STUDIES ON MANAGEMENT PRACTICES FOLLOWED BY CROSSBRED CATTLE OWNERS IN KONKAN REGION

BY

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M.Sc. (Agri.)

DEPARTMENT OF ANIMAL HUSBANDRY AND DAIRY SCIENCE,

FACULTY OF AGRICULTURE,

Dr. BALASAHEB SAWANT KONKAN KRISHI VIDYAPEETH, DAPOLI - 415 712, DIST. RATNAGIRI (M.S.)

DECEMBER, 2022

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thesis submitted to the

Dr. BALASAHEB SAWANT KONKAN KRISHI VIDYAPEETH, DAPOLI
(Agricultural University)
Dist. Ratnagiri (Maharashtra State), India

in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

In

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CERTIFICATE

This is to certify that the thesis entitled, **"Studies on Management Practices Followed by Crossbred Cattle Owners in Konkan Region"** submitted to the Faculty of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra State, in partial fulfilment of the requirements for the degree of **DOCTOR OF PHILOSOPHY** in **ANIMAL HUSBUNDRY,** embodies the results of piece of *bonafide* research work carried out by **MR. NIKHIL PRAKASH KADAM** under my guidance and supervision. No part of this thesis has been submitted for any other degree or diploma or published in other form. All the assistance and help received during the course of investigation and the sources of literature have been dully acknowledged by him.

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ABSTRACT

The present investigation entitled "Studies on Management Practices Followed by Crossbred Cattle Owners in Konkan Region**"** was carried out by collecting the data using stratified random sampling technique. Five districts selected from Konkan region for survey *viz.,* Palghar, Thane, Raigad, Ratnagiri and Sindhudurg. From each district 5 tehsils were selected randomly and from each tehsil 5 villages were selected. Further from each village 5 cattle owners were randomly selected. Thus, sample size was 625. Crossbred cattle owners were classified in five different groups i.e., landless, marginal (up to 1 ha), small (1.01 to 2 ha), medium (2.01 to 8 ha) and large (above 8 ha) and livestock population were also classified on the basis of herd size.

The majority crossbred cattle owners from Palghar (56.8%), Thane (48%) and Raigad (53.6%) district having marginal land holding. Whereas, majority crossbred cattle owners from Ratnagiri (47.2%) and Sindhudurg (50.4%) district having small land holding.

The most of the crossbred cattle owners from Palghar (51.2%), Thane (50.4%) and Raigad (47.2%) district having herd size of 3 to 5 animals. Whereas, most of the crossbred cattle owners from Ratnagiri (50.4%) and Sindhudurg (53.6%) district having herd size up to 2 animals. Classification of crossbred cattle owners was done on the basis of their

annual income and found that overall 61.76 per cent farmers from a study area having anuual income between Rs. 50000 to 100000.

In feeding practices maximum number of crossbred cattle owners adopted grazing + stall feeding system of feeding in study area and it was found highest in Raigad district with 94.4 per cent. Practice regarding individual feeding of milch animal was prominently adopted by crossbred cattle owners of Ratnagiri (87.2%) district and though group feeding practice was not adopted widely it was maximum found in Raigad (26.4%) district. Among selected districts of Konkan region feeding of animals twice in a day was maximum adopted by Raigad (67.2%) district and minimum by Thane (56%) district. All the crossbred cattle owners of study area followed the practice of feeding colostrum to new born calf except Thane district (96.8%). Processing of roughages and concentrates before feeding was adopted by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 26.4 per cent, 40 per cent, 24 per cent, 37.6 per cent 35.2 per cent, respectively. No farmers used urea for the enrichment of poor quality straw except Thane (2.4%) and Ratnagiri (0.8%) district. In study region majority of crossbred cattle owners adopted the practice regarding manual chaffing of green fodder and dry fodder than mechanical chaffing and it was observed maximum in Raigad district with 94.4 per cent. Feeding of green fodder was maximum and minimum followed by crossbred cattle owners of Sindhudurg (62.4%) district and Palghar (40%) district, respectively. No crossbred cattle owner followed the practice of feeding silage except Thane (6.4%) and Ratnagiri (0.8%) district. From total selected crossbred cattle owners of study area, the practice about conservation of feeds and fodder was majorly followed by Ratnagiri (84%) district. Feeding of dry matter @ 2 to 2.5 kg/100 kg body weight of animal was minimum followed by crossbred cattle owners Raigad (69.6%) district and maximum followed by Ratnagiri (80.8%) district, whereas feeding of concentrate @ 40% of milk production and 1 kg for maintenance was adopted by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 30.4 per cent, 43.2 per cent, 28 per cent, 40 per cent and 36.8 per cent, respectively. Practice of feeding readymade purchased type of concentrates was abundantly used by farmers than homemade concentrates and it was highest found in Thane (77.6%) district. Pregnancy allowance ration for pregnant animals was maximum given by 80.8 per cent farmers of Thane district. Use of mineral mixture or mineral bricks for feeding was practiced by crossbred cattle owners of Palghar (8.8%), Thane (27.2%), Raigad (7.2%), Ratnagiri (24%) and Sindhudurg (21.6%) district, whereas feeding of unconventional roughages and concentrates during scarcity was majorly followed by crossbred cattle owners of Ratnagiri district with 72.8 per cent. Separate processing of concentrates was widely adopted than processing of concentrates with roughages and it was majorly found in Raigad (81.6%) district.

Management practices followed under given study area, the Artificial Insemination (AI) was prominently followed by crossbred cattle owners than natural breeding method and it was found highest in Thane (71.2%) district, whereas natural method of breeding was maximum followed in Raigad district with 44 per cent. Pregnancy diagnosis was carried out by Palghar (27.2%), Thane (54.4%), Raigad (23.2%), Ratnagiri (44.8%) and Sindhudurg (40.8%) district. In present study area Katcha type of housing was majorly adopted than Pucca type of housing and it was maximum observed in Palghar district with 81.6 per cent. Katcha type of flooring was mostly adopted than Pucca type of flooring in selected area of Konkan region with its highest percentage in Palghar (74.4%) district. Among different roofing material Roof tiles were prominently used than Grasses and Asbestos or Cement sheets in Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 45.6 per cent, 48.8 per cent, 51.2 per cent, 63.2 per cent and 71.2 per cent, respectively. In study area closed system of housing was majorly adopted than open system of housing and it was found highest in Sindhudurg (84.8%) district. In health and sanitation practices washing of cattle was majorly carried out by Thane (77.6%) district. Practice regarding washing of udder before milking was followed by all the (100%) crossbred cattle owners of Thane, Ratnagiri and Sindhudurg district except Palghar (99.2%) and Raigad (99.2%) district. Regular cleaning of shed was maximum (100%) adopted by Thane, Ratnagiri and Sindhudurg district. Washing of floor was maximum followed by crossbred cattle owners of Thane (37.6%) district and minimum adopted by Raigad (22.4%) district. Practice of vaccination was majorly adopted by Thane (32%) district, whereas Deworming was followed by Palghar, Thane, Raigad, Ratnagiri, Sindhudurg district with 14.4 per cent, 29.6 per cent, 12 per cent, 27.2 per cent and 23.2 per cent, respectively. Spraying against ectoparasites was carried out by all the selected districts with highest percentage in Thane (32.8%) district. Practice of grooming was followed by very less number of crossbred cattle owners with lowest percentage in Raigad (4%) district.

Among different financial constraints, high cost of concentrates was majorly faced by Sindhudurg (92.8%) district, whereas high cost of green fodder was majorly faced by crossbred cattle owners of Palghar district with 90.4 per cent. In study area non-availability of agro-industrial by product was maximum faced Raigad (98.4%) district. Problem regarding low income was majorly faced by Palghar (96%) district, followed by Raigad (94.4%), Thane (90.4%), Ratnagiri (88%) and Sindhudurg (84.8%) district, whereas lack of loan facility was maximum and minimum faced by Raigad (78.4%) and Sindhudurg (70.4%) district, respectively. Technical constraints like lack of scientific knowledge was faced by Palghar (92%), Thane (84.8%), Raigad (92%), Ratnagiri (87.2%) and Sindhudurg (89.6%) district, whereas lack of technical guidance was majorly faced by Raigad district with 92 per cent.Situational constraints

like inadequate land holding was maximum faced by Palghar district with 95.2 per cent. In selected study area problem regarding lack of irrigation facility was faced by Palghar (87.2%), Thane (83.2%), Raigad (84.8%), Ratnagiri (79.2%) and Sindhudurg (76%) district, whereas shortage of green fodder was majorly faced by crossbred cattle owners of Palghar (85.6%) district. Mostly Sindhudurg (69.6%) district faced the problem regarding non-availability of labour, whereas lack of awareness about use of mineral mixture / mineral block was maximum and minimum faced by Palghar (91.2%) district and Thane (80%) district, respectively. Problem related to non-availability of veterinary hospitals or veterinary services was majorly faced by Palghar (67.2%) district, followed by Raigad (64.8%), Thane (60%), Sindhudurg (55.2%) and Ratnagiri (52.8%) district. Breeding poblems were majorly faced by crossbred cattle owner of Sindhudurg district with 12 per cent. Faulty pregnancy diagnosis was not faced by many farmers in given study area and it was lowest faced by Raigad district with 16.8 per cent. Infrastructural constraints like lack of chaff cutter, lack of communication and lack of storage facility were maximum faced by crossbred cattle owners of Raigad district with 94.4 per cent, 74.4 per cent and 84.8 per cent, respectively. Maximum farmers of Raigad (88.8%) district faced problem of lack of personal interest about adoption of standard management practices.

There is need to improve management of crossbred cattle on scientific line which includes, proper feeding, housing and health care. Therefore, regular training programs of dairy cattle owners in the area *viz.,* vaccination, deworming, fodder cultivation, AI etc. should be undertaken to make the dairy sector sustainable in Konkan region of Maharashtra to increase the production of crossbred cattle.

CHAPTER I
INTRODUCTION

Animal Husbandry is making significant contribution in the socio-economic and national economic development of the country. One of the largest livestock populations in the world is situated in India. Livestock sector is an important subsector of Indian agricultural economy which provides livelihood support to the rural population of India. In the last decade share of livestock to agricultural GDP has increased from 14.00 per cent to 30.00 per cent and its ownership has remained egalitarian. Livestock sector provides employment opportunities, asset creation, increased income sources and security to the livestock owners along with sustained annual growth rate of nearly 4 per cent. The annual milk production of India is 199 million tons which makes India highest milk producer country in the world having contribution of 22 per cent to the world's total milk production. India ranks first in buffalo and cattle population, second in goat population, third in sheep population and seventh in poultry farming in the world. Total livestock population of the country is 535.78 million which shows an increase of 4.6 per cent over Livestock Census, 2012. In year 2019 total number of cattle population in the country was 192.49 million which shows an increase of 0.8 per cent over previous census, 2012. The female cattle population was 145.12 million which is increased by 18.0 per cent over previous Livestock Census, 2012. There are six types of cow breeds in Maharashtra namely Dangi, Khillar, Deoni, Red Kandhari, Gaolao and Konkan Kapila. During year 2019, India ranked first in total cattle production and also first in the total milk production with the production of 187 million tonnes (Anonymous, 2019).

The Exotic/Crossbred and Indigenous/Non-descript cattle population in the country is 50.42 million and 142.11 million respectively. In Konkan region of Maharashtra the Exotic/Crossbred and Indigenous/Non-descript cattle population is 0.93 lakh and 5.23 lakh respectively. In India Per day average milk production of Indigenous/Non-descript cattle is only about 3.9 kg per day and per day average milk production of Crossbred cattle is about 7.1 kg per day. The Total milk production of Konkan region is about 444.63 metric tonnes per year and the milk demand is more than 700 metric tonnes per year. Hence, still there is huge gap between demand and supply of milk in a Konkan region. To fulfil the milk demand in a Konkan region there is need to increase milk production of cattle by crossing local cattle with high yielding exotic breeds.

In developing countries livestock management is becoming an important source of farm income along with crop production. Advancement in management and technological procedures of modern livestock enterprises have contributed enormously to profitability of

livestock industry. There is an existence of close relationship between farmers management (personal characteristics, attitude, management practices) and farm income. It is important to gain knowledge of various livestock management practices followed by farmers of different tribal belts which may help in filling the gap between existing traditional practices followed and recommended improved scientific practices. Indigenous cattle show poor performance due to more populations of nondescript animals and deficiency of feed and fodder hence it is imperative to arrange great quality feed and fodder to get sustainable improvement in livestock productivity and to achieve efficient utilization of genetic potential of different livestock species.

In rural parts of India milk is an important source of protein and demand for milk is increasing with increasing rural prosperity. Livestock development is labour intensive activity and it requires close attention throughout the year. Government should encourage Public Private Partnership so that to attract efficient modern technologies, effective networking of forward and backward integration, larger investments and scientifically advanced practices of livestock production and management. In India livestock play an important role in strengthening the economy. In developing countries, the main constraint of livestock development is fluctuation and scarcity in the quantity and quality of animal feed (Mishra *et al.*, 2018).

Live animals are important natural assets and integral part of the social as well as economic fabric of rural people not only source of livelihood but also provider of fuel, manual and drought energy. In addition of producing highly nutritious food products dairy sector is also important in sustaining poor farmers and overall prosperity of farming community. Around 15-20 per cent families of rural India are landless and around 80 per cent of land holders belongs to the category of marginal and small farmers where main source of livelihood is livestock. Due to scarcity of fertile lands, assured irrigation and lack of employment in service and industrial sector most of the rural families belonging from socio-economically weaker sections of the society choose to maintain different livestock species to supplement their family income. Land owners prefer to keep buffaloes and cattle while landless owners choose to maintain goat, sheep and poultry. As the policy of the State Animal Husbandry Department to extend free vaccination, breeding, veterinary services and permission of free grazing on community lands, majority of farmers are getting encouraged to enhance and expand their livestock size without any financial burden and this may be the reason for having world's largest livestock population in India. In India livestock have sentimental value so that farmers keep maintaining livestock animals even though they become uneconomical. Mainly only four milch breeds namely Gir, Sahiwal, Sindhi and Rathi are maintained for milk production among major Indian breeds. Kankrej, Deoni, and Tharparkar

these are some dual-purpose breeds while majority of remaining breeds are used for draft purpose that is for production of bullocks.

In Animal husbandry maintenance of feed and fodder is very crucial to attain nutritional balance. Dairy sub-sector occupies important position in Indian agricultural economy, as after rice milk is a second largest agriculture commodity contributing to the GDP of India. The fast growth of milk production in India is due to increasing number of animals rather than improved productivity which is affected by various factors like social, economic and climactic factors. Though India has enormous bovine wealth the production is one of the lowest in the world due to reason that the farmers do not choose to follow improved practices of dairy management at desired level. The main notable characteristic of Indian livestock population is that almost its entire feed requirement is met from grazing on harvested lands and common fields; crop residues and plant by-products; weeds, grasses and tree leaves gathered from both cultivated and uncultivated lands (Dikshit A.K. and Birthal, P. S., 2010). Major constraint of dairy husbandry is availability of feed and fodder. Most of the Indian lands are utilized for grain purpose which causes acute shortage of green leguminous fodder so that milch animals are deprived of good quality fodder and essential nutrients. Nutrients are very essential as they are very crucial to fulfil the requirement of maintenance and growth of foetus, placenta, and uterus. Nutrients help to replenish the body tissue losses due to postpartum milk production.

Agriculture and all allied sectors of agriculture are true backbone of Indian economy. Farmers prefer rearing of livestock population along with crop production as it provides employment to farmers family during lean period and act as buffer in crises like crop failure. Different fodder crops like Kharif Maize, Cowpea, Sorghum, Guar and Rabi Chinese mustard, Oats can be grown to ensure the year-round supply of green fodder to the animals as green forages are the most important and shows immediate supply of essential nutrients including water to the animals. Mixture feeding of legumes and cereals can be achieved by following mixed cropping practice to provide essential nutrients and proteins so as to increase the productivity of livestock.

Sheltering of livestock population is an important aspect of livestock management. Better housing managements provide shelter to the animals along with providing comfort zone during severe environmental conditions when animals become more vulnerable to get afflicted with stress conditions like very hot weather, extreme cold temperatures, drought conditions etc. In India Gaushalas are the five-thousand-year-old tradition in which abandoned, old, chronically ill, unproductive and stary cows are kept until they die of their natural causes. Role of shelters in the economic growth of India by advocating the dairying and breeding of shelter cows on the basis of scientific principles rather than religious role was emphasized by Mahatma

Gandhi. Role of Gaushalas was changed from sacred cow sanctuaries to potential dairying and breeding centres with high yielding cows and active financial support from government.

Breeding, nutrition, managerial skills, disease control methods, resources, marketing and increasing population hinders the progress of dairying in our country. In Maharashtra major problems of dairy industry are feeding, management, breeding and animal health practices. Farm women contribute around fifty to sixty per cent in agriculture. Women play important role in animal husbandry activities like skilled workers, managers, feeding, milking, sale of milk, housing managements, take their animals for grazing, animal protection, health managements, watering, marketing of produce and decision makers. Livestock farming plays a significant role in accelerating the rural economic growth.

Livestock is becoming an integral part of all interventions aimed to reduce rural poverty and enhancing food and nutritional security. If all management practices like feeding, housing, health and other managemental practices fits in proper operation, it is possible to meet desired level of milk production. Farmers are not fully aware of scientifically improved practices of livestock production and management. It is necessary to meet increasing fodder demand of livestock and it can be achieved by following mixed cropping system. Livestock rearing and crop husbandry are two important complementary components of mixed farming system which influence agricultural economy leading to sustainable agriculture.

In developing countries demand for milk production is increasing and it is essential to achieve sustainable development of dairy industry as helps in improving nutritional standards of the people, generating employment, improving income level in rural areas, improving living standards of people especially small and marginal farmers. Small holder dairy production is important to contribute improved livelihoods of rural people and it can reduce their poverty. Adoptions of high quality scientifically improved technologies are associated with the better milk yield, greater income generation, poverty alleviation and increased availability of animal protein. Livestock is potential to having increasing demand for milk but to achieve this focus should be given to high yielding breeds, improved management practices, better housing, supply of high-quality feed and fodder and adoption of technologies like Artificial Insemination (AI).

Balance ration is crucial to supply all the essential nutrients and to nourish the animal properly in twenty four hour period. Balance ration provide best out of all the constituents present in their food and it depends upon type of breed of animal and purpose for which animal is kept. Deficiency symptoms such as low production potential, retarded growth, disturbance in reproductive efficiency and delayed maturity are witnessed if cattle are not properly fed. For farmers it is of immense

importance to know the economics of milk production because production of milk varies according to type of milch animals, type of breed, type of managemental practice and health care management practices followed by owner. Animal diet must contain all required essential nutrients in desirable proportion and appropriate ratio to achieve proper maintenance and productivity. Over-feeding and under-feeding can be avoided. Along with protein and energy animal diet must contain minerals and vitamins which perform various vital activities and protect animal body against pathogens and diseases by providing immunity to the animals. Single feed ingredient cannot meet all the requirements of animal body required for their maintenance and growth hence it is important and necessary to provide combination of different ingredients like roughages (succulent and dry), concentrates, silage and mineral supplements.

To lower the stress of animals caused by extreme climatic conditions and to provide protection against predators, housing and sheltering is very important. Housing creates suitable microenvironment in animal house which enables protection of animals from external environment and increases efficiency of proper labour utilization. Wellbeing of animals is greatly influenced by type of housing and type of flooring used to keep them healthy. Animal behaviour is most sensitive and commonly used indicator of animal welfare.

Breeding of animals is important to enhance their potential. Crossbreeds are more prone to diseases and disorders, mainly udder and reproductive disorders than indigenous animals. In 1960 Artificial Insemination (AI) was introduced as an effective breeding programme with the objective of upgradation of local indigenous cows. Artificial Insemination plays important role and helps in genetic improvement, to reduce the number of bulls required, to access genetics from across the world, access to breeds that are not available locally, to increase number of females per bull in one mating season, potential increased value of progeny, to mate individual cows to specific sires, access to genetics from bulls that they would not otherwise be able to afford to purchase and to reduce the risk of infection from venereal diseases. Initial demand of Artificial Insemination is to keep different reproductive records to evaluate efficiency of cow fertility and semen quality of bulls and skills of inseminators (Potdar *et al.*, 2020). Disease affected livestock results in great economic loss to the farming community and hence it is important to follow improved scientific practises of feeding, breeding and health care during livestock management and production.

Study is essential to improve and enhance productivity of milk and milk products among large number of cows and buffaloes to meet increasing demand. Dairy farming can be seen as a profession of high economical return and largest source of employment generation hence productivity of cows needs to be increased.

The present research work entitled “Studies on Management Practices Followed by Crossbred Cattle Owners in Konkan Region” has been executed to assess the adoption and constrains in recommended feeding and management practices with the following objectives:

1. To study the management practices followed by the crossbred cattle owners
2. To study the constraints faced by crossbred cattle owners in adoption of management practices
3. To suggest ways and means for improvement in crossbred cattle management practices

CHAPTER II
REVIEW OF LITURATURE

The success of mixed farming in our country is largely determined by how well cattle farming, grain farming, and other allied farming sectors are integrated. In order to manage this company profitably, the combination of livestock and agriculture should be organized jointly since their synergistic benefits will increase farmers income. Dairy is an efficient technique of increasing farm output in India. The farm provides the majority of the roughages and concentrates. As the animal consumes the forage and other feeds, a large portion of the crop's fertility value will be returned to the farm as manure. Better feeding procedures are the most immediate means of boosting milk production per milch animal.

The review of past research findings relevant to the objectives of the current study has been attempted in this chapter with the view of its importance. The review pertaining to feeding, breeding, health care and housing management and milk production economics are narrated under different headings

2.1 Feeding practices:

Balance ration is very important to supply all the essential nutrients and to nourish the animal properly in period of twenty four hour. An animals diet must contain the essential nutrients in appropriate quantity and ratio for achieving proper maintenance and productivity. Feeding of balanced diet, avoiding over or underfeeding with plenty of supply with cool and clean water would help to optimize feed and nutrient use of the animals, which also reflects on their productivity. Besides, energy and protein their diets must contain different types of minerals and vitamins to perform various vital activities and protect their body against diseases. However, a single feed ingredient cannot provide all the essential nutrients required for their body maintenance and productivity hence needs to provide a combination of different ingredients.

Singh *et al.* (2004) studied the feeding of existing concentrate mixtures to dairy animal in the kumaon hills of uttaranchal. An intensive survey was conducted in Tarikhet Block of Almora District of Uttaranchal comprising of 150 farmers of 17 villages, for assessing the availability and ingredient proportion of conceotrate mixtures. Results revealed that preparation of concentrate mixtures by farmers was mostly dependant on locally available feed resources like wheat, minor millet, rice, soybean and bhat. About 95 per cent farmers used wheat atta (flour) as major ingredient of concentrate and 5.3 per cent farmers were using purchased pashu ahar (compound feed) for only productive animals. Availability of homemade concentrate was 597,664 and 847 g/d/household under small, medium and large farmers, respectively and compound feed was 41, 54 and 263 g/d/household, respectively. thus, the availability of

concentrate mixture was increased with the size of land holding. Highest availability of concentrate (0.863 kg) supply was in the month of January, which was represented by monthly availability.

Madke *et al.* (2006) studied that animal grazing and soaking of concentrates for dairy cattle was practiced by (16%) of farmers only whereas, feeding extra dose of concentrates to pregnant animals and mineral mixture feeding was practiced by (44.67%), (3.33%), (32.67%) and (33.33%) of farmers from all categories. The use of tree leaves for fodder, enrichment of poor-quality roughages, processing of roughages and the production of silage have not been pursued by farmers of any category. The overall study showed that the level of adoption of scientific feeding practices by the farmers of Bhandara district was very low in all categories while large farmers were better adopters compared to other categories.

Hodshil *et al.* (2007) studied the feeding practices of the Gaolao breed and it was observed that 58.66% of farmers fed up to 3 kg of dry roughages to milch cows, (79.22%) and (55.69%) of farmers used to fed roughages only i.e., above 4 kg to bullocks and dry cows, (65.51%) and (65%) farmers used to fed dry roughages 3.01 to 4 kg to pregnant cows and heifer while no farmer fed concentrates to dry cows. Chaffing of green and dry fodder was adopted by 36.00 per cent and 16.25 per cent, respectively. (82.75%), (61.29%), (14.28%) farmers used to fed up to 2 kg of concentrates to pregnant cows, milch cows and bullocks, respectively whereas only (11.82%) farmers fed milch cows with 3.01 to 4 kg of concentrated feed.

Chaturvedi *et al.* (2008) studied to gather information on land, livestock husbandry patterns and livestock feeding practices in the semi-arid eastern region of Rajasthan. Selection of Fifty six farmers was done randomly. The proportion of small ruminants was higher in marginal farmers which is followed by medium-sized, large and small farmers whereas, sheep, goats, idle bullocks and non-producing cattle were majorly grazed by mixed grazing on community/public range land for about 8-12 hours at a time in a day and the concentrate was offered to bullocks, milch cattle and buffaloes @ 2.5-3.0 kg/animal/day. Farmers mainly have poorly kept livestock and generally small ruminants. They were not supplemented with a concentrate blend during the critical growth stages and advance pregnancy.

Khan *et al.* (2009) observed the feeding strategy to improve productivity of dairy cattle in smallholder farms of Bangladesh. Dairy cattle production in the country is characterized by low levels of productivity, mainly due to genetic and dietary limitations. Unless feeding management is improved, these animals are limited in their ability to express their potential genetic superiority; hence it is a fundamental approach to provide dairy cattle with good quality forage in sufficient quantities to maximize production. Dairy farming provides women with a

steady daily income which is essential for household security and well-being of their family. Quantitative and qualitative lacking in feeding practices impairs the performance of the milking animal. Local cows produce on an average of 1.5 liters of milk per day and on the other hand 5-8 liters milk is produced by crossbred cows hence requiring better feeding i.e., mainly concentrates, which are not available to farmers at their affordable prices. As costs of feed are becoming the most important factor in animal production, increasing self-sufficiency in feed production will be the crucial factor in future development programs.

Meena *et al.* (2009) conducted the study in Jhansi district of Bundelkhand region. It was found that majority of the respondents (69.58 %) had the medium level of knowledge regarding feeding practices of dairy animals. The highest extent of knowledge was observed on dry animal feeding practices (69.60%) followed by feeding of heifers i.e., 65.82 per cent, and lowest was observed in the feeding of calves (43.08%). Further it was found that large farmers hold maximum knowledge up to the extent of 60.57 per cent and lowest knowledge was possessed by medium farmers (57.17%), whereas remaining three categories of farmers were having near about 58 per cent extent of knowledge in relation to scientific feeding practices of dairy animals. On the whole the respondents of the study area were having 58.66 per cent extent of knowledge on scientific feeding practices of dairy animals. The path analysis indicated that risk orientation was the most potent variable in effecting the knowledge of farmers positively.

Sinha *et al.* (2009) examined the feeding management practices of dairy cattle in Uttar Pradesh. Information on feeding management and housing management practices was collected by using a structured schedule from 90 households raising cattle and buffalo from rural, semi-urban, and urban areas. Wheat straw was used as dry fodder by (86.00%) to (98.00%) of farmers in rural, semi-urban and urban areas whereas in urban areas, (97.80%) of farmers fed concentrates for year-round but on the other hand in rural and semi-urban areas only (66.70%) and (75.60%) of farmers respectively followed this practice. None of the farmers used silage, hay or straw treated with urea.

Dikshit A.K. and Birthal, P. S., (2010) studied the India's Livestock Feed Demand along with Estimates and Projections. The paper has estimated the feed consumption rates for different livestock species by age-group, sex, and function at the national level, and based on that the paper has generated demand for different types of feed by the year 2020. According to this study, by 2020 India would require a total 526 million tonnes (Mt) of dry matter, 855 Mt of green fodder, and 56 Mt of concentrate feed (comprising 27.4 Mt of cereals, 4.0 Mt of pulses, 20.6 Mt of oilseeds, oilcakes and meals, and 3.6 Mt of manufactured feed). In terms of nutrients, this translates into 738 Mt of dry matter, 379 Mt of total digestible nutrients and 32 Mt of digestible crude protein. The

estimates of demand for different feeds will help the policymakers of the country in designing trade strategy to maximize benefits from livestock production

Khirari (2010) Studied morphological characteristics of non-descript cattle in Ratnagiri district of Konkan region In Maharashtra. He observed that average land holding of the dairy farmers in Ratnagiri district was very small and it was 1.70ha. Majority of the respondents followed the practice of Grazing + Stall feeding and feed concentrates to pregnant animals.

Rathore *et al.* (2010) studied the Existing management practices followed by the cattle keepers in Churu district of Rajasthan. Regarding feeding practices, majority of the farmers followed group feeding (68.75%) and grazed in fallow/harvested field (65.25%). Home prepared concentrate mixture (60.50%) with soaking (78.50%) was prevalent in the area. Only 17.25 and 32.25% of the respondents incorporated mineral mixture and common salt in concentrate mixture, respectively.

Sabapara *et al.* (2010) studied the housing and feeding management practices of dairy animals in the tribal area of South Gujarat. Paddy straw was used as dry fodder by 98% of farmers. All the farmers provided green natural border grasses of cultivated plots and grasses from fellow land. In addition to this 75% of farmers grew fodder crops. None of the farmers practiced silage making. Concentrates was fed to the animals after milking by 91% of the farmers. Mineral supplements were provided by only 30.5% of farmers to their milch animals.

Chatterjee *et al.* (2012) studied the feeding practices and macronutrient status of high-altitude dairy cattle in eastern Himalaya region. He found that overall more than half of the cattle owners under the survey offered dry matter to their animals at the rate more than 2.5 kg per 100 kg body weight.

Mircha *et al.* (2012) studied the feeding, nutritional supplementation status and general health issues of 142 lactating crossbred cattle and 150 lactating buffaloes (total 292 dairy animals) assessed by a joint questionnaire without bias for age, performance, and health status. The majority of dairy animals were on an intermediate nutritional level, representing an increasing awareness of their feeding practices in the district. Only (46.5%) of the dairy cattle and (34.0%) of the dairy buffaloes, a total of (44.1%) of the dairy animals received mineral supplements either premixed with the feed or separately. The most frequently reported health problems in the animals were repeated breeding/anestrous followed by pica and low milk production

Kumar *et al.* (2012) examined the adoption of improved practices in cattle rearing. None of the livestock owners, who belong to an unorganized group, provided the animals with a balanced ration. Dry animals were not fed with concentrates and even dairy animals did not receive sufficient amounts of concentrates due to the bad economic

situation. It was further noted that some of the organized ranchers regularly gave the mineral mixtures, salts, added urea molasses and dry fodder to the cattle due to their higher economic status and also because of the reason that they had higher knowledge regarding scientific feeding practices.

Sharma (2012) studied the dry fodder being fed to dairy cattle when a sufficient amount of forage was not available. Bajra Kadbi, Sewen Kutar, Bhurut Kutar, Pala, Moth Phalgati and Groundnut Bhusa were used to provide in the winter season. In the summer season, wheat straw and dry grasses of Sewen and Bhurut were usually made available at desired level to all categories of dairy cattle. There were no differences in the type of dry fodder fed to the dairy cattle in the milkshed and non-milkshed areas. The majority of farmers (91.11% in the milkshed area and 74.44% in the non-milkshed area) reported that they chopped up the dry fodder before feeding to dairy cattle. No method of enriching the dry feed by biological treatment was practiced by the dairy farmers. However, chopping and soaking practices were common in the milkshed area (65.55%) and non-milkshed area (50%).

Simul *et al.* (2012) investigated to obtain existing baseline information on feeding and management practices of Red Chittagong (RC) cattle and the results showed that 52.38 per cent of the 42 cattle owners had farming as their primary occupation. The percentage of RC cattle was about 70.00 per cent and the concentration was higher than that of Chandanaish upazila in Anowara. Farmers in the study area provided on an average of 4.93, 8.35, 2.25, 1.54 (kg/d) of rice straw, green grass, rice polish, and wheat bran, respectively. About 45.24 per cent, 21.43 per cent, 30.95 per cent, and 2.38 per cent of farmers provided whole and dry straw, chopped and dry straw, water-soaked chopped straw, and straw with green grass respectively. About 55.00 per cent, 14.30 per cent, and 13.00 per cent of farmers followed stall feeding (cut-and-carry system), grazing, and stall feeding with grazing for green grass feeding, respectively.

Thalkar (2012) studied morphological characterization of non-descript cattle in Raigad District of Konkan Region. He observed the average land holding of the dairy farmers in Raigad district was very small and it was 1.52 ha. Majority of the respondents followed the practice of Grazing + Stall feeding and feed concentrates to pregnant animals.

Babu, S. and Rao, S. (2013) studied feeding practices of cattle adopted by the farmers in four mandals of Chittoor districts of Andhra Pradesh. He observed that all the cattle owners were feeding green fodder to their animal. About 40.00 per cent to 52.00 per cent cattle owners feeding premixed cattle feed and 43.00 per cent feeding feed ingredients.

