almost all the tribal farmers (98 percent) followed grazing where as only 1.5 of the farmers followed stall feeding. Majority provided water to their animal two times a day.

Rao *et al.* (2008) revealed that no rural farmer was adopting weaning, use of mineral supplement and providing pregnancy allowance. Very few were following the practice of lamb feeding.

### 3.3.3 Breeding Management

Majority of the tribal farmers (76 per cent) could identify a cow in heat by observing the symptoms like bellowing, mounting on other animals, nudging and frequent urination. (Kokate and Tyagi, 1991)

Jabar *et al*. (2000) informed that the mountain specificities such as inaccessibility, marginality and fragility, diversity and niches play crucial role in determining the livestock species and breeds suitable for hilly region.

Awareness of socio-economic dimensions can address the location specific priorities.

Podikunju *et al.* (2001) reported that lack of improved sire was perceived as the most important problem faced by the tribes, followed by lack of knowledge about time of mating.

Bebe *et al.* (2003) reported that in rural areas few number of bulls serve all the female population potentially increasing the inbreeding level.

Farmers within extensive systems of production more commonly use natural service, in contrast with the more intensified farmers who use more A.I (Baltenweck *et al.,* 2004)

Artificial insemination facilities are very scarce available to the farmers for upgrading their local animals in terms of productivity and resistant to diseases. (Meena *et al.*, 2007)

Traditionally tribal farmers are believed in natural breeding practice for animals. Only few individuals follow artificial insemination. (Bebe *et al.*, 2000; Avinasalingam *et al.*, 2008)

According to Ndebele *et al.* (2007), majority of the communal farmers in the Gwayi smallholder farming area of South-Western Zimbabwe practiced uncontrolled breeding, did not own bulls, had no structured breeding season and did not keep records. Poor breeding management, lack of fences and tick-borne diseases were the major constraints of communal cattle production in the area.

A research work conducted at Ethiopia showed that crossbred cows under the small scale management systems had a good reproductive performance than large and medium scale systems. Shortage of feed coupled with poor husbandry and herd health management were important reason for reproductive inefficiency. An appropriate feed resource and reproductive herd health management, a reliable AI service and an appropriate level of husbandry could be the management options to reduce or alleviate some of the prevailing problems. (Mureda and Zeleke, 2008)

Avinasalingam *et al.* (2008) reported that majority of the tribal households (67 percent) could identify whether a heifer is mature for service by observing the symptoms like bellows frequently, tamp over to another animal, smells the vulva or the hinder part of other animals, urinates frequently, shows tendency to remain in close association with bulls.

High cost for artificial insemination, poor results and poor genetic merit are the major disadvantages in rural areas. (Hann, 2008)

### 3.3.4 Management of Young stock

Kokate and Tyagi (1991) reported that the tribal farmers are not only unaware of the merits of colostrum feeding to calves, but also had the misconception that colostrum induces diarrhoea in calves.

Generally tribes did not practice navel cutting and it is left to fall off itself naturally. ( Kokate and Tyagi, 1991; Avinasalingam *et al.*, 2008)

Avinasalingam *et al.* (2008) reported that 82 percent of the tribal farmers supported colustrum feeding to new born calves.

### 3.3.5 Health Care Management

Swaleh (1999) reported that lack of transport, limited availability of modern drugs and vastness of working territory as the major problems affecting the efficiency of veterinary services in rural areas.

According to Chatterjee *et al.* (2007), 55 percent of the animals in rural Bengal showed energy and protein deficiency and around 15 percent animals showed severe energy deficiency.

#### *3.3.5.1 Prevalence of Diseases*

Morse *et al.* (1988) studied the climatic effect on the occurrence of clinical mastitis and there was positive correlation between the temperature humidity index and occurrence of diseases.

Kanistanon (1997) studied the effect of environmental variables on disease outbreaks and found that temperature and relative humidity had effect on occurrence of bovine salmonellosis.

#### *3.3.5.2 Ethno-veterinary Practices*

Kokate and Tyagi (1991) observed a change in the outlook of tribes towards the treatment of animals due to the impact of urbanisation and veterinary facility being available nearby. Thirty percent of the respondents were seeking the help of a veterinarian, at least after using indigenous medicines.

Sunil (2001) studied the traditional belief system in dairy husbandry among the tribes of Attappady area and documented the ethno veterinary practices prevailing among them.

According to *Ghotge et al.* (2002), communal knowledge and innovation are an integral part of the day to day healing and management practices of farmers in all areas and over 80% of farmers continue to use these because they are easily and quickly available, especially in remote villages. However, this knowledge is today rapidly being lost.

The Raji tribal community of Kumaon Himalaya is rich in ethno-biological knowledge and this knowledge is being transmitted from one generation to another. (Negi *et al.*, 2002)

Tribes prefer indigenous remedies because they were available freely from the nearby forest or in the vicinity of the village. Since the government veterinary hospitals are usually far away form the village, it is difficult to carry the sick animals to the hospitals. They were found to be satisfied with the performance of the local healers, who prove to be quite efficient in offering treatment. (Misra and Kumar, 2004)

With respect to prevention of animal diseases, majority of farmers are not aware and only 26.66 percent farmers know about vaccinations. (Meena *et al.*, 2007)

According to Avinasalingam *et al.* (2008), 90 percent of the tribal cattle owners got their animals treated by priest or indigenous medicines. Only 2 percent contacted veterinarian when their animal fell sick. Majority of the tribal farmers (97 percent) did not vaccinate their animals against diseases where as vaccination was adopted by 3 percent. Most of the farmers did not practice deworming among calves.

### 3.3.6 Lactation Yield of Animals

Average milk yield in the Udhamsingh Nagar district of Uttaranchal from indigenous cows was found to be 934.21 litres. (Bardhan *et al.*, 2004).

Chatterjee *et al.* (2007) found that average milk production of cows in the old Alluvaial zone of West Bengal was 4.0 ± 0.45 Kilogram daily

### 3.3.7 Goat Husbandry in Rural Areas

According to Reddy (2003), the tendency of the tribes of Andhra Pradesh was to take up goat-keeping and to become full-fledged agriculturists, due to a number of reasons viz., they feel that wealth in cattle is highly volatile or unstable move over, the cattle are less disease-resistant, require better grazing, more water and shade. On the other hand, goats are more disease-resistant, can tolerate the scarcity of fodder and water, particularly during the drier season.

The landless are better represented among sheep and goat producers than among dairy producers. Reliance on sheep and goats may reflect a decline in the common resources on which landless households and smallholders depend. Goats are able to survive on degraded land where cows would not survive.

Small ruminant production, in the context of sustainable livelihood of the poorest is facing a number of grave problems in India. The important ones are pressure on fodder resource base, inadequate veterinary health services, lack of adequate focus on genetic improvement, reduced access to credit and insurance, lack of efficient marketing mechanisms, poor inter-departmental coordination. (Anon., 2005)

Stephen *et al*. (2005) reported that Attappady black goats are mainly reared by the tribes of that area and these are maintained extensively on grazing. These goats are mainly black in colour with bronze coloured eyes. All the herds in the area were stationary and maintained entirely on an extensive grazing/browsing system. Concentrate feeding was not practiced at all.

According to Nedumchezhian and Thirunavakarashu (2006), in a mixed farming system consisting dairy cows and goats, the number of goats has significant impact on the gross income from the unit.

Husbandry practices like confinement; improved sanitation and ventilation of pens; and improved feeding that will lead to increased daily weight gain in animals could increase the frequency of selling marketable animals thus further increasing the total small ruminant market value. (Clottey *et al.* 2007)

Poor and socially disadvantaged households tend to own low quality livestock (goat) rather than cow or buffalo and the holding size was one to three goats per family. (Dey *et al.* 2007)

Safari *et al.* (2008) informed that the sustainability of the goat systems in Tanzania is vulnerable as they require continuous supply of new blood either through introduction of bucks or Artificial Insemination. There was also a need to establish workable buck circles and elite buck stations.

### 3.3.8 Marketing of Livestock Produce in Rural Areas

Chipeta (2003) analysed the livestock produce market of rural farmers of Bangladesh and reported the farmers receive only 50 percent of the final

consumer prize and rest 30 to 40 percent gained by the traders who transport the animals or products to the market.

Study conducted by Mburu *et al.* (2007) in Kenyan highlands showed that the milk cooperatives were not competitive in milk pricing and the farmers should utilize the other available milk marketing channels for earning more income.

Marketing of goat is under the hand of unorganized sector and middleman oriented. Goats from villages were sold to middleman or butcher or in the local goat market that go to the slaughterhouses of organized or unorganized sector. (Dey *et al.*, 2007)

Musemwa *et al.* (2007) opined that the formation of small farmer groups and associations has the potential to increase the participation of small scale cattle farmers in formal markets. Formation of cattle marketing groups lower transaction costs, increase access to information and increase participation into formal markets. By aggregating into larger associations such as inter-group associations, small scale farmers have the potential to achieve even greater economies of scale in accessing services, information, infrastructure and markets.

A study conducted by Dossa *et al.* (2008) in Germany showed the existence of an important market potential for small-scale local goat production in Southern Benin. Proper flock management including feeding, health and selection; combined with effective marketing can significantly contribute to increase overall returns from small-scale goat production.

According to Rao *et al.* (2008), shepherds in the rural areas were exploited by middle men or butchers. Majority of the farmers sell their stock

to middle men without any body weight basis. Failure of co-operatives and backwardness of sheep farmers are the twin causes for exploitation. Strengthening of co-operatives and contract farming can help the farmers in a big way to come out of the clutches of middle men.

Patil (2008) reported that the collective marketing strategy evolved for tribes under the guidance of MITTRA (an NGO) in Maharashtra was proved to be very effective.

## 3.4 SCIENTIFIC MANAGEMENT OF LIVESTOCK

The concentrate supplementation in the diet of goats will improve the body weight gain and also facilitates optimum availability of nutrients (Prache *et al*., 1990; Morales *et al.*, 2000). However, the response varies widely depending upon the level and nature of supplement, breed of the animals and environmental conditions.

Increasing live weight gain in milking cows with higher concentrate input was observed by Biwott *et al.* (1998).

The experiment conducted by Chaturvedi and Harabola (2000) revealed that average weight gain of the animals kept on continuous grazing without supplementing any concentrate, those kept on stall feeding on similar grasses of field and was kept on stall feeding through cut and carry method and supplemented concentrate at the rate of 1.0 percent of animal body weight were 12.5, 29.6 and 59.8 kg respectively.

Clottey *et al*. (2007) proved that the introduction of animal health care services to small ruminant farmers increased the volumes of marketable

animals they presented by 22 percent which consequently projected the total market value up by 34 percent.

Karim *et al.* (2007) after a study conducted in Rajasthan reported that the growth performance of goats was better under cafeteria system of feeding management than grazing with 1.5 or 2.5 % of body weight of concentrate supplementation. The feed conversion efficiency was also increased. However, slightly higher feed cost per kg. meat was incurred.

A study conducted by Karunanithi *et al.* (2007) proved that sheep fed with 250 gram concentrate daily under intensive system of management was beneficial in terms of increased weight gain and better return than those fed with 150 gram concentrate daily.

Karunanithi *et al.* (2007) reported that the supplementation of concentrate feed at the rate of 250g/day/animal to the kids maintained under intensive system of management was beneficial in terms of weight gain and reduction in cost of production.

### 3.4.1 Economic Analysis of Livestock Rearing

George *et al.* (2000) analysed the economics of cattle rearing in south Kerala and found that the majority of the farmers used family labour and the enterprise was profitable only at net cost. The major cost was accounted for feed cost especially concentrates. Due to the high cost of feed the farmers are unable to feed the animals according to the standards.

Reddy *et al.* (2000) calculated the economics of dairy cum crop farming systems of peri-urban areas of Andhra Pradesh. The critical variables influencing the annual net income of the farmers are education, farm size, herd

size, physical assets, and gross income from both agriculture and dry enterprise. The cause and effect of each independent variable on annual income per household per unit area in the agricultural year were studied.

Krishna and Prasad (2004) analysed the economics of milk production in crossbred cows of southern Telengana region of Andhra Pradesh and found that milk production is profitable in the study area and farmers are getting remunerative price for their milk.

Aitawade *et al*. (2005) analysed the economics of milk production from the crossbred cows in Akola district of Maharastra state. They used simple tabular method of analysis to calculate the economics and the total maintenance cost, gross income, net income, per litre cost of milk production and output input ratio were used as the tools.

Singh and Agarwal (2007) worked out the economics of milk production in Imphal west district of Manipur and found that the net returns from milk production per local milch cow were negative except for the large herd size category.

## 3.5 GENDER CONCERNS IN RURAL LIVESTOCK REARING

Women handle most of the critical jobs like feeding, milking, care of new born and administration of medicine *etc*. in dairy farming. Women accounted for 93 percent of total employment in dairy production. (Anon., 1991)

In a study conducted by Raj *et al*. (1999), it was observed that the rural women by spending only two hours a day in poultry farming without

overloading themselves could reap a good return which helped them to raise their standard of living.

In view of the crucial role of women the policy strategy should ensure women farmers' participation in all stages of the planning cycle for livestock production and marketing and in extension education activities (Jabar *et al.*, 2000)

While land ownership is entirely in the hands of men, livestock are more often owned by women. Women mainly rear cows, goats and poultry to make an additional income. Eighty three percent of female headed households and 85.7 per cent of married women with a homestead own livestock and poultry (Chipeta, 2003).

According to Das (2003), poor tribal women of Orissa showed immense potential to live with the Self Help Group (SHG) philosophy.

Kala and Verma (2003) after conducting a study among the tribal women of Bihar showed that many of them had started dairying husbandry to supplement the family income and they believed that this enterprise had high margin of profit. They were motivated by their family members for this work.

A study was carried out by Torimiro and Adetaya (2004) to determine the nomadic heads perception of the children's involvement in animal rearing critical to entrepreneurial activities among some selected communities in Osun State, Nigeria revealed that ad 87 percent of the household heads had a very high favorable perception of their children's involvement in animal rearing activities.

According to Mariamma (2004), there was not any gender and class discrimination among the tribes of Attapady and the tribal men share work with the women equally in collecting firewood, bringing water, and grazing cattle.

Ramkumar *et al.* (2004) found that rearing one or two cows for milk is an important source of livelihood for landless women in Pondicherry in south India. Possession of dairy animals gives financial security, status, self-confidence and an opportunity to leave some control over their lives. Preferring this alternative to exhausting agricultural labour, the women are self-employed, with flexible working hours and maintain better health as a result.

Farinde and Ajayi (2005) opined that empowerment of women farmers through adequate training in areas like construction of modern livestock houses, compounding of livestock feed, breeding of livestock and general livestock or poultry health management needs in livestock production is a predisposing factor to sustainable livelihoods.

## 3.6 CONSTRAINTS IN RURAL LIVESTOCK PRODUCTION

Prasad and Roy (1988) reported that the rural people had very low level of knowledge about credit facilities available at bank and its lending procedure. The agricultural labourers had relatively lower level of knowledge than small and marginal farmers. Therefore, the agencies should launch educational programmes for educating rural people in general and agricultural labourers in particular with respect to credit facilities.

Majority of the tribal people have low level of knowledge about animal husbandry programmes, they were selling away their cattle which supplied by

Government agencies as they could not maintain properly and also to get the money for household purposes by selling. The extension officials after distributing the animals, showed less interest in guiding and advising the farmers in cattle management, and also the veterinary medical aid facilities in the area were very meager. (Ratnakar and Reddy, 1991)

Podikunju *et al.* (2001) reported that high prices of concentrate as the top most constraint perceived by the tribal farmers.

A study conducted by Misra and Pal (2003) in rural Bengal proved that inadequacy of technical knowledge; poor organizational support and lack of financial resources were the major constraints for dairying.

Nataraju and Channegowda (1984), opined that provision of financial assistance through banks and other institutions to all the categories of dairy farmers, measures to make concentrates available to farmers at reasonable rates and for securing green fodder and supplying at reasonable cost and effective extension education activities were required to improve the dairy husbandry production system of poor dairy farmers.

According to Upadhyay (2000) factors like poor genetic potential of the animals, mal and under nutrition, lack of adequate health care, poor management practices and harsh environmental conditions contribute to lower productivity. Weak research-extension linkage due to poor mobility of staff, lack of trained personnel and financial constraints are impediment in transfer of technology in the field of animal husbandry and dairying.

To a large extent, the aggregate size of livestock population in India is determined by free availability of crop-residue and fodder from both private land as well as common property resources (Chawla *et al.*, 2003).

No choice of production system, weak support services and high mortality, lack of access to land, labour constraints to grazing, cost of feeding concentrate too high for the production to be profitable and lack of sustainability are the main constraints of dairy production in rural areas. (Chipeta, 2003)

Easy access to and free choice of loans to women SHGs gave independence from private money-lenders. A sense of self-confidence by women is witnessed. (Das, 2003)

Zonal fencing of private ranches aimed to control the transfer of animal diseases in Botswania had reduced the size and quality of rangeland resources to the disadvantage of the poor pastoralists. (Timan *et al.*, 2004)

Water and fodder are critical constraints for livestock development in semi-arid areas. Most small, marginal and landless farmers depend on common pool resources (CPR) such as fodder and water for grazing their animals. Access to these resources is becoming increasingly restricted, which results in livestock rearing becoming a non-viable livelihood option for poor families. (Anon., 2005)

Kumaravel and Krisnaraj (2006) opined that lack of credit facility, inadequate input distribution, inadequate service at veterinary sub-centres, inadequate demonstrations, inadequate knowledge about symptoms of various infectious diseases are the most serious constraints faced by the rural farmers.

Microfinance is an important component of the programme enabling the tribal families to attain a greater degree of self-sufficiency. Sahabhagi Vikas Yojana (SVY) in Maharastra, mainly focused on livelihood promotion and was

implemented through village level organisations called Gram Vikas Mandals. This was found to be very much effective in improving the quality of life. (Rao, 2006)

According to Akter *et al.* (2007), domestic shocks or stresses were identified as the most important cause for a decrease in numbers of livestock, followed by pest and disease problems. The loss of access to grazing/fodder has resulted both from natural factors like the drought as well as man made factors like CPR related rules and regulations such as privatization of commons and overgrazing.

According to Chinogaramombe *et al.* (2008), the major constraints faced by smallholder dairy farmers in the semiarid areas of Zimbabwe were shortage of feed and transport. Smallholder milk producers are recommended to resort to lower-cost and locally available multipurpose trees and agro-industrial by-products to augment the inadequate grazing resources.

The bottlenecks for livestock production in rural areas are absence of timely and suitable veterinary services within easy reach, appropriate credit delivery systems and appropriate infrastructure such as roads, communication facilities, electricity, *etc*. (Jayapadma and Johnson, 2008).

## 3.7 SUGGESTIONS FOR IMPROVEMENT OF THE SYSTEM

Reddy and Prasad (2000) reported that development of community fodder plots, community dairy farming and community marketing channels and credit source can be established for improvement of input-output profitability of poor rural farmers.

According to Upadhyay (2000), constraints of increasing production and productivity of dairy animals need to be prioritized at agro-eco regional

level because production problems are unique to each agro-ecological region. Experiences gained in different regions can be greatly utilized in fine -tuning of site-specific technological innovations.

Proper feeding and health care of young calves to reduce calf mortality; improvement in genetic potential of dairy animals through selection, grading up and cross-breeding, improving the reproductive efficiency of dairy animals; supply of nutritious quality fodder throughout the year and availability of quality animal feed at reasonable price, development of proper health strategies to overcome various health problems including preventive measures, proper housing and other management practices to avoid heat and cold stresses; availability of institutional credit facility and development of marketing infrastructure are the issues which need to be tackled for enhanced productivity.

# Materials and Methods

# 3. MATERIALS AND METHODS

## 3.1 SELECTION OF THE STUDY AREA

### 3.1.1 Location

The study was carried among the livestock farmers of the tribal belt of Attappady, which is one of the largest tribal settlement areas of Kerala.

### 3.1. Meteorological Data

Climatological parameters such as maximum and minimum temperature, humidity and annual rainfall of the area were obtained from the Hydrology division of Attappady Hill Area Development Society (AHADS).

## 3.2 RESEARCH METHODOLOGY

The research work was conducted in an action research mode among the tribal livestock farmers of Attappady area.

### 3.2.1 Survey

A survey work was conducted to study the livestock management practices followed by the tribal farmers of the area. By employing stratified random sampling, 106 tribal livestock farmers from three Gram panchayats (Agali, Pudur and Sholayoor) were selected with the help of milk cooperative societies and veterinary institutions functioning in the area. The Gram Panchayats formed the primary strata and the hamlets were selected randomly from these Panchayats. Using a well structured schedule, data pertaining to the

socio-economic status, livestock production trends and management practices were collected and analysed.

#### *3.2.1.1 Profile of Tribal Farmers*

Data regarding the socio-economic status, educational level, occupational distribution, per capita land availability and agricultural practices were collected and evaluated.

#### *3.2.1.2 Livestock Details.*

Total livestock population of the area, trends in livestock population over the last few years, herd size, species wise and breed wise possession of livestock by individual families and purpose for rearing livestock were analysed and documented.

#### *3.2.1.3 Housing Management*

The types of housing facilities provided to the animals were studied. The mode of construction of roof, walls and floor, availability of dung pit and drainage facility, and the hygienic standards were evaluated and documented.

#### *3.2.1.4 Feeding Management*

Types of feed, methods of feeding, grazing practices, fodder preservation and the watering system followed by the farmers were studied in detail.

### *3.2.1.5 Breeding Management*

Breeding activities of livestock present in the area, heat detection, type of breeding, pregnancy diagnosis, care during pregnancy and parturition were analyzed and documented.

### *3.2.1.6 Management of Young stock*

Care and management of young ones such as cutting of navel cord, colustrum feeding and milk feeding were documented.

### *3.2.1.7 Lactation Details*

Data pertaining to the method of milking, frequency of milking and average yield per animal were recorded.

### *3.2.1.8 Health care Practices*

Adoption of scientific practices followed by the tribal farmers, prevalence of diseases among the livestock, treatment strategies, deworming, ethno-veterinary practices and attitude towards vaccination were documented.

### *3.2.1.9 Marketing Facilities Available*

Mode of marketing the livestock produces, average price obtained for the products, and value addition strategies were analysed.

### 3.2.2 Scientific Intervention

A sample of twelve tribal families engaged in livestock rearing activities with respect to cattle and goat were selected for the study. They were divided in to two groups of six families each and the cattle and goats possessed by the families in the first group were maintained under traditional housing, feeding and health care practices prevailing in the study area (control group). The second group (test group) were provided with the management practices as per the recommendations of the package of practices recommendations of Kerala Agricultural University (Anon., 2001b), for a period of six months and monitored.

#### *3.2.2.1 Items of Observation:*

a) Body weight of animals
b) Birth weight and daily weight gain of calves
c) Daily milk production and lactation yield of cows.
d) Milk composition; Fat percentage and Solid Not Fat (SNF).
e) Body weight of bucks at one year age
f) Disease occurrence
g) Marketing Pattern
h) Input costs and return from livestock rearing

#### *3.2.2.2 Economics of Livestock Rearing*

The data pertained to the input costs like feed and fodder requirements, maintenance cost and gross and net returns were collected. Simple tabular method of analysis is used for the benefit cost analysis of milk production in both the test and control groups (Aitawade *et al.*, 2005).

## 3.3 CONSTRAINTS AND SUGGESTIONS

Constraints in the livestock production system of the tribal farmers and areas for scientific intervention were identified and suggestions were put forward to evolve a long-term strategy for sustainable livestock production in the area.

## 3.4 STATISTICAL ANALYSIS OF THE DATA

The data collected by the survey was analysed statistically as per Snedecor and Cochran (1994). The results of the experimental trial was processed and analysed by students‘t’ test utilizing the Statistical Package for the Social Sciences (SPSS).

# Results

# 4. RESULTS

## 4.1 PROFILE OF THE STUDY AREA

### 4.1.1 Geography

Attappady is situated in the Western Ghats, between 10°55'10'' and 11°14'19'' north latitude and 76°27'11''and 76°48'8''east longitude. Attappady stretches from Mukkaly to Anakatty in the west-east direction and Thazhemully to Muthikkulam in the north-south direction. It is bordered by Palakkad taluk in the south and Karimba, Pottessery and Mannarkad revenue villages of Mannarkad taluk and Ernad taluk of Malapuram district in the West. Nilgiri and Coimbatore districts of Tamil Nadu are situated on the north and east respectively. (Fig. 1, 2)

The terrain of Attappady is marked by hills and valleys, with high mountains and narrow valleys in the western half. The area lies between two ranges of the Western Ghats with a general slope towards the north-east. The northern boundary of Attappady block lies at an elevation of around 2300 m in the Nilgiri peak, from where it decreases along the south-west and later climbs up to 2000 m at Muthikulam.

Attappady has a total geographical area of 745 square kilometers of which 444 sq. km is forest land, 170.6 sq. km is waste or fallow land and the rest 130.4 sq. km is used for agricultural purposes.

### 4.1.2 Climate and Rainfall

The climatology data obtained for the period from April 2007 to March 2008 is depicted in Table 1.

The observed mean maximum temperature ranged between 26.22°C (June) to 33.8°C (April) and mean minimum temperature ranged between 14.71°C (January) to 23.1°C in Agali region. Average humidity was found to be 77.26 percent in Agali and 77.27 percent in Sholayoor. Mean rainfall during the period was 137.13 centimeter (cm) in Agali and 199.71 cm in Sholayoor.

**Fig. 1 Location Map of Study Area**

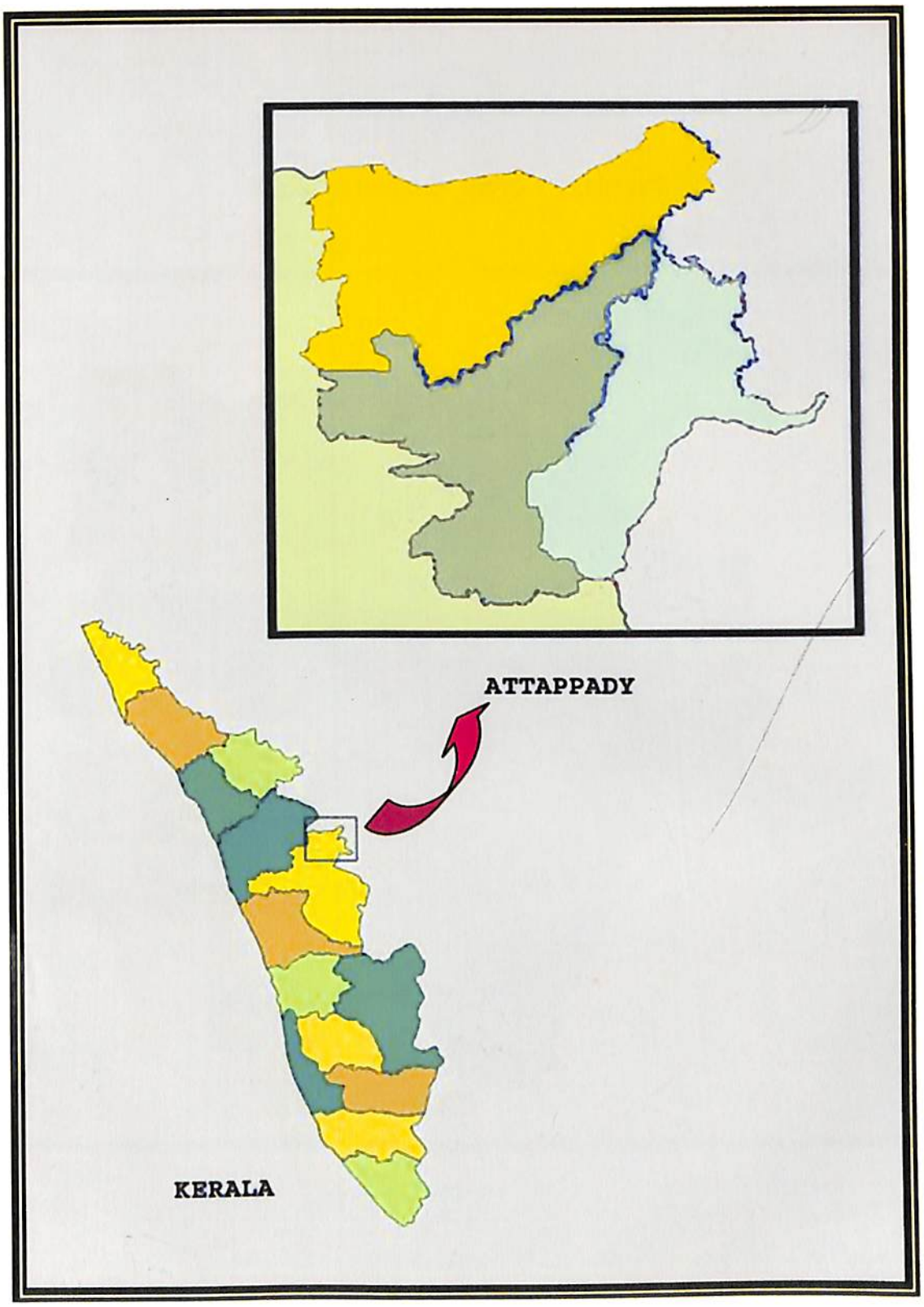


**Fig. 2 Attappady Block Panchayat**

**Table 1. Weather Parameters**

| Month | | Agali | | | | Sholayoor | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Max. Temp ($^0$C) | Min. Temp ($^0$C) | Humidity (%) | Rainfall (cm) | Max. Temp ($^0$C) | Min. Temp ($^0$C) | Humidity (%) | Rainfall (cm) |
| 2007 | April | 33.8 | 22.12 | 64.13 | 99.6 | 30.03 | 19.73 | 54.65 | 92 |
| | May | 30 | 23.1 | 67.23 | 42.2 | 28.29 | 18.9 | 57.45 | 110 |
| | June | 26.22 | 18.68 | 74.17 | 315.9 | 28.73 | 19.13 | 80.1 | 302 |
| | July | 27.08 | 21.77 | 87.9 | 150 | 26.77 | 18.87 | 78.74 | 293.5 |
| | August | 27.05 | 22.03 | 83.61 | 139.2 | 28.55 | 19.19 | 83.03 | 368 |
| | September | 27 | 21.77 | 82.17 | 70.5 | 28.3 | 18.5 | 83.37 | 231 |
| | October | 28.53 | 20.69 | 80.61 | 310.1 | 27.39 | 18.61 | 80.26 | 275 |
| | November | 29.42 | 17.62 | 74.6 | 69.3 | 28.23 | 18.97 | 82.8 | 240 |
| | December | 28.44 | 17.18 | 77.03 | 86.6 | 29.03 | 18.9 | 82.32 | 118 |
| 2008 | January | 28.95 | 14.71 | 76.97 | 2.2 | 29.35 | 19.29 | 82.77 | 0 |
| | February | 30.22 | 17.69 | 78.69 | 114 | 29.07 | 19 | 79.24 | 98 |
| | March | 30.03 | 19.02 | 80.03 | 246 | 28.84 | 18.61 | 82.55 | 361 |
| | Mean | 28.90 | 19.70 | 77.26 | 137.13 | 28.55 | 18.98 | 77.27 | 199.71 |

### 4.1.3 Administration

Attappady is situated at distance of 75 kilometers from the district headquarters of Palakkad. Attappady block consists of three gram panchayats namely Agali, Pudur and Sholayoor with 20, 12, and 13 wards respectively.

### 4.1.4 Demographics

The population of Attappady was 66,171 (2001 census report, Kerala) of which 27,121 belong to scheduled tribes (Table 2). Tribes constitute about 41 percent of total population. Tribal people of Attappady comprises mainly of three ethnic groups, viz. *Irula, Kurumba and Muduga.*

*Irula* is the numerically and socially dominant tribal group of Attappady. They occupy 84 percent of total hamlets in the area. They are of Tamil origin and derived their name *Irula* from their pitch black complexion. Hunting and gathering, trapping of birds and animals, shifting cultivation, animal husbandry and pastoralism were their traditional occupations. Presently their major source of income is wage labour. Those who possess small plots of land near their hamlets perform dry land agriculture, mainly indigenous grains and cotton.

Following *Irula, Muduga* is the second largest tribal group. The name *Muduga* is derived from the practice of carrying their children on their 'Muthuku' (back). They live in clusters with twelve or so households in each settlement. They consider themselves superior to *Irulas* and *Kurumbas*. Their occupations include agriculture, hunting and fishing.

*Kurumbas* were the earliest group of tribes to settle in Attappady. They climbed down the Nilgiri hills and settled in the northern area of Attappady.

They have 19 hamlets spreading across the catchment area of Bhavani River. *Kurumbas* were shifting cultivators and food gatherers. They have vast knowledge of ethno-veterinary practices.

### 4.1.5 Hamlets

The tribes live in hamlets which is a collection of few families of same community in a place. In local language this is called as '*Ooru'*. There are a total of 183 hamlets in Attappady, of which 140 belong to *Irulas*, 24 belong to *Mudugas* and rest 19 belong to *Kurumbas*. *Irulas* possess 84% of the hamlets, followed by *Mudugas* (10%) and *Kurumbas* (6%). The number and distribution of hamlets in each Panchayat is presented in Table 3.

**Table 2. Population Details (2001)**

| Category | Population | Percentage |
|---|---|---|
| Scheduled Tribe | 27121 | 41 |
| Scheduled Caste | 3024 | 4 |
| General | 36026 | 55 |
| Total | 66171 | 100 |

**Table 3. Number of Tribal Hamlets in Attappady**

| Panchayat | *Irula* | *Muduga* | *Kurumba* | Total |
|---|---|---|---|---|
| Agali | 53 | 18 | 0 | 71 |
| Pudur | 43 | 5 | 19 | 67 |
| Sholayoor | 44 | 1 | 0 | 45 |
| Total | 140 | 24 | 19 | 183 |

### 4.1.6 Livestock Population

As per the livestock census 2007, there were 15803 cattle, 111 buffaloes, 18567 goats, 463 pigs, 33936 fowls and 175 ducks in Attappady. Panchayat wise details and trends in livestock population for the last four censuses are depicted in Table 4 and Fig. 3, 4 & 5.

### 4.1.7 Veterinary Institutions

Eleven veterinary institutions, one goat farm, one dairy extension office, one milk chilling plant and 15 milk co-operatives were functioning in the locality (Plate 1). Details of the institutions and vacancy status are given in Table 5.

Government goat farm situated at *Kottathara* was mainly meant for conserving Attappady black breed of goat. Details are discussed under the heading 'management of small ruminants'.