Manohar *et al.* (2013) studied to collect the first hand information on the feeding management practices of buffalo farmers in Jaipur district

of Rajasthan. The data were collected from 160 buffalo rearers randomly selected from two tehsil of Jaipur district through pretested and pre designed interview schedule. Regarding feeding practices, most of the farmers followed group feeding and grazed their buffaloes in fallow/harvested field. All the respondents used to chop dry fodder before feeding while 70 per cent of respondent chopped green fodder. A large share i.e. 84.37 per cent of buffalo keepers soaked concentrate mixture before feeding. About 90.62 per cent of buffalo keepers fed concentrate mixture to buffaloes in advance pregnancy. Only 34.37 and 13.75 per cent of the respondents fed common salt and mineral mixture, respectively. None of the buffalo keeper has been recorded to prepare hay and silage. Five traits of respondents i.e. age, family size, education, land holdings and herd size were selected and their relationship with feeding management practices were identified. From the study It was concluded that feeding practices were significantly ($P< 0.01$) correlated with education, herd size and age of respondents.

Denli *et al.* (2014) studied on the structural situation and feeding practices in cattle farms in Diyarbakir Province, Turkey and the results showed that the cattle farms in the region consist of family-based small-scale operations (83.00%), cooperatives (12.00%), and large-scale private operations (5.00%). Current cattle breeds on farms were 11.00 per cent local breeds, 31.00 per cent crossbreeds and 58.00 per cent pure breeds. The average milk yield per cow was 5.25 liters for local breeds, 7.25 for crossbreeds and 10.65 liters for pure breeds. In addition to that the 26.00 per cent of the cattle farms had problems in obtaining feed. They observed that 70.00 per cent and 88.00 per cent of the farms buy forage and concentrated feed, respectively whereas fodder crops are only cultivated over 10.00 per cent of the farms examined. As a source of roughage hay, poor quality hay, silage and other roughage were used at 69.00, 18.00, 12.00 and 10.00 per cent, respectively on the farms. The results of this study showed that farmers had insufficient scientific knowledge of feed preparation, feeding management and animal feeding practices.

Jadav *et al.* (2014) studied the feeding practices of Periurban dairy farmers in Surat district and data was collected from 200 Periurban livestock farmers using a well-structured, pre-tested interview schedule. The majority of respondents followed single and stall feeding of dairy cattle. More than half of the respondents (58%) fed their animals two times a day. The majority of respondents fed non-leguminous forage, rice straw and compound feed for cattle. The vast majority of respondents offered concentrates based on the amount of milk produced. Feeding of concentrates observed separately by 14.78 per cent and with roughages 85.22 per cent. The majority of respondents fed green and dry fodder as such and fed animals with the concentrated feed after milking. The large number of respondents fed 2 to 3 kg of concentrates to animals those are

lactating and also gave concentrates to young calves and heifers. About one third of the respondents fed concentrates during the last two months of pregnancy or confirmed pregnancy until calving. The majority of respondents (89%) gave special feed after calving whereas most of the respondents (64%) provided mineral mixes and 76 per cent did not provide salt to animals. Half of the surveyed respondents provided drinking water three times a day, and the majority relied on a well as a source of drinking water for animals. All respondents fed colostrum to newborn calves and half of them fed it prior to expulsion of the placenta. Less than half of the dairy farmers (44%) allowed the calf to suckle both before and after milking and the vast majority (95%) allowed the calf to suckle only one teat.

Pedhekar *et al.* (2017) found that scientific feeding practices such as balanced ration at regular intervals, enriching poor quality roughage with urea, ammonia and molasses, feeding at least 5 kg of feed, feeding concentrate feed at 40 per cent of milk production, using 60 g of common salt, mineral mix and mineral bricks were not accepted by the majority (more than 75%) of cattle farmers. However, the majority of farmers belonging to the owners of crossbred cattle of categories 1-3 (75.70%) and crossbreed cattle 4-6 (74.07%) adopted the feeding of dry fodder, forage and concentrates in the required production. Most crossbreed cattle owners acquired the feeding practices of roughage and concentrates (80.50%), feeding dry matter 2-2.5 kg /100 kg body weight (80.50%) and incorporating agro-industrial by-products such as tur chunni, bran etc. (72.50%), the results indicated that there is great scope for improvement in adopting scientific nutritional practices by properly educating them.

Raskar (2017) reported that 100 per cent of cattle owners followed stall feeding with grazing. Only grazing and stall feeding was not carried out by the livestock farmers because of insufficient grazing areas and forage. It was also observed that processing concentrates before feeding in large, small, marginal, landless and medium-sized farmers with 42.86 per cent, 22.22 per cent, 20.75 per cent, 14.29 per cent and 22.22 per cent, respectively was acquired. The overall practice of crossbred cattle owners was 20.83 per cent. It also showed that among the 120 crossbreed cattle owners of each land holding in the category of farmers namely landless, small, medium, marginal and large with 52.38 per cent, 70.37 per cent, 58.33 per cent, 58.49 per cent and 71.43 per cent were fed green fodder. Overall acceptance of green forage feeding was 53.50 per cent as it helps to minimize milk production costs.

Choudhary *et al.* (2019) conducted the research in Hisar, Biwani, Rohtak and Jhajjar districts of Haryana state in India to assess the socioeconomic profile, technology adoption and constraints of the farmers rearing Hariana cattle in its breeding tract. A total of 240 respondents (60 respondents from each district) were purposively selected and interviewed individually using structured questionnaire prepared for the purpose.

Different feeding management practices were recorded and it was found that 41.7 per cent of the respondents preferred grazing and stall feeding system and 58.3 per cent of them practiced only stall feeding. In the case of types of fodder fed to cattle, mostly dry fodders like wheat straw and paddy straw were fed due to its availability round the year and easy to preserve for its less moisture content which reduce the chances of mould growth and spoilage. Green fodder availability was more during winter and rainy seasons than summer. The respondents provided concentrate feed only to milch cattle and the average quantity of concentrate feed given was 2 to 4 kg/day/animal supplemented with 0-40 kg green fodder and 2-8 kg straw depending upon the seasons. Majority (90.0%) of the respondents were not using mineral mixture in animals diet. None of farmer was aware about preservation of fodder crop methods like hay and silage as farmers are having poor economic status, non-availability of skilled workers and poor knowledge about preservation methods. In respect to calf feeding practices, 63.8 per cent of the respondents are feeding colostrum to calf after the placenta was shed and others are feeding colostrum immediately. The result helps in educating the farmers regarding the advanced feeding methods and feeding interventions during different physiological status of the animal were depending on their feeding strategies.

Mishra *et al.* (2018) studied the Housing and feeding practices of buffaloes in Katni district of Madhya Pradesh. The milk yield (88.0%) of the buffaloes was the main basis of feeding concentrate to them. The buffaloes generally thriving on the grazing land and only limited numbers of medium and large farmers were providing concentrate to them. Wheat straw and paddy straw were the main dry roughage used for feeding of animals. Most of the respondents were occasionly providing common salt and rarely mineral mixture to their animals. Concentrate was mostly given to medium and high yielders, while poor yielders, pregnants, heifers and calves were if fed concentrate, it was in very less quantities.

Mohan *et al.* (2018) conducted the survey in Bikaner district of Rajasthan .Regarding feeding practices, most of the farmers followed group feeding and grazed in fallow/harvested field. 81.25% of Rathi cattle keeper soaked concentrate mixture before feeding, 93.75% of cattle keepers fed concentrate mixture to cattle in advance pregnancy.

Kadam *et al.* (2019) conducted the survey on feeding and management practices followed by crossbred cattle owners in Seloo tahsil of Wardha district. Total 120 dairy cattle owners were selected on the basis of land holding pattern. Grazing, stall feeding and grazing plus stall feeding was followed by 3.33 per cent, 2.50 per cent and 94.17 per cent cattle owners, respectively. Selected crossbred cattle owners followed other feeding practices such as processing of concentrates before feeding (22.50%), feeding of green fodder (68.33%), feeding of dry matter @ 2 to 2.5 kg per 100 kg body weight of animal (79.16%), feeding of

concentrates @ 40% of milk production and 1 kg for maintenance (38.33%), feeding additional ration to the pregnant animal (80.83%), Use of mineral mixture or mineral bricks for feeding (2.50%) and feeding of unconventional roughages and concentrates during scarcity (81.66%). Manual chaffing of green fodder and dry fodder was followed by 77.50 per cent cattle owners and mechanical chaffing was followed by 16.67 per cent cattle owners. Homemade concentrates, purchased concentrates, both homemade and purchased concentrates, separate feeding of concentrate mixture and feeding concentrate mixture with roughages was adopted by 5.83 per cent, 85.00 per cent, 9.17 per cent, 25.83 per cent and 74.17 per cent cattle owners, respectively. Nobody (0%) among selected cattle owners used urea for enrichment of poor quality straw and also nobody (0%) adopted the practice of feeding silage.

Kumar *et al.* (2019) worked to analyses the feeding practices and breeding practices by the dairy farmers in Saharanpur district of Western Uttar Pradesh. This study was conducted in five villages of five blocks of Saharanpur district by personally interviewing 200 respondents selected randomly. Mostly majority of the farmers used in stall feeding and both (stall and grazing) feeding. Two third majority of the respondent are cultivation of green fodder and also availability of green and dry fodder of the animal. Majority of the respondents fed green and dry fodders with chaffing. Almost two third of the respondents fed Homemade + compounded cattle feed. Two third of concentrate feeding time are before of milking and one third of after milking of the dairy animal. Above two third of the respondents each fed concentrates during the last two month of pregnancy or confirmed pregnancy to calving and majority provided special feed after calving. Two third of the respondents provided mineral mixture while majority did not provide salt along with feed.

Prajapati *et al.* (2020) studied the feeding system of dairy animals varied in different states within the region. The composition of feed varied depending on the availability of crop residues and by products, socioeconomic conditions of farmers and availability of common grazing land. On average, a dairy animal was offered 6 kg dry roughage, 5 kg green fodder and 1.6 kg concentrate feed in the region, though the amount of feed differed in different states depending on the production level and economic conditions of farmers. The dairy farmers of North Bihar were fed on average dry roughages 8.85 kg, green fodder 5.33kg and concentrate feed 0.77kg per head per day. Rice straw was found most common dry roughage in all states except Eastern UP and Bihar where wheat straw is preferred. Grazing is practiced in all most all states by the resource poor farmers. In Chhattisgarh 100% of surveyed households practiced grazing of animals due to the abundant availability of common property resources and nearby forest areas. As a result, farmers did not cultivate green fodder. In other states more than 60% households practiced grazing except for Bihar and Eastern UP where

rice-wheat crop was prevalent with abundant availability of crop residues. So far as the method of feeding is concerned, separate feeding of dry & green roughage and concentrates was practiced by farmers of Odisha (94%), Assam (86%) and West Bengal (74%). In states like Chhattisgarh (100%), Eastern UP (90%), Bihar (94%) and Jharkhand (46%), a mixed feeding system was followed where dry & green fodder was mixed with concentrates and water. A combination of dry and green fodder together was fed by the farmers of West Bengal (26%), Jharkhand (18%), Assam (14%) and Eastern UP (10%).

Geetha *et al.* (2021) conducted the survey to collect the first hand information on dairy animal management practices followed by the dairy animal owners of Erode district of Tamil Nadu. Existing feeding management practices were studied through predesigned and pretested questionnaire from 100 dairy animal owners. As far as feeding of green fodder is concerned, leguminous and non-leguminous fodders used by farmers were 75.00 & 25.00 per cent, respectively. About 25.00 per cent farmers used to feed merely compounded cattle feed, while 75.00 per cent farmers used mixture of home-made concentrate with compounded feed.

2.2 Management practices:

2.2.1 Breeding management:

The congenital and genetic makeup plays an important role. Livestock with production genes always provide better milk yield. Therefore, the quality of the animals owned by the farmer is one of the basic criteria for the dairy farm.

Yadav *et al.* (2009) studied the indigenous cow management practices followed by the tribal farmers in Dungarpur district of Rajasthan. It was found that a significantly higher per centage (90.00%) of responds resorted to natural service and only 2.50 per cent adopted artificial insemination (A.I.). The postpartum breeding intervals in 11.25, 67.50, 8.75 and 12.50 per cent cases were 2-3, 3-5, 5-6 and more than 6 months, respectively. The indigenous bull was available in only 30.00 per cent cases. Majority of farmers (52.50%) followed pregnancy diagnosis. Only 27.50 per cent respondents were following vaccination against contagious diseases. Majority of the respondents (83.75%) were benefited by animal health care service. Only 12.50 and 7.50 per cent respondents were adopting deworming of adult animals and calves, respectively. Only 2.50 per cent farmers adopted isolation of sick animals and 25 per cent adopted tick control measure.

Ahirwar *et al.* (2010) studied the managemental practices in water buffalo in India. He found that only 9.66 per cent of the cattle owners breed their animals with artificial insemination and 90.33 per cent preferred natural service.

Kadam and Wangikar (2010) reported that a total of 108 respondents were the sample for the animal husbandry training needs study. It shows that 50.00 per cent of respondents rated the selection of

improved animal breeds as the most important area of training, followed by 47.22 per cent of respondents who rated this area as important. Heat detection was not considered an important area of training by the majority of respondents (85.19%). In terms of the timing of fertilization, insemination, diagnosis of pregnancy, pregnancy after childbirth, a similar trend of expressing the need for exercise was noted by the majority of respondents, accounting for 90.74 per cent, 85.19 per cent, 79.63 per cent and 62.90 per cent, respectively.

Rathore *et al.* (2010) worked in Churu district of Rajasthan to acquire first-hand information on existing breeding, feeding and housing management practices for dairy cattle. It was observed that 86.00 per cent of the respondents resorted to natural service, 61.75 per cent inseminate their cows at an early heat stage. Significantly more (82.00%) respondents believed in quacks treatment for anoestrous/repeaters animals and only 4.25 per cent cattle keepers followed pregnancy diagnosis.

Akila and Senthilvel (2012) found that 71.00 per cent of the animals in the study area showed the regular signs of estrum. 60 per cent of the farmers rely on artificial insemination to breed the animals. However, 16.00 per cent of the farmers practiced both artificial insemination and natural service and 22.00 per cent of the respondents only practiced natural service because the veterinary pharmacy is far from where they live and they cannot afford the cost of calling the private veterinarians could. Among the farmers who practiced artificial insemination, they mainly invited veterinarians to their homes (63.00%) and the farmers felt that the animals mostly became pregnant through one or two inseminations (81.00%).

Kumar *et al.* (2012) examined the introduction of improved practices in cattle rearing. There was a significant difference in the adoption of farming practices between the two groups of organized and non-organized dairy owners. It has been adopted at a much higher level by organized farmers compared to non-organized farmers. The mean breed practice scores were 4.52 and 2.04 from two groups, respectively. Fewer than none of the disorganized dairy farmers have adopted improved breeding methods for artificial insemination due to extreme summer temperatures. They could not identify the animal in heat, secondly, the availability of green fodder for the crossbreed was a problem due to lack of irrigation facilities, the reason for the high acceptance among organized dairy farmers that they had good knowledge in pregnancy diagnosis and timely removal of the placenta while unorganized dairy farmers lack knowledge about these aspects.

Lokhande *et al.* (2012) examined the limitations perceived by dairy farmers in adopting breeding practices. It was found that the maximum limitations faced by the marginal dairy farmers included the lack of artificial insemination (AI) centers, poorly equipped AI centers, lack of

services at the AI centers and unavailability of veterinary staff at the centers. These limitations were experienced by 75.00 per cent of marginal dairy farmers. Lack of knowledge about pregnancy diagnoses was experienced by 62.50 per cent of marginal farmers. This shows that marginal farmers were also aware of the benefits of artificial insemination and pregnancy diagnosis and would like to benefit from this opportunity. In the small dairy farmers category, the maximum limitations experienced by the majority of dairy farmers (61.36%) include insufficient knowledge of breeding practices, 54.55 per cent of small dairy farmers experienced limitations from poor conception rate in animals from AI, while 52.27 per cent experienced limitation of erroneous pregnancy diagnosis. The highest number of restrictions was experienced by the middle category of dairy farmers, such as insufficient knowledge of breeding practices (53.06%) followed by repeat breeding in crossbred cows/buffaloes by 51.02 per cent of dairy farmers.

Singh *et al.* (2012) examined the motivating factors influencing the adoption of improved dairy farming practices in rural areas. Data from 5 milk innovation studies under breeding aspects, the practice of mating the cow within 60-90 days after calving had the highest adoption index, followed by treatment of repeat breeders and sterile animals. In third place was the introduction of artificial insemination in the animals at the appropriate time of heat. The other two practices, which practiced pregnancy diagnosis between 45 and 90 days after duty and dried the animals 2 months before calving, achieved a low adoption index. The reason for the high adoption index of "treatment of repeat breeders and sterile animals" and "service within 60–90 days after calving" may be due to relatively good veterinary facilities in the study area coupled with high dairy farmer awareness of dairy practices. In addition, with the freezing technique used in the rural veterinary pharmacies, it was possible to carry out the artificial insemination of the animals at the right time of heat. These selected practices were adopted by almost all categories of dairy farmers in the selected area.

Chandran *et al.* (2014) observed the characteristics and performance of Bachaur cattle in the Ganges plains of North Bihar. Breeding was generally by artificial insemination with the seed of exotic germplasm, paving the way for genetic dilution and subsequent endangerment of the breed. The farmers, who understand the importance of the breed and want to preserve it, use the Bachaur bulls to cross their cows. The breeding bulls did not belong to any particular farmer or breeder, as they were allowed to move freely around the field in the breeding wing. Whenever there was a need for breeding, these bulls were used. The bulls used for breeding were not selected for a specific characteristic.

Faruk *et al.* (2015) studied dairy husbandry practices in suburban Chittagong. It was observed that 87.00 per cent of the cows were

artificially inseminated and (13.00%) both naturally and artificially. For artificial insemination, the majority of farmers preferred Friesian semen.

Prajapati *et al.* (2015) conducted the survey to find out the status of existing breeding and health care management practices followed by dairy animal owners of rural and urban areas of Navsari district of South Gujarat, India. Majority of farmers used scientific method of artificial insemination (AI) for conceiving their dairy animals in rural (82%) and urban (70%) areas. Majority of respondents in rural (98%) and urban (95%) area allowed their female animals for breeding between 12 and 18 hrs. after heat detection for better conception rate.

Wakchaure *et al.* (2015) worked on Development of Crossbred Cattle in India The formation of new crossbred cattle breeds to increase milk production was started in India because of crossbred cattle were more economical and gave higher milk yield than the indigenous cows and increase the income of a farmers, dairy entrepreneurs and provide beneficial and round the year employment to them. Therefore, population of crossbred cows should be increased simultaneously with Artificial Insemination programme to increase profitability to the farmers and dairy industry.

Kadam (2018) studied the feeding and management practices followed by crossbred cattle owners in Seloo tahsil of Wardha district. Among 120 selected crossbred cattle owners 36.67 per cent cattle owners followed natural breeding method and 63.33 per cent cattle owners adopted artificial insemination (AI) method.

Tewari *et al.* (2018) investigated on existing housing and breeding management practices adopted by dairy farmers in Tarai region of Uttarakhand, India. Around, 87.50 per cent farmers considered body weight as the main criteria to consider first time mating and 83.00 per cent farmers relied on mucus discharge along with bellowing as most important signs of heat detection. 98.12 per cent of farmers preferred artificial insemination over natural service as method of mating in their animals, but only 9.00 per cent farmers relied upon the views given by experienced veterinarians. About, 88.13 per cent of farmers practiced mating through A.I or natural service between 8 to 12 hrs. after heat detection. Pregnancy diagnosis was preferred by only few of farmers 6.00 per cent however, it was performed by qualified veterinarian in 2.50 per cent cases. All of the farmers adopted the practice of maintenance of breeding records of their animals.

Mohan *et al.* (2018) conducted the survey in Bikaner district of Rajasthan, out of 8 tehsils of Bikaner district two tehsils i.e. Bikaner and Lunkaransar were selected purposively. Further, four villages from each selected tehsil were identified. From each village 20 respondents were selected randomly. Thus, the entire sample consists of 160 respondents. The data was collected through the personal interview. The field survey was conducted to collect the first hand information on existing breeding

and feeding management practices followed by Rathi cattle owners in Bikaner district of Rajasthan. It was observed that only 40.62 per cent of respondents adopted natural service, 35.62 per cent used indigenous (pure bred) under quality of breeding bull. Majority 98.12 per cent can detect heat, 62.50 per cent inseminate their cows at an early heat stage. 68.12 per cent Rathi cattle keepers followed pregnancy diagnosis

Gujrathi *et al.* (2019) studied to assess the prevalence of reproductive problems in selected cattle dairy farms of Pune and Nashik districts and a total of 168 cows with the history of various reproductive disorders were examined per-rectally and blood samples were collected. The compilation of data revealed that the most frequently encountered reproductive health problems were retention of placenta, contributing 28.57 per cent (48 cases) of the total cases followed by 36 (21.42%) cases of abortion, 25 (14.88%) cases of repeat breeding and 25 (14.88%) cases of anestrous. 17 cases of abortion along with retained placenta contributed 10.11 per cent and 6 cases of still birth and 6 metritis were noted with the prevalence of 3.57 per cent each. Pyometra was observed in 5 cows showing a percentage of 2.97.

Kumar *et al.* (2019) worked on feeding & breeding practices of dairy animal in western Uttar Pradesh. Highly majority of the respondent is breeding of female animals through artificial insemination. Almost two third of the respondent are uses Breeding after calving and great majority of the respondents allowed mid heat insemination. The village level dairy farmers need to be provided knowledge and skill through training in scientific feeding & breeding practices.

Panchbhai and Gubbawar (2021) conducted the research on Houseing and breeding practices followed by buffalo owners in Katol Tahsil of Nagpur District . Majority of farmers 91.67 per cent farmers provided manager for buffaloes. Majority of the farmers 53.00 percentage observed heat by mucus discharge while 21.50 per cent farmers through slightly off feed. About 72.00 per cent farmers mated their animal within 12 hours and 27.50 per cent within 12-18 hours. About 83.00 per cent farmers adopt natural method of insemination and artificial insemination by 17.00 per cent farmers. Buffalo owners were well aware regarding health care practices *viz.,* eradication of ectoparasites, regular vaccination and deworming.

2.2.2 Housing Management:

Proper housing is essential to the comfort and maintenance of livestock health. Many epidemics are always linked to the quality of housing for livestock. It proves very difficult to maintain hygiene in poorly constructed livestock barns, increasing the possibility of disease infection of the milking animals and severely affecting milk production.

Roy *et al.* (2007) found that housing types did not have a significant effect on milk production, with barn having a tiled roof, tiled

floor and wall had a better effect on milk production than other housing types (P<0.01) than others.

Gupta *et al.* (2008) reviewed management practices and productivity status of cattle and buffalo in Rajasthan. On average, 86.00 per cent of households provide a separate stall inside or outside the human dwelling. The remaining households (13.90%) that could not provide separate housing for their cattle managed them in attached human dwellings. More than three quarters of the farmers kept their cattle in pucca stalls and the rest kept their cattle in kaccha houses. Almost 70.00 per cent of the farmers cleaned the stables once a day and the rest of the households twice a day. The majority of Pucca farmers had separate houses for animals and cleaned these stalls once a day. The farmers take great care to keep sick animals separate and to clean the barn properly. Vaccination is adopted by almost half of farmers and its application varies across agro climatic zones. Efforts are needed in this direction so that the production loss can be minimized.

Khan *et al.* (2009) reported that the highest percentage of farmers (77.50%) provided open housing, (22.50%) closed and semi-closed housing. In another region of the same district, it was observed that (63.00%) of farmers provided closed houses and 63.00 per cent of farmers used paved floors.

Sinha *et al.* (2009) reported on the housing of dairy cattle in Uttar Pradesh. Information on housing management practices was collected using a structured schedule from 90 cattle and buffalo herding households from rural, semi-urban and urban areas. The result showed that 63.30 per cent of rural farmers shared residence with the animals, this percentage was higher in semi-urban areas at 83.30 per cent. Brick floors were observed in 85.60 per cent, 72.20 per cent and 80.00 per cent of homes in rural, semi-urban and urban areas, respectively. House size and height were optimal in more than 75.00 per cent, 65.00 per cent, and 90.00 per cent of farmers in rural, semi-urban, and urban areas.

Acharya, R. M. (2010) studied the sustainable improvement of production and genetic resources conservation of Sahiwal, as an important cattle breed in tropics. He observed that 68 per cent of cattle owners provided pucca housing to their cattle.

Rathore *et al.* (2010) studied the Existing management practices followed by the cattle keepers in Churu district of Rajasthan.All the cattle keepers had kutcha floor in shed and 58.50 per cent kept their cattle near dwelling house. Thatched (70.50%) and single slope roof (45.50%) was observed in study area. Water trough and manger was cleaned at weekly interval by 78.00 per cent respondents, while animal shed was cleaned daily by 91.50 per cent cattle keepers.

Sabapara *et al.* (2010) conducted a survey to collect to collect the first hand information on dairy animal management practices followed by the tribal dairy animal owners of Vansada taluka of Navsari district of

South Gujarat. Existing housing and feeding management practices were studied through pre designed and pre tested questionnaire from 200 dairy animal owners. Close type of animal house was provided by 98 per cent of the farmers. Kaccha type of floor was observed in 87 per cent of the houses. Earthen plates with thatched roof were present in 94 per cent of the animal sheds and wooden poles were used to support roof in 85.5 per cent of the houses. Pucca drainage facility of urine was found in only 6 per cent of animal shed.

Kumar *et al.* (2012) examined the introduction of improved practices in cattle rearing. The significant difference was observed between the organized and non-organized groups in terms of housing practices. The mean showed that the scientific husbandry practices were almost equally and well accepted by the organized dairy farmers, while acceptance by the non-organized dairy farmers respondents was low.

Sharma (2013) reported on husbandry management practices for dairy cattle in dairy and non-dairy areas of Bikaner District (Rajasthan). Regarding housing conditions for dairy cattle, no major differences were found in both areas in terms of location, housing system, type of perimeter wall and housing system for different categories of animals, but a very significant difference between dairy and non-dairy housing areas in terms of available housing capacity for dairy cattle and the provision of managers in the cattle barn. In both areas, shed attached to the house with Kuchha boundary wall was widespread. A large percentage (76.67%) of cattle owners in dairy stalls and 75.55 per cent in non-dairy stalls adopted the open yard with border + stall housing system. The bull occupies a maximum area of 221.0 ± 1.51 and 215.21 ± 48 square feet, followed by bullock (170.50 ± 4.21 and 180.62 ± 5.31), dairy cow (73.73 ± 1.08 and 70.36 ± 0.95) and dry cow (65.20 ± 0.78 and 62.62 ± 0.64). In milkshed or non-milkshed areas. Water flow was not normally used in the cattle shed. All dairy farmers stated that they do not use floor coverings in the shed.

Faruk *et al.* (2015) observed dairy husbandry practices in suburban Chittagong. Only (10.00%) of farmers provide half building and rest (90.00%) farmers used tin and straw barns to house their livestock. The highest percentage of farmers (80.00%) supplied an open stall, (13.00%) supplied a closed stall and the rest used a semi-closed stall.

Malsawmdawngliana and Rahman (2016) have studied that the dairy sector in Mizoram, India is currently developing through the efforts of various authorities. A study was conducted in the state's Aizawl and Kolasib districts with the aim of examining the existing farming practices of the state's dairy farmers. A total of 100 farmers were randomly selected from these two districts and personally interviewed using a structured interview plan. The study shows that the dairy farmers raised crossbreed cattle in the intensive system. The cattle shed were mainly built with locally available materials such as bamboo, wood etc.

Kadam (2018) conducted the research on feeding and management practices followed by crossbred cattle owners in Seloo tehsil of Wardha district. Total 120 dairy cattle owners were selected on the basis of their land holding pattern. Different animal housing managements like katcha type of housing (67.50%), pucca type of housing (32.50%), katcha type of flooring (60.83%), pucca type of flooring (39.17%), open system of housing (70.83%), closed system of housing (29.17%), use of grasses for roofing material (45.00%), use of asbestos sheets as a roofing material (0%), use of kawelu for roofing material (55.00%), use of disinfectant in shed (40.83%) and control of parasites (59.16%) were followed by cattle owners of Seloo tehsil.

Mishra *et al.* (2018) carried out the survey and the study was conducted to see the housing and feeding practices of buffaloes in Katni district of Madhya Pradesh. The survey data obtained revealed that buffaloes in Katni district were mostly reared in a single row (93.40%) kachcha house (62.60) with fairly ventilated (51.60%) house. The surveyed farmers of the district were not following any scientific practices of feeding and they do not have any knowledge of feeding standard and nutrient recommendations of any agency.

Tewari *et al.* (2018) conducted a survey to collect the information on existing housing and breeding management practices followed by the dairy animal owners in Tarai region of Uttarakhand. The results revealed that 91.25 per cent of farmers adopted group housing system for their animals. Kuccha type of floor and asbestos roof was observed in 79.38 per cent and 26.25 per cent of animal houses respectively. Poor drainage facility was observed in 41.50 per cent of animal sheds. About, 89.38 per cent farmers provided their animals with provision of shade from trees.

Rajadurai *et al.* (2020) studied the housing management practices of dairy cows in Villupuram district of Tamil Nadu Of the 1000 respondents, 80.7 per cent of the dairy farmers provided housing to their animals. The allotted floor space for adults, heifer and calves were 3.7, 2.3 and 1.6 square meter respectively. Majority of houses consisted of mud floor (80.19 per cent), with side wall (64 per cent) with either asbestos (72.2 per cent) or thatches (27.8 per cent) as roofing material. The sheds had good ventilation and were without any manger facilities. Water was supplied in separate buckets individually, in limited quantity, in the morning and evening before milking

Bhagat *et al.* (2021) carried out a survey on status of existing housing practice followed by the cattle owners were conducted in Surajpur district of Chhattisgarh state. Existing housing management practices were studied through personal interview using predesigned questionnaire from randomly selected 200 cattle owners. The survey revealed that 66 per cent animal sheds were nearby their dwellings and most of the respondents 72 per cent and 58 per cent and had kuccha type (mud wall) of animal housing and kuccha floor (mud). It was

observed that (62.00%) of the respondents used thatch type roof, while 38.00 per cent of respondents used asbestos sheet. The data regarding the features of roof shows that 66 per cent of the farmers possessed single slope type of roof. About 65.00 per cent and 70 per cent cattle owner had good ventilation and sufficient light arrangements in their animal shed. In present investigation reported that only 42.00 per cent of animal sheds had provision of pucca drainage facility of urine and the majority of the farmers, 85.00 per cent had provision of shade from trees for their animals.

Madkar *et al.* (2021) conducted the research in 4 districts of Western Maharashtra viz. Sangli, Satara, Solapur and Kolhapur. Data were collected from individual farmer on housing and shelter management. A total of 600 (150 from each district) livestock owners were selected. Out of that 492 and 108 were large animals and small ruminant's owners, respectively. At least one animal per farmer were randomly selected. Farmers were interviewed by a presented structured interview schedule. Two tahsil were selected and from each tahsil three villages were selected. Respondents (25 no.) were selected randomly belonging to different categories of farmers. Majority of the respondents in Kolhapur (97.21%), Sangli (96.58%), Satara (91.60) and Solapur (56.00%) housed their animals separately away from their residence in tie stalls/ conventional barns. Mostly farmers in Kolhapur and Sangli (>50%) follow north-south long axis orientation of the animal house. East-west long axis orientation was observed in >50 per cent of animal houses in Solapur and Satara. They varied significantly between the districts. Majority of animals shed in Kolhapur (53.44%), Sangli (33.33%) and Satara (43.70%) had cemented floor. However, in Soalpur area majority (52.22%) animal sheds were with Kuccha/mud floor (60.80%) followed brick floor and rest with cemented floor. Half-walled animal shed was predominant in Kolhapur (59.54%) and Sangli (55.56%). Full wall was predominant in Satara (57.98%), but in Solapur, 60.00 per cent animal houses were without any walls. Wall materials of animal houses varied in different districts. So, there is future scope for improving better management practices for gradation in dairy animal production Western Maharashtra.

Mote *et al.* (2022) studied the housing practices of crossbred cattle adopted in Pathardi tahsil of Ahmednagar, Maharashtra (India). Total 150 crossbred cattle owners were chosen randomly as respondents from the ten randomly selected villages. The data was collected through pretested questionnaire. The owners were distributed in three groups on the basis of crossbred cattle possessed by them as group-I less than 5 crossbred cattle, Group-II 6 to 10 crossbred cattle and group-III more than 11 crossbred cattle. Majority (56.00%) of cattle owners were between age of 31 to 50 years age. In education 40.66 per cent of the owners had completed primary education and 12.66 per cent were educated up to

graduation level. Maximum (32.00%) farmers were having medium land holdings i.e. 2.1 to 4 ha. Further, 40.00, 38.00 and 22.00 per cent respondents had small, medium and large herd size, respectively. About 68.65 per cent farmers were having low annual income i.e. below 1,00,000 per annum. Majority (89.33%) of cattle owners had provided shed facility and remaining 10.66 per cent farmers were not providing shelter to their animals. The 52.00 per cent farmers were providing pacca cattle shed and 48.00 per cent were providing kaccha cattle shed. Further, 46.66 per cent farmers provided thatched roofing, 48.66 per cent farmers provided G.I. sheets and very few farmers (4.66%) were using asbestos for roofing. There was positive and significant association between number of crossbred cattle maintained by various groups of farmers and different housing practices *viz.,* availability of cattle shed, type of shed, provision of optimum size of manger, direction of byre, slope of floor and type of wall. There was non-significant association between number of crossbred cattle maintained by various groups of farmers and housing practices viz., type of roof, type of manger and availability of whitewash for cattle shed.