**Table 4. Livestock Population**

| Species | 1996 | | | | 2003 | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Agali | Pudur | Sholayoor | Total | Agali | Pudur | Sholayoor | Total | Agali | Pudur | Sholayoor | Total |
| Cattle | 9736 | 6392 | 9164 | 25292 | 8952 | 5413 | 4662 | 19027 | 6780 | 3906 | 5117 | 15803 |
| Buffalo | 474 | 472 | 868 | 1814 | 200 | 46 | 14 | 260 | 79 | 15 | 17 | 111 |
| Goat | 7369 | 4655 | 6178 | 18202 | 5710 | 4822 | 7422 | 17954 | 6225 | 5056 | 7310 | 18591 |
| Sheep | 41 | 22 | 48 | 111 | 0 | 0 | 156 | 156 | 0 | 0 | 177 | 177 |
| Pig | 75 | 2 | 17 | 94 | 227 | 0 | 351 | 578 | 48 | 0 | 415 | 463 |
| Poultry | 20030 | 6642 | 14378 | 41050 | 16930 | 6976 | 8624 | 32530 | 8587 | 7975 | 9031 | 25593 |
| Duck | 81 | 42 | 47 | 170 | 159 | 24 | 0 | 183 | 15 | 16 | 0 | 31 |
| Total | 37806 | 18227 | 30700 | 86733 | 32178 | 17281 | 21229 | 70688 | 21734 | 16968 | 22067 | 60769 |

**Table.5 Veterinary Institutions in Attappady**

| Institutions | Number | Vacancy of officers |
|---|---|---|
| Veterinary Hospital | 1 | 2 |
| Veterinary Dispensary | 2 | 1 |
| Govt. Goat Farm | 1 | 1 |
| I.C.D.P Sub-centres | 8 | 3 |
| Dairy Extension Office | 1 | 1 |
| Milma Chilling Unit | 1 | 0 |

**Fig.3 Livestock Population of Attappady**

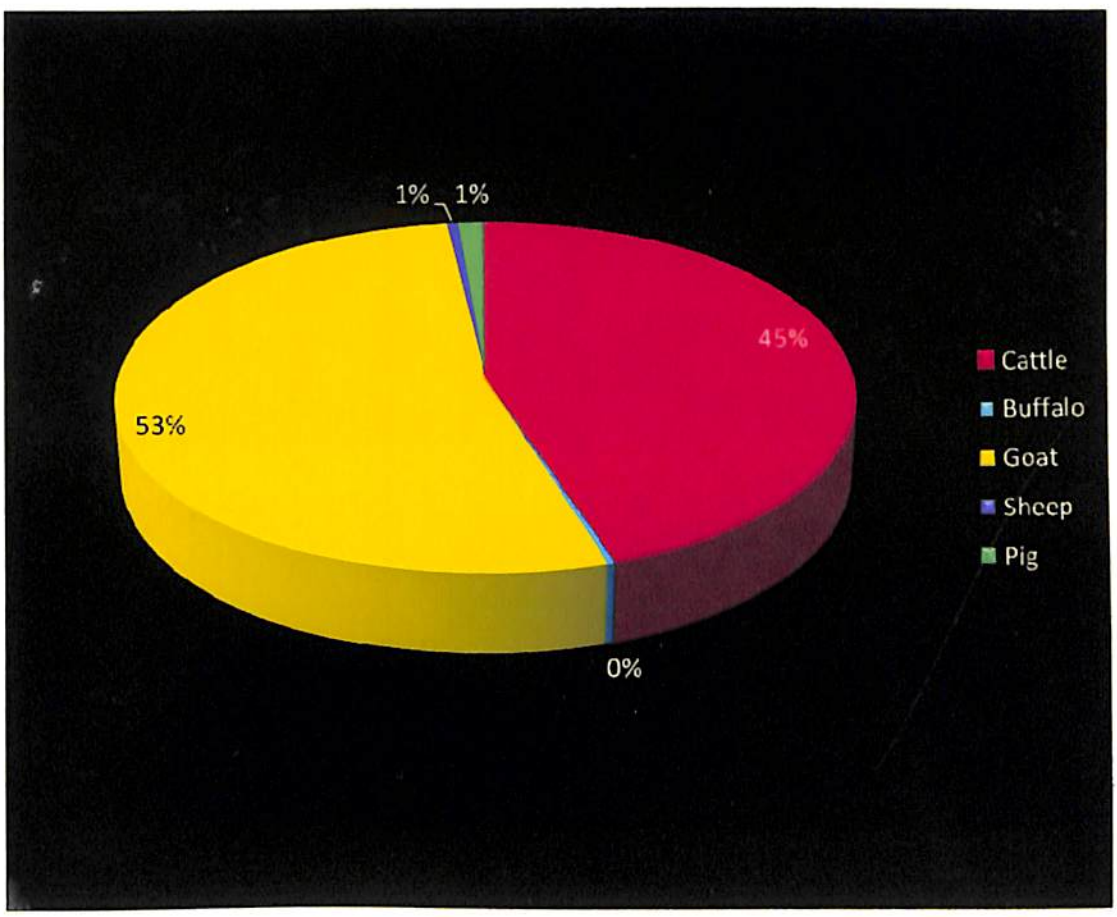
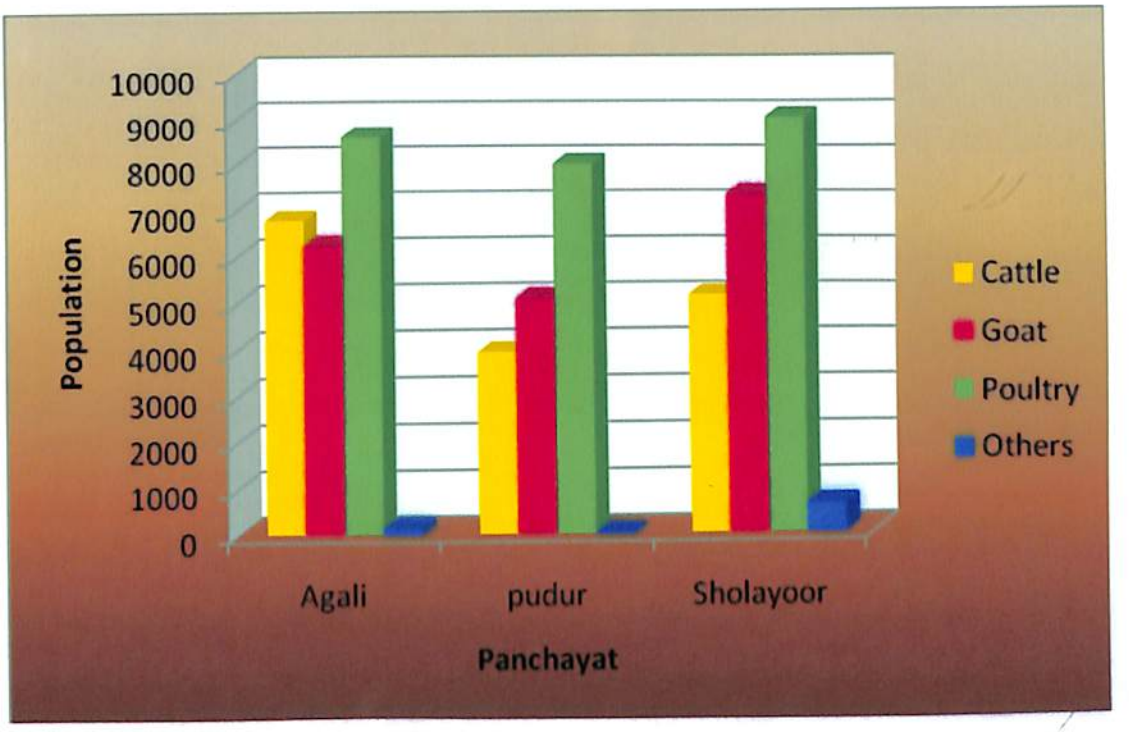


**Fig.4 Livestock Population (2007 Census)**



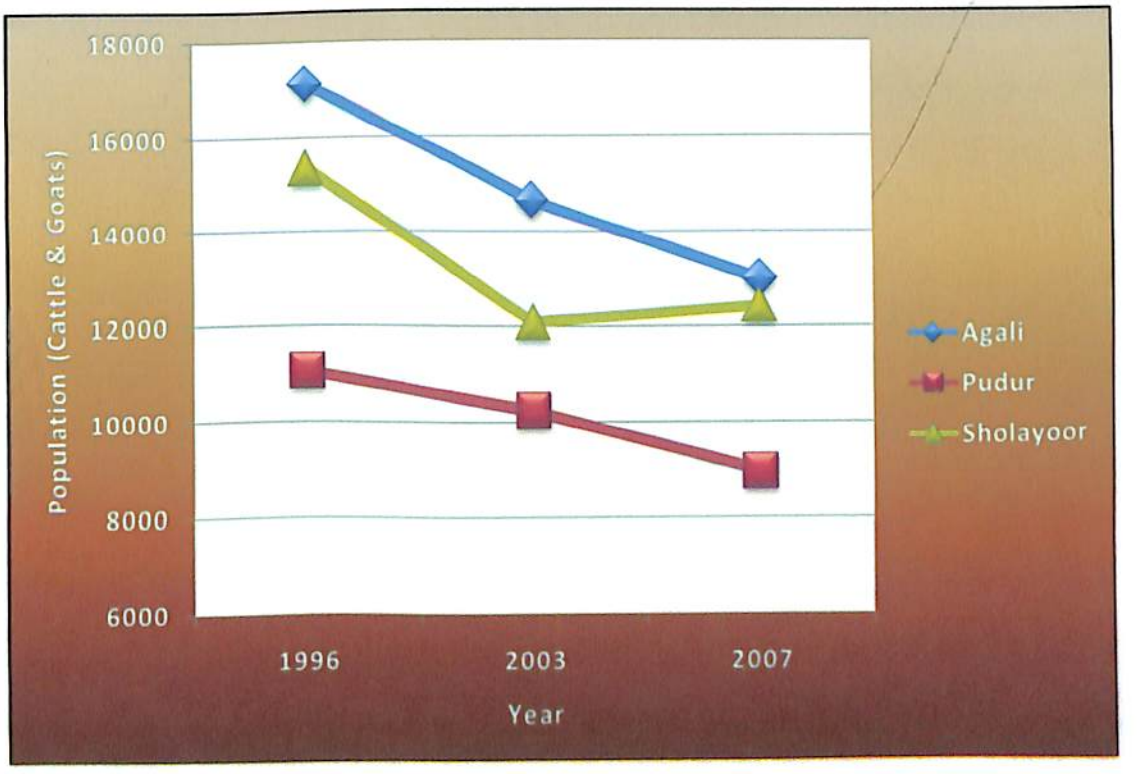




**Fig.5 Trend in Cattle and Goat Population**

A

B

C


D

E

Plate 1. Major Veterinary institutions in the area

A. Veterinary Hospital, Agali

B. Veterinary Dispensary, Pudur

C. Veterinary Dispensary, Sholayoor

D. Milk Chilling Unit, Milma

E. Govt. Goat Farm, Kottathara

## 4.2 PROFILE OF TRIBAL LIVESTOCK FARMERS

### 4.2.1 Socio-economic Status

In order to evaluate the socio economic status of tribal farmers of Attappady, information was collected from 106 respondents regarding their age, educational status, occupation, family members, land holding etc. from all Panchayats under the scope of the study and analysed.

The survey revealed that majority of tribal farmers (60.24%) were middle aged (between 30-50 years). Only 11.31% of the total farmers were youngsters. In Pudur panchayat the contribution of youngsters in dairying was zero. The panchayat wise and age wise distribution of tribal livestock farmers are presented in Table 6 and Fig. 6 and 7.

#### *4.2.1.1 Gender wise Distribution*

Among the tribal farmers of Attappady, 49.30% were females. The percentage of female farmers was highest in Pudur panchayat (54.84%) and lowest in Sholayoor (45.45%). In Agali, it was found to be 47.62%. (Fig. 6)

#### *4.2.1.2 Educational Status*

Farmers were classified on the basis of education as illiterate, primary level and high school level. As per the findings, 71.52% of tribal farmers were illiterate with out any formal education. Illiteracy was more prevalent in Sholayoor and Pudur panchayats, while in Agali panchayat it was comparatively less (52.38%). Average number of years of schooling among the farmers in Agali, Pudur and Sholayoor panchayats were 3.75±0.67,

1.6±0.62 and 1.2±0.45 respectively. Panchayat wise literacy and educational details are presented in Table 6 and Fig.9.

#### *4.2.1.3 Occupational Distribution*

The primary occupation of farmers was categorised as labour, agriculture, animal husbandry, milking, government employee and others. Of the total population, 56.95% were working as labourers and 34.83% were depended upon agriculture for their primary income. Only 4.18% of the total population considered animal husbandry as their primary occupation. Among the three Panchayats, Agali stood first in animal husbandry activities with involvement of 9.52% people. People involved in animal husbandry activities as primary occupation in Sholayoor panchayat was 3.03% and none were involved in Pudur panchayat. Panchayat wise data regarding occupation is given in Table 6 and Fig.8.

#### *4.2.1.4 Family Details*

Majority of the tribal families possessing livestock consisted of three to five members (65.83%). The percentage of family possessing two members was 13.35% and 20.82% families had six or more than six members. Nuclear families were more in Pudur panchayat (16.67%) (Table 6).

#### *4.2.1.5 Land Availability*

The farmers were classified based on the land holding as those with less than one acre, one to two acres, three to five acres and above five acres. Of the total population 37.46% possessed average land holding between 1-2 acres, while 29.42% had land holding less than 1 acre. The percentages of farmers having land holding of 3-5 acres and above 5 acres were 26.96 and

6.16 respectively. The average land holding per farmer was observed to be 2.26±0.33 (Agali), 2.21±0.25 (Pudur) and 2.22±0.28 (Sholayoor). The details are presented in Table 6.

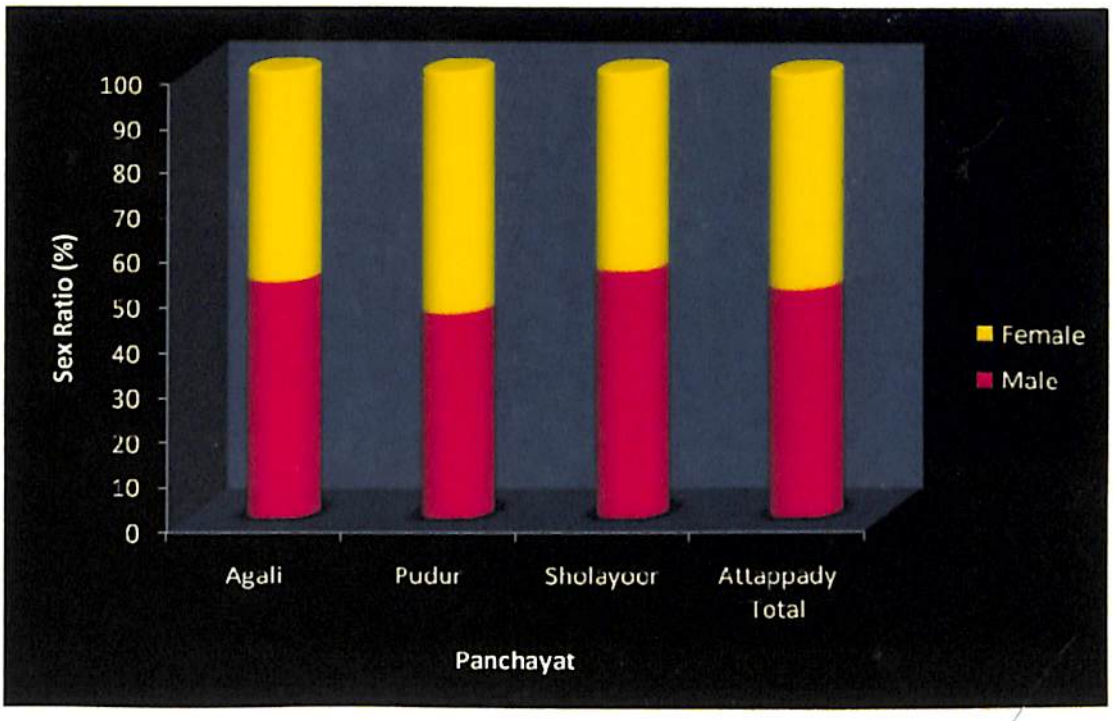
**Table 6. Socio-Economic Status of Farmers of Attappady** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Sex ratio | Male | 52.38 | 45.16 | 54.55 | 50.70 |
| | Female | 47.62 | 54.84 | 45.45 | 49.30 |
| Age | Below 30 | 21.43 | 0.00 | 12.50 | 11.31 |
| | 30-50 | 52.38 | 68.97 | 59.38 | 60.24 |
| | 50 above | 26.19 | 31.03 | 28.13 | 28.45 |
| Education level | Illiterate | 52.38 | 82.14 | 80.00 | 71.51 |
| | Primary | 14.29 | 17.86 | 16.67 | 16.27 |
| | High school | 33.33 | 0.00 | 3.33 | 12.22 |
| | Average schooling (Standard) | 3.8±0.67 | 1.7±0.62 | 1.2±0.45 | 2.37±0.37 |

**Table 6. (Continued)**

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Family size | 2 or less | 14.29 | 16.67 | 9.09 | 13.35 |
| | 3 to 5 | 54.76 | 70.00 | 72.73 | 65.83 |
| | 6 & above | 30.95 | 13.33 | 18.18 | 20.82 |
| Job | Agri. Labour | 64.29 | 58.06 | 48.48 | 56.95 |
| | Agriculture | 26.19 | 41.94 | 36.36 | 34.83 |
| | Animal Husbandry | 9.52 | 0.00 | 3.03 | 4.18 |
| | Milking | 0.00 | 0.00 | 9.09 | 3.03 |
| | Others | 0.00 | 0.00 | 3.03 | 1.01 |
| Land owned (acres) | Less than 1 | 30.56 | 22.22 | 35.48 | 29.42 |
| | 1-2 | 38.89 | 44.44 | 29.03 | 37.46 |
| | 3-5 | 22.22 | 29.63 | 29.03 | 26.96 |
| | 5 & above | 8.33 | 3.70 | 6.45 | 6.16 |
| | Average | 2.26±0.33 | 2.21±0.25 | 2.40±0.36 | 2.29±0.19 |

**Fig.6 Sex Ratio Among Tribal Farmers**



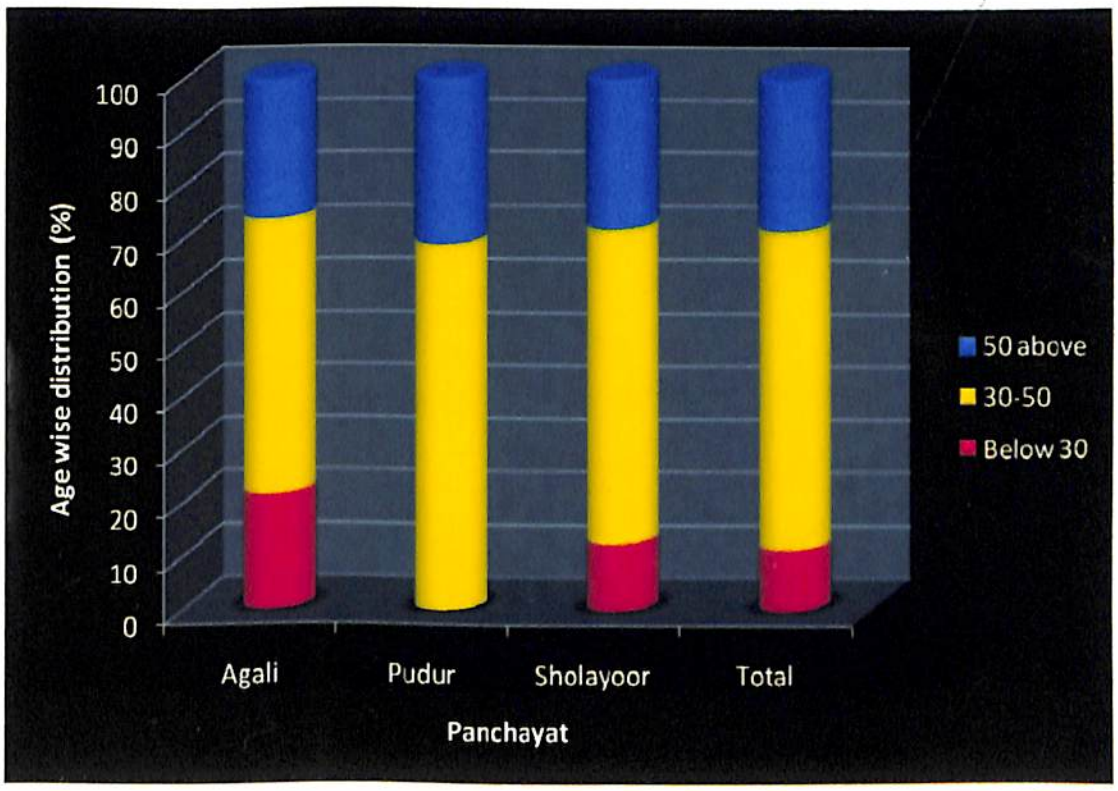
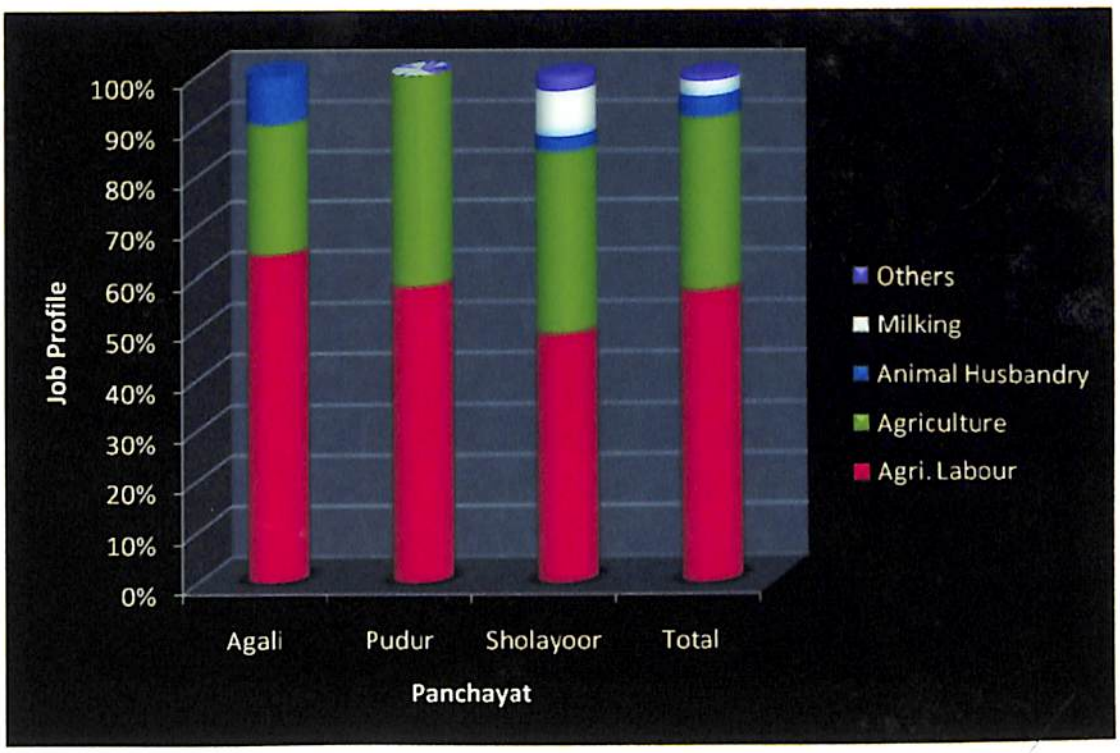




**Fig.7 Age Wise Distrbution of Livestock Farmers**

**Fig.8 Job Profile of Livestock Owners**



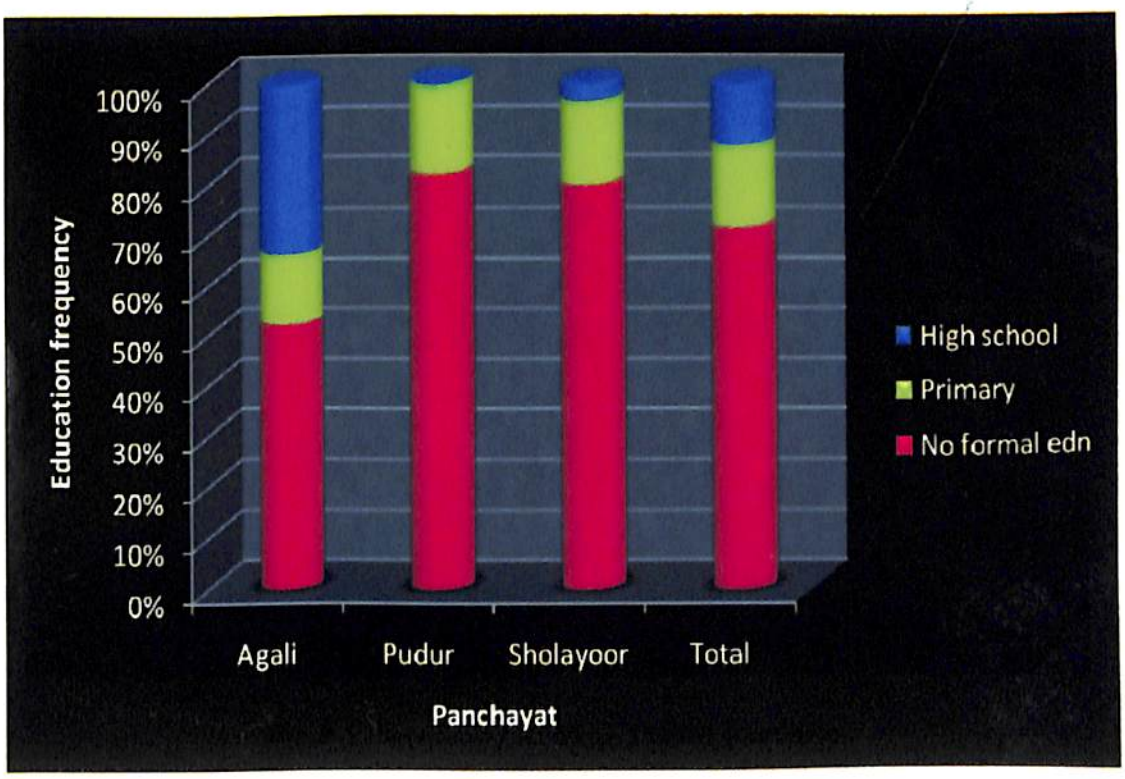




**Fig.9 Education Level of Tribal Farmers**

#### *4.2.1.6 Cropping Pattern*

The tribal people traditionally cultivate Ragi (*Elusine coracana*), Chama (*Panicum milaceum*), Thuvara (*Cajanus indicus*), Amara (*Dolichos lablab*), Keera (*Amaranthus gangeticum*) and Mustard (*Brassica juncea*). Due to the influence of settlers the cropping pattern has shifted to cultivation of perennial and seasonal crops like Bengal gram, Cotton, Chilly, Banana, Sugar cane etc.

### 4.2.2 Livestock Ownership Details

Majority of the tribal farmers (42.87%) owned 3 to 4 cattle. The percentage of farmer who had 2 cattle was 26.54% and 27.93% owned 5 or more cattle. Farmers of Pudur panchayat possessed maximum number with an average ownership of 3.67±0.27 cattle where as in Agali and Sholayoor, it was 3.77±0.77 and 3.88±0.28 respectively.

Nearly 60% of the farmers had a possession of 5 and above number of goats. Twenty eight percent had 3 to 4 goats and 5.91% had 1-2 numbers of goats. Of the total, 5.41% did not possess any goats. The average number of goats possessed by the farmers of Agali, Pudur and Sholayoor panchayats were 5.95±0.51, 6.61±0.44 and 4.94±0.63 respectively (Table 7).

### 4.2.3 Purpose of Livestock Rearing

Similar to any other society, the tribes of Attappady also reared cattle and goats for milk and meat. The percentage of farmer who used their cattle for ploughing was found to be 59.17% and 40.83% reared livestock as food animals alone. The Panchayat wise details are presented in Tables 7.

**Table 7. Livestock Ownership** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Herd size of cattle | Single cow | 4.76 | 3.23 | 0.00 | 2.66 |
| | 2 cow | 16.67 | 38.71 | 24.24 | 26.54 |
| | 3-4 cow | 57.14 | 29.03 | 42.42 | 42.87 |
| | 5 & above | 21.43 | 29.03 | 33.33 | 27.93 |
| | Average | 3.67±0.27 | 3.77±0.77 | 3.88±0.28 | 3.764±0.18 |
| Herd size of Goats | Nil | 7.14 | 0.00 | 9.09 | 5.41 |
| | 1 to 2 | 2.38 | 3.23 | 12.12 | 5.91 |
| | 3 to 4 | 28.57 | 19.35 | 36.36 | 28.10 |
| | 5 & above | 61.90 | 77.42 | 42.42 | 60.58 |
| | Average | 5.95±0.51 | 6.61±0.44 | 4.94±0.63 | 5.83±0.31 |
| Purposes of rearing livestock | Ploughing | 59.38 | 41.67 | 76.47 | 59.17 |
| | Milk and Meat | 40.63 | 58.33 | 23.53 | 40.83 |

## 4.3 MANAGEMENT PRACTICES

### 4.3.1 Housing Facilities

Many of the tribal farmers did not provide any separate housing to their livestock. A total of 54.33% farmers provided shed to their animals. In Agali Panchayat, 64.29% farmers had separate cattle shed. The farmers of Pudur Panchayat were found to be backward with respect to the provision of cattle shed.

Among the farmers of Attappady, 95.95% provided shelter to the animals during night time. None of the farmers kept their animals always in shed. The observation in this aspect were summarized and presented in Table 8.

#### *4.3.1.1 Shed Structure*

Majority of the tribal cattle farmers relied on low input housing facilities for their animals. They used locally available resources like bamboo, tree branches, grasses etc. to construct cattle houses. Of the total farmers, 51.46% constructed sheds with thatched roof, 34.61% with tiles, 8.33% with sheet and rest 5.6% used other materials. None of the farmer possessed a shed with concrete roofing.

Among the sheds, 54.55% did not have any side walls and 40.51% provided half walls. Sheds with flooring by mud possessed by 48.23% and 24.87% had floor with mud and stone. The percentage of sheds with floor made up of concrete, stone and wood were 5.46, 15.98 and 5.46 respectively. Most of the sheds did not have a separate manger (80.85%).

Among the total farmers, 79.40% did not have dung pit facility for collection of manure and 85.18% had no drainage channel attached to the sheds.

Different systems of cattle housing systems are shown in Plate 2.

**Table 8. Livestock Housing** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Shed | Provided | 35.71 | 61.29 | 40.00 | 45.67 |
| | Not provided | 64.29 | 38.71 | 60.00 | 54.33 |
| Roof | Concrete | 0.00 | 0.00 | 0.00 | 0.00 |
| | Tile | 40.74 | 25.00 | 38.10 | 34.61 |
| | Thatched | 55.56 | 41.67 | 57.14 | 51.46 |
| | Sheet | 0.00 | 25.00 | 0.00 | 8.33 |
| | Others | 3.70 | 8.33 | 4.76 | 5.60 |
| Wall | No wall | 44.44 | 58.33 | 60.87 | 54.55 |
| | Full wall | 14.81 | 0.00 | 0.00 | 4.94 |
| | Half wall | 40.74 | 41.67 | 39.13 | 40.51 |
| Floor | Concrete | 3.70 | 8.33 | 4.35 | 5.46 |
| | Stone | 22.22 | 8.33 | 17.39 | 15.98 |
| | Mud | 55.56 | 50.00 | 39.13 | 48.23 |
| | Wood | 3.70 | 8.33 | 4.35 | 5.46 |
| | Mud & Stone | 14.81 | 25.00 | 34.78 | 24.87 |
| Manger | Not present | 81.48 | 87.50 | 69.23 | 79.40 |
| | Present | 18.52 | 12.50 | 30.77 | 20.60 |
| Drainage | Not present | 87.18 | 92.59 | 75.76 | 85.18 |
| | Present | 12.82 | 7.41 | 24.24 | 14.82 |
| Sheltering of animals | During night only | 97.56 | 93.33 | 96.97 | 95.95 |
| | Always in shed | 0.00 | 0.00 | 0.00 | 0.00 |
| | Never in shed | 2.44 | 6.67 | 3.03 | 4.05 |

A

B

C

D

**Plate 2. Different types of Cattle Sheds**
**A. Thatched Roof B. Tiled Roof**
**C. Polythene Sheet Roof D. Open Shed**

### 4.3.2 Feeding Management

#### *4.3.2.1 Concentrate Feeding*

Majority of the animals of Attappady were maintained entirely on grazing and locally available feed ingredients. Concentrate feeding was practiced by 27.46% of the farmers. The farmers of Agali Panchayat were found to be more advanced with respect to concentrate feeding. In Agali, 33.33% farmers fed concentrate to their animals. In Pudur, 77.42% and in Sholayoor, 73.53% of farmers did not provide any concentrate to their animals. Total 52.78% of the farmers bought concentrate feed from cooperative societies and in Agali panchayat it was found to be 69.23% (Table 9).

Among the farmers who fed the animals with concentrate, 55.57% fed concentrate twice daily and 29.62% fed once daily. Majority fed their animals before milking (75.56%) and all the farmers fed concentrate adding water.

#### *4.3.2.2 Grazing and Fodder*

The livestock production system adapted by the tribes of Attappady is a low input one depending mainly upon grazing and other locally available feed resources. Cent percent tribal farmers practiced grazing of their animals. During day time, 97.22% of the farmers sent their animals for grazing to the surrounding forest areas. In Sholayoor panchayat this was found to be 100%. A total of 23.80% farmers cultivated fodder crops to feed their animals. Cut and carry system of feeding fodder was practiced by 62.62% of farmers. Only 17.70% farmers fed straw to their animals.

The summary of feeding practices is given in Table 9 and plate 3.

#### *4.3.2.3 Watering*

The tribal farmers were not concerned about providing water to the animals. The rivers and streams are the main source of water for the animals. The important rivers in the area are *Bhavani* and *Siruavni*. They arise from the south west mountains and flows to the east. Many narrow streams are also present inside the forest and the animals quenched the thirst from these sources. Various Government agencies made attempts for supplying water to the hamlets by constructing bore wells, public wells and public taps, but hardly succeed to produce any tangible results.

**Table 9. Feeding Practices** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Concentrate feeding | No | 66.67 | 77.42 | 73.53 | 72.54 |
| | Yes | 33.33 | 22.58 | 26.47 | 27.46 |
| Concentrate source | Shop | 30.77 | 41.67 | 69.23 | 47.22 |
| | Society | 69.23 | 58.33 | 30.77 | 52.78 |
| Feeding frequency | Morning | 25.64 | 37.50 | 25.71 | 29.62 |
| | Evening | 20.51 | 12.50 | 11.43 | 14.81 |
| | 2 times | 53.85 | 50.00 | 62.86 | 55.57 |
| Feeding time | Before milking | 80.00 | 80.00 | 66.67 | 75.56 |
| | After Milking | 20.00 | 20.00 | 33.33 | 24.44 |
| Feeding method | Dry | 0.00 | 0.00 | 0.00 | 0.00 |
| | Adding water | 100.00 | 100.00 | 100.00 | 100.00 |
| Grazing time | Day time | 95.12 | 96.55 | 100.00 | 97.22 |
| | Full day | 4.88 | 3.45 | 0.00 | 2.78 |
| Fodder cultivation | No | 83.33 | 70.97 | 74.29 | 76.20 |
| | Yes | 16.67 | 29.03 | 25.71 | 23.80 |
| Cut & carry system | No | 45.24 | 35.48 | 31.43 | 37.38 |
| | Yes | 54.76 | 64.52 | 68.57 | 62.62 |
| Straw feeding | No | 83.33 | 87.10 | 76.47 | 82.30 |
| | Yes | 16.67 | 12.90 | 23.53 | 17.70 |

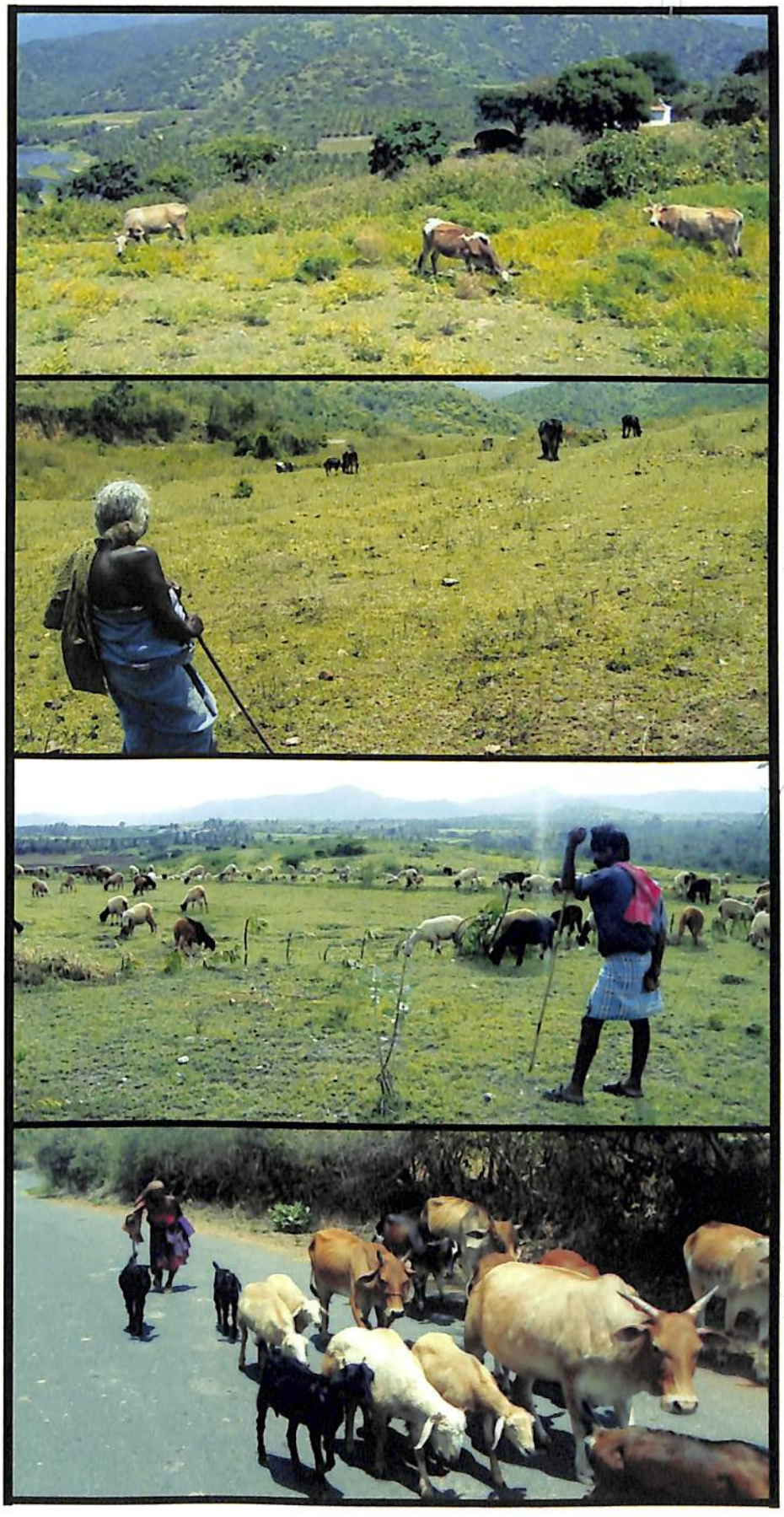



**Plate 3. Grazing of Animals**
**A & B. Cattle Herds**
**C. Small Ruminants**
**D. Return After Grazing**

### 4.3.3 Breeding Management

The livestock population possessed by tribal farmers belonged to non-descriptive or indigenous type. Traditionally every tribal household reared their own cows and bullocks. The inbreeding coefficient was expected to be very high in these areas.