Panchbhai and Gubbawar (2021) investigated the various management practices adopted by buffalo owners. A sample of 200 farmers was classified into three categorized viz., small, medium and large based on the land holdings, in Katol Tahsil. About 40.00 per cent of farmers in the age group of 41-50 years were engaged in buffalo rearing while only 6.50 per cent of young farmers (21-30 year) had shown their interest in buffalo rearing. About 91.11 per cent farmers provided housing for buffaloes. Majority of farmers 69.44 per cent provided kaccha housing for buffaloes.

2.2.3 Health care management:

Livestock farming is a key factor in milk production. Regardless of high-quality genes and balanced feeding, it is crucial how much comfort the animal is offered at the right time. In other words, exhibiting genetic traits depends on the proper care and management provided to the animals. The introduction of appropriate improved management practices and their introduction at an appropriate level is the prerequisite for higher milk production.

Kadam and Wangikar (2010) indicated that diagnosing common ailments was considered unimportant by 40.74 per cent of respondents and about 60.00 per cent of respondents who clubbing together perceived it as the most important and crucial area of training. Care after the onset of illness is perceived by 56.49 per cent and 35.18 per cent as a mandatory and most crucial area of training. For disease prevention measures, a significant number (44.44%) considered this practice to be an important area, while a group of respondents (33.33%) indicated it as a not important area of training. A significant percentage (46.30%) perceived common complaints as an important area, while 38.89 per cent

did not consider it important. The majority of respondents (73.14%) considered vaccination to be an unimportant area of training.

Rathore *et al.* (2010) investigated Existing management practices followed by the cattle keepers in Churu district of Rajasthan. None of the respondents followed grooming practice. The results indicated that knuckling (81.75%) was the main method of milking. All the respondents, clean udder and teats and wash hand before milking. None of the cattle keepers did dry hand milking and sealing of teat canal at the end of lactation. More than half (53.50) of the respondents fed colostrum to newly born calf within 2 hrs. All the respondents attended the calf at the time of calving and 96.25 per cent cattle keepers cut and disinfected the naval cord of calf. Only few respondents dehorned and castrated the calf. Regarding sick animal treatment, 82.00 per cent cattle keepers preferred first quacks then veterinar doctor/stock man. Only 14.25 per cent of the respondent followed vaccination and deworming practice. Majority (65.50%) of the cattle keepers isolated their sick animals from healthy animals.

Kumar *et al.* (2012) investigated the introduction of improved cattle rearing methods. The reason behind the lower acceptance by disorganized dairy farmers could be because the medicines and veterinary treatments are expensive and the cost is also high as they are disorganized hence, they choose local treatment to eradicate external parasites of animals. As for castration, they do not prefer it, but sell the calves and do not feel the need to dehorn or vaccinate the animals until they are seriously ill. The likely reasons may be illiteracy, low socioeconomic status, and lack of awareness of scientific health care practices.

Mircha *et al.* (2012) observed the feeding, nutritional supplementation status and general health issues of dairy cattle in Moga District, Punjab. The most commonly reported health problems in dairy cattle were repeat breeding, anestrous, pica, mastitis and low milk yield. For all animals studied, rebreeding was the most commonly reported problem, with an incidence of 31.70 and 22.70 per cent in dairy cows and buffalo, respectively.

Simul *et al.* (2012) reported on the available basic information on management practices of Red Chittagong cattle. Approximately 26.19 per cent of respondents-built cattle house out of tin and chatai. A total of 81.00 per cent of the cattle shed was adequately ventilated and lit. The largest disease outbreak in the Region was FMD, which accounted for 45.00 per cent of the total disease incidence. Approximately (36.00%) of respondents used vaccines and (95.00%) sought help from a village doctor to treat their livestock. Cattle farming contributed more (about 57.00%) to income generation for low-income groups than for middle-income (6.89%) and high-income (8.25%) groups. 35.00 per cent of the respondents showed their interest in growing forage crops and 65.00 per

cent of farmers were reluctant to grow forage crops because their arable land was limited.

Singh *et al.* (2012) examined the motivating factors influencing the adoption of improved health care practices in rural areas. 77.60 per cent of the farmers properly dispose of the dead animals in the right place, while the adoption of health practices in the study area was low, indicating low awareness of the respondents towards these practices. However, farmers showed they could not vaccinate in time, and the high cost may have limited the uptake of vaccines against contagious diseases. Some of the practices, however, only adopted by a small percentage of farmers, were the isolation of animals suffering from contagious diseases.

Prajapati *et al.* (2015) studied on Status of Breeding and Health Care Management Practices of Dairy Bovines in the Rural and Urban Areas of South Gujarat of India. Around 49.5 per cent of the respondents in the rural and 78 per cent in the urban areas practiced deworming to their milch animals at regular interval. Overall farmers in urban areas were following more scientific and organized herd management practices compared to farmers of rural areas.

Pedhekar *et al.* (2017) found that 64.00 per cent of mixed-breed cattle owners took health and hygiene measures such as washing the udder before milking, cleaning milking equipment, cleaning the shade and grooming mixed-breed cattle. Similarly, most crossbreed owners (97.00%) have implemented vaccination. Most of the owners of crossbred cattle (94.50%) used the method of artificial insemination for breeding in the study area.

Kadam (2018) studied the feeding and management practices followed by crossbred cattle owners in Seloo tahsil of Wardha district. Among 120 selected crossbred cattle owners 68.33 per cent followed practice of washing cattle, 88.33 per cent followed washing of udder before milking, all the (100%) cattle owner used to maintain regular cleaning of shed, 79.16 per cent cattle owners used to wash floor, 72.50 per cent cattle owners adopted vaccination practice and grooming was followed by 80.00 per cent cattle owners.

Madkar *et al.* (2020) conducted the research in 4 districts of Western Maharashtra *viz.,* Sangli, Satara, Solapur and Kolhapur. A data were collected from individual farmer on livestock health management. A total of 600 (150 from each district) livestock's owners out of that were 492 large animals and 108 small ruminants owners having at least one animal per farmer were randomly selected. Farmers were interviewed by a presented structured interview schedule from each district. Two tahsil were selected and from each tahsil three villages were selected and from that 25 respondents were selected randomly belonging to different categories of farmers. Treatment of sick animals, deworming and control of ectoparasite, vaccination programme on FMD, HS, BQ and Tetanus and carcass disposal pattern at field level were found to be 68.17 per

cent, 33.17 per cent regular, 46.83 per cent 58.00 per cent and 67 per cent respectively. Kolhapur district is one of the unique district of Maharashtra having fertile land and high potentialities for the dairy development, availability of government hospitals and local assistant for treatment. In conclusion that the Kolhapur district farmer's adopted better in terms of scientific health management practices followed by Sangli, Satara and Solapur districts. So, there is future scope for improving better management practices to up gradation in dairy animal production Western Maharashtra.

2.3 Other Management Practices

Chauhan *et al.* (2006) investigated an attempt to determine the impact of land holding size on the adoption of improved dairy farming practices by tribal farmers in Kinwat Tahsil, Nanded District. The data showed that land holding size had a positive and highly significant association with the introduction of dairy farming practices that included improved feeding practices, introduction of improved breeds, improved management, improved housing, and veterinary aids. In general, it has been observed that tribal farmers are ignorant of proper cattle feeding and management practices. You feed them the available grasses and tree leaves of that region. The low milk production per animal in India is mainly due to poor feeding and management practices by farmers. Dairy farming is essentially based on four pillars, namely dairy farming. Innovative breeding, proper feeding, management and well-monitored health practices.

Gupta *et al.* (2008) reviewed management practices and productivity status of cattle and buffalo in Rajasthan. The study found that cow milk productivity is highest in the flood prone or irrigated Northwestern Flat Zone and lowest in the sub-humid Southern Flat Zone. A similar trend was observed for peak milk yield. Natural service for the breeding of animals during the middle heat season is a widespread practice. Chopped dry and green fodder was offered at the stand to individuals/groups, supplemented with homemade concentrate after soaking in water. Supplementary feeding in late pregnancy and feeding with table salt or a mineral mixture is also practiced. Milking the animals twice a day in the barn after washing the udders is mostly done by the farmers. All farmers allowed the calves to suckle.

Singh *et al.* (2008) observed the adoption of scientific methods of dairy farming by Khatal owners of the city of Ranchi. It showed that the majority of respondents were under medium (57.22%) and high (35.55%) levels of acceptance, while only 7.22 per cent of respondents were under the low category of acceptance of scientific dairy farming practices. The zero-order correlation coefficient showed that adoption level was positively and significantly associated with knowledge ($p<0.01$), family size, milk production, milk sales, and net income ($p<0.05$) at a rate of

5.00 per cent of the importance of Scientific Dairy and husbandry practices for Khatal owners correlated with degree of adoption.

Mande and Thombre (2009) examined the adoption of livestock practices by dairy farmers in Latur District. The study revealed that 45.00 per cent of the respondents had an annual income of Rs. 36,001 to 60,000/-. Regarding the breed-related livestock population, it is feared that (55.00%) of the respondents owned the Deoni breed, followed by Red Kandhari (43.33%), non-descript cattle (33.33%) and Marathwadi buffalo ((10.00%) The study found that this was the maximum score for adopting cattle breeds of the region (90), followed by raising improved breeds of cattle (65), adopting breeds of cattle (64), appropriate age of cow for breeding (53) and selection of bulls for breeding (45) as dairy farmer adoption of breeding practices. It was also observed that the category-wise adoption index was presented, in which feeding practices for cows resulted in a higher adoption index (57.36) followed by newborn calf feeding practices (54.83), breeding practices (52.83), and health care practices (40.20). The overall adoption index was (52.17).

Singh *et al.* (2010) reporting on the level of acceptance of scientific dairy farming practices by dairy farmers in the state of Haryana was conducted on a sample of 200 cooperative dairy farmers who had been regular members of dairy farmers cooperatives for the past three years. The study was conducted at Kurukshetra and Karnal Co-operative Milk Producers Union Limited, Karnal at Kurukshetra. The study shows that the majority of farmers (69.50%) have adopted scientific methods of dairy farming at an overall intermediate level. However, the maximum percentage of adoption by dairy farmers (80.91%) was found in animal feeding practices, followed by breeding practices (68.41%), health care practices (67.12%) and management practices (66.45%). The overall average adoption of (70.75%) of all scientific dairy farming practices. Further analysis of variance showed that there was a significant difference (F-value=3.390) in adoption between different farming practice groups, namely milk breeding, milk feeding, milk health care and dairy farming practices.

Kumar *et al.* (2011) examined animal welfare practices in calf rearing in Madhubani district of Bihar. Calf welfare was considered to be mixed, i.e., some practices were satisfactory and some were below standards. Colostrum feeding has been practiced after the release of the placenta to the calf, which may take longer, while the recommendation is to give colostrum within an hour of birth. In general, there was no practice of applying disinfectant to sea line. In addition, castration was performed by the Desi (local) method by the majority of farmers, which was very painful and unsanitary. The biggest obstacles for farmers to follow good animal welfare practices were lack of money, lack of knowledge and veterinarians nearby. Veterinary officials perception of the above practices ranged from poor to satisfactory.

Singh *et al.* (2011) observed improved milk production and processing through training programs. The data was collected through interviews of 614 farmers who attended dairy farming training courses organized by Krishi Vigyan Kendra, Hanumangarh (Rajasthan) from 2007 to 2010. It was observed that the average adoption rate was (52.30%) and unemployed rural youth (55.00%) strong interest in dairy farming Respondents knowledge level before and after cattle breeding, feeding, care and management training was (29.31%), (46.41%), (30.61%), (57.49%), and (71.33%), (86.32%), (68.72%), and (89.90%). respectively. Milk yield was increased with a decrease in anoestrus cases and calf mortality, which in turn brought more profit to farmers.

Kumar *et al.* (2012) examined the introduction of improved practices in cattle rearing. They reported that adoption was highest in the case of breeding (83.49%), followed by health care (64.08%), management (62.33%), and breeding practices (49.11%).

Kumawat and Yadav (2012) reported on the adoption of improved dairy farming practices by dairy farmers. Livestock farming has become an integral part of all interventions aimed at reducing rural poverty and improving food and nutrition security. The farmers who raise cattle and buffalo are not yet familiar with scientific management practices. If feeding, breeding, health care and other management practices fit into a proper farm, it would be possible to achieve the desired level of milk production. The results show that the majority of dairy farmers (64.33%) have adopted intermediate-level improved dairy practices, while almost equal numbers of low-level (17.67%) and high-level dairy farmers (18.00%) have adopted improved dairy practices. The highest level of acceptance was found for the practice 'Balanced ration feeding', followed by 'Chopping the long straw/dry grass', 'Calves dehorned', 'Let a newborn calf nurse its mother' and 'Amount of concentrate mix and method'. Of milking", while the least acceptance was found for "Methods of identification of dairy animals", followed by "Allowing the animal to mate after estrus", "Vaccination against diseases such as B.Q. F.M.D., H.S.", "Isolating sick animals" and "Feeding mineral mixture".

Sarap *et al.* (2012) studied the husbandry practices of livestock owners in Karanja tahsil in Washim district. A sample of 170 farmers were divided into three categories, namely small, medium and large, based on land ownership, consisting of 10 each in 17 villages in the Karanja-Tahsil group of 41-50, followed by 31-40 and 21- 30 years. About 92.94 per cent of farmers provided housing for native cattle, while 94.11 per cent of farmers provided housing for crossbred cattle. The majority of farmers (92.29%) used cribs for crossbred cattle. A similar majority of farmers (94.11%) used mangers for domestic livestock. About 83.33 per cent and 87.05 per cent of farmers mated their native and crossbred cattle within 12 hours, while 16.66 per cent and 12.94 per cent mated cattle after 12 hours of heat induction.

Singh *et al.* (2012) observed motivating factors influencing the adoption of improved dairy farming practices in rural areas. The practice of having the cow tended within 60-90 days after calving had the highest adoption index, followed by treatment of repeat breeders and sterile animals. Adoption of feeding colostrum to newborn calves and feeding colostrum continuously until day 5 of their birth had the highest index of acceptance. The reason for the higher acceptance of many feeding practices is an indication of a positive attitude to dairy farming and to making more profit by breeding healthy offspring. The high adoption index for balanced feeding of dairy animals was due to practical experience gained by farmers participating in dairy development programs. Adoption of health practices in the study area was low, indicating low awareness of these practices among respondents. The level of acceptance of dairy management practices, such as conducting clean milk production, was matched to a greater extent by farmers in the selected area. The majority of dairy farmers (47.50%) in the selected area had fallen into the medium adoption category. A little less than fifty per cent (48.3%) had moderate adoption of dietary practices

Eqbal *et al.* (2013) reported on the dairy farming practices followed by tribal dairy farmers in the Chotanagpur region of India. The study found that while the majority (65.00%) of tribal dairy farmers kept native cattle, only a few (18.33%) dairy farmers kept crossbred cattle. Most (55.83%) of tribal respondents identified heat in animals by roaring. A large percentage (57.50%) of the tribal respondents diagnosed pregnancy as having an enlarged abdomen and the majority (55.83%) of them did not perform artificial insemination. Colostrum feeding was practiced by most (79.17%) tribal dairy farmers. While only a few 20.00 per cent tribal dairy farmers fed their animals mineral blends.

Kishore *et al.* (2013) reported on buffalo management practices in the Khammam district of Andhra Pradesh. They examined that more than half of the farmers surveyed (58.00%) were able to inseminate or inseminate their animals in heat at the right time, while 42.00 per cent of farmers were unable to inseminate their animals on time for various reasons. Only 16.66 per cent of farmers used artificial insemination, while 37.51 per cent of farmers opted for natural insemination. About 85.85 per cent of the farmers fed green and dry roughage in combination and provided their animals with clean drinking water, but none of the farmers practiced silage making or other special treatments such as chopping, soaking or urea treatment of rice straw. Most farmers collected fodder from the fields. Only 3.00 per cent of the farmers also fed concentrated feed to pregnant animals; the rest did not.

Kochewad *et al.* (2013) conducted a study to determine the management practices of dairy animals in Uttar Pradesh. First-hand information was collected on management practices in the dairy industry, such as feeding, housing, milking and raising animals. The study found

that all animals were stable feed, group feeding was followed by 29.00 per cent of farmers, while (71.00%) farmers followed individual feeding. Homemade concentrates were used by (65.00%) farmers, (20.00%) bought concentrates from the market, while (15.00%) farmers used both. The majority of farmers (84.50%) did not feed any mineral mixture. 49 per cent of cattle owners provide concentrate mixture to the advanced pregnant animal. Artificial insemination in crossbred cattle was pursued by (96.00%) farmers but only (9.00%) in buffalo. Farmers were aware of symptoms of heat, but only (5.00%) of farmers followed up on the pregnancy diagnosis. The overall study shows that the management practices used by the farmers in the study area for feeding and housing have been satisfactory, but require technological improvements for breeding and milking management.

Kumar and Bashir (2013) studied milking management practices in selected areas of Kottayam district, Kerala state, followed by 60 dairy farmers with an average herd size of 7.25, most of whom raised crossbred cattle in Kottayam district, Kerala state. The majority (73.33%) of dairy farmers followed the whole hand method, 18.33 per cent and 8.33 per cent followed knuckle milking and machine milking, respectively, as the milking method. All dairy farmers practiced milking twice a day; None of the dairy farmers adhered to the three-time milking plan. About 68.33 per cent of the dairy farmers practiced udder massage and concentrate feeding and 31.66 per cent practiced the calf sucking reflex to drain milk. Only 11.67 per cent of dairy farmers milked their animals in separate and dry locations, but all farmers regularly cleaned the cluster and washed the udder before milking as part of clean milk production. The study shows that milking management practices are satisfactory for the majority of dairy farmers, but milk production practices can be further improved through awareness raising.

Singh *et al.* (2013) studied improved dairy farming practices by dairy farmers in the mountainous region of Manipur, India. An adoption index covering all aspects of Improved Dairy Husbandry Practices (IDHPs) was developed specifically for this region. The weighting of the practices was decided by the judges' evaluation method. It was found that most respondents had little adoption of IDHPs in breeding (44.17%) and feeding (50.00%), while the majority of dairy farmers in Management (54.17%), Healthcare (60.83%)) and marketing (40.83%) had medium acceptance.

Varaprasad *et al.* (2013) studied the management practices of farmers breeding Jersey x Sahiwal cows in Chittoor district of Andhra Pradesh. All farmers were aware of heat detection in cows and artificial insemination. The present study found that an average of 2.43 inseminations were required for each conception. Most farmers (91.68%) provided katcha housing for animals, while (27.90%) farmers had manure pits. In most cases, an average level of hygiene was observed. All

dairy farmers allowed their calves to be suckled before and after milking and followed regular whole-hand milking twice a day. The weaning of the calves was not observed. Mastitis was the biggest health problem faced by farmers, followed by Theileriasis and FMD. Predominant reproductive problems were offspring with anestrus and retained placenta. Most farmers (89.00%) vaccinated the animals with the vaccines provided by the animals.

Das and Singh (2014) studied on adoption of dairy cattle towards climate change by improved housing and management. Animals were kept in semi-open RCC house with concrete floor and GI sheet roof in one row. Housing modification was done by way of roof modification i.e., white painting of roof on the outer surface of roof and black painting on the inner surface of roof, to reduce the load of solar radiation as white colour reflect solar radiation and black colour absorbs any solar radiation, if penetrates through roof as well as radiation reflected from floor. Daily splashing of cold water was done on the body surface of cattle thrice i.e., morning at 7.00 am, noon at 11.00 am and afternoon at 3.00 pm followed by air circulation by electric fans for 1 hr. as cooling arrangement to reduce heat stress on cows.

Mali *et al.* (2014) reported on dairy farmers knowledge and acceptance of improved milk management practices in the Belgaum district of Karnataka during 2012-13. 72 dairy farmers were selected at random. The results of the study revealed that 37.50 per cent of dairy farmers had an intermediate level of knowledge and 65.28 per cent of dairy farmers had an intermediate level of acceptance. One hundred per cent of dairy farmers had complete knowledge of cow and buffalo breeds, timing of artificial insemination, pregnancy testing, insemination period after normal calving and breed selection. In terms of health management, the majority of dairy farmers (94.44%) had a good knowledge of the main diseases affecting dairy cattle and the symptoms of foot and mouth disease. The majority of dairy cattle owners (87.50%) regularly feed newborn calves with colostrum within half an hour of birth and more than half (66.67%) of dairy farmers regularly practice pregnancy diagnosis.

Saha (2014) studied the documentation of indigenous breeding and management practices of dairy animals. Modern technology has become indispensable for milk development today. However, the importance of indigenous knowledge (IC)/expertise (ICT) should not and cannot be undermined if development is to be sustainable. It is important to use local knowledge to increase production in a way that does not harm the ecosystem and environmental health. Against this background, an attempt was made to document IK on breeding and management aspects of dairy cattle and to assess the rationality of this IK. Participatory observation, unstructured interaction, and recording of oral case histories through tape recording were used to document indigenous

knowledge/traditional practices related to dairy cattle feeding. Thirteen IK related to breeding and management of dairy cattle were collected and documented with rationality. Identifying, documenting and rationalizing IK in the dairy industry is essential for sustainable development.

Faruk *et al.* (2015) studied the husbandry practices of dairy farming in suburban Chittagong. Knowing the present status includes general information, feeding, breeding, housing, milking, etc., as well as small dairy farm costs and yields, to compare the production and reproductive performance of crossbred and domestic cows and make recommendations for small dairy farm development. It showed that 57 per cent of farm owners belong to business class and the remaining (43.00%) to other categories. Fifty-three per cent engage in dairy farming as a sideline, while only (47.00%) do it as a mainline occupation. The largest percentage of farm owners educational attainment was upper secondary (60.00%). The dry period, calving interval, performances per conception, and days open of crossbreed were 98.5 ± 18.9, 419 ± 11, 3.1 ± 0.82, 118 ± 25.8, and indigenous 140 ± 10.4, 428 ± 24.7, 1.95 ± 0.44, 137 ± 7.78, respectively. The study also showed non-significant differences within the calving interval for crossbreeds and natives.

Shitole *et al.* (2019) studied the management practices of buffaloes in the Parbhani district of Maharashtra State. A multistage random sampling technique was used to select the respondents. It could be revealed from the study that grazing + stall feeding seems to be more adoptive in the area of study. Feeding of mineral mixture, additional ration for pregnant animals, urea treatment and silage preparation not practiced at all in the study area. Before milking, washing of udder, milk utensils, cleaning of hands adopted by cent per cent farmers. The respondents were well aware about the vaccination for preventive diseases.

2.4 Constraints:

Every business has many economic aspects and removing various constraints makes the business profitable. The dairy enterprise is linked to the cattle farm, the dairy manager and the socio-economic personality of the individual cattle owner. The various programs published by the government through various scientists are always beneficial to the livestock owner. However, availability at the farmers door with adoptability is required for a profitable venture. The restrictions faced by individual owners worked with skill, will and zeal that the individual showed to make each business profitable.

Sinha (1982) studied on Gap Analysis in Relation to Feeding Recommendation and he reported that land availability was limiting factor for cultivation of green fodder for most of the cattle owners around NDRI, Karnal.

Kokate and Tyagi (1994) noticed factors contributing to the level of breeding gaps in cattle of tribal meileu. He reported that lack of the irrigation facility for the fodder production was perceived as very serious problem.

Meenakshi and Intodia (2000) studied this in Barmer district of Rajasthan state, where efforts were made to identify certain limitations in the introduction of modern management practices. The results of the study showed that poor irrigation systems for growing forage, high cost of concentrates, transportation of forage and fodder, and unavailability of improved forage seeds were identified as the most serious limitations faced by pastoralists

Singh *et al.* (2004) conducted the research in Tarikhet Block of AImora district of UttaranchaI during 2000-2001 for assessing constraint and suitable strategies regarding livestock production practices. Study revealed that the major constraints were shortage of feeds and fodders during dry season, traditional method of feeding, scattered and low land holding, poor animal productivity i.e., low milk production, large number of non-descript type animal, lack of breeding bull, poor extension services and monopoly gender role in livestock activity. The suitable strategies suggested that increase the production of feed resources through planting of fodder tree and grasses in community land area, strategically supplementation of deficient of critical nutrient through mineral mixture, UMMB, commor. salt and leguminous fodders, supply surplus crop residues available elsewhere the state; promotion of manufactured livestock feeds utilization, educate to farmers for modern livestock rearing practices, equity of gender role, supply the breeding bull in village and appointed skilled veterinary staff at village level.

Bardhan *et al.* (2005) reported that the main limitations perceived by farmers in raising their dairy cattle were identified as follows: unprofitable milk price, testing of milk only on the basis of fat percentage, reproductive problems, remote locations of AI centers and high cost of feed and poor concentrate quality. Based on the assessment of various constraints as perceived by farmers, the following policy proposals have been put forward.

Kavathalkar *et al.* (2007) examined the limitations in adopting scientific advice on feeding dairy cattle in Nagpur district. Financial constraints included high concentrate costs at 88.88 per cent intensity, high forage costs (79.25%), non-profitable milk prices (83.70%), high labor costs (72.59%), high mineral compound costs (54.81%) and bad economy 54.07 per cent.

Patil *et al.* (2009) to examine the constraints faced by dairy farmers in Nagpur district. The study was conducted in 15 villages from 3 talukas of Nagpur district by interviewing 225 dairy farmers face-to-face. Here, the majority of respondents (72.44%) cited their limitations as low milk production from the local breeds, 45.33 per cent as a lack of green fodder

and 41.33 per cent as a lack of clean water, while 25.33 per cent the lack of a preservation facility as their limitations stated limitations. Regarding the financial bottlenecks, 78.22 per cent of respondents indicated that this led to delays in milk payments, 63.11 per cent as insufficient money and lack of loan options, while 56.44 per cent of respondents saw the high cost of concentrates as obstacles. Regarding technical limitations, the majority of respondents (68.00%) cited their limitations as insufficient knowledge about diseases, their prevention and control, while 56.89 per cent related their limitations to the unavailability of veterinary services.

Lokhande *et al.* (2012) conducted a study to scientifically determine respondents' perceived limitations in engaging in dairy farming. Regarding breeding practices, the majority of dairy farmers (57.50%) perceived insufficient knowledge of breeding practices as their main obstacle, while the least important limitation perceived by dairy farmers was an incorrect pregnancy diagnosis (40.00%). Regarding feeding practices, the high cost of concentrate feeding (83.33%) is the biggest limitation, while the least reported limitations are the low resources for forage cultivation (44.16%). When it comes to management practices, the biggest constraint is disinterest in keeping simple records (85.00%), while the least important constraint is labor shortage, lack of credit facilities and lack of cold storage (48.33%).

Mohapatra *et al.* (2012) studied the Constraints faced by Tribal Entrepreneurs in Dairy Farming Enterprise. Dairy farming is one of the important enterprises which dominate the economic activities of the tribal people in the rural areas of Odisha in India. Increasing demand for milk and milk products in recent years intensifies dairy farming as profitable enterprise for tribals. The tribal entrepreneurs have been confronting to several constraints in this sector which hinder their way for development. The present study was undertaken in Mayurbhanj district of Odisha in India, to find out the constraints faced by tribal entrepreneurs and to suggest suitable measures to overcome these constraints. The results revealed that the major constraints faced by tribal dairy entrepreneurs were high cost of concentrate (96.67%), lack of availability of veterinary literature in the village (79.67%). non-remunerative price for milk (100%), The problem of poor irrigation facilities for growing fodder crops for the livestock animals (62.50%). Various suggestions provided by the sample of tribal dairy entrepreneurs were, better milk price for the producer, availability of concentration at cheaper rate, cost of veterinary services be reduced, marketing facilities be provided at village level for the outlet of milk and milk products and provision of veterinary literature to tribal entrepreneurs.

Quddus (2012) examined to determine the reasons for the adoption and non-adoption of high-performance breeds, the level of practices and limitations in adopting the improved technologies. The study was conducted in three different agro ecological zones and 180 dairy farmers

were interviewed. Self-practiced dairy technologies were examined for each technology and the acceptance index for each farmer. A quarter of the farmers used artificial insemination for breeding purposes and two-fifths belonged to a medium or high level of technology uptake. Only (35.00%) farmers adopted crossbred cows and some others upgraded native breeds with exotic breeds. About (17.50%) rural farmers and (70.00%) semi-urban farmers breed crossbred cows, and rural farmers are reluctant to use all kinds of improved technologies. Secondary and higher educated farmers were 9.7 times more likely to adopt improved technologies than illiterate farmers.

Tailor *et al.* (2012) conducted research in Udaipur district of Rajasthan to identify the constraints faced by the tribal milk producers with a sample of 80 households. The results of the study clearly indicated that major constraints faced by tribal farmers were non-availability of green fodder throughout the year, inadequate knowledge about scientific feeding of dairy animals, repeated breeding of animals, lack of pedigree bulls for natural services, low milk productivity of animals and lack of scientific housing etc., in the study area.

Sabapara *et al.* (2012) studied the tribal dairy animal owners of South Gujrat and reported their constraints such as high cost of building materials, feeds and on the other hand lack of awareness and knowledge of the dairy owners were on their top of the list including breeding, milking and health care of the dairy animals. 84.00 per cent cattle owners were faced constraints of non- availability of green fodder.

Yadav *et al.* (2014) studied the constraints involved in livestock management practices perceived by tribal livestock owners of Banswara district of Rajasthan. Two tehsils namely Bagidora and Kushalgarh were selected and from them 8 villages were selected to study about 120 tribal families. The qualitative and quantitative data were collected by various means such as through interview schedule, discussion, observations and available secondary sources. All the collected constraints were listed and divided into five main categories such as socio-economic, feeding, breeding, management and health care constraints followed by asking respondents to assign rank to each of listed constraints according to perceived intensity. On the basis of assigned rank to each constraint, the rank-based quotient for individual constraint was calculated. Poor production status of livestock, lack of grazing pasture land, repeat breeding problem, high cost of medical treatment to diseased animals and poor economic conditions of family were considered as major constraints reported by tribals.

Raskar (2017) studied that, high cost of concentrates to feed crossbreed cattle was the major constraints faced by majority of farmers in marginal group (94.33%) which is followed by landless (95.23%), small farmers group (92.59%), medium farmers group (91.66%) and large group (85.71%). On an average 93.33 per cent farmers reported the high cost of

concentrates in animal feeding. High cost of green fodder was faced by majority of farmers such as landless and marginal farmers (90.56%) which is followed by small farmers (88.8%), marginal (83.01%) and medium farmers (83.33%), respectively. On an average 88.33 per cent crossbreed cattle owners faced the problem of high cost of green fodder and majority of farmers were found to be unaware about crucial importance of mineral mixture feeding to their animals. Technical constraints faced by majority of cattle owners were lack of their scientific knowledge about feeding practices and majority of farmers group such as marginal group (100%), landless (90.40%), small farmers group (96.29%), medium farmers group (100%) and large group (100%) faced this problem. About 57.1 per cent crossbreed cattle owners faced problems due to their lack of scientific knowledge and about 88.33 per cent had lack of technical guidance.

Mohan *et al.* (2018) conducted the study in Bikaner district of Rajasthan, out of 8 tehsils of Bikaner district two tehsils i.e. Bikaner, and Lunkaransar were selected purposively. Further, four villages from each selected tehsil were identified. From each village 20 respondents were selected randomly. Thus, the entire sample consists of 160 respondents. The data was collected through the personal interview. The field survey was conducted to collect the first hand information on existing breeding and feeding management practices followed by Rathi cattle owners in Bikaner district of Rajasthan. It was observed that only 40.62 per cent of respondents adopted natural service, 35.62 per cent used indigenous (pure bred) under quality of breeding bull. Majority 98.12 per cent can detect heat, 62.50 per cent inseminate their cows at an early heat stage. 68.12 per cent Rathi cattle keepers followed pregnancy diagnosis. Regarding feeding practices, most of the farmers followed group feeding and grazed in fallow/harvested field. 81.25 per cent of Rathi cattle keeper soaked concentrate mixture before feeding and 93.75 per cent of cattle keepers fed concentrate mixture to cattle in advance pregnancy.

Kadam (2018) conducted the survey on feeding and management practices followed by crossbred cattle owners in Seloo tahsil of Wardha district. Total 120 dairy cattle owners were selected on the basis of their land holding pattern. Selected cattle owners faced financial constraints, technical constraints, situational constraints and infrastructural constraints. Financial constraints like high cost of concentrates (94.16%), high cost of green fodder (86.66%), high cost of mineral mixture or mineral bricks (87.50%) and non-availability of agro-industrial by product (100%). Technical constraints like lack of scientific knowledge (94.16%) and lack of technical guidance (90.00%). Situational constraints like inadequate land holding (79.16%), lack of irrigation facility (63.33%), shortage of green fodder (57.50%), non-availability of labour (64.16%) and unavailability of veterinary hospitals (67.50%). Infrastructural constraints like lack of chaff cutter (92.50%), lack of communication

(85.83%), lack of storage facility (87.50%) and lack of loan facility (94.16%). 88.33 per cent cattle owners had lack of interest in adopting different feeding and management practices.