Most of the tribal cattle owners detected heat in their animals by observing the bellowing sign (75.81%), 19.87% through mounting behaviour and 3.53% through vaginal discharge associated with estrus cycle.

A total of 68.25% farmers depended on natural service for impregnating their animals and this practice was more prevalent in Sholayoor Panchayat (71.43%). Breeding through natural service occurred mostly during grazing when the cows and bulls were sent together. Of the farmers who adopted artificial insemination for their cows, 89.46% brought their animals to the hospital or A.I centre for availing the facility. The percentage of farmers who either brought the animals to the hospital or called the technician to the house was 3.06%. The details are presented in Table 10.

**Table 10. Breeding Practices** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Heat detection | Bellowing | 76.19 | 65.52 | 85.71 | 75.81 |
| | Mounting | 14.29 | 31.03 | 14.29 | 19.87 |
| | Discharge | 7.14 | 3.45 | 0.00 | 3.53 |
| | Discharge & Mounting | 2.38 | 0.00 | 0.00 | 0.79 |
| Breeding method | A.I | 33.33 | 33.33 | 28.57 | 31.75 |
| | Natural | 66.67 | 66.67 | 71.43 | 68.25 |
| A.I availability | Hospital | 78.57 | 89.80 | 100.00 | 89.46 |
| | Door step | 14.29 | 8.16 | 0.00 | 7.48 |
| | Both | 7.14 | 2.04 | 0.00 | 3.06 |
| Pregnancy Diagnosis | No | 59.38 | 33.33 | 62.96 | 51.89 |
| | Yes | 40.63 | 66.67 | 37.04 | 48.11 |

### 4.3.4 Care during Pregnancy

Pregnancy diagnosis was not so common in the tribal areas. Majority depended upon external signs like abdominal enlargement for identification of pregnant animals. Pregnancy diagnosis facility was sought by 48.33% farmers. In Sholayoor Panchayat only 37.04% farmers utilized facility for pregnancy diagnosis. Of the respondent farmers, 59.03% reported that they provided additional care to their animals during pregnancy and 49.65% reported difficulties during parturition time (Table 11).

### 4.3.5 Care and Management of Young stock

Care and management of the young stock is very much significant as far as a sustainable livestock production system is concerned. The study revealed that only 43.78% of the farmers provided special care to the young stock. In Sholayoor Panchayat, 62.07% farmers provided special attention to young stock.

About 80 percent farmers did not cut navel cord soon after birth and allowed to break it off naturally. Majority of the tribal farmers were allowing the calves to suckle colustrum immediately after birth (88.39%).

Among the tribal farmers, 67.30% allowed the calves to suckle milk after milking the animal completely. The young stock was allowed to suckle one teat fully, by 32.70% farmers (Table 11).

**Table 11. Care of Pregnant animals and Calves** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Care during pregnancy | No | 33.33 | 45.45 | 44.12 | 40.97 |
| | Yes | 66.67 | 54.55 | 55.88 | 59.03 |
| Parturition difficulties | No | 37.04 | 68.18 | 45.83 | 50.35 |
| | Yes | 62.96 | 31.82 | 54.17 | 49.65 |
| Care of calves | No | 65.52 | 65.22 | 37.93 | 56.22 |
| | Yes | 34.48 | 34.78 | 62.07 | 43.78 |
| Milk feeding for calves | After full milking | 65.00 | 79.31 | 57.58 | 67.30 |
| | Allow one teat | 35.00 | 20.69 | 42.42 | 32.70 |
| | No milk feeding | 0.00 | 0.00 | 0.00 | 0.00 |
| Practice of cutting the navel cord | No | 81.82 | 75.00 | 84.38 | 80.40 |
| | Yes | 12.20 | 25.00 | 15.63 | 17.61 |
| Colustrum feeding to calves | No | 9.52 | 9.68 | 15.63 | 11.61 |
| | Yes | 90.48 | 90.32 | 84.38 | 88.39 |

### 4.3.6 Milking and Lactation

Among the livestock farmers of Attappady, 95.24% practiced milking of their animals by themselves. Percentage of the farmers who milked their animals by themselves in Agali, Pudur and Sholayoor panchayats were 95.12, 96.67 and 95.24 respectively.

Milking of animals only in morning alone was practiced by 51.74% farmers and 48.26% practiced milking twice daily. In Agali panchayat 60.98% farmers practiced morning time milking.

The average daily milk yield of cows of Attappady was reported between 2 to 4.9 litres by most of the farmers (43.76%). It was reported to be less than 2 litres by 26.21% and between 5 to 8 litres by 26.15%. Only 3.87% of farmers had cows with above 8 litres yield. The average production of cows in Agali, Pudur and Sholayoor Panchayats were found to be 4.01±0.32, 3.7±0.37 and 3.75±0.38 respectively (Table 12 and Figure 10).

The average daily milk collection and society wise milk collection are provided in Table 13 and Table 14 respectively. The maximum milk production was found to be during June month (14,419 Kg/day) and minimum during February (11,016 Kg/day).

**Table 12. Milking and Lactation** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Milking | Self | 95.12 | 96.67 | 93.94 | 95.24 |
| | Milker | 4.88 | 3.33 | 6.06 | 4.76 |
| Milking frequency | Two times | 39.02 | 63.33 | 42.42 | 48.26 |
| | Morning | 60.98 | 36.67 | 57.58 | 51.74 |
| Average yield of cows (litres) | Less than 2 | 7.69 | 36.67 | 34.29 | 26.21 |
| | 2-4.9 | 51.28 | 40.00 | 40.00 | 43.76 |
| | 5-8 | 38.46 | 20.00 | 20.00 | 26.15 |
| | 8 above | 2.56 | 3.33 | 5.71 | 3.87 |
| | Average production | 4.01±0.32 | 3.7±0.37 | 3.75±0.38 | 3.85±0.31 |
| Milk products | No products | 20.00 | 48.39 | 48.57 | 38.99 |
| | Curd | 70.00 | 51.61 | 51.43 | 57.68 |
| | Others | 10.00 | 0.00 | 0.00 | 3.33 |

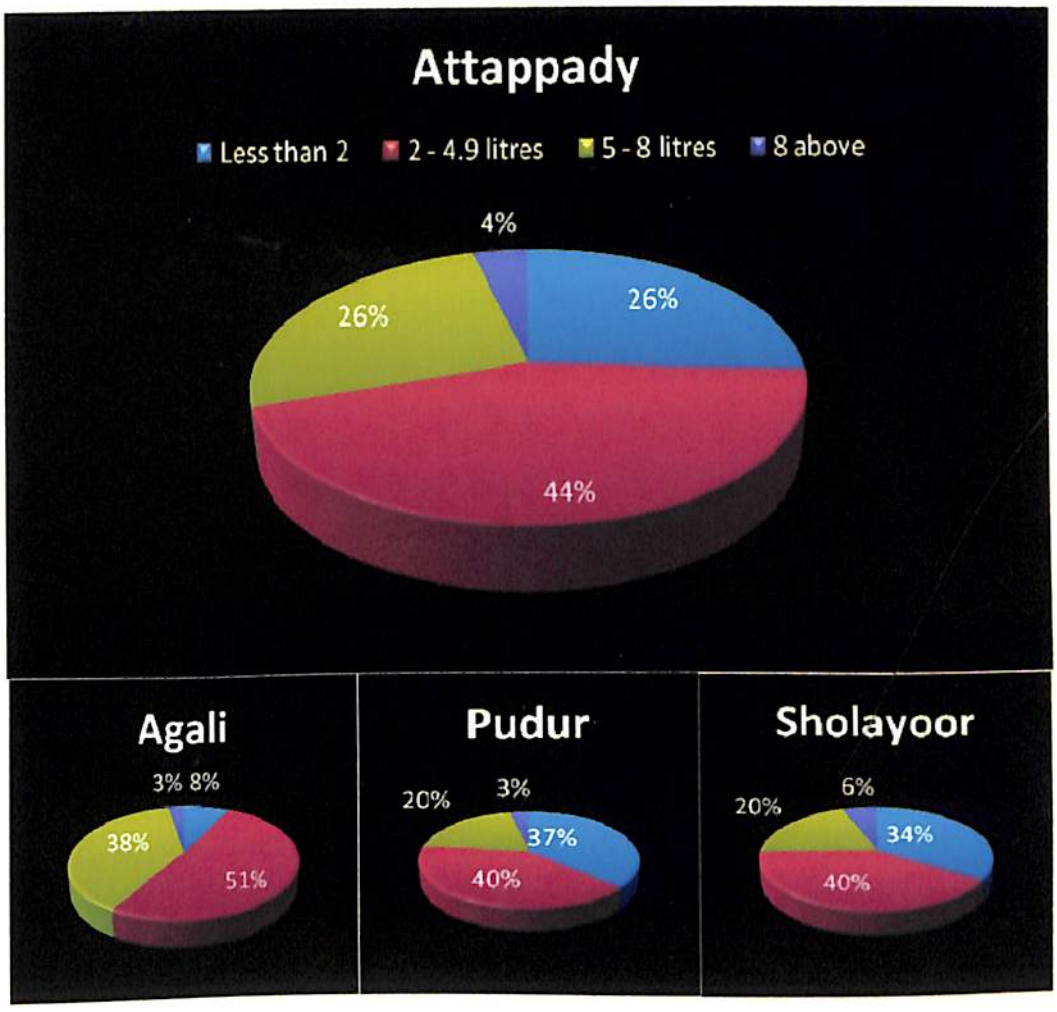
**Table 13. Daily Milk Production of Attappady (Month wise)**

| Year | Month | Production (Kg.) |
|---|---|---|
| 2007 | April | 11793 |
| | May | 13901 |
| | June | 14419 |
| | July | 13758 |
| | August | 13215 |
| 2008 | September | 13039 |
| | October | 12994 |
| | November | 12867 |
| | December | 12081 |
| | January | 11468 |
| | February | 11016 |
| | March | 12883 |
| Total | | 153434 |
| Mean | | 12786±295 |

**Table 14. Daily Milk Production of Attappady (Area wise)**

| Area | Morning (Kg) | Evening (Kg) | Total (Kg) |
|---|---|---|---|
| Sholayoor | 1100 | 250 | 1350 |
| Attappady | 1900 | 800 | 2700 |
| Agali | 1100 | 320 | 1420 |
| Thavalam | 1400 | 210 | 1610 |
| Mukkali | 400 | 100 | 500 |
| Kallamala | 400 | 110 | 510 |
| Kandiyoor | 200 | 50 | 250 |
| Mundampara | 1500 | 350 | 1850 |
| Pettickal | 600 | 150 | 750 |
| Karuvambady | 460 | 70 | 530 |
| Chittoor | 450 | 40 | 490 |
| Moochikadavu | 150 | 45 | 195 |
| Palliyara | 410 | 100 | 510 |
| Pudur | 850 | 200 | 1050 |
| Paloor | 490 | 30 | 520 |
| Total | 11410 | 2825 | 14235 |
| Mean | 761±135.37 | 188±50.99 | 949±182.07 |

**Fig.10 Average Milk Yield of Cows**



### 4.3.7 Health care Activities

Data collected from the farmers revealed that more than half of them relied on indigenous remedies for treating their animals (50.28%). The percentage of farmers who approached veterinary doctors for getting their animals treated was 45.98%. The practice of indigenous remedies was found to be deep rooted among the farmers of Pudur (54.84%) and Sholayoor (47.22%).

Among the farmers who adopted modern management practices, 57.47% took their animals to veterinary institutions for treatment. At their door step, 42.53% of the farmers availed the service of veterinarians. Among the three Panchayats, 77.42% farmers of Sholayoor took their animals to hospital for treatment. Deworming of young calves did not practiced by 64.13% of tribal cattle owners. In Pudur, 73.33% and in Sholayoor 71.43% farmers did not dewormed the animals.

The practice of vaccination against infectious diseases was found to be rare among the tribal farmers. Vaccination against Foot and mouth disease was adopted by 40.35% farmers only. In Pudur and Sholayoor panchayats, the number of animals vaccinated was very low, 29.03% and 31.03% respectively. As compared to others, Agali Panchayat presented the highest figure (60.98%) regarding this parameter (Table.15).

#### *4.3.7.1 Prevalence of Diseases.*

Prevalence of diseases in the study area based on records available from the veterinary institutions functioning in the locality is depicted in the Table 16.

**Table 15. Health Care Activities** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Treatment mode | Doctor | 48.78 | 41.94 | 47.22 | 45.98 |
| | L.I | 2.44 | 3.23 | 5.56 | 3.74 |
| | Indigenous | 48.78 | 54.84 | 47.22 | 50.28 |
| Availability of service | Take to hospital | 55.00 | 40.00 | 77.42 | 57.47 |
| | Bring the doctor | 45.00 | 60.00 | 22.58 | 42.53 |
| Deworming of calves | No | 47.62 | 73.33 | 71.43 | 64.13 |
| | Yes | 52.38 | 26.67 | 28.57 | 35.87 |
| Vaccination | No | 39.02 | 70.97 | 68.97 | 59.65 |
| | Yes | 60.98 | 29.03 | 31.03 | 40.35 |

**Table 16. Disease Prevalence of Attappady (2007-08)**

| Month | Disease | Agali | Pudur | Sholayoor | Total |
|---|---|---|---|---|---|
| February<br>March<br>April<br>May | Digestive disorders | 122 | 87 | 66 | 275 |
| | Respiratory diseases | 30 | 13 | 17 | 60 |
| | Metabolic diseases | 7 | 2 | 2 | 12 |
| | Deficiency syndromes | 5 | 1 | 0 | 6 |
| | Skin diseases | 8 | 6 | 4 | 18 |
| | Parasitic infestations | 230 | 166 | 56 | 452 |
| | Gynecological cases | 18 | 15 | 17 | 50 |
| | Mastitis | 6 | 5 | 4 | 16 |
| | E fever | 0 | 2 | 2 | 3 |
| | Others | 31 | 20 | 6 | 57 |
| | Total | 456 | 317 | 175 | 948 |
| June<br>July<br>August<br>September | Digestive disorders | 148 | 107 | 68 | 322 |
| | Respiratory diseases | 16 | 15 | 7 | 39 |
| | Metabolic diseases | 16 | 7 | 3 | 27 |
| | Deficiency syndromes | 3 | 3 | 0 | 5 |
| | Skin diseases | 10 | 4 | 9 | 23 |
| | Parasitic infestations | 254 | 138 | 58 | 450 |
| | Gynecological cases | 29 | 12 | 16 | 57 |
| | Mastitis | 15 | 5 | 5 | 25 |
| | E fever | 23 | 9 | 11 | 43 |
| | Others | 56 | 28 | 4 | 88 |
| | Total | 568 | 327 | 183 | 1078 |
| October<br>November<br>December<br>January | Digestive disorders | 160 | 76 | 50 | 287 |
| | Respiratory diseases | 21 | 17 | 8 | 46 |
| | Metabolic diseases | 9 | 2 | 3 | 14 |
| | Deficiency syndromes | 5 | 0 | 0 | 5 |
| | Skin diseases | 8 | 5 | 4 | 17 |
| | Parasitic infestations | 214 | 164 | 61 | 439 |
| | Gynecological cases | 26 | 14 | 11 | 51 |
| | Mastitis | 4 | 5 | 10 | 20 |
| | E fever | 3 | 3 | 6 | 13 |
| | Others | 44 | 28 | 1 | 73 |
| | Total | 494 | 314 | 155 | 963 |

### 4.3.8 Management of Small Ruminants

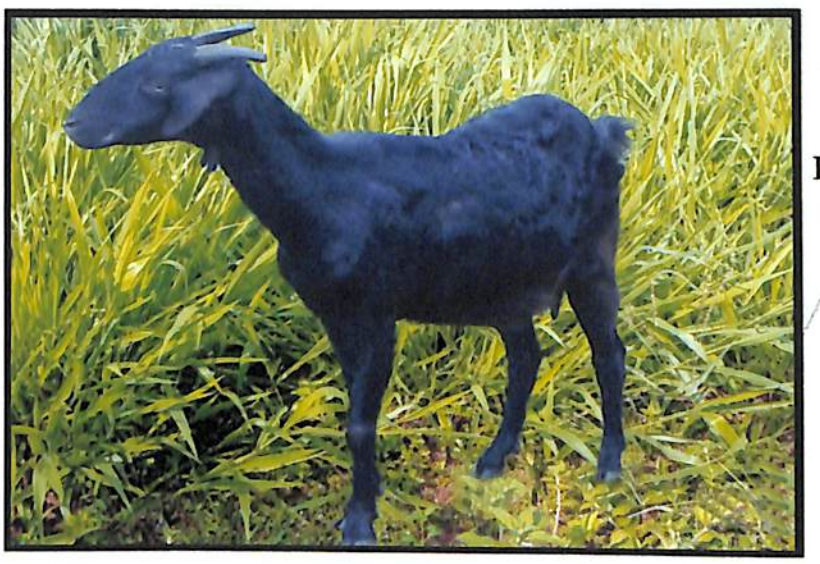
Among the tribal dairy farmers, 94.59% owned goats also. Attappady black breed of goat was peculiar to the locality. Average number of goats possessed by each farmer in the study area was found to be 5.83±0.31. The major share of the flock was comprised of non-descript animals.

Attappady black goat is native of this area. As the name indicates, they are dark black in colour with peculiar bronze coloured eyes (Plate 4). Government goat farm situated at Kottathara was mainly intended for maintaining Attappady black goats. As on 1.07.2008, there were 33 male goats and 70 females present in the farm.

The percentage of farmers who provided separate housing facility to goats was found to be 67.53%. In Agali and Pudur this was 78.57% and in Sholayoor 45.45% only. The goat houses were made up of bamboo stem and palm leaves. Wooden blocks and tiles were also used. Goats were housed during night time alone.

No farmer in the study area fed concentrate to their goats. All farmers sent their animals for grazing during the day time. Old aged family members herded the animals. All the farmers followed natural service to breed their animals. Milking of goats was not practiced in and the kids were allowed to suckle milk adlibitum. Other practices followed were similar to that of large animals (Plate 5).

A



B

C

**Plate 4. Attappady Black Goats**
**A. Buck B. Doe C. A Flock**

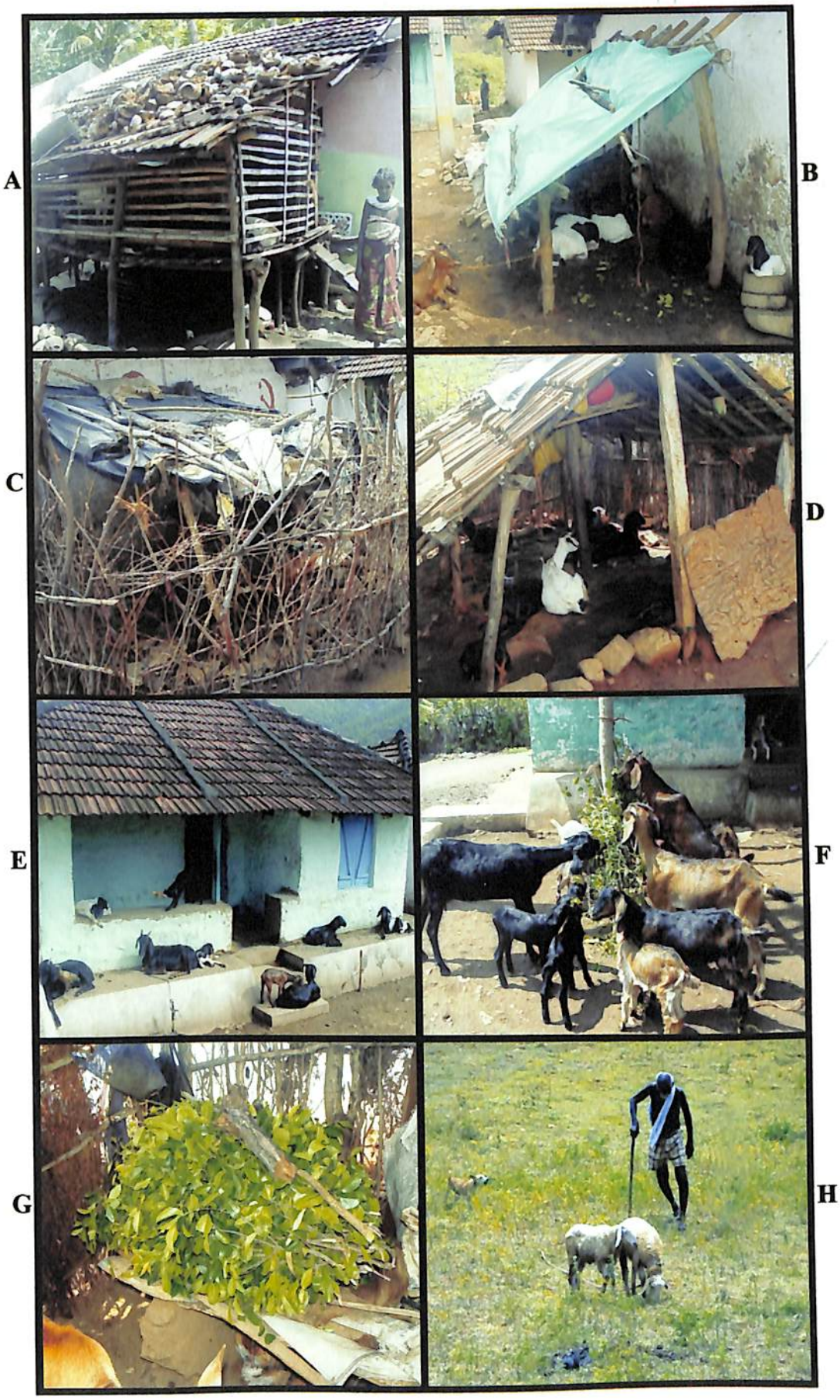



**Plate 5. Management of Small Ruminants**
**A, B, C, D & E. Different types of Housing**
**F & G. Feeding Local Tree Leaves**
**H. Grazing**

## 4.4 MARKETING FACILITIES

The details regarding various marketable products of livestock are given in Table 18 and discussed below.

### 4.4.1 Milk

The tribal farmers were not much aware of the potential marketing facilities available for livestock products. Only 26.58% of the total farmers were selling milk to milk societies. Others were either consuming the milk themselves or distributing it to nearby houses in the hamlet. Percentages of farmers who sold milk to societies in the three Panchayats namely Agali, Pudur and Sholayoor were 33.33, 25.81 and 26.58 respectively.

A percentage of 51.34 farmers were getting price between rupees 14 to 15.9 per litre of milk from the milk societies. Price between 16 to 17.9 were getting and 18.72% were getting 18 and above. Below 12 was earned by 0.85%. Proportion of farmers who earned above 18 rupees per litre was found to be more at Agali panchayat (33.33%).

### 4.4.2 Manure

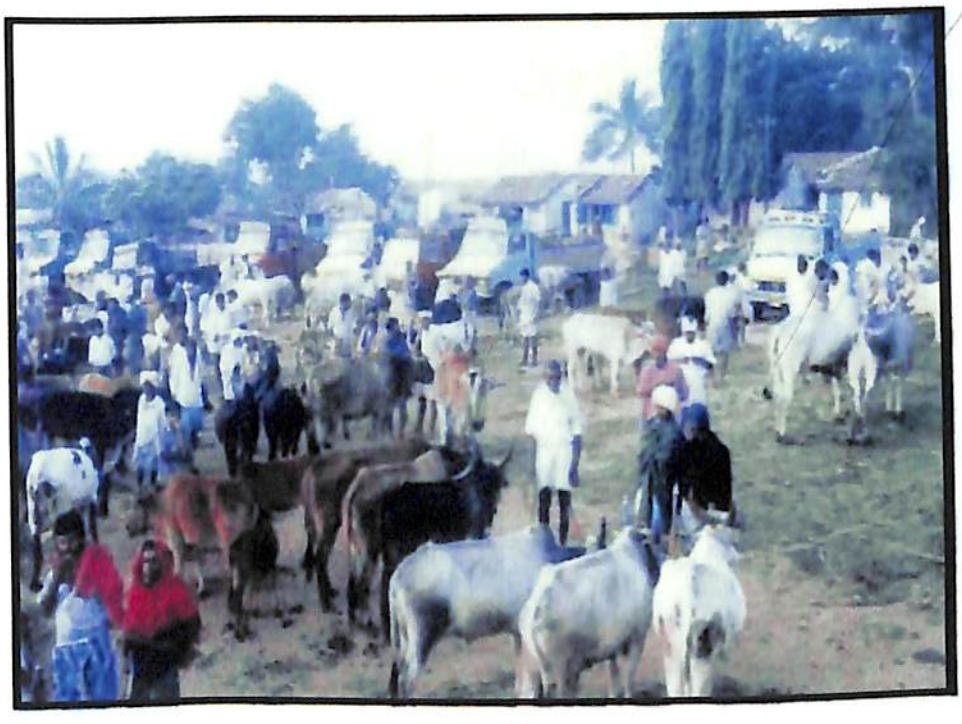
Other than milk their major marketable produce was manure. Among the farmers, 51.39% sold manure to outside people. A total of 44.32% farmers used manure for their own agriculture while 4.30% used a portion for both sale and agriculture. The percentage of farmers who were selling manure was more in Agali (69.44) followed by Sholayoor (43.33) and Pudur (51.39). None of the farmers used manure for making biogas. Usually people from the low land procured manure directly from farmers' premises and were paid a price

between rupees 30 to 40 for goat manure and around rupees 20 for cow dung per gunny bag.

### 4.4.3 Sale of Goats

The tribal farmers considered goats as an easily liquefiable source of commodity. When they were in need of money they sold their animals and middle men collected these animals at a lower price than the market price. On an average the amount a farmer recieve through the sale of an year old buck was around 1500 rupees. There is a famous cattle market at Kottathara in Attappady on every Saturdays, which act as the main location of the trade. Few of the tribal farmers and most of the middle men were participating in this (Plate 6).


A



B

**Plate 6. Marketing Facilities**
**A. Milk Society, Agali**
**B. Cattle Market, Kottathara**

## 4.5 EXTENSION ACTIVITIES

Various agencies like Animal Husbandry Department, Dairy Development Department, Kerala Livestock Development Board and AHADS were occasionally conducting farmers' camps and seminars in the area. But the participation of tribal farmers was observed to be meager in these activities. It was reported by 41.23% farmers that they were noticing the agriculture related programmes in Television, Radio and newspaper regularly. A percentage of 47.04 farmers occasionally participated in farmers' camps and seminars. Those who never participated in such activities were 41.54% and 11.04% were reported to be regular in attending it. The details are presented in Table 18.

## 4.6 CONSTRAINTS

Most of the farmers (84.62%) pointed out that lack of adequate support from the government agencies as the major constraint faced by them. Concern was expressed by 66.02% about the restrictions to grazing imposed by government agencies blaming livestock for soil erosion. Lack of sufficient veterinary professionals in the area was reported by 53.31% and 21.78% farmers were worried about the lacunae in marketing facilities existing. Panchayat wise break up is presented in Table 18 and Figure 11.

## 4.7 PHYSIOLOGICAL PARAMETERS

The mean haematology picture and other details of a sample population are depicted in Table 19.

**Table 17. Marketing Facilities** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Sale of milk to societies | Yes | 33.33 | 25.81 | 20.59 | 26.58 |
| | No | 66.67 | 74.19 | 79.41 | 73.42 |
| Price obtained for milk from societies (Rs.) | Less than 12 | 2.56 | 0.00 | 0.00 | 0.85 |
| | 12-13.9 | 15.38 | 8.00 | 0.00 | 7.79 |
| | 14-15.9 | 30.77 | 64.00 | 59.26 | 51.34 |
| | 16-17.9 | 17.95 | 20.00 | 25.93 | 21.29 |
| | 18 & above | 33.33 | 8.00 | 14.81 | 18.72 |
| | Average | 16.04±0.37 | 15.46±0.27 | 15.92±0.29 | 15.84±0.20 |
| Dung utility | Sale to others | 69.44 | 41.38 | 43.33 | 51.39 |
| | Agriculture purpose | 27.78 | 55.17 | 50.00 | 44.32 |
| | Sale & Agriculture purpose | 2.78 | 3.45 | 6.67 | 4.30 |
| | Biogas | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 18. Extension Activities and Constraints** (n=106)

| Parameter | | Agali (%) | Pudur (%) | Sholayoor (%) | Total (%) |
|---|---|---|---|---|---|
| Watching media programmes | No | 26.32 | 78.57 | 71.43 | 58.77 |
| | Yes | 73.68 | 21.43 | 28.57 | 41.23 |
| Farmers' camps | Never | 23.81 | 65.52 | 35.29 | 41.54 |
| | Occasionally | 57.14 | 31.03 | 52.94 | 47.04 |
| | Always | 19.05 | 3.45 | 11.76 | 11.42 |
| Constraints | No govt. support | 83.33 | 83.87 | 86.67 | 84.62 |
| | Restriction for grazing | 66.67 | 58.06 | 73.33 | 66.02 |
| | Lack of veterinary services | 54.76 | 45.16 | 60.00 | 53.31 |
| | Difficulties in marketing | 26.19 | 25.81 | 13.33 | 21.78 |

**Fig.11 Costraints Reporetd by Farmers**

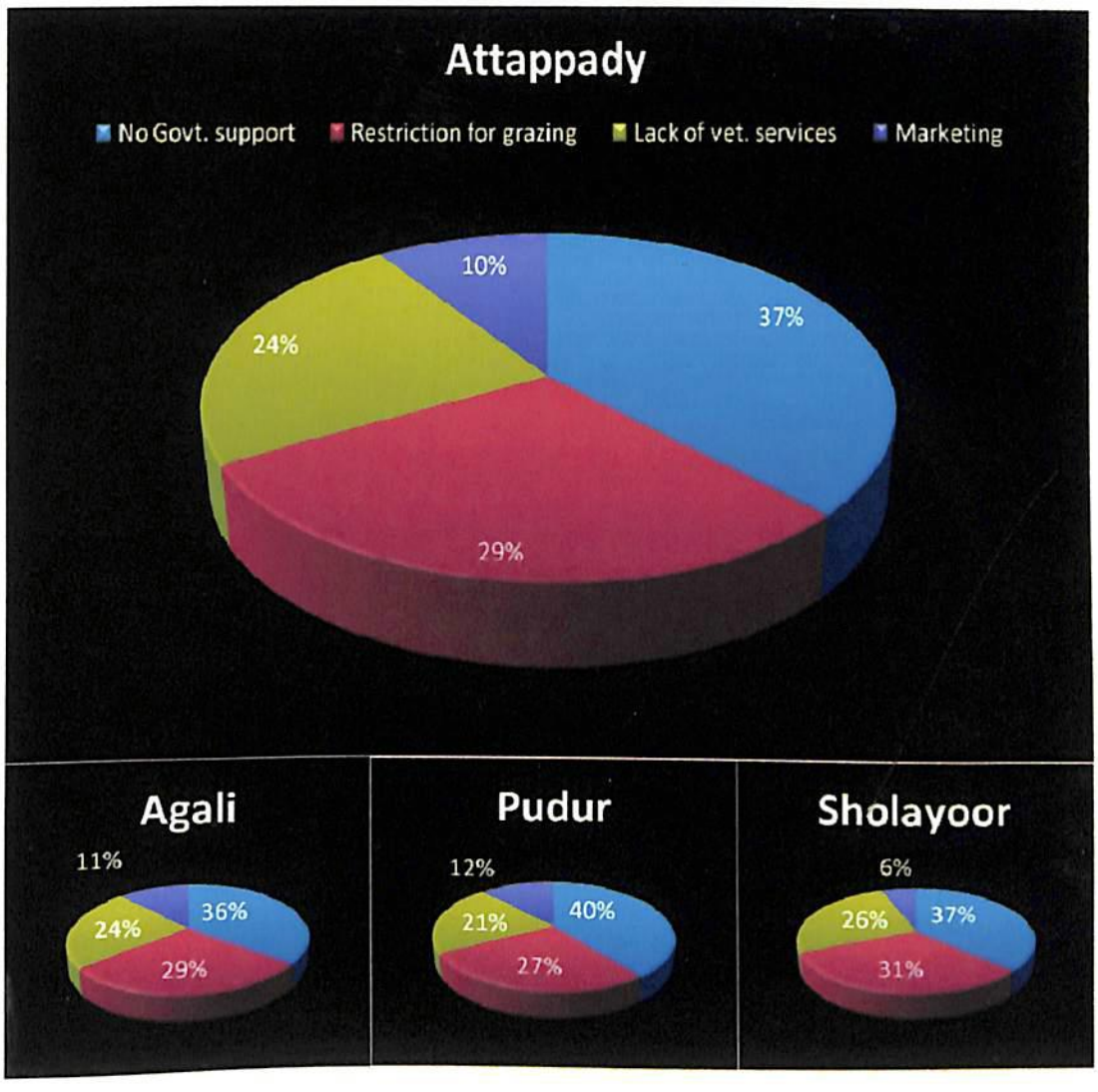


**Table 19. Physiological Parameters of Cattle**

| Parameter | Mean | S.E |
|---|---|---|
| Haematological | | |
| Total leukocytes (No./$mm^3$) | 9342.83 | 191.41 |
| Neutrophils (%) | 31.00 | 3.03 |
| Eosinophils (%) | 8.10 | 0.78 |
| Lymphocytes (%) | 67.05 | 1.71 |
| ESR at one hour (mm) | 3.17 | 0.48 |
| Haemoglobin (g %) | 12.50 | 0.33 |
| PCV (%) | 33.20 | 0.44 |
| Red blood cells | 6.90 | 0.27 |
| Body temperature ($^0$F) | 101.18 | 0.36 |
| Respiration rate per minute | 17.50 | 1.82 |
| Pulse rate per minute | 70.83 | 2.87 |

## 4.8 SCIENTIFIC INTERVENTION

After the experimental period of six months, data were collected from both test group and control group with respect to body weight of animals, birth weight of calves, daily weight gain of calves, lactation yield of animals, milk composition and occurrence of diseases. These were tabulated and subjected to statistical analysis.