More *et al.* (2020) studied the Socio-economic Status and Constraints in Feeding and Management Practices of Dairy Animals in Latur District of Maharashtra was undertaken to study socio-economic status of dairy farmers. The 120 farmers of 9 villages were selected to study in Latur tahsil of Latur district. The study revealed that 0.83 per cent of the respondents were landless, 45.83 per cent of the respondents were marginal/small farmers, 38.33 per cent of the respondents were medium farmers and 15.00 per cent of the respondents were large farmers. Majority of livestock owners reared crossbred animal 76.34 per cent followed by indigenous 22.34 per cent animal. In constraints, feeding constraints, production and marketing constraints, technical constraints and health related constraints were faced by farmer in livestock management.

CHAPTER III
MATERIAL AND METHODS

The present investigation entitled "Studies on Management Practices Followed by Crossbred Cattle Owners in Konkan Region" was undertaken by collecting data from different Crossbred cattle owners in the Konkan Region of Maharashtra.

The data regarding various feeding practices, management practices and constraints encountered while non-adopting recommended feeding and management practices were collected through a comprehensive pretested questionnaire to collect information by personal interview**.**

3.1 General information about Konkan Region:

3.1.1 Geographical situation:

The region is traversed by seasonal rivers that drain the heavy monsoonal rainfall from the crest of the Sahyadri Hills. The tribal area also forms a part of this region. The human population of Konkan region is near about 28.6 million and total livestock population is 14.98 lakh.

The Konkan region is coastal part of Maharashtra covering total geographical area of 3.09 Mha. The Konkan region lies between 1506' N to 20022' N latitude and 72039' E to 73048' E longitudes, falls under heavy rainfall and hilly region.

3.1.2 Climate:

The region is characterized by warm and humid climate with the winter season (October to January), Summer season (February to May) and Rainy season (June to Sept).

3.1.3 Temperature:

The ambient temperature varies between 13.50 ^{0}C and 38.50 ^{0}C and relative humidity varies from 55 per cent to 99 per cent in the region.

3.1.4 Rainfall: The annual precipitation in the region ranges from 2500 mm to 4500 mm.

3.1.5 Soil and Topography: In Konkan zone, mostly laterite and acidic coarse, shallow soil is found. The western ghats are with light, laterite and reddish-brown soil.

3.1.6 Cropping pattern:

There are mainly two cropping seasons i.e., Kharif and Rabi. Rice, Finger millet and Prosso millet are the major crop grown in kharif season. In Rabi season generally vegetable crops are grown. Mango, Cashew-nut, Coconut, and Spices are the major horticulture crops.

3.1.7 Fodder available:

Rain fed grasses and shrubs in the mango and cashew orchards are potential source of green fodder in rainy season. Horticulture pasture lands and Deorai forests are major source for free grazing. Fodder shrubs and tree leaves are also conventional fodder

source in Konkan region. The paddy and ragi straw are the main dry roughages resources of crossbreed cattle of the region.

a. Grazing: farmers tend to graze freely their animals for 5 to 6 hours a day mostly at morning or at evening time.

b. Stall feeding: After returning of animals from grazing they are fed with dry/green/concentrate in the house shed.

3.2 Collection of Data:

The information was collected by the survey personal interview method. For collection of information from livestock owners of Konkan region by undertaking personal interview of the cattle owners selected for survey.

3.2.1 Method of sampling and size of sample:

The data for the study was collected by stratified random sampling technique. The Konkan region includes seven districts *viz.,* Palghar, Mumbai, Navi Mumbai, Thane, Raigad, Ratnagiri and Sindhudurg. Out of which five districts was selected for survey *viz.,* Palghar, Thane, Raigad, Ratnagiri and Sindhudurg. From each district 5 tehsils were selected randomly and from each tehsil 5 villages were selected. Further from each village 5 crossbred cattle owners (generally those who have jersey or Holstein Friesian crossed animals) were randomly selected. Thus, sample size was 625. The data in respect of existing feeding and management practices, constraints of cattle owners was collected by personal interview by using well designed and pretested questionary.

3.2.1.1 List of villages randomly selected for collection of data:

District	Sr. No	Name of Tahsil	Name of Villages	Number of Farmers
Palghar	1.	Talasari	Kawada, Sutrakar, Varwade, Zari, Sawroli.	25
	2.	Dahanu	Agwan, Kankradi, Raipur, Ghadane, Charoti.	25
	3.	Palghar	Bahadoli, Man, Umroli, Vilongi. Pole.	25
	4.	Wada	Khupari, Pimplas, Ujjaini, Dahivali-Kumbhiste, Dhadhare.	25
	5.	Jawhar	Palshin, Rampur, Juni-jawhar, Suryanagar, Akhar.	25
Thane	1.	Murbad	Nhave, Bhadane, Manivali, Sidhgad, Nyahadi.	25
	2.	Shahapur	Dolkhamb, Sajivali, Mugaon, Dhamani, Cherpoli.	25

	3.	Kalyan	Khoni, Kambe, Nadgon, Rayate, Goveli.	25
	4.	Bhivandi	Mohandun, Koshmbade, Khardi, Lonad, Gorsai.	25
	5.	Ambernath	Chinchavali, Umbroli, Sonawale, Posari, Shil.	25
Raigad	1.	Mahad	Kusgaon, Dabhol, Pachad, Karanjade, Kiye	25
	2.	Karjat	Khandape, Pathraj, Nasurapur, Asal, Dhak	25
	3.	Sudhagad	Rabgaon, Uddhar, Dhokshet, Nadsur, Pachhapur	25
	4.	Alibag	Bamangaon, Bopoli, Zirad, Choul, Narangi	25
	5.	Mhasala	Kelte, Salvinde, Kharsai, Pabhore, Pashti	25
Ratnagiri	1.	Khed	Dabhil, Khopi, Tale, Dhavade, Furus	25
	2.	Rajapur	Miland, Patharde, Bhalavali, Govil, Katradevi	25
	3.	Ratnagiri	Volke, Majgaon, Kolambe, Nachne, Ori	25
	4.	Sangmeshwar	Tural, Agavali, Sonavade, Kosumb, Chaphavali	25
	5.	Dapoli	Gavhe, Chikhalgaon, Asud, Shivajinagar, Wakavali	25
Sindhudurg	1.	Devgad	Vijaydurg, Padel, Shirgaon, Goval, Mithbav	25
	2.	Kankavli	Shidvane, Nandgaon, Sangve, Wagade, Phondaghat	25
	3.	Vengurla	Vetore, Parule, Vengurla, Hodavade, Mhapan	25
	4.	Kudal	Mangaon, Tendoli, Zarap, Kadval, Digas	25
	5.	Sawantwadi	Malgaon, Amboli, Kariwade, Satarda, Chaukul	25
Total		25	125	625

The help of the District Animal Husbandry Officers of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg districts was taken for determining the sample size of survey work. The selected villages and tehsils were highlighted on the map.

3.2.2 Classification of cattle owners according to land holding:

Six hundred and twenty-five cattle owners were randomly selected on the basis of farm size

Sr. No.	Category	Size of land holding
1	Landless	Nil
2	Marginal farmers	Up to 1 ha
3	Small farmers	1.01 to 2 ha
4	Medium farmers	2.01 to 8 ha
5	Large farmers	Above 8 ha

3.2.3 Classification of animal population on the basis of herd size:

The farmers were further categorized into 4 groups according to number of animals managed by them.

Group No.	No. of animal (Herd size)
1	Up to 2
2	3 to 5
3	6 to 10
4	More than 10

3.2.4 Annual Income: .....

3.3 Observations recorded:

3.3.1 Adoption of recommended feeding practices:

1. System of feeding
   i. Grazing
   ii. Stall feeding
   iii. Both (Grazing + Stall feeding)
2. Feeding of milch animal
   i. Individual milch animal
   ii. Group feeding of animals
3. Frequency of feeding
   i. Once in a day
   ii. Twice in a day
   iii. Thrice or more in a day
4. Feeding colostrum to new born calf
5. Processing of roughages and concentrate before feeding (chaffing, crushing, Soaking)
6. Enrichment of poor-quality straw by urea.
7. Chaffing of green fodder and dry fodder.
   i. Manual chaffing
   ii. Machinery chaffing
8. Feeding of green fodder.
9. Feeding of silage.
10. Conservation of feeds and fodder e.g., Stacking, Hay making etc.
11. Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal.
12. Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration

13. Type of concentrates
    i. Homemade concentrates
    ii. Readymade purchased concentrates
    iii. Both types
14. Pregnancy allowance ration for pregnant animal
15. Use of mineral mixture or mineral blocks
16. Feeding of unconventional roughages and concentrates during scarcity
17. Processing of concentrate mixture
    i. Separate processing of concentrates
    ii. Processing of concentrates with roughages

3.3.2 Adoption of recommended management practices:

3.3.2.1 Breeding Management

i. Method of Breeding - Natural / A.I method
ii. Pregnancy diagnosis

3.3.2.2 Animal housing management

i. Type of housing
ii. Type of flooring
iii. Type of roofing material
iv. System of housing

3.3.2.3. Health and sanitation

i. Washing of cattle
ii. Washing of udder before milking
iii. Regular cleaning of shed
iv. Washing of floor
v. Vaccination
vi. Deworming
vii. Spraying against ectoparasites
viii. Grooming

3.4 Constraints in feeding and management practices:

3.4.1 Financial constraints

i. High cost of concentrates
ii. High cost of green fodder
iii. Non availability of agro-industrial by product
iv. Low income
v. Lack of loan facility

3.4.2. Technical constraints

i. Lack of scientific knowledge
ii. Lack of technical guidance

3.4.3. Situational constrains

i. Inadequate land holding
ii. Lack of irrigation facilities
iii. Shortage of green fodder

iv. Non availability of labour
v. lack of awareness about use of Mineral mixture / Mineral Block
vi. Non availability of veterinary hospitals / veterinary services
vii. Breeding problems eg. repeat Breeding or abortions
viii. Faulty pregnancy Diagnosis

3.4.4. Infrastructural constraints

i. Lack of chaff cutter
ii. Lack of communication
iii. Lack of storage facility

3.4.5. Personal interest

i. Lack of interest

3.5. Facilities required

The necessary facilities for the research work of "Studies on Management Practices Followed by Crossbred Cattle Owners in Konkan Region". Such as library, expert guidance and computer are available at Department of Animal husbandry and Dairy science, College of agriculture, Dapoli.

3.6. Statistical analysis of data

The data were analyzed statistically by using simple statistical measures. *viz.,* Mean and Percentage.

CHAPTER IV
RESULTS AND DISCUSSION

Adoption of advanced scientific practices in feeding and management of dairy animal helps to increase milk production and thereby raise the living standard of the cattle owners. Dairy development in India is recognized as an effective means for improving the economic condition of rural families. Several constraints are faced by livestock owners in relation with feeding of dairy animals. However, no planned study has so far been conducted to analyze the strategy of feeding and management of dairy cattle in Konkan region. The investigation on "Feeding and management practices Followed by Crossbred cattle owners in Konkan region" was carried out. The result of this investigation are presented and discussed in the light of research work conducted so far, under following heads.

4.1 Classification of cattle owners on the basis of size of land holding

4.2 Classification of animal population on the basis of herd size

4.3 Classification of cattle owners on the basis of Annual income

4.4 Feeding practices adopted by Crossbred cattle owners

4.5 Management practices adopted by Crossbred cattle owners

4.6 Constraints in feeding and management practices

4.1 Classification of crossbred cattle owners on the basis of size of land holding

The survey was carried out in five different districts of Konkan region namely Palghar, Thane, Raigad, Ratnagiri and Sindhudurg by selecting 125 dairy cattle owners from each district. All the dairy cattle owners were selected on the basis of their land holdings such as landless, marginal (up to 1 ha), small (1.01 to 2 ha), medium (2.01 to 8 ha) and large (above 8 ha).

Table No. 1A: Land holding of crossbred cattle owners in Palghar district

Sr. No	Name of Tehsil	Landless	Marginal	Small	Medium	Large	Total
		(No land)	(Up to 1 ha)	(1.01 to 2 ha)	(2.01 to 8 ha)	(Above 8 ha)	
1	Talasari	2	16	7	0	0	25
2	Dahanu	2	15	8	0	0	25
3	Palghar	1	15	9	0	0	25
4	Wada	2	14	8	1	0	25
5	Jawhar	1	11	11	1	1	25
	Total	8	71	43	2	1	125
	Total Per cent (%)	6.4	56.8	34.4	1.6	0.8	

Table No. 1B: Land holding of crossbred cattle owners in Thane district

Sr. No	Name of Tehsil	Landless	Marginal	Small	Medium	Large	Total
		(No land)	(Up to 1 ha)	(1.01 to 2 ha)	(2.01 to 8 ha)	(Above 8 ha)	
1	Ambernath	1	13	11	0	0	25
2	Bhivandi	1	11	12	1	0	25
3	Kalyan	1	12	12	0	0	25
4	Shahapur	1	11	11	1	1	25
5	Murbad	1	13	10	0	1	25
	Total	5	60	56	2	2	125
	Total Per cent (%)	4	48	44.8	1.6	1.6	

Table No. 1C: Land holding of crossbred cattle owners in Raigad district

Sr. No	Name of Tehsil	Landless	Marginal	Small	Medium	Large	Total
		(No land)	(Up to 1 ha)	(1.01 to 2 ha)	(2.01 to 8 ha)	(Above 8 ha)	
1	Mahad	1	15	8	1	0	25
2	Karjat	1	14	10	0	0	25
3	Sudhagad	1	13	11	0	0	25
4	Alibag	2	14	8	1	0	25
5	Mahsala	2	11	11	0	1	25
	Total	7	67	48	2	1	125
	Total Per cent (%)	5.6	53.6	38.4	1.6	0.8	

Table No. 1D: Land holding of crossbred cattle owners in Ratnagiri district

Sr. No	Name of Tehsil	Landless	Marginal	Small	Medium	Large	Total
		(No land)	(Up to 1 ha)	(1.01 to 2 ha)	(2.01 to 8 ha)	(Above 8 ha)	
1	Khed	1	9	13	1	1	25
2	Rajapur	0	11	13	0	1	25
3	Ratnagiri	2	9	13	1	0	25
4	Sangmesh-war	1	12	10	1	1	25
5	Dapoli	0	14	10	1	0	25
	Total	4	55	59	4	3	125
	Total Per cent (%)	3.2	44	47.2	3.2	2.4	

Table No. 1E: Land holding of crossbred cattle owners in Sindhudurg district

Sr. No	Name of Tehsil	Landless	Marginal	Small	Medium	Large	Total
		(No land)	(Up to 1 ha)	(1.01 to 2 ha)	(2.01 to 8 ha)	(Above 8 ha)	
1	Devgad	2	9	12	1	1	25
2	Kankavli	0	10	14	0	1	25
3	Vengurla	1	9	11	2	2	25
4	Kudal	0	10	14	1	0	25
5	Sawantwadi	1	11	12	1	0	25
	Total	4	49	63	5	4	125
	Total Per cent (%)	3.2	39.2	50.4	4	3.2	

It was observed from Table 1A and depicted in Fig. 1 that in Palghar district maximum number of crossbred cattle owners possessed marginal land holding (56.8%) which was followed by small land holding (34.4%), landless (6.4%), medium land holding (1.6%) and minimum number of cattle owners possessed large land holding (0.8%).

Table 1B and Fig. 1 conclude that in Thane district higher number of crossbred cattle owners own marginal land holding (48%), 44.8 per cent cattle owners possessed small land holding and 4 per cent cattle owners were landless, while equal number of crossbred cattle owners possessed medium land holding (1.6%) and large land holding (1.6%).

It was revealed from Table 1C and illustrated in Fig. 1 that in Raigad district large number of cattle owners acquired marginal land holding (53.6%) and minimum number of cattle owners possessed large land holding (0.8%), while 38.4 per cent cattle owners possessed small land holding, 5.6 per cent crossbred cattle owners were landless and 1.6 per cent crossbred cattle owners possessed medium land holding.

From Table 1D and Fig. 1 it was revealed that in Ratnagiri district small land holding, marginal land holding, medium land holding and large land holding (2.4%) was acquired by 47.2 per cent, 44 per cent, 3.2 per cent and 2.4 per cent crossbred cattle owners, respectively. In Ratnagiri district 3.2 per cent crossbred cattle owners were landless.

Table 1E and Fig. 1 conclude that in Sindhudurg district large number of crossbred cattle owners acquired small land holding (50.4%) which was followed by marginal land holding (39.2%), medium land holding (4%) and large land holding (3.2%), whereas 3.2 per cent crossbred cattle owners were landless.

Mande and Thombre (2009) categorized all the cattle owners in Latur district as marginal (8.33%), small (18.33%), semi medium (28.33%), medium (25.00%) and large land holding (20.00%).

Khirari, P. B. (2010) revealed that the average land holding of the dairy farmers in Ratnagiri district was very small and it was 1.70ha.

Similar results were also found by Thalkar (2012) that the average land holding of the dairy farmers in Raigad district was very small and it was 1.52 ha.

Kadam *et al.* (2019) classified 120 selected cattle owners of seloo tehsil on the basis of size of land holding into landless (no land), marginal (up to 1 ha), small (1.01 to 2 ha), medium (2.01 to 8) and large (above 8 ha) group with 15.00 per cent, 40.83 per cent, 25.84 per cent, 13.33 per cent and 5.00 per cent, respectively.

4.2 Classification of animal population on the basis of herd size

The present survey was carried out in five different districts of Konkan region namely Palghar, Thane, Raigad, Ratnagiri and Sindhudurg by selecting 125 dairy cattle owners from each district. All the dairy cattle owners are distributed according to animal population on the basis of their herd size such as up to 2 animals, 3 to 5 animals, 6 to 10 animals and more than 10 animals.

Table No. 2A: Herd Size of crossbred cattle owners in Palghar district

Sr. No.	Name of Tehsil	Up to 2	3 to 5	6 to 10	More than 10	Total
1	Talasari	10	13	2	0	25
2	Dahanu	12	12	1	0	25
3	Palghar	8	14	2	1	25
4	Wada	11	13	1	0	25
5	Jawhar	11	12	1	1	25
	Total	52	64	7	2	125
	Total Per cent (%)	41.6	51.2	5.6	1.6	

Table No. 2B: Herd Size of crossbred cattle owners in Thane district

Sr. No.	Name of Tehsil	Up to 2	3 to 5	6 to 10	More than 10	Total
1	Ambernath	11	12	1	1	25
2	Bhivandi	9	12	3	1	25
3	Kalyan	8	13	3	1	25
4	Shahapur	11	12	2	0	25
5	Murbad	9	14	1	1	25
	Total	48	63	10	4	125
	Total Per Cent (%)	38.4	50.4	8	3.2	

Table No. 2C: Herd Size of crossbred cattle owners in Raigad district

Sr. No.	Name of Tehsil	Up to 2	3 to 5	6 to 10	More than 10	Total
1	Mahad	13	11	1	0	25
2	Karjat	10	12	2	1	25
3	Sudhagad	14	10	1	0	25
4	Alibag	11	12	1	1	25
5	Mahsala	10	14	1	0	25
	Total	58	59	6	2	125
	Total Per cent (%)	46.4	47.2	4.8	1.6	

Table No. 2D: Herd Size of crossbred cattle owners in Ratnagiri district

Sr. No.	Name of Tehsil	Up to 2	3 to 5	6 to 10	More than 10	Total
1	Khed	12	10	2	1	25
2	Rajapur	15	8	1	1	25
3	Ratnagiri	10	12	2	1	25
4	Sangmeshwar	14	10	1	0	25
5	Dapoli	12	9	2	2	25
	Total	63	49	8	5	125
	Total Per cent (%)	50.4	39.2	6.4	4	

Table No. 2E: Herd Size of crossbred cattle owners in Sindhudurg district

Sr. No.	Name of Tehsil	Up to 2	3 to 5	6 to 10	More than 10	Total
1	Devgad	15	8	1	1	25
2	Kankavli	11	11	2	1	25
3	Vengurla	12	10	2	1	25
4	Kudal	15	9	1	0	25
5	Sawantwadi	14	9	1	1	25
	Total	67	47	7	4	125
	Total Per cent (%)	53.6	37.6	5.6	3.2	

From Table 2A and Fig. 2 it was concluded that in Palghar district large number of cattle owners (51.2%) possessed the herd size of 3 to 5 animals. 41.6 per cent cattle owners had up to 2 animals, 5.6 per cent cattle owners possessed 6 to 10 animals and 1.6 per cent cattle owners possessed the herd size of more than 10 animals.

It was revealed from Table 2B and depicted in Fig. 2 that in Thane district 50.4 per cent crossbred cattle owners had 3 to 5 animals which was followed by 38.4 per cent cattle owners with herd size of up to 2 animals, 8 per cent cattle owners with 6 to 10 animals and 3.2 per cent crossbred cattle owners with herd size of more than 10 animals.

Table 2C and Fig. 2 conclude that in Raigad district large number of cattle owners (47.2%) possessed the herd size of 3 to 5 animals, followed by 46.4 per cent cattle owners with herd size of up to 2 animals, 4.8 per cent cattle owners with 6 to 10 animals and 1.6 per cent cattle owners having herd size of more than 10 animals.

It was revealed from Table 2D and Fig. 2 that in Ratnagiri district maximum number of cattle owners (50.4%) had up to 2 animals which was followed by 39.2 per cent cattle owners with 3 to 5 animals, 6.4 per cent cattle owners with herd size of 6 to 10 animals and 4 per cent cattle owners had more than 10 animals.

Table 2E and Fig. 2 reveal that in Sindhudurg district large number of cattle owners (53.6%) possessed the herd size of up to 2 animals, followed by 37.6 per cent cattle owners having herd size of 3 to 5 animals, 5.6 per cent cattle owners with 6 to 10 animals and 3.2 per cent cattle owners with herd size of more than 10 animals.

The present study is in conformity with the observations reported by Kumawat and Yadav (2012) who categorized all the dairy cattle owners into three groups i.e., respondents possessing 1-3 Cattle\buffalo were termed as small group of dairy cattle owners, those respondents possessing 4-6 Cattle\buffalo, termed as medium group and those possessing more than 6 cattle\buffalo termed as large group of dairy cattle owners.

Kadam *et al.* (2019) studied and classified 120 selected cattle owners of Seloo tehsil of Wardha District on the basis of herd size as animal population up to 2 (7.50%), population between 2 to 5 (49.17%), between 5 to 10 (35.00%) and animal population more than 10 (8.33%).

4.3 Classification of crossbred cattle owners on the basis of Annual income

The current survey was carried out in five different districts of Konkan region namely Palghar, Thane, Raigad, Ratnagiri and Sindhudurg by selecting 125 dairy cattle owners from each district. All the dairy cattle owners are distributed according to annual income on the basis of their income category such as up to Rs.25000/-, Rs.25001 to 50000/-, Rs.50001 to 100000/- and more than Rs.100000/-.

Table No. 3: Classification of cattle owners on the basis of Annual income in Konkan region

Category (Income)	Palghar	Thane	Raigad	Ratnagiri	Sindhudurg	Overall Average
Up to Rs.25000/-	9 (7.2)	5 (4)	7 (5.6)	6 (4.8)	6 (4.8)	33 (5.28)
Rs. 25001 to 50000/-	40 (32)	20 (16)	37 (29.6)	22 (17.6)	25 (20)	144 (23.04)
Rs. 50000 to 100000/-	70 (56)	83 (66.4)	74 (59.2)	81 (64.8)	78 (62.4)	386 (61.76)
Above 100000/-	6 (4.8)	17 (13.6)	7 (5.6)	16 (12.8)	16 (12.8)	62 (9.92)
Total	125 (100)	125 (100)	125 (100)	125 (100)	125 (100)	625 (100)

(Figures in parenthesis are percentages of parameters in respected group)

It was revealed from Table 3 and depicted in Fig. 3 that crossbred cattle owners having annual income up to Rs.25000/- includes Palghar (7.2%), Thane (4%), Raigad (5.6%), Ratnagiri (4.8%) and Sindhudurg (4.8%). Total 5.28 per cent owners had annual income up to Rs.25000/-. Crossbred cattle owners of Palghar (32%), Thane (16%), Raigad (29.6%), Ratnagiri (17.6%) and Sindhudurg (20%) had annual income in the range of Rs.25001 to 50000/- and overall 23.04 per cent owners had annual income between Rs.25001 to 50000/-.Crossbred cattle owners of Palghar

(56%), Thane (66.4%), Raigad (59.2%), Ratnagiri (64.8%) and Sindhudurg (62.4%) had annual income in the range of Rs.50001 to 100000/-. Average 61.76 per cent owners had annual income between Rs.50001 to 100000/-. Cattle owners of Palghar (4.8%), Thane (13.6%), Raigad (5.6%), Ratnagiri (12.8%) and Sindhudurg (12.8%) had annual income above 100000/-. Overall 9.92 per cent crossbred cattle owners had annual income above 100000/-.

Mande *et al.* (2009) observed that 45.00 per cent of the respondents in Latur district had an annual income of Rs. 36,001 to 60,000/-. Similar results were also observed by Mote *et al.* (2022), who reported that about 68.65 per cent farmers were having low annual income i.e. below 1,00,000 per annum in Pathardi tahsil of Ahmednagar district.

4.4 Feeding practices adopted by Crossbred cattle owners

Table No. 4A: Feeding practice followed in Palghar District

Sr. No.	Feeding practices	Landless	Marginal	Small	Medium	Large	Total
		8	**71**	**43**	**2**	**1**	**125**
1	System of feeding						
i)	Grazing	3 (37.5)	0 (0)	0 (0)	0 (0)	0 (0)	3 (2.4)
ii)	Stall feeding	0 (0)	1 (1.41)	2 (4.65)	0 (0)	0 (0)	3 (2.4)
iii)	Grazing + Stall feeding	5 (62.5)	70 (98.59)	41 (95.35)	2 (100)	1 (100)	119 (95.2)
2	Feeding of milch animal						
i)	Individual milch animal	5 (62.5)	52 (73.24)	35 (81.40)	2 (100)	1 (100)	95 (76)
ii)	Group feeding of animals	3 (37.5)	19 (26.76)	8 (18.60)	0 (0)	0 (0)	30 (24)
3	Frequency of feeding						
i)	Once in a day	3 (37.5)	25 (35.21)	13 (30.23)	0 (0)	0 (0)	41 (32.8)
ii)	Twice in a day	5 (62.5)	45 (63.38)	28 (65.12)	2 (100)	1 (100)	81 (64.8)
iii)	Thrice or more in a day	0 (0)	1 (1.41)	2 (4.65)	0 (0)	0 (0)	3 (2.4)
4	Feeding colostrum to new born calf	8 (100)	71 (100)	43 (100)	2 (100)	1 (100)	125 (100)
5	Processing of roughages and concentrate before feeding (chaffing, crushing, soaking. etc.)	2 (25)	14 (19.72)	15 (34.88)	1 (50)	1 (100)	33 (26.4)
6	Enrichment of poor quality straw by urea	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	Chaffing of green fodder and dry fodder						
i)	Manual chaffing	8 (100)	68 (95.77)	39 (90.70)	1 (50)	0 (0)	116 (92.8)
ii)	Machinery chaffing	0 (0)	3 (4.23)	4 (9.30)	1 (50)	1 (100)	9 (7.2)
8	Feeding of green fodder	2 (25)	22 (30.99)	23 (53.49)	2 (100)	1 (100)	50 (40)
9	Feeding of silage	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
10	Conservation of feeds and fodder eg. Stacking, Hay making etc	5 (62.5)	56 (78.87)	34 (79.07)	2 (100)	1 (100)	98 (78.4)
11	Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal	3 (37.5)	51 (71.83)	33 (76.74)	2 (100)	1 (100)	90 (72)
12	Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration	2 (25)	16 (22.54)	18 (41.86)	1 (50)	1 (100)	38 (30.4)
13	Type of concentrates						
i)	Homemade concentrates	4 (50)	26 (36.62)	17 (39.53)	0 (0)	0 (0)	47 (37.6)
ii)	Readymade purchased concentrates	1 (12.5)	35 (49.30)	24 (55.81)	2 (100)	1 (100)	63 (50.4)
iii)	Both type	3 (37.5)	10 (14.08)	2 (4.65)	0 (0)	0 (0)	15 (12)
14	Pregnancy allowance ration for pregnant animal	5 (62.5)	47 (66.20)	34 (79.07)	2 (100)	1 (100)	89 (71.2)
15	Use of mineral mixture or mineral block	0 (0)	4 (5.63)	5 (11.63)	1 (50)	1 (100)	11 (8.8)
16	Feeding of unconventional roughages and concentrates during scarcity	5 (62.5)	46 (64.79)	28 (65.12)	2 (100)	1 (100)	82 (65.6)
17	Processing of concentrate mixture						
i)	Separate processing of concentrates	6 (75)	55 (77.46)	35 (81.40)	2 (100)	1 (100)	99 (79.2)
ii)	Processing of concentrates with roughages	2 (25)	16 (22.54)	8 (18.60)	0 (0)	0 (0)	26 (20.8)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 4B: Feeding practice followed in Thane district

Sr. No.	Feeding practices	Landless	Marginal	Small	Medium	Large	Total
		5	**60**	**56**	**2**	**2**	**125**
1	System of feeding						
i)	Grazing	2 (40)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1.6)
ii)	Stall feeding	0 (0)	8 (13.33)	11 (19.64)	1 (50)	0 (0)	20 (16)
iii)	Grazing + Stall feeding	3 (60)	52 (86.67)	45 (80.36)	1 (50)	2 (100)	103 (82.4)
2	Feeding of milch animal						
i)	Individual milch animal	3 (60)	48 (80)	49 (87.5)	2 (100)	2 (100)	104 (83.2)
ii)	Group feeding of animals	2 (40)	12 (20)	7 (12.5)	0 (0)	0 (0)	21 (16.8)
3	Frequency of feeding						
i)	Once in a day	4 (80)	18 (30)	13 (23.21)	0 (0)	0 (0)	35 (28)
ii)	Twice in a day	1 (20)	34 (56.67)	32 (57.14)	1 (50)	2 (100)	70 (56)
iii)	Thrice or more in a day	0 (0)	8 (13.33)	11 (19.64)	1 (50)	0 (0)	20 (16)
4	Feeding colostrum to new born calf	4 (80)	58 (96.67)	55 (98.21)	2 (100)	2 (100)	121 (96.8)
5	Processing of roughages and concentrate before feeding (chaffing, crushing, soaking. etc.)	1 (20)	21 (35)	25 (44.64)	1 (50)	2 (100)	50 (40)
6	Enrichment of poor quality straw by urea	0 (0)	2 (3.33)	1 (1.79)	0 (0)	0 (0)	3 (2.4)
7	Chaffing of green fodder and dry fodder						
i)	Manual chaffing	5 (100)	50 (83.33)	43 (76.79)	1 (50)	0 (0)	99 (79.2)
ii)	Machinery chaffing	0 (0)	10 (16.67)	13 (23.21)	1 (50)	2 (100)	26 (20.8)
8	Feeding of green fodder	2 (40)	29 (48.33)	34 (60.71)	2 (100)	2 (100)	69 (55.2)
9	Feeding of silage	0 (0)	2 (3.33)	4 (7.14)	1 (50)	1 (50)	8 (6.4)
10	Conservation of feeds and fodder eg. Stacking, Hay making etc	1 (20)	47 (78.33)	47 (83.93)	2 (100)	2 (100)	99 (79.2)
11	Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal	1 (20)	43 (71.65)	46 (82.14)	2 (100)	2 (100)	94 (75.2)
12	Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration	0 (0)	24 (40)	27 (48.21)	1 (50)	2 (100)	54 (43.2)
13	Type of concentrates						
i)	Homemade concentrates	2 (40)	13 (21.67)	8 (14.29)	0 (0)	0 (0)	23 (18.4)
ii)	Readymade purchased concentrates	3 (60)	46 (76.67)	46 (82.14)	1 (50)	1 (50)	97 (77.6)
iii)	Both type	0 (0)	1 (1.67)	2 (3.57)	1 (50)	1 (50)	5 (4)
14	Pregnancy allowance ration for pregnant animal	2 (40)	48 (80)	47 (83.93)	2 (100)	2 (100)	101 (80.8)
15	Use of mineral mixture or mineral block	0 (0)	13 (21.67)	19 (33.93)	1 (50)	1 (50)	34 (27.2)
16	Feeding of unconventional roughages and concentrates during scarcity	0 (0)	42 (70)	40 (71.43)	2 (100)	2 (100)	86 (68.8)
17	Processing of concentrate mixture						
i)	Separate processing of concentrates	2 (40)	40 (66.67)	40 (71.43)	2 (100)	2 (100)	86 (68.8)
ii)	Processing of concentrates with roughages	3 (60)	20 (33.33)	16 (28.57)	0 (0)	0 (0)	39 (31.2)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 4C: Feeing practice followed in Raigad district