### 4.8.1 Body Weight of Cattle

The mean body weight of cows in control group was found to be 163.72 ±7.14 kilograms (Kg). Mean body weight of animals in the test group after the treatment was found to be 175.08±4.16 Kg.

On statistical analysis with t test, t value was found to be 1.375 and the effect was significant at 19% level only.

The mean birth weight of calves in the control group was 15.29±0.36 Kg., where as that in the control group was found to be 16.93±0.61 Kg. The average daily body weight gain of test group animals was 335.71±15.37 grams (g) and that in control group was 266.25±16.36 g only.

With respect to birth weight of calves, the *t* value was 2.317 and the effect of the treatment was statistically significant at 5% level. In case of daily weight gain the effect was found to be highly significant (at 1% level) with a *t* value of 3.094.

The mean body weight of male goats at the age of one year in control group was 13.2±0.15 Kg and that in the test group was 15.82±0.30 Kg. The effect was found to be statistically highly significant (Table 20).

### 4.8.2 Lactation Details.

The test group animals had a mean lactation yield of 1092.95±25.38 Kg where as that of the control group animals was 916.30±26.98 Kg. With respect to milk composition, test group animals had mean fat percentage of 4.29±0.27 and solid not fat (SNF) content of 8.4±0.05 percent. The mean fat and SNF content of control group animals were 4.48±0.30 percent and 8.44±0.05 percent respectively. The details are shown in Table 20.

The t test indicated that the effect of treatment on milk yield was highly significant (at 1% level) and the t value was 4.769. With respect to fat percentage and SNF content the effect was not statistically significant.

### 4.8.3 Disease Occurrence

During the treatment period, a total of 46 cases were reported from control group and 17 cases from test group. Details of disease occurrence are presented in Table 20.

*t* test indicated that the effect of treatment is statistically significant at 8% level only.

**Table 20. Influence of Scientific Intervention**

| Parameter | Mean value of results observed | | t value | P (significance) |
|---|---|---|---|---|
| | Test group | Control group | | |
| Body weight of cows (Kg) | 175.08±4.16 | 163.72±7.14 | 1.3755 | 0.1906 |
| Standard lactation yield (Kg) | 1092.95±25.38 | 916.3±26.98 | 4.7689 | 0.0004 |
| Milk fat (%) | 4.29±0.27 | 4.475±0.3 | -0.4691 | 0.6468 |
| Milk SNF (%) | 8.4±0.489 | 8.44±.05 | -0.5380 | 0.5997 |
| Birth weight of calves (Kg) | 16.93±0.612 | 15.29±0.357 | 2.3175 | 0.0430 |
| Daily weight gain of calves (Kg) | 335.71±15.37 | 266.25±16.36 | 3.0946 | 0.0085 |
| Body weight of goats at 1 year age (Kg) | 15.82±0.296 | 13.32±0.148 | 7.5390 | 0.0001 |
| Disease occurrence (No. of cases) | 17 | 46 | -1.9164 | 0.0843 |

### 4.8.4 Benefit-Cost Analysis

For benefit cost analysis, a unit containing one cow and one goat was taken as standard. The test group farmer obtained a net annual gain of Rs. 16457 and that in control group was Rs. 15563 per unit. The details are given in Table 21.

**Table 21. Benefit-Cost Analysis**

| Item | Test | | Control | |
|---|---|---|---|---|
| | Amount (Rs) | Amount (%) | Amount (Rs) | Amount (%) |
| **Cost** | | | | |
| Concentrates | 3200 | 70.02 | 0 | 0.00 |
| Veterinary charges | 370 | 8.10 | 1000 | 66.67 |
| Miscellaneous | 1000 | 21.88 | 500 | 33.33 |
| Total | 4570 | 100 | 1500 | 100 |
| **Return** | | | | |
| Sale of milk | 17402 | 82.76 | 14238 | 83.44 |
| Sale of manure | 1825 | 8.68 | 1825 | 10.70 |
| Sale of goats | 1800 | 8.56 | 1000 | 5.86 |
| Total returns | 21027 | 100 | 17063 | 100 |
| **Net gain per year** | **16457** | | **15563** | |

*(One unit contains 1 cow + 1 goat)*

# Discussion

# 5. DISCUSSION

Even though the Indian economy during the past few years had an accelerated phase of development and raising prosperity in many of the metropolitan areas, reports shows that the gap between rich and the poor are widening day by day. This has worried many of the economists and social scientists leading to the thought of development of the sustainable livelihoods approach paying increased interest in the role and impact of livestock. This has brought many of the rural and tribal areas in to thrust areas of focus which might had otherwise been remained unnoticed. Gopalakrishnan and Lal (1988) and Edmond *et al.* (2006) also stressed the need for rural development.

Attappady is notorious for exploitation of forest land and its natural inhabitants by the settlers who were culturally and technologically more advanced than the tribal people, the original inhabitants of the area. The emergence of the settlers shattered the socio-economic fabric of tribal settlements. Traditionally the livelihood of tribal people was depended solely up on cultivation, animal husbandry and sale of forest produces. Findings of Oladeji *et al.* (2006) and Nandakumar (2004) were also in tune with this. But the observations from Attappady brought to light that majority of the tribal farmers were working as labourers for the settlers and very few were involved in animal husbandry activities. Earlier report from Ali (2007) is also substantiating these observations.

This study made an intensive appraisal of the livestock production system of Attappady and identified possible areas of scientific intervention to improve its efficiency.

## 5.1 SOCIO ECONOMIC STATUS OF TRIBAL FARMERS

Survey on the socio economic status of tribal farmers revealed that above sixty percent of respondents were in between the age group of 30 to 50. Percentage of farmers below the age of 30 was found just above 10 percent. The participation of young farmers was found to be nil in Pudur panchayat. This can be explained on the basis of the occupational pattern of tribes of these panchayats. Nearly sixty percent of the respondents considered labour as their primary occupation. Animal husbandry was reported as the primary occupation by just four percent of the farmers. In Agali, 9.52 percent were involved fully in animal husbandry and in Pudur none of the respondents were involved. As the number of farmers involved in animal husbandry practices were less in Pudur panchayat, youngsters were not motivated towards adopting dairy husbandry as a full time occupation. The findings were akin to Kannan *et al.* (2006), Nair (2007) and Rajaganapathy (2008).

More than seventy percent of the tribal farmers in Attappady were found to be illiterate. Illiteracy was observed to be more in Pudur panchayath (82.14%) nobody having education above primary level. This backwardness is an important reason as to why the farmers of Pudur retrained from accepting modern animal husbandry practices. These findings were in contradiction to that of Nair (2007) and Rajaganapathy (2008). This was not a matter of worry as the average literacy rate of Attappady was 57% against the state average of 90.86%.

About two-third of the tribal families comprised of 3 to 5 members. Nuclear types of families were more in Pudur Panchayat. Average land holding of the respondents was reported to be 229±19 cents per family. Nearly 40 percent families possessed land holding between 1 to 2 acres. This finding is in close agreement with that of Nair (2007) and Rajaganapathy (2008).

### 5.1.1 Livestock Ownership

The tribes of Attappady had an average livestock wealth of 3.8 cattle and 5.8 goats. Ownership of other livestock appeared to be insignificant. Average number of cows per family was more in Sholayoor panchayat (3.88), which also recorded the lowest (4.94) figure for goats. More than 40 percent of the families possessed 3 to 4 cows and more than 60 percent families had 5 or more goats. Almost similar statistics were reported from Attappady earlier by Velluva (2004) and Purushothaman (2005).

## 5.2 MANAGEMENT PRACTICES

### 5.2.1 Feeding Practices

The study revealed that the production system of livestock farmers of Attappady area is of subsistence nature depending solely on grazing. All farmers sent their animals for grazing in to surrounding forest area during day time. Rangnekar (2006) and Avinasalingam *et al.* (2008) also reported similar grazing practice of tribal farmers. Senior members of the family usually herded the animals. In some areas community grazing was also practiced where the animals belonging to three or more families in the same hamlet were herded together.

More than a quarter of the farmers fed concentrate to their animals. This observation goes in tune with the findings of Kokate and Tyagi (1991) and Chatterjee *et al.* (2001). The concentrate feeding practice was more among the farmers of Agali panchayat. This can be correlated with the progress in socio economic status of the farmers with respect to education, job etc. Majority of the farmers fed concentrate twice daily before milking, after adding sufficient quantity of water.

Fodder cultivation was found to be not so common among the tribal farmers. Cut and carry system was followed by 62.62 % farmers. Many of the farmers feed locally available feed and fodder like maize to their animals. These are in agreement with earlier reports by Pradhan *et al.* (1991), Komwihangilo *et al.* (1995) and Meena *et al.* (2007). The adoption of fodder preservation techniques was found to be lowest among tribal farmers. Only 17.70% farmers fed straw to their animals. None of the farmers were adopting practices like enrichment of straw with urea and chaffing of fodder before feeding. Similar findings were also reported by Kavatalkar (2007). No farmer was providing feed supplements like mineral mixture and salt to the animals. This was reported earlier by Rao *et al.* (2008).

The study revealed that tribal farmers were not much concerned about watering of their animals. Animals quenched their thirst depending upon rivers and streams present in the locality. This is in contradictory to the earlier finding of Avinasalingam *et al.* (2008) who reported that the tribal farmers of Tamil Nadu provided water twice daily. This might be due to less adoption level of modern scientific practices by the tribes of Attappady and also due to non availability of natural water resources as in Attappady.

### 5.2.2 Housing Facilities

Tribal farmers spent minimum amount for providing housing facilities to their animals. The study revealed that nearly half of the farmers provided separate sheds to their animals. Rest were tying the animals beneath trees and adjacent to their houses during night time. This finding is in agreement with that of Avinasalingam *et al.* (2008). But Kokate and Tyagi (1991) reported that 95.50 percent farmers provided separate sheds to their animals. This was not agreeable as far as Attappady is concerned. The farmers of Agali and Sholayoor were found to be more advanced with respect to the provision of

cattle sheds. This can be substantiated with the fact that Pudur is backward with respect to socio-economic parameters like literacy rate, job profile and average land holding.

Farmers use locally available materials like bamboo and wood cuttings to construct sheds. Majority of the roofs were of thatched type with locally available plant materials like leaves or lemon grass (51.46%). Tiled roofs were found to be not uncommon (34.61%), but nobody had sheds with concrete roof. Above fifty percent of the sheds had no side walls and 40 percent had half wall. Because of this the ventilation facilities were found to be satisfactory. The floors were mainly of mud type (48.23%) and few were made up of stone and wood. The practice of flooring with concrete was not prevalent in the area.

Manger in cattle shed was not erected by 79.4 % of farmers. Construction of drainage channels was observed to be neglected by the farmers, with 85.18% of animal sheds lacking proper facility for clearing the animal excreta. Most of the animal houses were found to be unhygienic with sheds always soiled and wet and having dirty surroundings. Meena *et al.* (2007) also studied the housing pattern of tribal farmers and reported similar findings. With respect to the housing facilities, farmers of Pudur panchayat were found to be most backward

### 5.2.3 Breeding Management

The tribal livestock farmers of Attappady predominantly owned non-descriptive type of animals. These animals were short and small with long horns and average adult body weight of 163.72±7.14 Kg. Majority of the farmers detected heat in their animals by observing bellowing sign and few from mounting behaviour. In Sholayoor panchayat, 85.77 percent followed the

bellowing sign. Kokate and Tyagi (1991) and Avinasalingam *et al.* (2008) also reported similar findings. The practice of Artificial insemination was not common among the tribal dairy farmers. A total of 68.25 percent farmers followed natural service measures to impregnate their animals. Few numbers of bulls were present in the hamlets and these were used for serving the animals. Baltenweck *et al.* (2004), Meena *et al.* (2007), Ndebele *et al.* (2007) also reported the similar findings. Indiscriminate breeding mostly occurred during the grazing time when the animals were sent together. As a result a high inbreeding coefficient exists among the animals of Attappady. This is in close agreement with the findings of Bebe *et al.* (2003).

Among the farmers who followed A.I practice, 89.46% availed the service at the hospital and 7.48% sought the service to their door step. The reason for depending hospital might be to avoid paying any extra charge to the technicians.

**5.2.4 Care of Pregnant and Young Animals.**

The care during pregnancy is very much important as far as a sustainable livestock production system is concerned. Only 48.11% farmers were diagnosing pregnancy using scientific measures. Others identify the pregnant animal by observing the external manifestations like enlargement of abdomen and movement of the foetus. But these were possible only during the later stages of pregnancy. More than fifty percent of the tribal farmers reported that they were giving due importance to pregnancy care. Around 50% farmers reported of complications during parturition.

Among the tribal farmers of Attappady, 56.22% were giving special attention to calves. Soon after birth, aseptic severing and ligation of navel cord was not practiced by 80.40% farmers. This is in close agreement with the

earlier findings of Kokate and Tyagi (1991) and Avinasalingam *et al.* (2008). Feeding colustrum to new born calves was followed by 88.39% farmers. This also agrees with the findings of Avinasalingam *et al.* (2008). But Kokate and Tyagi (1991) reported that majority of the farmers had misconception which prevented feeding colustrum to calves. The reason for this conflict may be of geographical variations in customs and believes.

The calves were allowed to suckle milk by all the farmers. Majority (67.30%) allowed suckling after completely milking the animals and the rest were adopting the practice of providing one teat fully to suckle by the calves. Scientifically this practice is reported to be more acceptable in modern husbandry.

### 5.2.5 Milking and Lactation

Majority of the tribal farmers milked their animals themselves and this practice was found to be most prevalent among the farmers of Sholayoor (96.67%). More than fifty percent of the farmers milked their animals once in a day (morning) and this was found to be wide spread in Agali. The average daily yield of animals in the study area was reported to be between 2 to 4.9 litres by majority farmers (43.76%). Only 3.87% cows had daily milk production above 8 litres per day. The average standard lactation yield of cows in Attappady was found to be 916±26.98 Kg. In Agali, the daily production was found to be more (4.01±0.32), compared to Pudur (3.7±0.37) and Sholayoor (3.75±0.38). Similar findings were recorded by Bardhan *et al.* (2004) and Chattterjee *et al.* (2007).

Analysis of the total milk production records made it clear that maximum production occurred in June. This had strong positive correlation with the rainfall in the area. During June 2007, maximum rainfall was

recorded in the area (308.95 cm). The reason for increase in milk production in rainy season may be the more availability of good quality fodder to animals during grazing. Milk production had negative correlation with the mean maximum temperature recorded in the area which might be due to lack of fodder and also due to heat stress.

### 5.2.6 Health Care Activities

Usually tribal and rural farmers rely more on indigenous practices for curbing the ailments of their animals. More than 50% of the respondent farmers were depending on indigenous remedies for treatment. This was found to be higher among the farmers of Pudur panchayat (54.84%). These findings were concomitant with earlier findings by Kokate and Tyagi (1991), Ghotge (2002), Misra and Kumar (2004) and Avinasalingam *et al.* (2008). The farmers depend on indigenous remedies mainly because of the remoteness of veterinary hospitals and also due to satisfactory results from traditional healers. Ghotge (2002) and Misra and Kumar (2004) also pointed out the same. For getting Veterinary service, more than fifty percent of the farmers took their animals to hospitals. But this facility is available only to a limited portion of the population because of remoteness.

Deworming of calves was not practiced by two-third of the farmers. Majority of the farmers (59.65%) did not vaccinate their animals against infectious diseases including foot and mouth disease. This agrees well with the findings of Meena *et al.* (2007) and Avinasalingam *et al.* (2008). But in Agali panchayat the percentage of farmers practicing deworming and vaccination was found to be appreciable. This can be correlated with the fact that the farmers of Agali had greater awareness due to more education and activities of milk societies and other agencies.

The prevalence of diseases in Attappady was analyzed in the light of prevailing climatic conditions. Maximum numbers of cases were reported during the months from June to September. No statistically significant correlation existed among rain fall, mean maximum temperature and humidity with total number of disease cases reported. This is contradictory to the findings by Kanistanon (1997) and Morse *et al.* (1998) but their reports were specific to clinical mastitis and Bovine salmonellosis where as the present study analysed the effects in general.

## 5.3 MARKETING FACILITIES EXISTING

Markets are very much needed to scale up production and escape the poverty trap. Tribal farmers were not much concerned about marketing structure. The major marketable items were milk, meat and meat animals. Majority of the farmers live in remote areas with poor infrastructure and information systems. More than a quarter of the farmers sold milk to milk societies. Majority of them received a price between 14 and 15.9 per litre. On an average a farmer was getting an amount of rupees 15.84±0.20 per litre. The price being paid was found to be higher in comparison with other societies. This is in contradiction to the findings by Mburu *et al.* (2007) in Kenya. This fact possibly hints to the existence of marketing opportunities, but with majority of the tribes having no access to milk societies. In Agali, one third of the total farmer sold milk to the societies and they were getting an average price of 16.04±0.37 per litre.

Nearly half of the tribal farmers sold dung to people outside their hamlets. People from the low land came and collect dung at a lower rate than that existing else where in the state. The farmers of Agali panchayat sold comparatively more dung than those of Pudur and Sholayoor. This is because in Agali, less number of farmers involved in agriculture activities.

Even though there was a famous cattle market in Kottathara functioning every Saturdays, many of the farmers sold their animals to the middle men who collected the animals for very low prices tactfully often paying them in advance. Animals so collected were transported to the low lands of Kerala and Tamil Nadu and were sold at higher prices. Intervention by middlemen ensures the denial of a fair price to the produces of poor tribal farmers. Even in the market, the middlemen join hands with potential buyers, and the farmer getting betrayed. Chipeta (2003), Dey *et al.* (2007) and Rao *et al.* (2008) also reported similar findings.