Sr. No.	Feeding practices	Landless	Marginal	Small	Medium	Large	Total
		7	**67**	**48**	**2**	**1**	**125**
1	System of feeding						
i)	Grazing	4 (57.14)	0 (0)	0 (0)	0 (0)	0 (0)	4 (3.2)
ii)	Stall feeding	0 (0)	2 (2.99)	1 (2.08)	0 (0)	0 (0)	3 (2.4)
iii)	Grazing + Stall feeding	3 (42.86)	65 (97.01)	47 (97.92)	2 (100)	1 (100)	118 (94.4)
2	Feeding of milch animal						
i)	Individual milch animal	5 (71.43)	48 (71.64)	36 (75)	2 (100)	1 (100)	92 (73.6)
ii)	Group feeding of animals	2 (28.57)	19 (28.36)	12 (25)	0 (0)	0 (0)	33 (26.4)
3	Frequency of feeding						
i)	Once in a day	4 (57.14)	20 (29.85)	14 (29.17)	0 (0)	0 (0)	38 (30.4)
ii)	Twice in a day	3 (42.86)	45 (67.16)	33 (68.75)	2 (100)	1 (100)	84 (67.2)
iii)	Thrice or more in a day	0 (0)	2 (2.99)	1 (2.08)	0 (0)	0 (0)	3 (2.4)
4	Feeding colostrum to new born calf	7 (100)	67 (100)	48 (100)	2 (100)	1 (100)	125 (100)
5	Processing of roughages and concentrate before feeding (chaffing, crushing, soaking. etc.)	0 (0)	13 (19.40)	16 (33.33)	1 (50)	0 (0)	30 (24)
6	Enrichment of poor quality straw by urea	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	Chaffing of green fodder and dry fodder						
i)	Manual chaffing	7 (100)	65 (97.01)	46 (95.83)	0 (0)	0 (0)	118 (94.4)
ii)	Machinery chaffing	0 (0)	2 (2.99)	2 (4.17)	2 (100)	1 (100)	7 (5.6)
8	Feeding of green fodder	2 (28.57)	24 (35.82)	24 (50)	1 (50)	1 (100)	52 (41.6)
9	Feeding of silage	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
10	Conservation of feeds and fodder eg. Stacking, Hay making etc	4 (57.14)	50 (74.63)	37 (77.08)	2 (100)	1 (100)	94 (75.2)
11	Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal	3 (42.86)	45 (67.16)	36 (75)	2 (100)	1 (100)	87 (69.6)
12	Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration	1 (14.29)	17 (25.37)	15 (31.25)	1 (50)	1 (100)	35 (28)
13	Type of concentrates						
i)	Homemade concentrates	4 (57.14)	23 (34.33)	13 (27.08)	0 (0)	0 (0)	40 (32)
ii)	Readymade purchased concentrates	1 (14.29)	39 (58.21)	31 (64.58)	2 (100)	1 (100)	74 (59.2)
iii)	Both type	2 (28.57)	5 (7.46)	4 (8.33)	0 (0)	0 (0)	11 (8.8)
14	Pregnancy allowance ration for pregnant animal	3 (42.86)	45 (67.16)	35 (72.92)	2 (100)	1 (100)	86 (68.8)
15	Use of mineral mixture or mineral block	0 (0)	2 (2.99)	4 (8.33)	2 (100)	1 (100)	9 (7.2)
16	Feeding of unconventional roughages and concentrates during scarcity	3 (42.86)	42 (62.69)	31 (64.58)	2 (100)	1 (100)	79 (63.2)
17	Processing of concentrate mixture						
i)	Separate processing of concentrates	5 (71.43)	53 (79.10)	41 (85.41)	2 (100)	1 (100)	102 (81.6)
ii)	Processing of concentrates with roughages	2 (28.57)	14 (20.90)	7 (14.58)	0 (0)	0 (0)	23 (18.4)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 4D: feeding practice followed in Ratnagiri district

Sr. No.	Feeding practices	Landless	Marginal	Small	Medium	Large	Total
		4	**55**	**59**	**4**	**3**	**125**
1	System of feeding						
i)	Grazing	2 (50)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1.6)
ii)	Stall feeding	0 (0)	4 (7.27)	8 (13.56)	0 (0)	0 (0)	12 (9.6)
iii)	Grazing + Stall feeding	2 (50)	51 (92.73)	53 (89.83)	4 (100)	3 (100)	113 (90.4)
2	Feeding of milch animal						
i)	Individual milch animal	1 (25)	48 (87.27)	53 (89.83)	4 (100)	3 (100)	109 (87.2)
ii)	Group feeding of animals	3 (75)	7 (12.73)	6 (10.17)	0 (0)	0 (0)	16 (12.8)
3	Frequency of feeding						
i)	Once in a day	3 (75)	17 (30.91)	12 (20.34)	1 (25)	0 (0)	33 (26.4)
ii)	Twice in a day	1 (25)	34 (61.82)	40 (67.80)	3 (75)	3 (100)	81 (64.8)
iii)	Thrice or more in a day	0 (0)	4 (7.27)	8 (13.56)	0 (0)	0 (0)	12 (9.6)
4	Feeding colostrum to new born calf	4 (100)	55 (100)	59 (100)	4 (100)	3 (100)	125 (100)
5	Processing of roughages and concentrate before feeding (chaffing, crushing, soaking. etc.)	1 (25)	18 (32.73)	22 (37.29)	3 (75)	3 (100)	47 (37.6)
6	Enrichment of poor quality straw by urea	0 (0)	0 (0)	0 (0)	1 (25)	0 (0)	1 (0.8)
7	Chaffing of green fodder and dry fodder						
i)	Manual chaffing	4 (100)	49 (89.09)	49 (83.05)	2 (50)	1 (33.33)	105 (84)
ii)	Machinery chaffing	0 (0)	6 (10.91)	10 (16.95)	2 (50)	2 (66.67)	20 (16)
8	Feeding of green fodder	1 (25)	32 (58.18)	35 (59.32)	3 (75)	3 (100)	74 (59.2)
9	Feeding of silage	0 (0)	0 (0)	0 (0)	1 (25)	0 (0)	1 (0.8)
10	Conservation of feeds and fodder eg. Stacking, Hay making etc	1 (25)	45 (81.82)	52 (88.14)	4 (100)	3 (100)	105 (84)
11	Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal	1 (25)	43 (78.18)	50 (84.75)	4 (100)	3 (100)	101 (80.8)
12	Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration	1 (25)	20 (36.36)	25 (42.37)	2 (50)	2 (66.67)	50 (40)
13	Type of concentrates						
i)	Homemade concentrates	3 (75)	14 (25.45)	10 (16.95)	0 (0)	0 (0)	27 (21.6)
ii)	Readymade purchased concentrates	1 (25)	39 (70.90)	47 (79.66)	3 (75)	3 (100)	93 (74.4)
iii)	Both type	0 (0)	2 (3.64)	2 (3.39)	1 (25)	0 (0)	5 (4)
14	Pregnancy allowance ration for pregnant animal	1 (25)	42 (76.36)	47 (79.66)	4 (100)	3 (100)	97 (77.6)
15	Use of mineral mixture or mineral block	0 (0)	11 (20)	15 (25.42)	2 (50)	2 (66.67)	30 (24)
16	Feeding of unconventional roughages and concentrates during scarcity	2 (50)	39 (70.91)	44 (74.58)	3 (75)	3 (100)	91 (72.8)
17	Processing of concentrate mixture						
i)	Separate processing of concentrates	1 (25)	39 (70.91)	44 (74.58)	3 (75)	3 (100)	90 (72)
ii)	Processing of concentrates with roughages	3 (75)	16 (29.09)	15 (25.42)	1 (25)	0 (0)	35 (28)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 4E: Feeding practice followed in Sindhudurg district

Sr. No.	Feeding practices	Landless	Marginal	Small	Medium	Large	Total
		4	**49**	**63**	**5**	**4**	**125**
1	System of feeding						
i)	Grazing	2 (50)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1.6)
ii)	Stall feeding	0 (0)	5 (10.20)	8 (12.70)	2 (40)	0 (0)	15 (12)
iii)	Grazing + Stall feeding	2 (50)	44 (89.80)	55 (87.30)	3 (60)	4 (100)	108 (86.4)
2	Feeding of milch animal						
i)	Individual milch animal	2 (50)	41 (83.67)	55 (87.30)	5 (100)	4 (100)	107 (85.6)
ii)	Group feeding of animals	2 (50)	8 (16.33)	8 (12.70)	0 (0)	0 (0)	18 (14.4)
3	Frequency of feeding						
i)	Once in a day	2 (50)	16 (32.65)	15 (23.81)	0 (0)	0 (0)	33 (26.4)
ii)	Twice in a day	2 (50)	28 (57.14)	40 (63.49)	3 (60)	4 (100)	77 (61.6)
iii)	Thrice or more in a day	0 (0)	5 (10.20)	8 (12.70)	2 (40)	0 (0)	15 (12)
4	Feeding colostrum to new born calf	4 (100)	49 (100)	63 (100)	5 (100)	4 (100)	125 (100)
5	Processing of roughages and concentrate before feeding (chaffing, crushing, soaking. etc.)	1 (25)	15 (30.61)	20 (31.75)	4 (80)	4 (100)	44 (35.2)
6	Enrichment of poor quality straw by urea	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	Chaffing of green fodder and dry fodder						
i)	Manual chaffing	4 (100)	45 (91.84)	55 (87.30)	3 (60)	2 (50)	109 (87.2)
ii)	Machinery chaffing	0 (0)	4 (8.16)	8 (12.70)	2 (40)	2 (50)	16 (12.8)
8	Feeding of green fodder	0 (0)	30 (61.22)	39 (61.90)	5 (100)	4 (100)	78 (62.4)
9	Feeding of silage	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
10	Conservation of feeds and fodder eg. Stacking, Hay making etc	2 (50)	39 (79.59)	53 (84.13)	5 (100)	4 (100)	103 (82.4)
11	Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal	1 (25)	38 (77.55)	50 (79.37)	5 (100)	4 (100)	98 (78.4)
12	Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration	0 (0)	17 (34.69)	23 (36.51)	3 (60)	3 (75)	46 (36.8)
13	Type of concentrates						
i)	Homemade concentrates	2 (50)	13 (26.53)	14 (22.22)	0 (0)	0 (0)	29 (23.2)
ii)	Readymade purchased concentrates	1 (25)	35 (71.43)	45 (71.43)	4 (80)	4 (100)	89 (71.2)
iii)	Both type	1 (25)	1 (2.04)	4 (6.35)	1 (20)	0 (0)	7 (5.6)
14	Pregnancy allowance ration for pregnant animal	1 (25)	33 (67.35)	51 (80.95)	5 (100)	4 (100)	94 (75.2)
15	Use of mineral mixture or mineral block	0 (0)	9 (18.37)	12 (19.05)	3 (60)	3 (75)	27 (21.6)
16	Feeding of unconventional roughages and concentrates during scarcity	0 (0)	33 (67.35)	47 (74.60)	4 (80)	4 (100)	88 (70.4)
17	Processing of concentrate mixture						
i)	Separate processing of concentrates	2 (50)	34 (69.39)	50 (79.37)	4 (80)	4 (100)	94 (75.2)
ii)	Processing of concentrates with roughages	2 (50)	15 (30.61)	13 (20.63)	1 (20)	0 (0)	31 (24.8)

(Figures in parenthesis are percentages of parameters in respected group)

It is needless to consequence the importance of feeds and fodder for milk production. Apart from the genetic potential of the animal, the milk production trend in livestock goes in responses with the quality and quantity of feed and fodder fed to the Crossbred cattle.

Livestock in India is largely maintained on the coarse and non-nutritious feeds like straw and other agricultural crop wastes and by products. On this background, it is essential to evaluate the existing status of feeding practices. The data obtained in this respect is presented in the above Table and discussed below.

4.4.1 System of feeding

Table 4A and Fig. 4 conclude that in Palghar district the practice of only grazing was followed by landless (37.5%) group and nobody (0%) from marginal, small, medium and large crossbred cattle owners followed this practice. Overall 2.4 per cent cattle owners followed only grazing. In case of only stall feeding 4.65 per cent crossbred cattle owners from small sized group adopted only stall feeding followed by marginal (1.41%) group and nobody (0%) from landless, medium and large crossbred cattle owners followed this practice. Average 2.4 per cent cattle owners followed only stall feeding. Grazing with stall feeding was followed by marginal (98.59%) small (95.35%), medium (100%), large (100%) and landless (62.5%) crossbred cattle owners. Overall 95.2 per cent of cattle owners followed grazing with stall feeding.

It was observed from Table 4B and depicted in Fig. 4 that in Thane district practice of only grazing was recorded highest in landless (40%) group and nobody (0%) from marginal, small, medium and large crossbred cattle owners followed only grazing. Only stall feeding was followed by marginal, small and medium crossbred cattle owners with 13.33 per cent, 19.64 per cent and 50 per cent, respectively. Nobody (0%) from landless and large cattle owners followed only stall feeding. Grazing with stall feeding was followed by marginal (86.67%) small (80.36%), medium (50%), large (100%) and landless (60%) crossbred cattle owners. Overall 1.6 per cent, 16 per cent and 82.4 per cent cattle owners followed the practice of only grazing, only stall feeding and grazing with stall feeding, respectively.

From Table 4C and Fig. 4 it was revealed that in Raigad district overall 3.2 per cent crossbred cattle owners followed the practice of only grazing and among different groups of crossbred cattle owners, only landless (57.14%) group followed this practice. Only stall feeding was followed by marginal (2.99%) and small (2.08%) group of crossbred cattle owners and nobody (0%) from landless, medium and large cattle owners adopted this practice. Average 2.4 per cent of cattle owners followed only stall feeding. Grazing with stall feeding was found higher in medium and large (100%) group followed by small (97.92%), marginal (97.01%) and landless (42.86%) group with average 94.4 per cent crossbred cattle owners adopted this practice.

From Table 4D and Fig. 4 it was observed that in Ratnagiri district among different groups of crossbred cattle owners practice of only grazing was followed by landless (50%) group and nobody (0%) from marginal, small, medium and large crossbred cattle owners followed this practice. Average 1.6 per cent cattle owners followed only grazing. Practice of only stall feeding was followed by marginal (7.27%) and small (13.56%) group of crossbred cattle owners, whereas nobody (0%) from landless, medium and large crossbred cattle owners followed this practice. Overall 9.6 per cent cattle owners adopted only stall feeding. Grazing with stall feeding was followed by marginal (92.73%), small (89.83%), medium (100%), large (100%) and landless (50%) group of crossbred cattle owners. Average 90.4 per cent of cattle owners followed grazing with stall feeding.

It was concluded from Table 4E and depicted in Fig. 4 that in Sindhudurg district only landless (50%) group of crossbred cattle owners followed only grazing. Practice of only stall feeding was followed by marginal, small and medium crossbred cattle owners with 10.20 per cent, 12.70 per cent, and 40 per cent, respectively. Grazing with stall feeding was followed by marginal (89.80%), small (87.30%), medium (60%), large (100%) and landless (50%) group of crossbred cattle owners. Overall 1.6 per cent, 12 per cent and 86.4 per cent cattle owners followed the practice of only grazing, only stall feeding and grazing with stall feeding, respectively.

Simul *et al.* (2012) also revealed that about 55.00 per cent, 14.03 per cent and 13.00 per cent of the cattle owners followed the practice of stall feeding, grazing and stall feeding with grazing, respectively. However present study is not matched with result reported by Kochewad *et al.* (2013) who observed that all dairy cattle in east ganga canal command in Uttar Pradesh was following stall feeding.

The present investigation was agreed with Raskar (2017), who observed that 100 per cent cattle owners followed stall feeding plus grazing practice whereas, only grazing and stall feeding not followed by cattle owners due to inadequate grazing land and fodder.

Choudhary *et al.* (2019) observed that in Hriyana State 41.7 per cent of the respondents preferred grazing and stall feeding system and 58.3 per cent practiced only stall feeding. Kadam *et al.* (2019) found that practice of grazing, stall feeding and grazing with stall feeding was followed by 3.33 per cent, 2.50 per cent and 94.17 per cent, respectively.

4.4.2 Feeding of milch animal

It is very important to feed the milch animal on nutrients rich feeds and fodder. Proper feeding of milch animal shows direct effect on milk production and economic returns of the farmer.

Table 4A and Fig. 5 conclude that in Palghar district individual feeding of milch animals was followed by landless, marginal, small, medium and large cattle owners with 62.5 per cent, 73.24 per cent, 81.40 per cent, 100 per cent and 100 per cent, respectively. Overall 76 per cent

cattle owners followed individual feeding of milch animals. Group feeding of milch animals was found highest in landless (37.5%) group of crossbred cattle owners followed by marginal (26.76%) and small (18.60%) group of crossbred cattle owners. Average 24 per cent cattle owners followed this practice of group feeding to milch animals.

It was observed from Table 4B and depicted in Fig. 5 that in Thane district individual feeding of milch animals was recorded highest in medium and large (100%) group of crossbred cattle owners, followed by small (87.5%), marginal (80%) and (60%) landless crossbred cattle owners. Practice of group feeding to milch animals was followed by landless, marginal and small crossbred cattle owners with 40 per cent, 20 per cent and 12.5 per cent, respectively. Nobody (0%) from medium and large cattle owners followed group feeding to milch animals. Overall 83.2 per cent and 16.8 per cent crossbred cattle owners followed the practice of individual feeding and group feeding of milch animals, respectively.

From Table 4C and Fig. 5 it was revealed that in Raigad district overall 73.6 per cent crossbred cattle owners followed the practice of individual feeding to milch animals. Among different groups of crossbred cattle owners landless, marginal, small, medium and large group of owners followed individual feeding of milch animals with 71.43 per cent, 71.64 per cent, 75 per cent, 100 per cent and 100 per cent, respectively. Group feeding of milch animals was followed by marginal (28.36%), small (25%) and landless (28.57%) group of crossbred cattle owners, whereas nobody (0%) from medium and large group of cattle owners followed this practice. Average 26.4 per cent of crossbred cattle owners followed group feeding to milch animals.

From Table 4D and Fig. 5 it was observed that in Ratnagiri district among different groups of crossbred cattle owners landless, marginal, small, medium and large group of owners followed individual feeding to milch animals with 25 per cent, 87.27 per cent, 89.83 per cent, 100 per cent and 100 per cent, respectively. Average 87.2 per cent cattle owners followed individual feeding of milch animals. Practice of group feeding to milch animals was followed by marginal (12.73%), small (10.17%) and landless (75%) crossbred cattle owners. Overall 12.8 per cent of crossbred cattle owners followed group feeding.

It was concluded from Table 4E and depicted in Fig. 5 that in Sindhudurg district individual feeding of milch animals was recorded highest in medium and large (100%) group of crossbred cattle owners, followed by small (87.30%), marginal (83.67%) and landless (50%) group of crossbred cattle owners. Practice of group feeding to milch animals was followed by landless, marginal and small crossbred cattle owners with 50 per cent, 16.33 per cent and 12.70 per cent, respectively. Nobody (0%) from medium and large category followed group feeding. Overall 85.6 per

cent and 14.4 per cent crossbred cattle owners followed the practice of individual feeding and group feeding of milch animals, respectively.

Rathore *et al.* (2010) observed that in Churu district of Rajasthan the majority of the farmers followed group feeding (68.75%) practice. Prajapati *et al.* (2020) reported that separate feeding of dry & green roughage and concentrates was practiced by farmers of Odisha (94%), Assam (86%) and West Bengal (74%). They also observed that in states like Chhattisgarh (100%), Eastern UP (90%), Bihar (94%) and Jharkhand (46%), a mixed feeding system was followed where dry & green fodder was mixed with concentrates and water.

4.4.3 Frequency of feeding

Frequent feeding or feeding of animal in intervals helps to increase intake of feed and fodder. Intermediate feeding increases the digestibility and absorption of nutrients.

It was concluded from Table 4A and depicted in Fig. 6 that in Palghar district feeding once in a day was recorded highest in landless (37.5%) group followed by marginal (35.21%) and small (30.23%) group of cattle owners, whereas nobody (0%) from medium and large crossbred cattle owners adopted this practice. Feeding twice in a day was followed by landless, marginal, small, medium and large crossbred cattle owners with 62.5 per cent, 63.38 per cent, 65.12 per cent, 100 per cent and 100 per cent, respectively. Feeding thrice or more in a day was followed by marginal (1.41%) and small (4.65%) crossbred cattle owners, whereas nobody (0%) followed this practice of feeding from landless, medium and large cattle owners. Overall 32.8 per cent, 64.8 per cent and 2.4 per cent cattle owners followed the practice of feeding once in a day, feeding twice in a day and feeding thrice or more in a day, respectively.

From Table 4B and Fig. 6 it was revealed that in Thane district overall 28 per cent crossbred cattle owners followed feeding once in a day. Among different groups of crossbred cattle owners nobody (0%) from medium and large group of cattle owners followed feeding once in a day, whereas landless, marginal and small group of cattle owners followed this feeding practice with 80 per cent, 30 per cent and 23.21 per cent, respectively. Feeding twice in a day was followed by marginal (56.67%) small (57.14%), medium (50%), large (100%) and landless (20%) crossbred cattle owners. Average 56 per cent of cattle owners followed feeding twice in a day. Practice of feeding thrice or more in a day was found highest in medium (50%) group, followed by small (19.64%) and marginal (13.33%) crossbred cattle owners whereas, nobody (0%) from landless and large crossbred cattle owners followed this feeding practice. Average 16 per cent cattle owners followed feeding thrice or more in a day.

It was observed from Table 4C and depicted in Fig. 6 that in Raigad district practice of feeding once in a day was recorded highest in landless (57.14%) group followed by marginal (29.85%) and small (29.17%) group

of crossbred cattle owners. Feeding twice in a day was followed by landless, marginal, small, medium and large crossbred cattle owners with 42.86 per cent, 67.16 per cent, 68.75 per cent, 100 per cent and 100 per cent, respectively. Practice of feeding thrice or more in a day was followed by marginal (2.99%) and small (2.08%) group of crossbred cattle owners, whereas nobody (0%) from landless, medium and large cattle owners adopted this practice. Overall 30.4 per cent, 67.2 per cent and 2.4 per cent cattle owners followed the practice of feeding once in a day, feeding twice in a day and feeding thrice or more in a day, respectively.

Table 4D and Fig. 6 conclude that in Ratnagiri district the practice of feeding once in a day was followed by landless, marginal, small and medium cattle owners with 75 per cent, 30.91 per cent, 20.34 per cent and 25 per cent, respectively. Nobody (0%) from large cattle owners adopted feeding once in a day and overall 26.4 per cent cattle owners followed this practice. Practice of feeding twice in a day was found highest in large (100%) group followed by medium (75%), small (67.80%), marginal (61.82%) and landless (25%) group of crossbred cattle owners with average 64.8 per cent cattle owners followed this practice. Feeding thrice or more in a day was followed by marginal (7.27%) and small (13.56%) cattle owners, whereas nobody (0%) from medium, large and landless crossbred cattle owners followed this practice. Average 9.6 per cent of cattle owners followed feeding thrice or more in a day.

From Table 4E and Fig. 6 it was observed that in Sindhudurg district among different groups of crossbred cattle owners landless, marginal and small group of owners followed feeding once in a day with 50 per cent, 32.65 per cent and 23.81 per cent, respectively. Nobody (0%) from medium and large cattle owners adopted feeding once in a day, whereas average 26.4 per cent cattle owners followed this practice of feeding. Feeding twice in a day was followed by marginal (57.14%), small (63.49%), medium (60%), large (100%) and landless (50%) crossbred cattle owners. Overall 61.6 per cent of cattle owners followed feeding twice in a day. Feeding thrice or more in a day was followed by marginal (10.20%), small (12.70%) and medium (40%) crossbred cattle owners, whereas nobody (0%) from landless and large group followed this practice. Average 12 per cent of cattle owners followed feeding thrice or more in a day.

Jadav *et al.* (2014) observed that in Surat district of Gujrat state more than half of the respondents (58%) fed their animals two times a day. According to Raskar (2017), average 67.2 per cent farmers of Chandur tehsil feed their animals twice in a day. Similar results were found by Kadam *et al.* (2019) that average 70 per cent farmers in Seloo tehsil of Maharshtra state feed their animals twice in a day.

4.4.4 Feeding colostrum to new born calf

Feeding of colostrum helps to boost the immunity of a new young one because it is rich in antibodies and proteins. Colostrum must be feed within 2 hours after parturition.

It was observed from Table 4A and depicted in Fig. 7 that in Palghar district the practice of feeding colostrum to new born calf was adopted by all the (100%) crossbred cattle owners from landless, marginal, small, medium and large category. The overall adoption was 100 per cent among 125 selected cattle owners.

From Table 4B and Fig. 7, it was observed that in Thane district feeding colostrum to new born calf was found highest in medium and large (100%) group of cattle owners, followed by small (98.21%), marginal (96.67%) and landless (80%) group of crossbred cattle owners. The overall adoption of this practice was 96.8 per cent.

It was revealed from Table 4C and depicted in Fig. 7 that in Raigad district the practice of feeding colostrum to new born calf was followed by all the (100%) selected crossbred cattle owners.

From Table 4D and Fig.7, it was revealed that in Ratnagiri district the practice of feeding colostrum to new born calf was followed by all the (100%) selected crossbred cattle owners.

It was revealed from Table 4E and depicted in Fig. 7 that in Sindhudurg district the practice of feeding colostrum to new born calf was adopted by all the (100%) crossbred cattle owners from landless, marginal, small, medium and large category. The overall adoption was 100 per cent among 125 selected cattle owners.

Choudhary *et al.* (2019) found that in Hisar, Biwani, Rohtak and Jhajjar districts of Haryana, 63.8 per cent of the respondents were feeding colostrum to calf after the placenta was shed whereas others were feeding colostrum immediately. Kadam *et al.* (2019) observed that all farmers (100%) in the Seloo tehsil of Wardha district adopted the practice feeding colostrum to new born calf.

4.4.5 Processing of roughages and concentrate before feeding

This is a very important recommendation in feeding of dairy animals. Roughages and concentrates need to be processed before feeding for increasing its utilization. It involves the crushing of grain, soaking of cake and practice of chaffing.

It was revealed from Table 4A and depicted in Fig. 8 that the practice of processing roughages and concentrates before feeding was followed by landless (25%), marginal (19.72%), small (34.88%), medium (50%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 26.4 per cent cattle owners followed the practice of processing roughages and concentrates before feeding in Palghar district.

From Table 4B and Fig. 8, it was observed that in Thane district the practice regarding processing of roughages and concentrates before feeding was found highest in large (100%) group, followed by medium

(50%), small (44.64%), marginal (35%) and landless (20%) group of crossbred cattle owners. The overall adoption of this practice was 40 per cent.

It was observed from Table 4C and depicted in Fig. 8 that in Raigad district the practice of processing roughages and concentrates before feeding was adopted by medium, small and marginal category of cattle owners with 50 per cent, 33.33 per cent and 19.40 per cent, respectively. Nobody (0%) from large and landless group of cattle owners followed processing of roughages and concentrates before feeding and the overall adoption of this practice was 24 per cent among 125 selected cattle owners.

From Table 4D and Fig. 8, it was revealed that in Ratnagiri district overall 37.6 per cent cattle owners adopted the practice of processing roughages and concentrates before feeding. Considering the various categories of cattle owners higher adoption of this practice was found in large (100%) group, followed by medium (75%), small (37.29%), marginal (32.73%) and landless (25%) group of cattle owners.

It was observed from Table 4E and depicted in Fig. 8 that in Sindhudurg district the overall adoption of this practice was 35.2 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 25 per cent, 30.61 per cent, 31.75 per cent, 80 per cent and 100 per cent, respectively.

Madke *et al.* (2006) found that only 16 per cent farmers adopted soaking of concentrates before feeding. Manohar *et al.* (2013) studied that about 84.37 per cent of buffalo keepers soaked concentrate mixture before feeding.

Similar result reported by Raskar (2017), who observed that processing of concentrate before feeding practice was adopted by large, small, marginal, landless and medium category of cattle owners with 42.86 per cent, 22.22 per cent, 20.75 per cent, 14.29 per cent and 22.22 per cent, respectively. The overall practice followed by Crossbred cattle owners were 20.83 per cent. Similar results were also found by Kadam *et al.* (2019) that total 22.50 per cent cattle owners followed the practice of processing before feeding.

4.4.6 Enrichment of poor quality straw by urea

It is an important practice which helps in proper utilization of available feed resources. Poor quality roughages can be converted into protein rich sources by urea treatment.

It was observed from Table 4A, 4C, 4E and depicted in Fig. 9 that in Palghar, Raigad and Sindhudurg district nobody (0%) from selected crossbred cattle owners followed the practice of enrichment of poor quality straw by urea. Table 4B and Fig. conclude that in Thane district marginal (3.33%) and small (1.79%) cattle owners followed this practice, whereas nobody (0%) from landless, medium and large group adopted this practice. Average 2.4 per cent cattle owners followed this practice in

Thane district. It was revealed from Table 4D and depicted in Fig. that in Ratnagiri district only medium (25%) group of crossbred cattle owners adopted this practice and overall 0.8 per cent crossbred cattle owners followed the practice of enrichment of poor quality straw by urea ammonation treatment.

These findings are in agreement with observations of Kavathalkar *et al.* (2007) who observed that in Nagpur district none of cattle owners adopted enrichment of poor qualities straw by urea. Kadam *et al.* (2019) found that no one among crossbred cattle owners of Seloo tehsil used urea for enrichment of poor quality straw.

4.4.7 Chaffing of green fodder and dry fodder

Chaffing of green and dry fodder before feeding is a very important process to utilize completely and to avoid the wastage of fodder. This practice also reduces the cost of production of milk.

It was observed from Table 4A and depicted in Fig. 10 that in Palghar district manual chaffing of green fodder and dry fodder was recorded highest in landless (100%) group, followed by marginal (95.77%), small (90.70%) and medium (50%) crossbred cattle owners, whereas nobody (0%) from large group of cattle owners followed this practice. Mechanical chaffing of green fodder and dry fodder was followed by marginal, small, medium and large crossbred cattle owners with 4.23 per cent, 9.30 per cent, 50 per cent and 100 per cent, respectively. Nobody (0%) from landless category used machinery for chaffing. Overall 92.8 per cent and 7.2 per cent crossbred cattle owners followed manual chaffing and mechanical chaffing of fodder, respectively.

From Table 4B and Fig. 10 it was observed that in Thane district among different groups of crossbred cattle owners landless, marginal, small and medium group of cattle owners followed manual chaffing of green fodder and dry fodder with 100 per cent, 83.33 per cent, 76.79 per cent and 50 per cent, respectively. Nobody (0%) from large group followed manual chaffing. Average 79.2 per cent cattle owners followed manual chaffing. Mechanical chaffing of green fodder and dry fodder was followed by marginal (16.67%), small (23.21%), medium (50%), large (100%) and nobody (0%) from landless group of crossbred cattle owners. Overall 20.8 per cent of crossbred cattle owners followed mechanical chaffing.

It was concluded from Table 4C and depicted in Fig. 10 that in Raigad district manual chaffing of green fodder and dry fodder was recorded highest in landless (100%) group followed by marginal (97.01%) and small (95.83%) crossbred cattle owners, whereas nobody (0%) from medium and large category of cattle owners followed this practice. Mechanical chaffing of green fodder and dry fodder was followed by marginal, small, medium and large crossbred cattle owners with 2.99 per cent, 4.17 per cent, 100 per cent and 100 per cent, respectively. Nobody from landless (0%) group of crossbred cattle owners used machinery for chaffing. Overall 94.4 per cent and 5.6 per cent crossbred cattle owners

followed the practice of manual chaffing and mechanical chaffing of green fodder and dry fodder, respectively.

From Table 4D and Fig. 10 it was revealed that in Ratnagiri district overall 84 per cent crossbred cattle owners followed the practice of manual chaffing. Among different groups of crossbred cattle owners landless, marginal, small, medium and large group of cattle owners followed manual chaffing of green fodder and dry fodder with 100 per cent, 89.09 per cent, 83.05 per cent, 50 per cent and 33.33 per cent, respectively. Practice of mechanical chaffing was followed by marginal (10.91%), small (16.95%), medium (50%), large (66.67%) and nobody (0%) from landless group crossbred cattle owners. Average 16 per cent of cattle owners followed mechanical chaffing of green fodder and dry fodder.

Table 4E and Fig. 10 conclude that in Sindhudurg district the practice of manual chaffing of green fodder and dry fodder was followed by landless, marginal, small, medium and large cattle owners with 100 per cent, 91.84 per cent, 87.30 per cent, 60 per cent and 50 per cent, respectively. Overall 87.2 per cent cattle owners followed manual chaffing of green fodder and dry fodder. Use of machinery for chaffing of dry and green fodder was found highest in large (50%) group, followed by medium (40%), small (12.70%) and marginal (8.16%) crossbred cattle owners, whereas nobody from landless (0%) cattle owners followed this practice. Average 12.8 per cent crossbred cattle owners used machinery for chaffing of green fodder and dry fodder.

Hodshil (2007) reported that chaffing of green and dry fodder was adopted by 36.00 per cent and 16.25 per cent Gaolao cattle owners which are less than the present result. Kadam *et al.* (2019) found that in Seloo tehsil chaffing of green fodder and dry fodder was manually done by 77.50 per cent crossbred cattle owners and machinery was used by 16.67 per cent of owners.

4.4.8 Feeding of green fodder

Nutrition is one of the important aspects, which influences the livestock production. Shortage of green fodder in almost all the regions, leads to under-feeding of animals and there by resulting the poor performance in milk production.

From Table 4A and Fig. 11, it was observed that in Palghar district the practice of feeding green fodder was found highest in medium and large (100%) group, followed by small (53.49%), marginal (30.99%) and landless (25%) group of cattle owners. The overall adoption of this practice was 40 per cent.

It was observed from Table 4B and depicted in Fig. 11 that in Thane district the overall adoption of feeding green fodder was 55.2 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 40 per cent, 48.33 per cent, 60.71 per cent, 100 per cent and 100 per cent, respectively.

It was revealed from Table 4C and depicted in Fig. 11 that in Raigad district the practice of feeding green fodder was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 50 per cent, 50 per cent, 35.82 per cent and 28.57 per cent, respectively. The overall adoption was 41.6 per cent among 125 selected cattle owners.

From Table 4D and Fig. 11, it was revealed that in Ratnagiri district overall 59.2 per cent cattle owners adopted the practice of feeding green fodder. Considering the various categories of cattle owners higher adoption of this practice was found in large (100%) group, followed by medium (75%), small (59.32%), marginal (58.18%) and landless (25%) group of crossbred cattle owners.

It was revealed from Table 4E and depicted in Fig. 11 that the practice of feeding green fodder was followed by landless (25%), marginal (59.18%), small (61.90%), medium (100%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 62.4 per cent cattle owners followed this practice in district.

The present results are in conformity with the observation reported by Babu and Rao (2013) who observed that in Chittoor districts of Andhra Pradesh all the cattle owners were feeding green fodder to their animal.

According to Raskar (2017) overall acceptance of green forage feeding was 53.50 per cent in Chandur tehsil as it helps to minimize milk production costs. Kadam *et al.* (2019) observed that 68.33 per cent crossbred cattle owners fed green fodder in Seloo tehsil.

4.4.9 Feeding of silage

Feeding of silage was the imaginary thought for the cattle owners due to lack of sufficient green fodder required for silage preparation. Silage making is the preservation of green fodder more or less in its original condition without the loss of much nutritive value.

It was observed from Table 4A, 4C, 4E and depicted in Fig. 12 that in Palghar, Raigad and Sindhudurg district nobody (0%) from landless, marginal, small, medium and large group of crossbred cattle owners followed the practice of feeding silage. Table 4B and Fig. conclude that in Thane district marginal (3.33%), small (7.14%), medium (50%) and large (50%) group of cattle owners followed this practice, whereas nobody (0%) from landless group adopted this practice. Average 6.4 per cent cattle owners followed this practice in Thane district. It was revealed from Table 4D and depicted in Fig. that in Ratnagiri district only medium (25%) group of crossbred cattle owners adopted this practice and overall 0.8 per cent crossbred cattle owners followed the practice of feeding silage. It is observed that, in a study area majority of the cattle owners are not aware about use of silage and its nutritional importance in animal diet

Similar result was reported by Madke *et al.* (2006), Hodshil *et al.*, (2007) Sabapara *et al.* (2010) and Kochewad (2013), who found silage preparation was not adopted by any of cattle owners. According to Kadam *et al.* (2019), no one followed the practice of feeding silage in Seloo tehsil.

4.4.10 Conservation of feeds and fodder eg. Stacking, Hay making etc.

Conservation of cheaply and locally available feeds and fodder helps to reduce cost of milk production. Conserved feeds and fodders can be used as an alternative source for high cost feed resources.

From Table 4A and Fig. 13, it was observed that in Palghar district practice regarding conservation of feeds and fodder was found highest in medium and large (100%) group, followed by small (79.07%), marginal (78.87%) and landless (62.5%) group of cattle owners. The overall adoption of this practice was 78.4 per cent.

It was observed from Table 4B and depicted in Fig. 13 that in Thane district conservation of feeds and fodder was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 100 per cent, 83.93 per cent, 78.33 per cent and 20 per cent, respectively. The overall adoption was 79.2 per cent among 125 selected cattle owners.

From Table 4C and Fig. 13, it was revealed that in Raigad district overall 75.2 per cent cattle owners adopted the practice of conservation of feeds and fodder. Considering the various categories of cattle owners higher adoption of this practice was found in medium and large (100%) group, followed by small (77.08%), marginal (74.63%) and landless (57.14%) group of crossbred cattle owners.

It was revealed from Table 4D and depicted in Fig. 13 that conservation of feeds and fodder was followed by landless (25%), marginal (81.82%), small (88.14%), medium (100%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 84 per cent cattle owners followed this practice in district.

It was observed from Table 4E and depicted in Fig. 13 that in Sindhudurg district the overall adoption of this practice was 82.4 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 50 per cent, 79.59 per cent, 84.13 per cent, 100 per cent and 100 per cent, respectively.

Choudhary *et al.* (2019) found that none of farmer was aware about preservation of fodder crop methods like hay. Similar result was reported Kadam *et al.* (2019), who observed that average 90 per cent crossbred cattle owners in a Seloo tehsil adopted the practice of conservation of feeds and fodder.

4.4.11 Feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal

Cows and buffaloes should get 2 to 2.5 kg DM/100 kg body weight so as to fulfill the appetite. Cattle may remain hungry if they didn't get dry matter in this proportion.

From Table 4A and Fig. 14, it was revealed that in Palghar district overall 72 per cent cattle owners adopted the practice regarding feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal. Considering the various categories of cattle owners higher adoption of this practice was found in medium and large (100%) category, followed by small (76.74%), marginal (71.83%) and landless (37.5%) group of crossbred cattle owners.

It was revealed from Table 4B and depicted in Fig. 14 that the feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal was followed by landless (20%), marginal (71.65%), small (82.14%), medium (100%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 75.2 per cent cattle owners followed this practice in Thane district.

From Table 4C and Fig. 14, it was observed that in Raigad district the practice of feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal was found highest in medium and large (100%) group, followed by small (75%), marginal (67.16%) and landless (42.86%) group of cattle owners. The overall adoption of this practice was 69.6 per cent.

It was observed from Table 4D and depicted in Fig. 14 that in Ratnagiri district overall adoption regarding feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal was 80.8 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 25 per cent, 78.18 per cent, 84.75 per cent, 100 per cent and 100per cent, respectively.

It was observed from Table 4E and depicted in Fig. 14 that in Sindhudurg district feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 100 per cent, 79.37 per cent, 77.55 per cent and 25 per cent, respectively. The overall adoption of this practice was 78.4 per cent among 125 selected cattle owners.

In high-altitude dairy cattle of eastern Himalaya region overall more than half of the cattle owners under the survey offered dry matter to their animals at the rate more than 2.5 kg per 100 kg body weight were observed by Chatterjee *et al.* (2012).

According to Pedhekar *et al.* (2017), most crossbreed cattle owners acquired the feeding practices of roughage and concentrates (80.50%), feeding dry matter 2 - 2.5 kg /100 kg body weight (80.50%). Kadam *et al.* (2019) found that the practice of feeding of dry matter @ 2 to 2.5 kg/100kg body weight of animal was followed by 79.16 per cent crossbred cattle owners of Seloo tehsil.

4.4.12 Feeding of concentrate @ 40% of milk production and 1 kg as a maintenance ration

Cattle should be fed with concentrate @40 per cent of milk production and 1 kg as a maintenance ration for maintaining their body energy levels. It also leads for steady and healthy milk production.

It was observed from Table 4A and depicted in Fig. 15 that in Palghar district the feeding of concentrate @ 40% of milk production and 1 kg for maintenance was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 50 per cent, 41.86 per cent, 22.54 per cent and 25 per cent, respectively. The overall adoption was 30.4 per cent among 125 selected cattle owners.

From Table 4B and Fig. 15, it was observed that in Thane district the practice regarding feeding of concentrate @ 40% of milk production and 1 kg for maintenance was found highest in large (100%) group, followed by medium (50%), small (48.21%) and marginal (40%) group of cattle owners, whereas nobody (0%) from landless group of crossbred cattle owners followed this feeding practice. The overall adoption of this feeding practice was 43.2 per cent.

It was revealed from Table 4C and depicted in Fig. 15 that the feeding of concentrate @ 40% of milk production and 1 kg for maintenance was followed by landless (14.29%), marginal (25.37%), small (31.25%), medium (50%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 28 per cent cattle owners followed this practice in Raigad district.

From Table 4D and Fig. 15, it was revealed that in Ratnagiri district overall 40 per cent cattle owners adopted the feeding of concentrate @ 40% of milk production and 1 kg for maintenance. Considering the various categories of cattle owners higher adoption of this feeding practice was found in large (66.67%) cattle owners, followed by medium (50%), small (42.37%), marginal (36.36%) and landless (25%) group of crossbred cattle owners.

It was observed from Table 4E and depicted in Fig. 15 that in Sindhudurg district the overall adoption regarding feeding of concentrate @ 40% of milk production and 1 kg for maintenance was 36.8 per cent. Among various groups of cattle owners marginal, small, medium and large owners followed this practice with 34.69 per cent, 36.51 per cent, 60 per cent and 75 per cent, respectively. Nobody (0%) from landless cattle owners followed this practice of feeding.

Similar result were reported by Babu and rao (2013) who observed that in four mandals of Chittoor districts of Andhra Pradesh 40.00 per cent to 52.00 per cent cattle owners feeding premixed cattle feed and 43.00 per cent feeding feed ingredients. According to Kadam *et al.* (2019) Feeding of concentrate @ 40% of milk production and 1 kg for maintenance was followed by 38.33 per cent of crossbred cattle owners in Seloo tehsil of wardha district.

4.4.13 Type of concentrates

It is essential to feed the concentrates according to availability, nutrient content and cost. Low cost concentrates help to increase net profit of the farmers. Homemade concentrates include various types of grinded grains and byproducts obtained in grain processing.

Table 4A and Fig. 16 conclude that in Palghar district the practice of feeding homemade concentrates was followed by landless, marginal and small cattle owners with 50 per cent, 36.62 per cent and 39.53 per cent, respectively. Nobody from medium and large cattle owners fed homemade concentrates, whereas overall 37.6 per cent cattle owners followed this practice. Feeding readymade purchased concentrates was found highest in medium and large (100%) group followed by small (55.81%), marginal (49.30%) and landless (12.5%) group of crossbred cattle owners. Average 50.4 per cent cattle owners followed this practice of feeding readymade purchased concentrates. Feeding both homemade and readymade purchased concentrates was followed by marginal (14.08%) small (4.65%) and landless (37.5%) crossbred cattle owners whereas, nobody (0%) from medium and large cattle owners followed feeding of both homemade and readymade purchased concentrates. Average 12 per cent of cattle owners followed feeding of both homemade and readymade purchased concentrates.

It was observed from Table 4B and depicted in Fig. 16 that in Thane district use of homemade concentrates for feeding was recorded highest in landless (40%) group of crossbred cattle owners followed by marginal (21.67%) and small (14.29%) crossbred cattle owners and nobody (0%) from medium and large cattle owners followed this practice. Feeding readymade purchased concentrates was followed by landless, marginal, small, medium and large crossbred cattle owners with 60 per cent, 76.67 per cent, 82.14 per cent, 50 per cent and 50 per cent, respectively. Use of both homemade and readymade purchased concentrates for feeding was adopted by marginal (1.67%) small (3.57%), medium (50%), large (50%) and nobody (0%) from landless crossbred cattle owners. Overall 18.4 per cent, 77.6 per cent and 4 per cent cattle owners followed the use of homemade concentrates, readymade purchased concentrates and combination of both homemade and readymade purchased concentrates, respectively.

From Table 4C and Fig. 16 it was revealed that in Raigad district overall 32 per cent crossbred cattle owners used homemade concentrates for feeding. Among different groups of crossbred cattle owners nobody (0%) from medium and large group of cattle owners adopted the practice of feeding homemade concentrates, whereas landless, marginal and small group of owners followed this feeding practice with 57.14 per cent, 34.33 per cent and 27.08 per cent, respectively. Feeding of readymade

purchased concentrates was followed by marginal (58.21%), small (64.58%), medium (100%), large (100%) and landless (14.29%) crossbred cattle owners. Average 59.2 per cent of cattle owners followed feeding of readymade purchased concentrates. Practice of feeding both homemade and readymade purchased concentrates was found highest in landless (28.57%) group of crossbred cattle owners followed by small (8.33%) and marginal (7.46%) group of crossbred cattle owners. Overall 8.8 per cent cattle owners adopted the practice of feeding both homemade and readymade purchased concentrates.

From Table 4D and Fig. 16 it was observed that in Ratnagiri district among different groups of crossbred cattle owners landless, marginal and small group of crossbred cattle owners followed the feeding of homemade concentrates with 75 per cent, 25.45 per cent and 16.95 per cent, respectively. Nobody (0%) from medium and large group of cattle owners followed feeding of homemade concentrates, whereas overall 21.6 per cent cattle owners followed this practice. Practice of feeding readymade purchased concentrates was followed by marginal (70.90%) small (79.66%), medium (75%), large (100%) and landless (25%) group of crossbred cattle owners. Overall 74.4 per cent of cattle owners followed feeding of readymade purchased concentrates. Feeding of both homemade and readymade purchased concentrates was followed by marginal (3.64%), small (3.39%) and medium (25%) group of cattle owners, whereas from large and landless cattle owners nobody (0%) followed this practice. Average 4 per cent of crossbred cattle owners followed feeding of both homemade and readymade purchased concentrates.

It was concluded from Table 4E and depicted in Fig. 16 that in Sindhudurg district practice of feeding homemade concentrates was recorded highest in landless (50%) group of crossbred cattle owners followed by marginal (26.53%) and small (22.22%) group of cattle owners, whereas nobody (0%) from medium and large cattle owners followed this practice of feeding. Feeding of readymade purchased concentrates was followed by landless, marginal, small, medium and large crossbred cattle owners with 25 per cent, 71.43 per cent, 71.43 per cent, 80 per cent and 100 per cent, respectively. Practice of feeding both homemade and readymade purchased concentrates was followed by marginal (2.04%), small (6.35%), medium (20%) and landless (25%) group of crossbred cattle owners, whereas nobody (0%) from large category followed this practice. Overall 23.2 per cent, 71.2 per cent and 5.6 per cent cattle owners followed the practice of feeding homemade concentrates, feeding readymade purchased concentrates and feeding combination of both homemade and readymade purchased concentrates, respectively.

Singh *et al.* (2004) observed that in the kumaon hills of uttaranchal only 5.3 per cent farmers were using purchased pashu ahar (compound feed) for productive animals.

The above findings are in agreement with observations of Gupta *et al.* (2008) Who observed that type of concentrates fed homemade (45.60%), compounded feed (31.4%) and both (16.50%) in Rajasthan and Kochewad (2013) reported that homemade (65.00%), purchased feed (20.00%) and both used (15.00%) feed to the cattle by cattle owners of Uttar Pradesh.

According to Kadam *et al.* (2019) 5.83 per cent crossbred cattle owners of Seloo tehsil used homemade concentrates, 85.00 per cent owners used purchased concentrates and 9.17 per cent owners used both homemade and purchased concentrates. Geetha *et al.* (2021) observed that about 25.00 per cent farmers used to feed merely compounded cattle feed, while 75.00 per cent farmers used mixture of home-made concentrate with compounded feed in Erode district of Tamil Nadu.

4.4.14 Pregnancy allowance ration for pregnant animal

The pregnant animal should be given 1 to 1.5 Kg concentrate mixture during last trimester of pregnancy over and above the maintenance quota for the overall development of foetus.

From Table 4A and Fig. 17, it was revealed that in Palghar district overall 71.2 per cent cattle owners adopted the practice of feeding additional ration to pregnant animals. Considering the various categories of cattle owners higher adoption of this feeding practice was found in medium and large (100%) group, followed by small (79.07%), marginal (66.20%) and landless (62.5%) group of owners.

It was observed from Table 4B and depicted in Fig. 17 that in Thane district the overall adoption of practice regarding feeding additional ration to pregnant animals was 80.8 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this feeding practice with 40 per cent, 80 per cent, 83.93 per cent, 100 per cent and 100 per cent, respectively.

It was observed from Table 4C and depicted in Fig. 17 that in Raigad district feeding additional ration to pregnant animals was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 100 per cent, 72.92 per cent, 67.16 per cent and 42.86 per cent, respectively. The overall adoption was 68.8 per cent among 125 selected crossbred cattle owners.

From Table 4D and Fig. 17, it was observed that in Ratnagiri district the feeding of additional ration to pregnant animals was found highest in medium and large (100%) group, followed by small (79.66%), marginal (76.36%) and landless (25%) group of crossbred cattle owners. The overall adoption of this practice was 77.6 per cent.

It was revealed from Table 4E and depicted in Fig. 17 that feeding of additional ration to pregnant animals was followed by landless (25%), marginal (67.35%), small (80.95%), medium (100%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 75.2 per

cent cattle owners followed this practice of feeding additional ration to pregnant animals in Sindhudurg district.

Madke *et al.* (2006) observed that 44.67 per cent farmers feed extra dose of concentrates to pregnant animals. Kochewad (2013) reported that in Uttar Pradesh 49.00 per cent of cattle owners provide concentrate mixture to the advanced pregnant animal. Manohar *et al.* (2013) observed that in Jaipur district of Rajasthan about 90.62 per cent of buffalo keepers fed concentrate mixture to buffaloes in advance pregnancy. Kadam *et al.* (2019) recorded that 80.83 per cent crossbred cattle owners of Seloo tehsil fed additional ration to pregnant animals.

4.4.15 Use of mineral mixture or mineral block

Use of mineral mixture helps to regain the minerals removed from the body of animal during its production cycle. It also helps to get rid from various deficiencies caused due to lack of minerals.

From Table 4A and Fig. 18, it was observed that in Palghar district the practice of feeding mineral mixture or mineral block was found highest in large (100%) cattle owners, followed by medium (50%), small (11.63%) and marginal (5.63%) group of cattle owners, whereas nobody (0%) from landless category followed this practice. The overall adoption of this practice was 8.8 per cent.

It was revealed from Table 4B and depicted in Fig. 18 that the practice regarding feeding of mineral mixture or mineral block was adopted by marginal (21.67%), small (33.93%), medium (50%) and large (50%) group of cattle owners, whereas nobody (0%) from landless cattle owners followed this practice. Out of total 125 selected crossbred cattle owners 27.2 per cent cattle owners followed this practice of feeding mineral mixture or mineral block in Thane district.

It was observed from Table 4C and depicted in Fig. 18 that in Raigad district the practice of feeding mineral mixture or mineral block was adopted by large, medium, small and marginal category of cattle owners with 100 per cent, 100 per cent, 8.33 per cent and 2.99 per cent, respectively. Nobody (0%) from landless group followed this practice. The overall adoption of feeding mineral mixture or mineral block was 7.2 per cent among 125 selected cattle owners.

From Table 4D and Fig. 18, it was revealed that in Ratnagiri district overall 24 per cent cattle owners adopted the practice of feeding mineral mixture or mineral block. Considering the various categories of cattle owners higher adoption of this feeding practice was found in medium (50%), followed by large (66.67%), small (25.42%) and marginal (20%) group of owners, whereas nobody (0%) from landless group followed this practice.

It was observed from Table 4E and depicted in Fig. 18 that in Sindhudurg district the overall adoption of feeding mineral mixture or mineral block was 21.6 per cent. Among various groups of cattle owners marginal, small, medium and large cattle owners followed this practice

with 18.37 per cent, 19.05 per cent, 60 per cent and 75 per cent, respectively. Nobody (0%) from landless crossbred cattle owners followed feeding of mineral mixture or mineral block.

Madke *et al.* (2006) found that only 3.33 per cent farmers provide mineral mixture to their animls. Sabapara *et al.* (2010) observed that in the tribal area of South Gujarat mineral supplements were provided by only 30.5% of farmers to their milch animals. Mircha *et al.* (2012) observed that overall 44.1 per cent cattle owners used mineral mixture for dairy animals.

The present results are in conformity with the observation reported by Singh *et al.* (2013) and Kochewad (2013) reported that only 6.00 and 15.51 per cent respectively, respondents provide mineral mixture to animals. Manohar *et al.* (2013) found that only 13.75 per cent buffalo owners in Jaipur district of Rajasthan fed mineral mixture to their animals.

Kadam *et al.* (2019) observed that 2.50 per cent crossbred cattle owners of Seloo tehsil used mineral mixtures or mineral block.

4.4.16 Feeding of unconventional roughages and concentrates during scarcity

The economic rearing of animals can be done by including unconventional roughages and concentrates in the ration of ruminants. This will not only reduce the cost of feed but also narrow the gap of demand and supply of feeds and can also use during scarcity.

From Table 4A and Fig. 19, it was revealed that in Palghar district overall 65.6 per cent cattle owners adopted the practice of feeding unconventional roughages and concentrates during scarcity. Considering the various categories of cattle owners higher adoption of this was found in medium and large (100%) group, followed by small (65.12%), marginal (64.79%) and landless (62.5%) group of crossbred cattle owners.

It was revealed from Table 4B and depicted in Fig. 19 that feeding of unconventional roughages and concentrates during scarcity was followed by marginal (70%), small (71.43%), medium (100%) and large (100%) group of cattle owners, whereas nobody (0%) from landless cattle owners followed this practice. Out of total 125 selected cattle owners 68.8 per cent cattle owners followed this practice in Thane district.

From Table 4C and Fig. 19, it was observed that in Raigad district the practice of feeding unconventional roughages and concentrates during scarcity was found highest in medium and large (100%) cattle owners, followed by small (64.58%), marginal (62.69%) and landless (42.86%) group of cattle owners. The overall adoption of this practice was 63.2 per cent.

It was observed from Table 4D and depicted in Fig. 19 that in Ratnagiri district the overall adoption of feeding unconventional roughages and concentrates during scarcity was 72.8 per cent. Among various groups of cattle owners landless, marginal, small, medium and

large owners followed this practice with 50 per cent, 70.91 per cent, 74.58 per cent, 75 per cent and 100 per cent, respectively.

It was observed from Table 4E and depicted in Fig. 19 that in Sindhudurg district the practice of feeding unconventional roughages and concentrates during scarcity was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 80 per cent, 74.60 per cent and 67.35 per cent, respectively. Nobody (0%) from landless cattle owners followed this practice of feeding. The overall adoption of this feeding practice was 70.4 per cent among 125 selected cattle owners.

These findings are in agreement with observations of Kavathalkar *et al* (2007) who observed that 88.88 per cent farmers in Nagpur district adopted practice of feeding of unconventional roughages and concentrates to reduce cost. According to Kadam *et al.* (2019) feeding of unconventional roughages and concentrates during scarcity was followed by 81.66 per cent crossbred cattle owners of Seloo tehsil.

4.4.17 Processing of concentrate mixture

In the present scenario total mixed ration system for feeding livestock has become increasing popular among dairy cattle owners. In this system locally available feed ingredients or concentrate mixture are mixed with roughages in certain proportion to ensure balance ration for consumption by animal.

From Table 4A and Fig. 20, it was observed that in Palghar district among different groups of crossbred cattle owners landless, marginal, small, medium and large group of cattle owners followed separate processing of concentrate mixtures with 75 per cent, 77.46 per cent, 81.40 per cent, 100 per cent and 100 per cent, respectively. Average 79.2 per cent cattle owners followed separate processing of concentrate mixtures. Processing of concentrate mixture with roughages was followed by marginal (22.54%), small (18.60%) and landless (25%) crossbred cattle owners, whereas nobody (0%) from medium and large group of cattle owners followed this practice. Overall 20.8 per cent of crossbred cattle owners followed the practice of Processing with roughages.

Table 4B and Fig. 20 conclude that in Thane district separate processing of concentrate mixtures was followed by landless, marginal, small, medium and large cattle owners with 40 per cent, 66.67 per cent, 71.43 per cent, 100 per cent and 100 per cent, respectively. Overall 68.8 per cent cattle owners followed separate processing. Practice of concentrate mixture processing with roughages was found highest in landless (60%) group, followed by marginal (33.33%) and small (28.57%) crossbred cattle owners, whereas from medium and large cattle owners nobody (0%) followed this practice. Average 31.2 per cent crossbred cattle owners followed processing of concentrate mixture with roughages.

It was observed from Table 4C and depicted in Fig. 20 that in Raigad district separate processing of concentrate mixtures was recorded

highest in medium and large (100%) group of crossbred cattle owners followed by small (85.41%), marginal (79.10%) and landless (71.43%) crossbred cattle owners. Processing of concentrate mixture with roughages was followed by landless, marginal and small crossbred cattle owners with 28.57 per cent, 20.90 per cent and 14.58 per cent, respectively. Nobody (0%) followed this practice of processing with roughages from medium and large category of cattle owners. Overall 81.6 per cent and 18.4 per cent crossbred cattle owners followed separate processing of concentrate mixture and processing with roughages, respectively.

From Table 4D and Fig. 20, it was revealed that in Ratnagiri district overall 72 per cent crossbred cattle owners followed the practice of separate processing of concentrate mixture. Among different groups of crossbred cattle owners landless, marginal, small, medium and large group of owners followed this with 25 per cent, 70.91 per cent, 74.58 per cent, 75 per cent and 100 per cent, respectively. Processing of concentrate mixture with roughages was followed by marginal (29.09%), small (25.42%), medium (25%), landless (75%) and nobody (0%) from large crossbred cattle owners. Average 28 per cent of cattle owners followed processing of concentrate mixture with roughages.

It was concluded from Table 4E and depicted in Fig. 20 that in Sindhudurg district separate processing of concentrate mixture was recorded highest in large (100%) group, followed by medium (80%), small (79.37%), marginal (69.39%) and landless (50%) crossbred cattle owners. Processing of concentrate mixture with roughages was followed by landless, marginal, small and medium crossbred cattle owners with 50 per cent, 30.61 per cent, 20.63 per cent and 20 per cent, respectively. Nobody (0%) from large group of cattle owners followed processing of concentrate mixture with roughages. Overall 75.2 per cent and 24.8 per cent crossbred cattle owners followed the practice of separate processing and processing of concentrate mixture with roughages, respectively.

The present results are in conformity with the observation reported by Jadav *et al.* (2014) who reported that feeding of concentrates separately 14.78 per cent and with roughages 85.22 per cent. Kadam *et al.* (2019) observed that processing of concentrate mixture separately and with roughages was followed by 25.83 per cent and 74.17 per cent crossbred cattle owners respectively.

4.5 Management practices adopted by Crossbred cattle owners

Management is the art and science of combining idea, facilities, processes, materials and labour to produce market worthwhile product for service successfully.

The management practices adopted by different categories of cattle owners were calculated in each category by number of cattle owners, percentages and results are presented in below table.

Table No. 5A: Management practice followed in Palghar district

Sr. No.	Management practices	Landless	Marginal	Small	Medium	Large	Total
		8	**71**	**43**	**2**	**1**	**125**
1	**Breeding Management**						
a	**Method of breeding**						
i)	Natural service	5 (62.5)	30 (42.25)	15 (34.88)	1 (50)	0 (0)	51 (40.8)
ii)	A.I method	3 (37.5)	41 (57.75)	28 (65.12)	1 (50)	1 (100)	74 (59.2)
b	Pregnancy Diagnosis	1 (12.5)	15 (21.13)	15 (34.88)	2 (100)	1 (100)	34 (27.2)
2	**Animal housing management**						
a	**Type of Housing**						
i)	Katcha	8 (100)	60 (84.51)	33 (76.74)	1 (50)	0 (0)	102 (81.6)
ii)	Pucca	0 (0)	11 (15.49)	10 (23.26)	1 (50)	1 (100)	23 (18.4)
b	**Type of flooring**						
i)	Katcha	7 (87.5)	55 (77.46)	31 (72.09)	0 (0)	0 (0)	93 (74.4)
ii)	Pucca	1 (12.5)	16 (22.54)	12 (27.91)	2 (100)	1 (100)	32 (25.6)
c	**Type of roofing material**						
i)	Grasses	5 (62.5)	27 (38.03)	14 (32.56)	0 (0)	0 (0)	46 (36.8)
ii)	Asbestos or Cement sheets	0 (0)	10 (14.08)	10 (23.26)	1 (50)	1 (100)	22 (17.6)
iii)	Roof tiles	3 (37.5)	34 (47.89)	19 (44.19)	1 (50)	0 (0)	57 (45.6)
d	**System of housing**						
i)	Open system	6 (75)	18 (25.35)	11 (25.58)	2 (100)	0 (0)	37 (29.6)
ii)	Closed system	2 (25)	53 (74.65)	32 (74.42)	0 (0)	1 (100)	88 (70.4)
3	**Health and sanitation**	8	71	43	2	1	125
i)	Washing of cattle	2 (25)	46 (64.79)	28 (65.12)	2 (100)	1 (100)	79 (63.2)
ii)	Washing of udder before milking	7 (87.5)	71 (100)	43 (100)	2 (100)	1 (100)	124 (99.2)
iii)	Regular cleaning of shed	4 (50)	67 (94.37)	42 (97.67)	2 (100)	1 (100)	116 (92.8)
iv)	Washing of floor	1 (12.5)	15 (21.13)	11 (25.58)	2 (100)	1 (100)	30 (24)
v)	Vaccination	0 (0)	9 (12.68)	10 (23.26)	1 (50)	1 (100)	21 (16.8)
vi)	Deworming	1 (12.5)	7 (9.86)	8 (18.60)	1 (50)	1 (100)	18 (14.4)
vii)	Spraying against ectoparasites	1 (12.5)	12 (16.90)	12 (27.91)	1 (50)	1 (100)	27 (21.6)
viii)	Grooming	0 (0)	3 (4.23)	3 (6.98)	2 (100)	0 (0)	8 (6.4)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 5B: Management practice followed in Thane district

Sr. No.	Management practices	Landless	Marginal	Small	Medium	Large	Total
		5	**60**	**56**	**2**	**2**	**125**
1	**Breeding Management**						
a	**Method of breeding**						
i)	Natural service	3 (60)	17 (28.33)	16 (28.57)	0 (0)	0 (0)	36 (28.8)
ii)	A.I method	2 (40)	43 (71.67)	40 (71.43)	2 (100)	2 (100)	89 (71.2)
b	Pregnancy Diagnosis	2 (40)	30 (50)	32 (57.14)	2 (100)	2 (100)	68 (54.4)
2	**Animal housing management**						
a	**Type of housing**						
i)	Katcha	4 (80)	42 (70)	36 (64.29)	1 (50)	0 (0)	83 (66.4)
ii)	Pucca	1 (20)	18 (30)	20 (35.71)	1 (50)	2 (100)	42 (33.6)
b	**Type of flooring**						
i)	Katcha	4 (80)	38 (63.33)	33 (58.93)	0 (0)	0 (0)	75 (60)
ii)	Pucca	1 (20)	22 (36.67)	23 (41.07)	2 (100)	2 (100)	50 (40)
c	**Type of roofing material**						
i)	Grasses	3 (60)	9 (15)	6 (10.71)	0 (0)	0 (0)	18 (14.4)
ii)	Asbestos or Cement sheets	0 (0)	18 (30)	25 (44.64)	1 (50)	2 (100)	46 (36.8)
iii)	Roof tiles	2 (40)	33 (55)	25 (44.64)	1 (50)	0 (0)	61 (48.8)
d	**System of housing**						
i)	Open system	3 (60)	14 (23.33)	8 (14.29)	0 (0)	0 (0)	25 (20)
ii)	Closed system	2 (40)	46 (76.67)	48 (85.71)	2 (100)	2 (100)	100 (80)
3	**Health and sanitation**	5	60	56	2	2	125
i)	Washing of cattle	0 (0)	46 (76.67)	47 (83.93)	2 (100)	2 (100)	97 (77.6)
ii)	Washing of udder before milking	5 (100)	60 (100)	56 (100)	2 (100)	2 (100)	125 (100)
iii)	Regular cleaning of shed	5 (100)	60 (100)	56 (100)	2 (100)	2 (100)	125 (100)
iv)	Washing of floor	1 (20)	21 (35)	22 (39.29)	1 (50)	2 (100)	47 (37.6)
v)	Vaccination	1 (20)	18 (30)	18 (32.14)	1 (50)	2 (100)	40 (32)
vi)	Deworming	1 (20)	15 (25)	18 (32.14)	1 (50)	2 (100)	37 (29.6)
vii)	Spraying against ectoparasites	1 (20)	19 (31.67)	19 (33.93)	1 (50)	1 (50)	41 (32.8)
viii)	Grooming	0 (0)	12 (20)	12 (21.43)	1 (50)	1 (50)	26 (20.8)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 5C: Management practice followed in Raigad District