Exploitation by middle men can be avoided by extending the working area of milk societies to the interior regions of Attappady and also by following collective marketing and contract farming strategies. Self help groups have to play keen role in developing Animal husbandry in the region targeting at economic upliftment of the tribal farmers. Similar suggestions were put forth by Musemwa *et al.* (2007), Rao *et al.* (2008) and Patil (2008).

## 5.4 SCIENTIFIC MANAGEMENT OF LIVESTOCK

After the study period of six months results obtained were subjected to statistical analysis. The mean body weight of 175.08±4.16 Kg was observed among the test group animals against that of 163.72±7.14 Kg among the control group animals. The effect was found to be statistically significant only at 19 percent level. The findings of the study were in tune with the earlier findings by Prache *et al.* (1990), Biwott *et al.* (1998), Chaturvedi and Harabola (2000) and Morales *et al.* (2000). The standard lactation yield of animals was observed to increase remarkably to a level of high statistical significance in the test group (1092.95±25.38 Kg) when compared with the control group animals (916.3±26.98 Kg). Clottey *et al.* (2007) conducted their study with similar

findings. There was no statistically significant difference observed in milk composition between the two groups.

The effect of the test was found to be statistically significant with respect to the birth weight of calves. In the test area it was 16.93±0.612 Kg against 15.29±0.357 Kg in the control group. An average difference of 70 g was observed between test and control groups with respect to daily weight gain of calves. This was highly significant statistically and supported by earlier findings by Prache *et al.* (1990), Biwott *et al.* (1998), Chaturvedi and Harabola (2000) and Morales *et al.* (2000). Body weight of goats at one year age, maintained under scientific management were recorded to be higher (13.32±0.148 Kg) than the control group animals (15.82±0.296 Kg) at highly significance level. This is in close agreement with the findings of Prache *et al.*, (1990), Morales *et al.* (2000), Karim *et al.* (2007) and Karunanithi *et al.* (2007). A significant reduction was noticed in the incidence of disease among test group animals.

### 5.4.1 Economic Analysis

The benefit cost analysis of the test group and control group revealed that with respect to annual net returns, the test group farmers earned Rs. 16457 where as those in control group earned Rs. 15563. In test group 70 percent of the expenditure was incurred for feeding. This is akin to the findings by George *et al.* (2000). The findings of the study clearly indicated that livestock production system of tribes needed scientific intervention as far as the economic aspects are concerned. Earlier findings by Reddy *et al.* (2000) Singh and Agarwal (2007) Aitawade *et al.* (2005) and Krishna and Prasad (2004) were also in agreement with this.

## 5.5 GENDER ROLES IN TRIBAL LIVESTOCK SYSTEM

Among the tribal livestock farmers, the sex ratio was found to be 1:1. The percentage of females was found to be more in Pudur panchayat (54.84). Mariamma (2004) also reported that there was no gender discrimination among the farmers of Attappady. Among the female farmers, 80 percent were illiterate. The illiteracy rate of females was found to be higher than that of males where it was 71.51%. The illiteracy of females was highest in Pudur (82%) and lowest in Agali (77.27%). This was of no specific concern as the literacy rate tribal of farmers was highest in Agali and lowest in Pudur. The average age of the female respondents were observed as 43.96±1.37. The gender concerns in animal husbandry were studied earlier by Chipeta (2003), Kala and Verma (2003) and Ramkumar *et al.* (2004).

## 5.6 CONSTRAINT ANALYSIS

Most of the tribal farmers (85 percent) blamed the lack of support from government agencies as the major constraint faced by them. Nearly two-third of the farmers was concerned about the restrictions to grazing imposed by various agencies in the wake of deforestation and soil erosion in the area. More than 50 percent of the farmers worried about the lack of sufficient veterinary professionals in the locality. Only few farmers stressed problems with the existing marketing facilities.

### 5.6.1 Restriction to Grazing

The tribal farmers of Attappady mainly depended upon the adjoining forests as the source for grazing their animals all time. But AHADS has established 'Vana Samrakshana Samitis' (VSS) with the cooperation of people for the conservation of forests and denied the entry of animals for grazing by

constructing wire fencing through out the borders. This also prevented the animals from gaining entry in to water sources like streams and rivers. The ban also disrupted natural livestock feeding strategies of the tribal farmers and a majority of them where forced to deviate away from livestock husbandry. Similar findings were also reported by Chawla (2003), Timan *et al.* (2004) CALPI (2005) and Akter *et al.* (2007).

### 5.6.2 Lack of Knowledge about Modern Practices

The tribal farmers lacked knowledge about most of the modern animal husbandry practices. Practices like concentrate feeding, feed supplementation, feed preservation, value addition etc, were not followed by them. Extension activities in this direction did not yield any tangible results as external interventions were not readily acceptable to the tribes.

### 5.6.3 Marketing Constraints

The major constraints in marketing are discussed under the heading of marketing facilities existing. Absence of direct market access and lack of marketing information were found to be the important factors.

### 5.6.4 Poor Genetic Potential of Animals

Majority of the tribal livestock were of non-descript type with poor production potential. Selection of animals was not practiced by the farmers. Inbreeding coefficient of the area was also high. Productivity enhancement among the animals through crossbreeding with exotic breeds was fraught with the danger of the populations loosing their inherent sturdiness, vitality and the ability to withstand stress.

### 5.6.5 Poor Credit and Insurance Availability

Access of tribal farmers to institutional credit and its flexibility to match the requirement of farmers are very much limited. Economically disabled tribal households have little or no capital resources to invest in their livestock enterprise. This was pointed out earlier by Nataraju and Channegowda (1984), Prasad and Roy (1988) and Kumaravel and Krisnaraj (2006). The benefits of the insurance programme 'Gosuraksha, implemented by Animal Husbandry Department (AHD) and Kerala Livestock Development Board (KLDB) were not availed by the tribal farmers due to lack of awareness.

### 5.6.6 Lack of Sufficient Veterinary Support

Most of the staff positions in local veterinary institutions were found to be vacant for a long time. The remoteness and difficulty in accessibility made Attappady as the last choice of veterinarians and technicians. Vastness of the area also affects timely intervention by the veterinarians. The suggestions of Kumaravel and Krisnaraj (2006) and Jayapadma and Johnson (2008) were also found to align with this.

### 5.6.7 Lack of Participation in Government Schemes

It was observed that the participation of tribes in various Government sponsored schemes were minimum. In schemes such as 'Vidharbha' model package of AHD, milk shed project of Dairy Development Department (DDD) etc., the participation of tribal farmers was found to be between five to eight percent only. The comparative share for animal husbandry activities in the budget plans of various institutions of the area was also found to be very less.

Other major constraints observed were:

1. Exploitation of tribes by the settlers.
2. Lack of motive to make profit by rearing livestock.
3. High price of cattle feed.
4. Scarcity of water especially during summer.
5. Poor inter departmental collaboration.

## 5.7 SUGGESTIONS FOR IMPROVEMENT OF THE SYSTEM

On analysis of the livestock production system of tribes of Attappady, it was evident that the system needs intervention in most of the areas. Thrust areas of interventions are discussed below.

### 5.7.1 Dissemination of Improved Animal Husbandry Practices

The tribal farmers should be made aware of the improved dairy husbandry practices like concentrate feeding, deworming and vaccination practices, hygienic maintenance of the shed and surroundings, ad libitum watering of animals etc. Community based biogas plants can be erected which can be used for cooking and lighting. Extension strategies should be reviewed and intensified using participatory learning and dissemination through facilitators.

### 5.7.2 Feed and Fodder Availability

The livestock production system of tribes solely depends upon the surrounding forests for feed resources. Instead of completely denying access to their livestock in to grazing yards, strategies should be worked out to formulate an effective environment friendly plan to optimize the utilization of forest resources. The dry season feed problem can be overcome through

promoting fodder cultivation and conservation in the form of hay at the end of the rainy seasons. Enrichment of fodder by adding substances like urea should be promoted. Concentrate feed should be made available to the farmers on subsidised rate considering the backwardness of Attappady.

### 5.7.3 Planned Breeding Strategies

The introduction of breeds which are new to the area may disrupt the system with respect to the adaptability. Superior breeding males identified and selected from the locality can be used for impregnating animals where A.I facility is not available. Periodic bull rotation programmes should be formulated to prevent inbreeding of animals.

### 5.7.4 Improvement of Veterinary Service Facilities

Government agencies should take up the matter immediately and the vacancies of veterinarians and technicians have to be filled urgently. In case of shortage of sufficient professionals, training can be given to community based para-veterinary workers for performing insemination and vaccination.

### 5.7.5 Promote Micro-finance and Credit Availability

Farmers should be motivated to consider dairy husbandry as an enterprise and credit facilities should be extended to them in the form of micro finances. Various NGOs and government agencies should move together to achieve this end. Credit should also be linked with insurance for covering the risk of loss of production and life.

### 5.7.6 Strengthening of Marketing System

It was made clear from the study that the farmers who had contact with milk cooperatives were more advanced than others with respect to adoption of modern practices. Activities of the milk cooperatives need to be extended to the interior regions. Collective marketing and contract farming may be popularised. The farmers need to be made aware of the existing market prices. Introduction of a mechanism for sale of goats on body weight basis is to be evolved.

### 5.7.7 Inter-departmental Collaboration

It was observed that departments like AHD, DDD, AHADS etc., were not having enough coordination in their activities. This often leads to duplication and overlapping of the efforts. They should discuss the projects periodically and must collaborate wherever possible to avoid duplication and wastage of resources. The tribes should be informed of various schemes and top priority should be given to them.

### 5.7.8 Gender Issues

Livestock production often plays a crucial role in the livelihoods of poor women. If poverty is to be reduced, women must become involved in livestock services both as producers and service providers. The targeted involvement of women may enhance their capabilities and social status

Some of the above mentioned remedies may be urgent, whereas others may not of course produce an immediate change in the conditions of the tribes. If sincere attempts are made, the tribal farmers may however move ahead towards progress in the field gradually.

# Summary

# 6. SUMMARY

Attappady is an important tribal settlement area of Kerala situated in the Western Ghats with plentiful vegetation and wide-ranging forests. It has a total geographical area of 745 sq. km of which 130.3 was used for agricultural purposes. Tribes constitute about 41 percent of the total population of Attappady and are comprised of three communities namely *Irula*, *Muduga*, and *Kurumba*. *Irula* is the dominant group while *Muduga* and *Kurumba* follow in the hierarchy. Tribal people of Attappady were traditionally engaged in agriculture, animal husbandry and collection of forest produces for their livelihood.

A survey was conducted among the tribal livestock farmers to assess the socio-economic status and livestock management practices. From the three panchayats namely Agali, Pudur and Sholayoor, 106 respondents were selected using stratified random sampling technique. The data collected was tabulated and analysed.

Survey findings revealed that more than sixty percent of the tribal farmers were middle aged. The contribution of youngsters in dairying was found to be minimal. Majority of the tribal farmers were illiterate. More than fifty percent of the people considered labour as their primary occupation with less than 5 percent considering animal husbandry as primary occupation. Majority of the families consisted of three to five members. Among the livestock farmers, gender wise distribution was found to be more or less equal. The average land holding per farmer was found to be 2.29 acres and they mainly cultivate *Ragi, Chama, Amaranthus* and *Mustard*.

The average herd size of cattle among the tribes in Attappady was 3.76 and the flock size of goat was 5.83 per farmer. Majority of the farmers used their livestock for ploughing in addition to milk and meat purposes.

Most of the tribal farmers did not provide separate housing facility to their livestock and many of them housed animals during the night time only. The tribal farmers relied mainly on low input housing facilities using locally available materials. Majority of the sheds had thatched roof with out any side walls and floor made up of mud. They did not provide manger facility in sheds and constructed sheds with out drainage channel and dung pit.

The livestock production system of Attappady was found to be a zero input system depending entirely on grazing and locally available feed resources. Concentrate feeding was practiced by only a quarter of the farmers. Majority of them purchased concentrate feed from milk societies. More than fifty percent of the farmers fed concentrate twice daily, before milking.

Almost all the farmers practiced grazing of their animals during day time. A quarter of the farmers cultivated fodder crops for feeding their animals. Most of them adapted cut and carry system and the percentage of farmers who were feeding straw to their animals was very low. The farmers were not concerned about watering their animals. The animals were depended on rivers and streams for quenching their thirst.

Most of the animals possessed by the tribal farmers were of non descriptive type. The farmers of Attappady depended upon natural service for impregnating their animals. Indiscriminate breeding occurred when the animals were sent together for grazing. Majority detected heat by observing the bellowing sign. Of the farmers who were following A.I majority took their animals to hospitals for insemination. Pregnancy diagnosis facilities were

sought by less than fifty percent of the farmers. Majority were depended upon signs like abdominal enlargement for diagnosing pregnancy. Most of the farmers provided additional care to their animals and many of them reported difficulties during parturition. Less than fifty percent of the farmers were provided special care to the young ones. Most of them did not cut the navel cord after birth and colustrum feeding was quite common. Nearly seventy percent of the farmers allowed calves to suckle milk after milking the animals completely.

Almost all the farmers milked their animals themselves and more than fifty percent farmers practiced milking in the morning. Majority of the animals had an average milk yield between 2 and 4.9 litres per day. Maximum milk production was reported during the month of June with minimum during February.

More than half of the farmers relied on indigenous remedies for treating their animals. Among the farmers who adopted modern practices, most of them took their animals to veterinary institutions for treatment. Deworming of calves was not practiced by most of them and vaccination against infectious diseases was sought by only 40 percent of the farmers. Parasitic infestations and digestive disorders were found to be the major animal health problems in the area.

All farmers in the area reared goats. Even though, Attappady black breed of goat was peculiar to the area, majority of the animals were non descriptive type. Most of the farmers provided sheds to goats which were made up of bamboo stem and grass leaves. Nobody fed concentrate to goats. All the farmers sent their goats for grazing during day time.

The major marketable items were milk, meat animals and manure. Tribes were not much concerned about the existing marketing facilities. Only a quarter of the farmers sold milk to the cooperative societies. Majority of them received a price between 14 and 16 rupees per litre of milk. Sale of dung was a major income source for tribes. Animals for meat purpose were collected by middle men from the farmers at very low price and were transported to the low lands. At cattle market also, the intervention from middle men was denied a fair price to the ethnic farmers. Extending the work area to the interior regions and adoption of collective marketing strategies were suggested for the improvement of marketing system.

An experiment was performed to find the effect of scientific intervention in a sample of tribal livestock units by maintaining the animals as per recommendations in package of practices. Animals in the test group were found to be superior to the control group with respect to standard lactation yield, birth weight and daily weight gain of calves, body weight of goats at one year and minimum diseases occurrence. There was no significant difference with respect to the body weight of cows, milk fat percentage and SNF. The results pointed to the draw backs in the existing management system and the need for scientific intervention.

The major constraints in the system as reported by the farmers were lack of support from Government agencies, restrictions imposed for grazing, limited veterinary services and marketing problems. Lack of knowledge about modern husbandry practices, poor genetic potential of animals, poor credit and insurance availability were found to be the other major constraints in the system.

After the analysis of data, following suggestions were put forth.

1. Dissemination of improved animal husbandry practices among the tribal farmers through intensive extension activity.
2. Improve the fodder production and implement feed subsidy schemes.
3. Well planned breeding strategies need to be formulated considering the economic viability and sustainability.
4. Improve veterinary services in the area and fill the vacancies of officers immediately.
5. Promote micro-finance and credit availability to the tribal farmers.
6. Strengthen the marketing system adopting collective marketing strategies and extending the activities of dairy cooperatives.
7. Inter-departmental cooperation should be strengthened and avoid duplication and overlapping of schemes and wastage of funds.
8. The involvement of women should be promoted so that their capabilities and social status can be improved.

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# LIVESTOCK PRODUCTION SYSTEM OF TRIBES IN ATTAPPADY AREA OF PALAKKAD DISTRICT

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# ABSTRACT

Attappady is an important tribal settlement area of Kerala. The tribes of Attappady belong to three communities namely *Irula, Muduga,* and *Kurumba*. They were traditionally engaged in agriculture and animal husbandry activities. This study was conducted to make an intensive appraisal of the livestock production system of Attappady and to identify possible areas of scientific intervention so as to improve its efficiency.

As per the survey findings, more than sixty percent of the tribal farmers were middle aged. Majority of the tribal farmers were illiterate and considered labour as their primary occupation. The average herd size of cattle and goat among the tribes in Attappady were found to be 3.76 and 5.83 respectively.

Most of the tribal farmers provided housing facility to their animals during night time only. The tribal farmers entirely depended on grazing and locally available feed resources for feeding their animals. Concentrate feeding was practiced by only a quarter of the farmers. Few of them were cultivated fodder and fed straw to animals. These farmers were not concerned about watering their animals.

The animals were non-descriptive type mostly and indiscriminate breeding was common. The farmers detected heat by observing the bellowing sign. Only few of them provided special care to pregnant and young animals. Most of them did not cut the navel cord after birth but the practice of colustrum feeding was quite common. Majority allowed calves to suckle milk after milking the animals completely.

The tribal farmers milked their animals themselves and majority practiced morning time milking. Most of the animals had an average milk yield of 2 to 4.9 litres per day. Majority of the farmers relied on indigenous remedies for treating their animals. Deworming and vaccination of animals were not practiced by most of the farmers. Parasitic infestations and digestive disorders were found to be the major problems in the area. Tribes were not much concerned about the marketing facilities. Only a quarter of the farmers sold milk to cooperative societies. The interference of middle men reduced the profit gaining from the sale of animals and manure.

An experiment was performed to study the effect of scientific intervention in the system. The animals in test group were found to be superior to the control group with respect to standard lactation yield, birth weight and daily weight gain of calves, body weight of goats at one year of age and minimum number of diseases occurrence. The results pointed to the draw backs in the existing management system and the need for scientific intervention.

Major constraints in the system were lack of knowledge about modern husbandry practices, poor genetic potential of animals, restrictions for grazing, lack of sufficient veterinary services, poor credit and insurance availabilities and marketing problems.

Measures like dissemination of improved animal husbandry practices, increased fodder production and introduction of feed subsidy schemes, planned breeding strategies, improvement of veterinary facilities, promoting micro-finance and credit availability, strengthening the marketing system and inter-departmental collaboration may be adopted to improve the efficiency of the livestock production system of tribes of Attappady.