Sr. No.	Management practices	Landless	Marginal	Small	Medium	Large	Total
		7	**67**	**48**	**2**	**1**	**125**
1	**Breeding Management**						
a	**Method of breeding**						
i)	Natural service	4 (57.14)	30 (44.78)	20 (41.67)	0 (0)	1 (100)	55 (44)
ii)	A.I method	3 (42.86)	37 (55.22)	28 (58.33)	2 (100)	0 (0)	70 (56)
b	Pregnancy Diagnosis	0 (0)	14 (20.90)	13 (27.08)	1 (50)	1 (100)	29 (23.2)
2	**Animal housing management**						
a	**Type of housing**						
i)	Katcha	7 (100)	55 (82.09)	38 (79.17)	0 (0)	0 (0)	100 (80)
ii)	Pucca	0 (0)	12 (17.91)	10 (20.83)	2 (100)	1 (100)	25 (20)
b	**Type of flooring**						
i)	Katcha	6 (85.71)	52 (77.61)	34 (70.83)	0 (0)	0 (0)	92 (73.6)
ii)	Pucca	1 (14.29)	15 (22.39)	14 (29.17)	2 (100)	1 (100)	33 (26.4)
C	**Type of roofing material**						
i)	Grasses	3 (42.86)	22 (32.84)	16 (33.33)	0 (0)	0 (0)	41 (32.8)
ii)	Asbestos or Cement sheets	0 (0)	9 (13.43)	9 (18.75)	1 (50)	1 (100)	20 (16)
iii)	Roof tiles	4 (57.14)	36 (53.73)	23 (47.91)	1 (50)	0 (0)	64 (51.2)
d	**System of housing**						
i)	Open system	4 (57.14)	16 (23.88)	11 (22.92)	0 (0)	1 (100)	32 (25.6)
ii)	Closed system	3 (42.86)	51 (76.12)	37 (77.08)	2 (100)	0 (0)	93 (74.4)
3	**Health and sanitation**	7	67	48	2	1	125
i)	Washing of cattle	2 (28.57)	39 (58.21)	31 (64.58)	2 (100)	1 (100)	75 (60)
ii)	Washing of udder before milking	6 (85.71)	67 (100)	48 (100)	2 (100)	1 (100)	124 (99.2)
iii)	Regular cleaning of shed	5 (71.43)	66 (98.51)	48 (100)	2 (100)	1 (100)	122 (97.6)
iv)	Washing of floor	1 (14.29)	12 (17.91)	12 (25)	2 (100)	1 (100)	28 (22.4)
v)	Vaccination	0 (0)	8 (11.94)	9 (18.75)	2 (100)	1 (100)	20 (16)
vi)	Deworming	1 (14.29)	5 (7.46)	7 (14.58)	1 (50)	1 (100)	15 (12)
vii)	Spraying against ectoparasites	1 (14.29)	10 (14.93)	12 (25)	1 (50)	0 (0)	24 (19.2)
viii)	Grooming	0 (0)	1 (1.49)	2 (4.17)	1 (50)	1 (100)	5 (4)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 5D: Management practice followed in Ratnagiri district

Sr. No.	Management practices	Landless	Marginal	Small	Medium	Large	Total
		4	**55**	**59**	**4**	**3**	**125**
1	**Breeding Management**						
a	**Method of breeding**						
i)	Natural service	2 (50)	18 (32.73)	18 (30.51)	1 (25)	0 (0)	39 (31.2)
ii)	A.I method	2 (50)	37 (67.27)	41 (69.49)	3 (75)	3 (100)	86 (68.8)
b	Pregnancy Diagnosis	1 (25)	24 (43.64)	27 (45.76)	2 (50)	2 (66.67)	56 (44.8)
2	**Animal housing management**						
a	**Type of housing**						
i)	Katcha	4 (100)	42 (76.36)	44 (74.58)	0 (0)	0 (0)	90 (72)
ii)	Pucca	0 (0)	13 (23.64)	15 (25.42)	4 (100)	3 (100)	35 (28)
b	**Type of flooring**						
i)	Katcha	4 (100)	37 (67.27)	38 (64.41)	0 (0)	0 (0)	79 (63.2)
ii)	Pucca	0 (0)	18 (32.73)	21 (35.59)	4 (100)	3 (100)	46 (36.8)
C	**Type of roofing material**						
i)	Grasses	0 (0)	8 (14.55)	7 (11.86)	0 (0)	0 (0)	15 (12)
ii)	Asbestos or Cement sheets	0 (0)	12 (21.82)	15 (25.42)	2 (50)	2 (66.67)	31 (24.8)
iii)	Roof tiles	4 (100)	35 (63.64)	37 (62.71)	2 (50)	1 (33.33)	79 (63.2)
d	**System of housing**						
i)	Open system	3 (75)	10 (18.18)	7 (11.86)	1 (25)	0 (0)	21 (16.8)
ii)	Closed system	1 (25)	45 (81.82)	52 (88.14)	3 (75)	3 (100)	104 (83.2)
3	**Health and sanitation**	4	55	59	4	3	125
i)	Washing of cattle	1 (25)	41 (74.55)	45 (76.27)	3 (75)	2 (66.67)	92 (73.6)
ii)	Washing of udder before milking	4 (100)	55 (100)	59 (100)	4 (100)	3 (100)	125 (100)
iii)	Regular cleaning of shed	4 (100)	55 (100)	59 (100)	4 (100)	3 (100)	125 (100)
iv)	Washing of floor	0 (0)	14 (25.45)	18 (30.51)	3 (75)	3 (100)	38 (30.4)
v)	Vaccination	0 (0)	13 (23.64)	16 (27.12)	3 (75)	3 (100)	35 (28)
vi)	Deworming	1 (25)	14 (25.45)	15 (25.42)	2 (50)	2 (66.67)	34 (27.2)
vii)	Spraying against ectoparasites	1 (25)	15 (27.27)	18 (30.51)	2 (50)	2 (66.67)	38 (30.4)
viii)	Grooming	0 (0)	8 (14.55)	11 (18.64)	2 (50)	2 (66.67)	23 (18.4)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 5E: Management practice followed in Sindhudurg distrct

Sr. No.	Management practices	Landless	Marginal	Small	Medium	Large	Total
		4	**49**	**63**	**5**	**4**	**125**
1	**Breeding Management**						
A	**Method of breeding**						
i)	Natural service	2 (50)	20 (40.82)	21 (33.33)	1 (20)	0 (0)	44 (35.2)
ii)	A.I method	2 (50)	29 (59.18)	42 (66.67)	4 (80)	4 (100)	81 (64.8)
B	Pregnancy Diagnosis	1 (25)	19 (38.78)	27 (42.86)	2 (40)	2 (50)	51 (40.8)
2	**Animal housing management**						
A	**Type of housing**						
i)	Katcha	4 (100)	38 (77.55)	48 (76.19)	1 (20)	2 (50)	93 (74.4)
ii)	Pucca	0 (0)	11 (22.45)	15 (23.81)	4 (80)	2 (50)	32 (25.6)
B	**Type of flooring**						
i)	Katcha	2 (50)	35 (71.43)	43 (68.25)	0 (0)	1 (25)	81 (64.8)
ii)	Pucca	2 (50)	14 (28.57)	20 (31.75)	5 (100)	3 (75)	44 (35.2)
C	**Type of roofing material**						
i)	Grasses	2 (50)	3 (6.12)	5 (7.94)	0 (0)	0 (0)	10 (8)
ii)	Asbestos or Cement sheets	0 (0)	8 (16.33)	13 (20.63)	2 (40)	3 (75)	26 (20.8)
iii)	Roof tiles	2 (50)	38 (77.55)	45 (71.43)	3 (60)	1 (25)	89 (71.2)
D	**System of housing**						
i)	Open system	1 (25)	9 (18.37)	9 (14.29)	0 (0)	0 (0)	19 (15.2)
ii)	Closed system	3 (75)	40 (81.63)	54 (85.71)	5 (100)	4 (100)	106 (84.8)
3	**Health and sanitation**	4	49	63	5	4	125
i)	Washing of cattle	1 (25)	33 (67.35)	46 (73.02)	4 (80)	4 (100)	88 (70.4)
ii)	Washing of udder before milking	4 (100)	49 (100)	63 (100)	5 (100)	4 (100)	125 (100)
iii)	Regular cleaning of shed	4 (100)	49 (100)	63 (100)	5 (100)	4 (100)	125 (100)
iv)	Washing of floor	0 (0)	13 (26.53)	16 (25.40)	3 (60)	3 (75)	35 (28)
v)	Vaccination	0 (0)	10 (20.41)	15 (23.81)	3 (60)	3 (75)	31 (24.8)
vi)	Deworming	0 (0)	10 (20.41)	15 (23.81)	2 (40)	2 (50)	29 (23.2)
vii)	Spraying against ectoparasites	1 (25)	13 (26.53)	17 (26.98)	2 (40)	2 (50)	35 (28)
viii)	Grooming	0 (0)	7 (14.29)	9 (14.29)	2 (40)	2 (50)	20 (16)

(Figures in parenthesis are percentages of parameters in respected group)

4.5.1 Breeding management

4.5.1.1 Method of breeding

Adoption of appropriate breeding method decides the future of herd. Adoption of Natural service for breeding may cause transfer of sexually transmitted diseases. A.I. helps for the rapid up gradation of the herd.

From Table 5A and Fig. 21 it was observed that in Palghar district among different groups of crossbred cattle owners landless, marginal, small and medium group of crossbred cattle owners followed natural breeding with 62.5 per cent, 42.25 per cent, 34.88 per cent and 50 per cent, respectively. Nobody from large (0%) group followed this practice. Average 40.8 per cent crossbred cattle owners followed natural breeding method. Artificial insemination method for breeding was followed by marginal (57.75%), small (65.12%), medium (50%), large (100%) and landless (37.5%) crossbred cattle owners. Overall 59.2 per cent of crossbred cattle owners followed artificial insemination method.

It was observed from Table 5B and depicted in Fig. 21 that in Thane district natural breeding was recorded highest in landless (60%) group, followed by small (28.57%) and marginal (28.33%) crossbred cattle owners, whereas nobody (0%) from medium and large cattle owners followed this practice. Artificial insemination method was followed by landless, marginal, small, medium and large crossbred cattle owners with 40 per cent, 71.67 per cent, 71.43 per cent, 100 per cent and 100 per cent, respectively. Overall 28.8 per cent and 71.2 per cent cattle owners followed the practice of natural breeding and artificial insemination method, respectively.

From Table 5C and Fig. 21 it was revealed that in Raigad district overall 44 per cent crossbred cattle owners followed the practice of natural breeding. Among different groups of crossbred cattle owners landless, marginal, small and large group of owners followed this with 57.14 per cent, 44.78 per cent, 41.67 per cent and 100 per cent, respectively. Nobody from medium (0%) cattle owners followed natural breeding. Artificial insemination method was followed by marginal (55.22%), small (58.33%), medium (100%) and landless (42.86%) crossbred cattle owners, whereas nobody from large (0%) cattle owners followed this breeding method. Average 56 per cent of crossbred cattle owners followed artificial insemination method.

It was concluded from Table 5D and illustrated in Fig. 21 that in Ratnagiri district natural breeding was recorded highest in landless (50%) group, followed by marginal (32.73%), small (30.51%), and medium (25%) crossbred cattle owners, whereas nobody from large category adopted this practice. Artificial insemination method was followed by landless, marginal, small, medium and large crossbred cattle owners with 50 per cent, 67.27 per cent, 69.49 per cent, 75 per cent and 100 per cent, respectively. Overall 31.2 per cent and 68.8 per cent crossbred cattle

owners followed the practice of natural breeding and artificial insemination method, respectively.

Table 5E and Fig. 21 conclude that the practice of natural breeding was followed by landless, marginal, small and medium cattle owners with 50 per cent, 40.82 per cent, 33.33 per cent and 20 per cent, respectively. Nobody from large (0%) cattle owners followed natural breeding method. Overall 35.2 per cent cattle owners followed natural breeding in Sindhudurg district. Artificial insemination method was found highest in large (100%) cattle owners, followed by medium (80%), small (66.67%), marginal (59.18%) and landless (50%) crossbred cattle owners with average 64.8 per cent cattle owners followed this practice breeding.

Gupta *et al.* (2008) observed that, natural services were adopted by (96.00%) of cattle owners in Rajasthan. Ahirwar *et al.* (2010) observed that only 9.66 per cent of the cattle owners breed their animals with artificial insemination and 90.33 per cent preferred natural service. Rathore *et al.* (2010) found that 86.00 per cent of the respondents resorted to natural service, 61.75 per cent inseminate their cows in Churu district of Rajasthan. Pedhekar *et al.* (2017) recorded that most of the owners of crossbred cattle (94.50%) used the method of artificial insemination for breeding in the study area.

Similar results were observed by Kadam (2018) who found that 36.67 per cent crossbred cattle owners in Seloo tehsil followed natural service of breeding while 63.33 per cent owners followed artificial insemination method.

4.5.1.2 Pregnancy Diagnosis

Pregnancy diagnosis is generally done after 3 months of successful conception and it helps to avoid the losses caused due to pseudo pregnancy.

From Table 5A and Fig. 22, it was observed that in Palghar district the practice of pregnancy diagnosis was found highest in medium and large (100%) cattle owners, followed by small (34.88%), marginal (21.13%) and landless (12.5%) group of crossbred cattle owners. The overall adoption of this practice was 27.2 per cent.

It was revealed from Table 5B and depicted in Fig. 22 that the pregnancy diagnosis was followed by landless (40%), marginal (50%), small (57.14%), medium (100%) and large (100%) group of crossbred cattle owners. Out of total 125 selected cattle owners 54.4 per cent cattle owners followed pregnancy diagnosis in Thane district.

It was observed from Table 5C and illustrated in Fig. 22 that in Raigad district the practice of pregnancy diagnosis was adopted by large, medium, small and marginal category of crossbred cattle owners with 100 per cent, 50 per cent, 27.08 per cent and 20.90 per cent, respectively. Nobody from landless (0%) cattle owners adopted this practice. The overall adoption of pregnancy diagnosis was 23.2 per cent among 125 selected cattle owners.

From Table 5D and Fig. 22, it was revealed that in Ratnagiri district overall 44.8 per cent cattle owners adopted the practice of pregnancy diagnosis. Considering the various categories of crossbred cattle owners higher adoption of this practice was found in large (66.67%) cattle owners, followed by medium (50%), small (45.76%), marginal (43.64%) and landless (25%) group of crossbred cattle owners.

It was observed from Table 5E and depicted in Fig. 22 that in Sindhudurg district the overall adoption of pregnancy diagnosis was 40.8 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 25 per cent, 38.78 per cent, 42.86 per cent, 40 per cent and 50 per cent, respectively.

Yadav *et al.* (2009) concluded that majority of farmers (52.50%) of Dungarpur district by Rajasthan followed pregnancy diagnosis. Rathore *et al.* (2010) observed that in Churu district of Rajasthan only 4.25 per cent cattle keepers followed pregnancy diagnosis.

Lokhande *et al.* (2012) observed that lack of knowledge about pregnancy diagnoses was experienced by 62.50 per cent of marginal farmers. Tewari *et al.* (2018) found that in Tarai region of Uttarakhand pregnancy diagnosis was preferred by only few of farmers 6.00 per cent however, it was performed by qualified veterinarian in 2.50 per cent cases.

4.5.2 Animal housing management

Animal housing management plays an important role in a milk production of the animals, because it shows direct effect on the animal comfort.

4.5.2.1 Type of housing

It was concluded from Table 5A and depicted in Fig. 23 that in Palghar district katcha housing was recorded highest in landless (100%) group, followed by marginal (84.51%), small (76.74%) and medium (50%) crossbred cattle owners, whereas nobody (0%) from and large group of cattle owners followed this practice. Pucca housing practice was followed by marginal, small, medium and large crossbred cattle owners with 15.49 per cent, 23.26 per cent, 50 per cent and 100 per cent, respectively. Nobody (0%) from landless group of cattle owners followed this practice of pucca housing. Overall 81.6 per cent and 18.4 per cent cattle owners followed the practice of katcha housing and pucca housing, respectively.

It was observed from Table 5B and depicted in Fig. 23 that in Thane district katcha housing practice was recorded highest in landless (80%) group, followed by marginal (70%), small (64.29%) and medium (50%) crossbred cattle owners, whereas nobody (0%) from large group of cattle owners followed this practice of katcha housing. Pucca housing practice was followed by landless, marginal, small, medium and large crossbred cattle owners with 20 per cent, 30 per cent, 35.71 per cent, 50 per cent and 100 per cent, respectively. Overall 66.4 per cent and 33.6

per cent crossbred cattle owners followed the practice of katcha housing and pucca housing, respectively.

Table 5C and Fig. 23 conclude that in Raigad district the practice of katcha housing was followed by landless, marginal and small cattle owners with 100 per cent, 82.09 per cent and 79.17 per cent, respectively. Nobody (0%) from medium and large group of cattle owners followed this practice of katcha housing. Overall 80 per cent cattle owners followed this practice. Pucca housing was found highest in medium and large (100%) group of cattle owners, followed by small (20.83%) and marginal (17.91%) crossbred cattle owners, whereas nobody (0%) from landless group of cattle owners followed this practice. Average 20 per cent cattle owners followed this practice of pucca housing.

From Table 5D and Fig. 23 it was revealed that in Ratnagiri district overall 72 per cent crossbred cattle owners followed the practice of katcha housing. Among different groups of crossbred cattle owners landless, marginal and small group of owners followed this practice with 100 per cent, 76.36 per cent and 74.58 per cent, respectively. Nobody (0%) from medium and large group of cattle owners followed this practice of katcha housing. Pucca housing was followed by marginal (23.64%), small (25.42%), medium (100%), large (100%) and nobody from landless (0%) crossbred cattle owners. Average 28 per cent of cattle owners followed pucca housing.

From Table 5E and Fig. 23 it was observed that in Sindhudurg district among different groups of crossbred cattle owners landless, marginal, small, medium and large group of owners followed this katcha housing practice with 100 per cent, 77.55 per cent, 76.19 per cent, 20 per cent and 50 per cent, respectively. Average 74.4 per cent cattle owners followed this practice of katcha housing. Pucca housing was followed by marginal (22.45%), small (23.81%), medium (80%), large (50%) and nobody from landless (0%) crossbred cattle owners. Overall 25.6 per cent of cattle owners followed this practice of pucca housing.

However Acharya (2010) reported that 68 per cent of cattle owners provided pucca housing to their Sahiwal cattle. Varaprasad *et al.* (2013) observed that most farmers (91.68%) in Chittoor district of Andhra Pradesh provided katcha housing.

Mishra *et al.* (2018) concluded that 62.60 per cent cattle owners in Katni district of Madhya Pradesh followed katcha type of housing. Kadam (2018) found that 67.50 per cent crossbred cattle owners of Seloo tehsil used katcha housing and 32.50 per cent owners used pucca housing.

4.5.2.2 Type of flooring

From Table 5A and Fig. 24 it was revealed that in Palghar district overall 74.4 per cent crossbred cattle owners followed the practice of katcha flooring. Among different groups of crossbred cattle owners landless, marginal and small group of owners followed this with 87.5 per cent, 77.46 per cent and 72.09 per cent, respectively. Nobody (0%) from

medium and large group of crossbred cattle owners followed this practice of katcha flooring. Pucca flooring was followed by marginal (22.54%), small (27.91%), medium (100%), large (100%) and landless (12.5%) crossbred cattle owners. Average 25.6 per cent of cattle owners followed pucca flooring.

From Table 5B and Fig. 24 it was observed that in Thane district among different groups of crossbred cattle owners landless, marginal and small group of owners followed this with 80 per cent, 63.33 per cent and 58.93 per cent, respectively. Nobody (0%) from medium and large group of cattle owners followed this practice of katcha flooring. Average 60 per cent cattle owners followed katcha flooring. Practice of pucca flooring was followed by marginal (36.67%), small (41.07%), medium (100%), large (100%) and landless (20%) crossbred cattle owners. Overall 40 per cent of cattle owners followed this practice of pucca flooring.

Table 5C and Fig. 24 conclude that in Raigad district the practice of katcha flooring was followed by landless, marginal and small cattle owners with 85.71 per cent, 77.61 per cent and 70.83 per cent, respectively. Nobody (0%) from medium and large group of cattle owners adopted katcha flooring. Overall 73.6 per cent cattle owners followed katcha flooring. Practice of pucca flooring was found highest in medium and large (100%) group, followed by small (29.17%), marginal (22.39%) and landless (14.29%) crossbred cattle owners. Average 26.4 per cent cattle owners followed pucca flooring.

It was concluded from Table 5D and depicted in Fig. 24 that in Ratnagiri district katcha flooring was recorded highest in landless (100%) group, followed by marginal (67.27%) and small (64.41%) crossbred cattle owners, whereas nobody (0%) from medium and large group of cattle owners followed this practice. Pucca flooring was followed by marginal, small, medium and large crossbred cattle owners with 32.73 per cent, 35.59 per cent, 100 per cent and 100 per cent, respectively. Nobody (0%) from landless group of cattle owners followed this practice of pucca flooring. Overall 63.2 per cent and 36.8 per cent cattle owners followed the practice of katcha flooring and pucca flooring, respectively.

It was observed from Table 5E and depicted in Fig. 24 that in Sindhudurg district katcha flooring was recorded highest in marginal (71.43%) group, followed by small (68.25%), landless (50%) and large (25%) crossbred cattle owners, whereas nobody (0%) from medium group of cattle owners followed this practice. Pucca flooring was followed by landless, marginal, small, medium and large crossbred cattle owners with 50 per cent, 28.57 per cent, 31.75 per cent, 100 per cent and 75 per cent, respectively. Overall 64.8 per cent and 35.2 per cent crossbred cattle owners followed the practice of katcha flooring and pucca flooring, respectively.

Sabapara *et al.* (2010) reported that 87 per cent cattle owners had kaccha type of floor for animal housing in Navsari district of South

Gujarat. Tewari *et al.* (2018) found that katcha type of floor was used by 79.38 per cent cattle owners in Tarai region of Uttarakhand. Rajadurai *et al.* (2020) reported that in Villupuram district of Tamil Nadu majority of houses consisted of mud floor (80.19 per cent).

4.5.2.3 Type of roofing material

Table 5A and Fig. 25 conclude that the practice of using grasses as a roofing material was followed by landless, marginal and small cattle owners in Palghar district with 62.5 per cent, 38.03 per cent and 32.56 per cent, respectively. Nobody (0%) from medium and large cattle owners used grasses as a roofing material. Overall 36.8 per cent cattle owners used grasses as a roofing material. Use of asbestos or cement sheets for roofing material was found highest in large (100%) group, followed by medium (50%), small (23.26%) and marginal (14.08%) crossbred cattle owners, whereas nobody (0%) from landless group followed this practice. Average 17.6 per cent cattle owners used asbestos or cement sheets for roofing material. Use of roof tiles as a roofing material was followed by marginal (47.89%), small (44.19%), medium (50%), nobody from large (0%) and landless (37.5%) crossbred cattle owners. Average 45.6 per cent of cattle owners used roof tiles for roofing material.

It was observed from Table 5B and depicted in Fig. 25 that in Thane district practice of using grasses for roofing material was recorded highest in landless (60%) group, followed by marginal (15%) and small (10.71%) crossbred cattle owners and nobody (0%) from medium and large crossbred cattle owners followed use of grasses for roofing material. Use of asbestos sheets or cement sheets as a roofing material was followed by marginal, small, medium and large crossbred cattle owners with 30 per cent, 44.64 per cent, 50 per cent and 100 per cent, respectively. Nobody from landless (0%) cattle owners used asbestos sheets or cement sheets as a roofing material. Practice of using roof tiles was followed by marginal (55%), small (44.64%), medium (50%) and landless (40%) crossbred cattle owners, whereas nobody from large (0%) cattle owners used roof tiles for roofing material. Overall 14.4 per cent, 36.8 per cent and 48.8 per cent cattle owners followed the practice of using grasses, asbestos sheets or cement sheets and roof tiles for roofing material, respectively.

From Table 5C and Fig. 25 it was revealed that in Raigad district overall 32.8 per cent crossbred cattle owners followed the use of grasses as a roofing material. Among different groups of crossbred cattle owners landless, marginal and small group of owners followed this practice with 42.86 per cent, 32.84 per cent and 33.33 per cent, respectively. Nobody (0%) from medium and large group of cattle owners used grasses for roofing material. Use of asbestos sheets or cement sheets for roofing material was adopted by marginal (13.43%), small (18.75%), medium (50%), large (100%) and nobody from landless (0%) crossbred cattle owners. Overall 16 per cent cattle owners adopted the use asbestos

sheets and cement sheets. Practice of using roof tiles for roofing material was found highest in landless (57.14%) group, followed by marginal (53.73%), small (47.91%) and medium (50%) crossbred cattle owners, whereas nobody (0%) from large group of cattle owners followed this practice. Average 51.2 per cent crossbred cattle owners followed this practice of using roof tiles for roofing material.

From Table 5D and Fig. 25 it was observed that in Ratnagiri district among different groups of crossbred cattle owners marginal and small group of owners followed use of grasses for roofing material with 14.55 per cent and 11.86 per cent, respectively. Nobody (0%) from landless, medium and large group of cattle owners followed this practice of using grasses aws a roofing material. Average 12 per cent cattle owners followed this practice. Practice of using asbestos sheets or cement sheets was adopted by marginal (21.82%), small (25.42%), medium (50%), large (66.67%) and nobody from landless (0%) crossbred cattle owners. Overall 24.8 per cent of cattle owners followed this practice. Use of roof tiles was followed by marginal (63.64%), small (62.71%), medium (50%), large (33.33%) and landless (100%) crossbred cattle owners. Average 63.2 per cent of crossbred cattle owners used roof tiles for roofing material.

It was concluded from Table 5E and depicted in Fig. 25 that in Sindhudurg district practice of using grasses as a roofing material was recorded highest in landless (50%) group, followed by small (7.94%) and marginal (6.12%) crossbred cattle owners, whereas nobody (0%) from medium and large group of cattle owners followed this practice. Practice of using asbestos sheets or cement sheets for roofing material was followed by marginal, small, medium and large crossbred cattle owners with 16.33 per cent, 20.63 per cent, 40 per cent and 75 per cent, respectively. Nobody (0%) from landless group of cattle owners followed this practice. Use of roof tiles for roofing material was adopted by marginal (77.55%), small (71.43%), medium (60%), large (25%) and landless (50%) crossbred cattle owners. Overall 8 per cent, 20.8 per cent and 71.2 per cent cattle owners followed the practice of using grasses, using asbestos sheets or cement sheets and use of roof tiles for roofing material, respectively.

Tewari *et al.* (2018) observed that in Tarai region of Uttarakhand asbestos roof was used by 26.25 per cent of cattle owners. This results are more or less comparable with Roy *et al.* (2007) who observed that majority of the sheds had tiles roof (63.00%) in co-operative and (55.00%) in non co-operative villages.

Kadam (2018) recorded that roofing material such as grasses and roof tiles were used by 45 per cent and 55 per cent owners respectively and no one used asbestos sheets/cement sheets. Rajadurai *et al.* (2020) observed in Villupuram district of Tamil Nadu asbestos as roofing was used by 72.2 per cent owners. Mote *et al.* (2022) found that very few

farmers (4.66 %) in Pathardi tahsil of Ahmednagar were using asbestos for roofing.

4.5.2.4 System of housing

Under close hosing system of animals, animals are kept inside the shed for maximum time or throughout the day. Where as in open system of housing animals are kept outside for maximum time (especially in a day time).

Table 5A and Fig. 26 conclude that in Palghar district the practice of open housing system was followed by landless, marginal, small and medium crossbred cattle owners with 75 per cent, 25.35 per cent, 25.58 per cent and 100 per cent, respectively. Nobody from large (0%) group followed open housing system. Overall 29.6 per cent cattle owners followed this practice. Closed housing system was found highest in large (100%) group, followed by marginal (74.65%), small (74.42%) and landless (25%) crossbred cattle owners, whereas nobody from medium (0%) category followed this practice. Average 70.4 per cent cattle owners followed this practice of closed housing system.

From Table 5B and Fig. 26 it was observed that in Thane district among different groups of crossbred cattle owners landless, marginal and small group of cattle owners followed open housing system with 60 per cent, 23.33 per cent and 14.29 per cent, respectively. Nobody (0%) from medium and large group of cattle owners followed this practice. Average 20 per cent cattle owners followed open housing system. Practice of closed housing system was followed by marginal (76.67%), small (85.71%), medium (100%), large (100%) and landless (40%) crossbred cattle owners. Overall 80 per cent of cattle owners followed closed housing system.

It was concluded from Table 5C and depicted in Fig. 26 that in Raigad district open housing system was recorded highest in large (100%) group, followed by landless (57.14%), marginal (23.88%), and small (22.92%) crossbred cattle owners, whereas nobody (0%) from medium group followed this practice. Practice of closed housing system was followed by landless, marginal, small and medium crossbred cattle owners with 42.86 per cent, 76.12 per cent, 77.08 per cent and100 per cent, respectively. Nobody (0%) from large group of cattle owners followed this practice. Overall 25.6 per cent and 74.4 per cent cattle owners followed the practice of open housing and closed housing, respectively.

From Table 5D and Fig. 26 it was revealed that in Ratnagiri district overall 16.8 per cent crossbred cattle owners followed the practice of open housing. Among different groups of crossbred cattle owners landless, marginal, small and medium group of owners followed this open housing practice with 75 per cent, 18.18 per cent, 11.86 per cent and 25 per cent, respectively. Nobody (0%) from large group of cattle owners followed open housing system. Closed housing system was followed by marginal (81.82%), small (88.14%), medium (75%), large (100%) and landless

(25%) crossbred cattle owners. Average 83.2 per cent of cattle owners followed closed system of housing.

It was observed from Table 5E and illustrated in Fig. 26 that in Sindhudurg district open housing system was recorded highest in landless (25%) group, followed by marginal (18.37%), and small (14.29%) crossbred cattle owners, whereas nobody (0%) from medium and large group of cattle owners followed this practice. Closed housing system was followed by landless, marginal, small, medium and large crossbred cattle owners with 75 per cent, 81.63 per cent, 85.71 per cent, 100 per cent and 100 per cent, respectively. Overall 15.2 per cent and 84.8 per cent crossbred cattle owners followed the practice of open housing and closed housing, respectively.

Khan *et al.* (2009) reported that farmers (77.50%) provided open housing, (22.50%) closed and semi-closed housing in Chittagong district of Bangladesh. Sabapara *et al.* (2010) reported that 98 per cent cattle owners of Navsari district of South Gujarat provided close type of housing to their animal. Kochewad *et al.* (2013) observed that open house used by 74.55 per cent cattle owners and close housing used by 25.45 per cent cattle owners in Uttar Pradesh. Kadam (2018) recorded that open system of housing and closed system of housing was respectively followed by 70.83 per cent and 29.17 per cent crossbred cattle owners of Seloo tehsil.

4.5.3 Health and Sanitation

Health and sanitation plays a vital role in production ability of animals. Sanitation reduces the growth of viruses, fungi, ectoparasites and types of harmful bacteria. It directly effect on the animal welfare and proper health, sanitation management leads to reduce stress among the animals. Better management and health care of animals is paramount for higher productivity.

4.5.3.1 Washing cattle

From Table 5A and Fig. 27, it was revealed that in Palghar district overall 63.2 per cent crossbred cattle owners adopted the practice of washing cattle. Considering the various categories of cattle owners higher adoption of this was found in medium and large (100%) group, followed by small (65.12%), marginal (64.79%) and landless (25%) group of crossbred cattle owners.

It was revealed from Table 5B and depicted in Fig. 27 that the practice of cattle washing was followed by marginal (76.67%), small (83.93%), medium (100%) and large (100%) group of crossbred cattle owners, whereas nobody (0%) from landless group of cattle owners followed this practice. Out of total 125 selected cattle owners 77.6 per cent cattle owners followed this practice in Thane district.

From Table 5C and Fig. 27, it was observed that in Raigad district the practice of cattle washing was found highest in medium and large (100%) group of cattle owners, followed by small (64.58%), marginal

(58.21%) and landless (28.57%) group of cattle owners. The overall adoption of this practice was 60 per cent.

It was observed from Table 5D and depicted in Fig. 27 that in Ratnagiri district the overall adoption of cattle washing was 73.6 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 25 per cent, 74.55 per cent, 76.27 per cent, 75 per cent and 66.67 per cent, respectively.

It was observed from Table 5E and depicted in Fig. 27 that in Sindhudurg district the practice of washing cattle was adopted by large, medium, small, marginal and landless category of crossbred cattle owners with 100 per cent, 80 per cent, 73.02 per cent, 67.35 per cent and 25 per cent, respectively. The overall adoption of this practice was 70.4 per cent among 125 selected cattle owners.

Kadam (2018) recorded that 68.33 per cent crossbred cattle owners in Seloo tehsil followed the practice of washing cattle.

4.5.3.2 Washing of udder before milking

It was observed from Table 5B, 5D, 5E and illustrated in Fig. 27 that in Thane, Ratnagiri and Sindhudurg district all the (100%) selected crossbred cattle owners from landless, marginal, small, medium and large group followed the practice of washing udder before milking. Table 5A and Fig. conclude that in Palghar district all the (100%) crossbred cattle owners from marginal, small, medium and large group followed this practice of washing udder before milking except landless (87.5%) group of cattle owners. Average 99.2 per cent cattle owners followed this practice in Palghar district. It was revealed from Table 5C and depicted in Fig. that in Raigad district all the (100%) crossbred cattle owners from marginal, small, medium and large group followed this practice except landless (85.71%) group of crossbred cattle owners. Overall 99.2 per cent crossbred cattle owners followed the practice of washing udder before milking.

Gupta *et al.* (2008) observed that washing of udder before milking was adopted by 96.60 per cent of buffalo owners in Rajasthan. Kishore *et al.* (2013) reported that in Khammam district of Andhra Pradesh about 49.16 per cent cattle owners washed their animals by splashing water manually. Kadam (2018) found that 88.33 per cent crossbred cattle owners in Seloo tehsil adopted washing of udder before milking.

4.5.3.3 Regular cleaning of shed

From Table 5B, 5D, 5E and Fig. 28 it was revealed that in Thane, Ratnagiri and Sindhudurg district all the (100%) selected crossbred cattle owners from landless, marginal, small, medium and large group of crossbred cattle owners followed regular cleaning of shed. Table 5A and Fig. conclude that in Palghar district marginal (94.37%), small (97.67%), landless (50%), large (100%) and medium (100%) group of cattle owners followed regular cleaning of shed. Average 92.8 per cent cattle owners followed this practice in Palghar district. It was observed

from Table 5C and illustrated in Fig. that in Raigad district among different groups of selected cattle owners all the (100%) cattle owners from small, medium and large group adopted the practice of regular cleaning of shed except landless (71.43) and marginal (98.51%) group. Overall 97.6 per cent crossbred cattle owners followed the practice of regular cleaning of shed.

Gupta *et al.* (2008) observed that cleaning of shed practice was adopted by 72.90 per buffalo owners in Rajasthan which are less than the present result. Kadam (2018) concluded that all the crossbred cattle owners of Seloo tehsil carried out regular cleaning of shed.

4.5.3.4 Washing of floor

From Table 5A and Fig. 28, it was observed that in Palghar district the practice of washing floor was found highest in medium and large (100%) group of cattle owners, followed by small (25.58%), marginal (21.13%) and landless (12.5%) group of crossbred cattle owners. The overall adoption of this practice was 24 per cent.

It was observed from Table 5B and depicted in Fig. 28 that in Thane district the overall adoption of practice regarding washing of floor was 37.6 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 20 per cent, 35 per cent, 39.29 per cent, 50 per cent and 100 per cent, respectively.

It was observed from Table 5C and depicted in Fig. 28 that in Raigad district the practice of washing floor was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 100 per cent, 25 per cent, 17.91 per cent and 14.29 per cent, respectively. The overall adoption was 22.4 per cent among 125 selected cattle owners.

From Table 5D and Fig. 28, it was revealed that in Ratnagiri district overall 30.4 per cent cattle owners adopted the practice of washing floor. Considering the various categories of cattle owners higher adoption of this practice was found in large (100%) group, followed by medium (75%), small (30.51%) and marginal (25.45%) group of owners, whereas nobody (0%) from landless category followed washing of floor practice.

It was revealed from Table 5E and depicted in Fig. 28 that the practice of washing floor was followed by marginal (26.53%), small (25.40%), medium (60%) and large (75%) group of cattle owners, whereas nobody (0%) from landless group of cattle owners adopted washing of floor practice. Out of total 125 selected cattle owners 28 per cent cattle owners followed this practice in Sindhudurg district.

Kadam (2018) recorded that 79.16 per cent crossbred cattle owners of Seloo tehsil adopted practice of washing of floor.

4.5.3.5 Vaccination

Vaccination plays important role to boost the immunity of animals against various diseases. It helps to avoid economic loss. In study area cattle owners generally vaccinate their animals against FMD, BQ and HS.

From Table 5A and Fig. 29, it was observed that in Palghar district the practice of vaccination was found highest in large (100%) group of cattle owners, followed by medium (50%), small (23.26%) and marginal (12.68%) group of cattle owners, whereas nobody (0%) from landless category followed this practice. The overall adoption of vaccination practice was 16.8 per cent.

It was observed from Table 5B and depicted in Fig. 29 that in Thane district the practice of vaccination was adopted by large, medium, small, marginal and landless category of cattle owners with 100 per cent, 50 per cent, 32.14 per cent, 30 per cent and 20 per cent, respectively. The overall adoption was 32 per cent among 125 selected cattle owners.

From Table 5C and Fig. 29, it was revealed that in Raigad district overall 16 per cent cattle owners adopted the practice of vaccination. Considering the various categories of cattle owners higher adoption of this practice was found in medium and large (100%) group of crossbred cattle owners, followed by small (18.75%) and marginal (11.94%) group of owners, whereas nobody (0%) from landless category adopted this practice of vaccination.

It was revealed from Table 5D and depicted in Fig. 29 that vaccination was followed by marginal (23.64%), small (27.12%), medium (75%) and large (100%) group of cattle owners, whereas nobody (0%) from landless group of cattle owners adopted this practice of vaccination. Out of total 125 selected cattle owners 28 per cent cattle owners followed this practice in Ratnagiri district.

It was observed from Table 5E and depicted in Fig. 29 that in Sindhudurg district the overall adoption of vaccination was 24.8 per cent. Among various groups of cattle owners marginal, small, medium and large owners followed this practice with 20.41 per cent, 23.81 per cent, 60 per cent and 75 per cent, respectively. Nobody (0%) from landless cattle owners followed vaccination in Sindhudurg district.

Kadam and Wangikar (2010) reported that the majority of respondents (73.14%) considered vaccination to be an unimportant area of training. Singh *et al.* (2012) observed that vaccination against diseases by 26.50 per cent dairy cattle owners and similar results were also reported by Gupta *et al.* (2008). Simul *et al.* (2012) observed that approximately 36 per cent respondents used vaccines for Red Chittagong cattle.

Rathore *et al.* (2010) concluded that in Churu district of Rajasthan only 14.25 per cent of the respondents followed vaccination practice. Pedhekar *et al.* (2017) found that most of the crossbreed owners (97.00%) have implemented vaccination.

4.5.3.6 Deworming

It was revealed from Table 5A and illustrated in Fig. 29 that the practice of deworming was followed by landless (12.5%), marginal (9.86%), small (18.60%), medium (50%) and large (100%) group of cattle owners. Out of total 125 selected cattle owners 14.4 per cent cattle owners followed this practice in Palghar district.

It was observed from Table 5B and depicted in Fig. 29 that in Thane district the overall adoption of deworming was 29.6 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 20 per cent, 25 per cent, 32.14 per cent, 50 per cent and 100 per cent, respectively.

From Table 5C and Fig. 29, it was revealed that in Raigad district overall 12 per cent cattle owners adopted the practice of deworming. Considering the various categories of cattle owners higher adoption of this practice was found in large (100%) group of cattle owners, followed by medium (50%), small (14.58%), landless (14.29%) and marginal (7.46%) group of owners.

From Table 5D and Fig. 29, it was observed that in Ratnagiri district the practice of deworming was found highest in large (66.67%) group, followed by medium (50%), marginal (25.45%), small (25.42%) and landless (25%) group of cattle owners. The overall adoption of this practice was 27.2 per cent.

It was observed from Table 5E and depicted in Fig. 29 that in Sindhudurg district the practice of deworming was adopted by large, medium, small and marginal category of cattle owners with 50 per cent, 40 per cent, 23.81 per cent and 20.41 per cent, respectively. Nobody (0%) from landless group followed deworming practice. The overall adoption was 23.2 per cent among 125 selected cattle owners.

Yadav *et al.* (2009) found that in Dungarpur district of Rajasthan only 12.50 per cent and 7.50 per cent respondents were adopting deworming of adult animals and calves, respectively. Rathore *et al.* (2010) reported that in Churu district of Rajasthan only 14.25 per cent of the respondent followed deworming practice.

Prajapati *et al.* (2015) examined that in Navsari district of South Gujarat around 49.5 per cent of the respondents in the rural and 78 per cent in the urban areas practiced deworming to their milch animals at regular interval.

4.5.3.7 Spraying against ectoparasites

From Table 5A and Fig. 30, it was revealed that in Palghar district overall 21.6 per cent cattle owners adopted the practice of spraying against ectoparasite. Considering the various categories of cattle owners higher adoption of this practice was found in large (100%) group, followed by medium (50%), small (27.91%), marginal (16.90%) and landless (12.5%) group of owners.

It was revealed from Table 5B and depicted in Fig. 30 that the practice of spraying against ectoparasite was followed by landless (20%), marginal (31.67%), small (33.93%), medium (50%) and large (50%) group of crossbred cattle owners. Out of total 125 selected cattle owners 32.8 per cent cattle owners followed this practice in Thane district.

From Table 5C and Fig. 30, it was observed that in Raigad district the practice of spraying against ectoparasite was found highest in medium (50%) group of cattle owners, followed by small (25%), marginal (14.93%) and landless (14.29%) group of crossbred cattle owners, whereas nobody (0%) from large category followed this practice. The overall adoption of spraying against ectoparasite was 19.2 per cent.

It was observed from Table 5D and depicted in Fig. 30 that in Ratnagiri district the overall adoption spraying against ectoparasite was 30.4 per cent. Among various groups of cattle owners landless, marginal, small, medium and large owners followed this practice with 25 per cent, 27.27 per cent, 30.51 per cent, 50 per cent and 66.67 per cent, respectively.

It was observed from Table 5E and depicted in Fig. 30 that in Sindhudurg district the practice of spraying against ectoparasite was adopted by large, medium, small, marginal and landless category of cattle owners with 50 per cent, 40 per cent, 26.98 per cent, 26.53 per cent and 25 per cent, respectively. The overall adoption of spraying against ectoparasite was 28 per cent among 125 selected cattle owners.

The present results are in conformity with the observations reported by Dube *et al.* (1989) and Dhiman *et al.* (1990). Kadam (2018) found that control of ectoparasites was carried out by 59.16 per cent of crossbred cattle owners in Seloo tehsil.

4.5.3.8 Grooming

From Table 5A and Fig. 30, it was revealed that in Palghar district overall 6.4 per cent cattle owners adopted the practice of grooming. Considering the various categories of cattle owners higher adoption of this practice was found in medium (100%) group, followed by small (6.98%) and marginal (4.23%) group of owners, whereas nobody (0%) from landless and medium category followed this practice of grooming.

It was observed from Table 5B and depicted in Fig. 30 that in Thane district the overall adoption of grooming practice was 20.8 per cent. Among various groups of cattle owners marginal, small, medium and large owners followed this practice with 20 per cent, 21.43 per cent, 50 per cent and 50 per cent, respectively. Nobody from landless (0%) group of crossbred cattle owners followed this practice.

It was observed from Table 5C and depicted in Fig. 30 that in Raigad district the practice of grooming was adopted by large, medium, small and marginal category of cattle owners with 100 per cent, 50 per cent, 4.17 per cent and 1.49 per cent, respectively. Nobody from landless

(0%) group of cattle owners adopted this practice of grooming. The overall adoption was 4 per cent among 125 selected cattle owners.

From Table 5D and Fig. 30, it was observed that in Ratnagiri district the practice of grooming was found highest in large (66.67%) group, followed by medium (50%), small (18.64%) and marginal (14.55%) group of cattle owners, whereas nobody (0%) from landless cattle owners followed this parctice. The overall adoption of this practice was 18.4 per cent.

It was revealed from Table 5E and illustrated in Fig. 30 that the practice of grooming was followed by marginal (14.29%), small (14.29%), medium (40%) and large (50%) group of cattle owners, whereas nobody (0%) from landless cattle owners adopted this practice of grooming. Out of total 125 selected cattle owners 16 per cent cattle owners followed this practice in Sindhudurg district.

Rathore *et al.* (2010) observed that in Churu district of Rajasthan none of the respondents followed grooming practice. Pedhekar *et al.* (2017) found that 64.00 per cent of crossbred cattle owners followed the practice of grooming. Kadam (2018) recorded that 80.00 per cent crossbred cattle owners in Seloo tehsil adopted grooming practice.

4.6 Constraints in feeding and management practices

The scientific research in the field of livestock production technology on the hoist of region specific demand of dairy cattle owners is moving very fast. There is now dearth of technical knowledge in these days of advanced technology. There may be countless constraints in front of the cattle owners, consequently they do not adopting the improved practices of livestock rearing to the extent as expected. With this point of view constraints faced by crossbred cattle owners was discussed, recorded and presented in below Tables.

Table No. 6A: Constraints in feeding and management practices of Palghar district

Sr. No.	Constraints	Landless	Marginal	Small	Medium	Large	Total
		8	**71**	**43**	**2**	**1**	**125**
1	**Financial constraints**						
i	High cost of concentrates	6 (75)	58 (81.69)	36 (83.72)	2 (100)	1 (100)	103 (82.4)
ii	High cost of green fodder	7 (87.5)	65 (91.55)	39 (90.70)	1 (50)	1 (100)	113 (90.4)
iii	Non availability of agro-industrial by products	8 (100)	71 (100)	40 (93.02)	2 (100)	0 (0)	121 (96.8)
iv	Low income	8 (100)	70 (98.59)	41 (95.35)	1 (50)	0 (0)	120 (96)
v	Lack of loan facility	8 (100)	59 (83.10)	33 (76.74)	0 (0)	0 (0)	100 (80)
2	**Technical constraints**						
i	Lack of scientific knowledge	8 (100)	67 (94.37)	38 (88.37)	2 (100)	0 (0)	115 (92)
ii	Lack of technical guidance	8 (100)	65 (91.55)	37 (86.05)	2 (100)	1 (100)	113 (90.4)
3	**Situational constraints**						
i	Inadequate land holding	8 (100)	70 (98.59)	41 (95.35)	0 (0)	0 (0)	119 (95.2)
ii	Lack of irrigation facilities	8 (100)	64 (90.14)	36 (83.72)	1 (50)	0 (0)	109 (87.2)
iii	Shortage of green fodder	7 (87.5)	63 (88.73)	34 (79.07)	2 (100)	1 (100)	107 (85.6)
iv	Non availability of labour	4 (50)	37 (52.11)	28 (65.12)	0 (0)	1 (100)	70 (56)
v	lack of awareness about use of Mineral mixture / Mineral block	8 (100)	67 (94.37)	38 (88.37)	1 (50)	0 (0)	114 (91.2)
vi	Non availability of veterinary hospitals or veterinary services	6 (75)	50 (70.42)	27 (62.79)	1 (50)	0 (0)	84 (67.2)
vii	Breeding problems eg. repeat breeding or abortions	5 (62.5)	13 (18.31)	6 (13.95)	0 (0)	0 (0)	24 (19.2)
viii	Faulty pregnancy Diagnosis	1 (12.5)	10 (14.08)	9 (20.93)	1 (50)	1 (100)	22 (17.6)
4	**Infrastructural constraints**						
i	Lack of chaff cutter	8 (100)	68 (95.77)	39 (90.70)	1 (50)	0 (0)	116 (92.8)
ii	Lack of communication	6 (75)	53 (74.65)	30 (69.77)	1 (50)	0 (0)	90 (72)
iii	Lack of storage facility	8 (100)	61 (85.92)	33 (76.74)	1 (50)	0 (0)	103 (82.4)
5	**Personal interest**						
i	Lack of interest about adoption of standard management practices	7 (87.5)	63 (88.73)	36 (83.72)	1 (50)	1 (100)	108 (86.4)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 6B: Constraints in feeding and management practices of Thane district

Sr. No.	Constraints	Landless	Marginal	Small	Medium	Large	Total
		5	**60**	**56**	**2**	**2**	**125**
1	**Financial constraints**						
i	High cost of concentrates	5 (100)	54 (90)	48 (85.71)	2 (100)	1 (50)	110 (88)
ii	High cost of green fodder	5 (100)	55 (91.67)	46 (82.14)	1 (50)	1 (50)	108 (86.4)
iii	Non availability of agro-industrial by products	5 (100)	58 (96.67)	51 (91.07)	2 (100)	2 (100)	118 (94.4)
iv	Low income	5 (100)	57 (95)	49 (87.5)	1 (50)	1 (50)	113 (90.4)
v	Lack of loan facility	5 (100)	47 (78.33)	41 (73.21)	0 (0)	0 (0)	93 (74.4)
2	**Technical constraints**						
i	Lack of scientific knowledge	5 (100)	52 (86.67)	47 (83.93)	1 (50)	1 (50)	106 (84.8)
ii	Lack of technical guidance	5 (100)	50 (83.33)	42 (75)	1 (50)	2 (100)	100 (80)
3	**Situational constraints**						
i	Inadequate land holding	5 (100)	59 (98.33)	50 (89.29)	0 (0)	0 (0)	114 (91.2)
ii	Lack of irrigation facilities	5 (100)	52 (86.67)	46 (82.14)	1 (50)	0 (0)	104 (83.2)
iii	Shortage of green fodder	5 (100)	51 (85)	41 (73.21)	1 (50)	1 (50)	99 (79.2)
iv	Non availability of labour	2 (40)	35 (58.33)	39 (69.64)	2 (100)	2 (100)	80 (64)
v	lack of awareness about use of Mineral mixture / Mineral block	5 (100)	50 (83.33)	43 (76.79)	1 (50)	1 (50)	100 (80)
vi	Non availability of veterinary hospitals or veterinary services	4 (80)	38 (63.33)	31 (55.36)	1 (50)	1 (50)	75 (60)
vii	Breeding problems eg. repeat breeding or abortions	2 (40)	9 (15)	7 (12.5)	0 (0)	0 (0)	18 (14.4)
viii	Faulty pregnancy Diagnosis	2 (40)	13 (21.67)	11 (19.64)	1 (50)	1 (50)	28 (22.4)
4	**Infrastructural constraints**						
i	Lack of chaff cutter	5 (100)	50 (83.33)	43 (76.79)	0 (0)	1 (50)	99 (79.2)
ii	Lack of communication	4 (80)	41 (68.33)	33 (58.93)	1 (50)	1 (50)	80 (64)
iii	Lack of storage facility	5 (100)	51 (85)	41 (73.21)	1 (50)	0 (0)	98 (78.4)
5	**Personal interest**						
i	Lack of interest about adoption of standard management practices	3 (60)	50 (83.33)	46 (82.14)	1 (50)	1 (50)	101 (80.8)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 6C: Constraints in feeding and management practices of Raigad district

Sr. No.	Constraints	Landless	Marginal	Small	Medium	Large	Total
		7	**67**	**48**	**2**	**1**	**125**
1	**Financial constraints**						
i	High cost of concentrates	7 (100)	57 (85.07)	39 (81.25)	1 (50)	0 (0)	104 (83.2)
ii	High cost of green fodder	7 (100)	60 (89.55)	41 (85.42)	1 (50)	1 (100)	110 (88)
iii	Non availability of agro-industrial by products	7 (100)	67 (100)	47 (97.92)	1 (50)	1 (100)	123 (98.4)
iv	Low income	7 (100)	65 (97.01)	45 (93.75)	1 (50)	0 (0)	118 (94.4)
v	Lack of loan facility	7 (100)	58 (86.57)	33 (68.75)	0 (0)	0 (0)	98 (78.4)
2	**Technical constraints**						
i	Lack of scientific knowledge	7 (100)	63 (94.03)	43 (89.58)	1 (50)	1 (100)	115 (92)
ii	Lack of technical guidance	7 (100)	62 (92.54)	44 (91.67)	2 (100)	0 (0)	115 (92)
3	**Situational constraints**						
i	Inadequate land holding	7 (100)	64 (95.52)	44 (91.67)	1 (50)	0 (0)	116 (92.8)
ii	Lack of irrigation facilities	7 (100)	58 (86.57)	40 (83.33)	1 (50)	0 (0)	106 (84.8)
iii	Shortage of green fodder	5 (71.43)	58 (86.57)	40 (83.33)	1 (50)	0 (0)	104 (83.2)
iv	Non availability of labour	3 (42.86)	36 (53.73)	28 (58.33)	0 (0)	1 (100)	68 (54.4)
v	lack of awareness about use of Mineral mixture / Mineral block	7 (100)	61 (91.04)	42 (87.5)	1 (50)	0 (0)	111 (88.8)
vi	Non availability of veterinary hospitals or veterinary services	7 (100)	44 (65.67)	29 (60.42)	1 (50)	0 (0)	81 (64.8)
vii	Breeding problems eg. repeat breeding or abortions	5 (71.43)	9 (13.43)	6 (12.5)	1 (50)	0 (0)	21 (16.8)
viii	Faulty pregnancy Diagnosis	0 (0)	10 (14.93)	10 (20.83)	1 (50)	0 (0)	21 (16.8)
4	**Infrastructural constraints**						
i	Lack of chaff cutter	7 (100)	65 (97.01)	46 (95.83)	0 (0)	0 (0)	118 (94.4)
ii	Lack of communication	6 (85.71)	53 (79.10)	33 (68.75)	1 (50)	0 (0)	93 (74.4)
iii	Lack of storage facility	7 (100)	58 (86.57)	40 (83.33)	0 (0)	1 (100)	106 (84.8)
5	**Personal interest**						
i	Lack of interest about adoption of standard management practices	6 (85.71)	59 (88.06)	43 (89.58)	2 (100)	1 (100)	111 (88.8)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 6D: Constraints in feeding and management practices of Ratnagiri district

Sr. No.	Constraints	Landless	Marginal	Small	Medium	Large	Total
		4	**55**	**59**	**4**	**3**	**125**
1	**Financial constraints**						
i	High cost of concentrates	4 (100)	52 (94.55)	52 (88.14)	2 (50)	1 (33.33)	111 (88.8)
ii	High cost of green fodder	4 (100)	49 (89.09)	48 (81.36)	2 (50)	1 (33.33)	104 (83.2)
iii	Non availability of agro-industrial by products	3 (75)	53 (96.36)	55 (93.22)	3 (75)	2 (66.67)	116 (92.8)
iv	Low income	4 (100)	50 (90.91)	51 (86.44)	3 (75)	2 (66.67)	110 (88)
v	Lack of loan facility	4 (100)	44 (80)	39 (66.10)	2 (50)	1 (33.33)	90 (72)
2	**Technical constraints**						
i	Lack of scientific knowledge	4 (100)	51 (92.73)	50 (84.75)	1 (25)	3 (100)	109 (87.2)
ii	Lack of technical guidance	4 (100)	49 (89.09)	46 (77.97)	3 (75)	1 (33.33)	103 (82.4)
3	**Situational constraints**						
i	Inadequate land holding	4 (100)	52 (94.55)	52 (88.14)	1 (25)	0 (0)	109 (87.2)
ii	Lack of irrigation facilities	3 (75)	44 (80)	49 (83.05)	2 (50)	1 (33.33)	99 (79.2)
iii	Shortage of green fodder	3 (75)	44 (80)	45 (76.27)	3 (75)	0 (0)	95 (76)
iv	Non availability of labour	1 (25)	35 (63.64)	42 (71.19)	3 (75)	3 (100)	84 (67.2)
v	lack of awareness about use of Mineral mixture / Mineral block	4 (100)	47 (85.45)	47 (79.66)	3 (75)	1 (33.33)	102 (81.6)
vi	Non availability of veterinary hospitals or veterinary services	3 (75)	30 (54.55)	30 (50.85)	2 (50)	1 (33.33)	66 (52.8)
vii	Breeding problems eg. repeat breeding or abortions	1 (25)	7 (12.73)	5 (8.47)	0 (0)	0 (0)	13 (10.4)
viii	Faulty pregnancy Diagnosis	1 (25)	11 (20)	10 (16.95)	1 (25)	1 (33.33)	24 (19.2)
4	**Infrastructural constraints**						
i	Lack of chaff cutter	4 (100)	49 (89.09)	49 (83.05)	2 (50)	1 (33.33)	105 (84)
ii	Lack of communication	3 (75)	37 (67.27)	38 (64.41)	2 (50)	1 (33.33)	81 (64.8)
iii	Lack of storage facility	4 (100)	41 (74.55)	40 (67.80)	2 (50)	1 (33.33)	88 (70.4)
5	**Personal interest**						
i	Lack of interest about adoption of standard management practices	3 (75)	41 (74.55)	46 (77.97)	4 (100)	0 (0)	94 (75.2)

(Figures in parenthesis are percentages of parameters in respected group)

Table No. 6E: Constraints in feeding and management practices of Sindhudurg district

Sr. No.	Constraints	Landless	Marginal	Small	Medium	Large	Total
		4	**49**	**63**	**5**	**4**	**125**
1	**Financial constraints**						
i	High cost of concentrates	4 (100)	47 (95.92)	59 (93.65)	4 (80)	2 (50)	116 (92.8)
ii	High cost of green fodder	4 (100)	41 (83.67)	54 (85.71)	2 (40)	0 (0)	101 (80.8)
iii	Non availability of agro-industrial by products	4 (100)	47 (95.92)	57 (90.48)	4 (80)	2 (50)	114 (91.2)
iv	Low income	4 (100)	44 (89.80)	53 (84.13)	4 (80)	1 (25)	106 (84.8)
v	Lack of loan facility	4 (100)	42 (85.71)	42 (66.67)	0 (0)	0 (0)	88 (70.4)
2	**Technical constraints**						
i	Lack of scientific knowledge	4 (100)	47 (95.92)	56 (88.89)	3 (60)	2 (50)	112 (89.6)
ii	Lack of technical guidance	3 (75)	46 (93.88)	53 (84.13)	4 (80)	1 (25)	107 (85.6)
3	**Situational constraints**						
i	Inadequate land holding	4 (100)	49 (100)	52 (82.54)	0 (0)	0 (0)	105 (84)
ii	Lack of irrigation facilities	4 (100)	39 (79.59)	48 (76.19)	3 (60)	1 (25)	95 (76)
iii	Shortage of green fodder	3 (75)	36 (73.47)	46 (73.02)	3 (60)	2 (50)	90 (72)
iv	Non availability of labour	0 (0)	34 (69.39)	45 (71.43)	4 (80)	4 (100)	87 (69.6)
v	lack of awareness about use of Mineral mixture / Mineral block	4 (100)	45 (91.84)	53 (84.13)	4 (80)	0 (0)	106 (84.8)
vi	Non availability of veterinary hospitals or veterinary services	3 (75)	30 (61.22)	33 (52.38)	2 (40)	1 (25)	69 (55.2)
vii	Breeding problems eg. repeat breeding or abortions	2 (50)	7 (14.29)	5 (7.94)	1 (20)	0 (0)	15 (12)
viii	Faulty pregnancy Diagnosis	1 (25)	11 (22.45)	12 (19.05)	1 (20)	1 (25)	26 (20.8)
4	**Infrastructural constraints**						
i	Lack of chaff cutter	4 (100)	45 (91.83)	55 (87.30)	3 (60)	2 (50)	109 (87.2)
ii	Lack of communication	3 (75)	36 (73.47)	41 (65.08)	3 (60)	2 (50)	85 (68)
iii	Lack of storage facility	4 (100)	38 (77.55)	46 (73.02)	3 (60)	2 (50)	93 (74.4)
5	**Personal interest**						
i	Lack of interest about adoption of standard management practices	2 (50)	38 (77.55)	52 (82.54)	3 (60)	2 (50)	97 (77.6)

(Figures in parenthesis are percentages of parameters in respected group)

4.6.1 Financial constraints

4.6.1.1 High cost of concentrates

It was observed from Table 6A and depicted in Fig. 31 that in Palghar district high cost of concentrates was majorly faced by medium and large (100%) group of crossbred cattle owners, followed by small

(83.72%), marginal (81.69%) and landless (75%) group. Overall 82.4 per cent of crossbred cattle owners faced high cost of concentrates.

It was recorded from Table 6B and illustrated in Fig. 31 that in Thane district overall 88 per cent of crossbred cattle owners faced this problem about high cost of concentrates. Among selected crossbred cattle owners this problem was faced by landless, marginal, small, medium and large group with 100 per cent, 90 per cent, 85.71 per cent, 100 per cent and 50 per cent, respectively.

From Table 6C and Fig. 31, it was revealed that in Raigad district crossbred cattle owners from landless (100%), marginal (85.07%), small (81.25%) and medium (50%) group faced the problem regarding high cost of concentrates, whereas nobody (0%) from large group faced this problem. Overall 83.2 per cent crossbred cattle owners faced this problem in Raigad district.

From Table 6D and Fig. 31, it was concluded that in Ratnagiri district high cost of concentrates was faced by landless, marginal, small, medium and large group of crossbred cattle owners with 100 per cent, 94.55 per cent, 88.14 per cent, 50 per cent and 33.33 per cent, respectively. Average 88.8 per cent of crossbred cattle owners faced this problem.

It was revealed from Table 6E and depicted in Fig. 31 that in Sindhudurg district overall 92.8 per cent of crossbred cattle owners faced high cost of concentrates. This problem about high cost of concentrates was majorly faced by landless (100%) group, followed by marginal (95.92%), small (93.65%), medium (80%) and large (50%) group.

Kavathalkar *et al.* (2007) reported that high costs of concentrates were faced by 88.88 per cent cattle owners. Patil *et al.* (2009) found that in Nagpur district 56.44 per cent of respondents saw the high cost of concentrates as obstacle.

Sabapara *et al.* (2012) reported that in South Gujrat high cost of feed were faced by 91.00 per cent cattle owners. Lokhande *et al.* (2012) also reported that 86.36 per cent of respondents were faced by high cost of concentrates. Mohapatra *et al.* (2012) revealed that the major constraints faced by tribal dairy entrepreneurs were high cost of concentrate (96.67%).

4.6.1.2 High cost of green fodder

From Table 6A and Fig. 31 it was revealed that in Palghar district overall 90.4 per cent crossbred cattle owners faced the problem regarding high cost of green fodder. This problem was majorly faced by large, marginal, small, landless and medium group of cattle owners with 100 per cent, 91.55 per cent, 90.70 per cent, 87.5 per cent and 50 per cent, respectively.

It was observed from Table 6B and illustrated in Fig. 31 that in Thane district high cost of green fodder was majorly faced by landless (100%) group of cattle owners, followed by marginal (91.67%), small

(82.14%), medium (50%) and large (50%) group. Average 86.4 per cent of crossbred cattle owners faced high cost of green fodder.

It was recorded from Table 6C and depicted in Fig. 31 that in Raigad district problem related high cost of green fodder was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 89.55 per cent, 85.42 per cent, 50 per cent and 100 per cent, respectively. Overall 88 per cent of cattle owners faced this problem.

From Table 6D and Fig. 31 it was concluded that crossbred cattle owners from landless (100%), marginal (89.09%), small (81.36%), medium (50%) and large (33.33%) group faced the problem about high cost of green fodder in Ratnagiri district. Average 83.2 per cent crossbred cattle owners faced this problem regarding high cost of green fodder.

It was revealed from Table 6E and depicted in Fig. 31 that in Sindhudurg district overall 80.8 per cent of crossbred cattle owners faced high cost of green fodder. Among selected crossbred cattle owners high cost of green fodder was faced by landless (100%) group, followed by small (85.71%), marginal (83.67%) and medium (40%) group, whereas nobody (0%) from large category faced this problem.

Kavathalkar *et al.* (2007) reported that in Nagpur district 79.25 per cent cattle owners were faced by high cost of green fodder. Sabapara *et al.* (2012) observed that in South Gujrat 84.00 per cent cattle owners were faced by non- availability of green fodder.

Raskar (2017) revealed that overall 88.33 per cent crossbred cattle owners of Chandur tehsil faced problem of high cost of green fodder. This result was conformity of present study. Kadam (2018) found that 86.66 per cent crossbred cattle owners of Seloo tehsil had problem regarding high cost of green fodder.

4.6.1.3 Non availability of agro-industrial by product

It was revealed from Table 6A and depicted in Fig. 32 that in Palghar district non-availability of agro-industrial by product was majorly faced by landless, marginal and medium (100%) cattle owners, followed by small (93.02%) group and nobody (0%) from large group faced this problem. Overall 96.8 per cent of crossbred cattle owners faced this problem regarding non-availability of agro-industrial by product.

From Table 6B and Fig. 32, it was illustrated that in Thane among total crossbred cattle owners landless, marginal, small, medium and large group faced the problem about non-availability of agro-industrial by product with 100 per cent, 96.67 per cent, 91.07 per cent, 100 per cent and 100 per cent, respectively. Average 94.4 per cent of crossbred cattle owners faced this problem.

It was observed from Table 6C and depicted in Fig. 32 that in Raigad district average 98.4 per cent crossbred cattle owners faced non-availability of agro-industrial by product. This problem was maximum faced by landless, marginal and large (100%) crossbred cattle owners, followed by small (97.92%) and medium (50%) cattle owners.

It was recorded in Table 6D and given in Fig. 32 that in Ratnagiri district non-availability of agro-industrial by product was faced by landless, marginal, small, medium and large group of cattle owners with 75 per cent, 96.36 per cent, 93.22 per cent, 75 per cent and 66.67 per cent, respectively. Overall 92.8 per cent of crossbred cattle owners faced this problem.

Table 6E and Fig. 32 conclude that non-availability of agro-industrial by product was maximum faced by landless (100%) cattle owners, followed by marginal (95.92%), small (90.48%), medium (80%) and large (50%) cattle owners in Sindhudurg district. Average 91.2 per cent crossbred cattle owners faced non-availability of agro-industrial by product.

Kadam (2018) observed that non-availability of agro-industrial by product was faced by all crossbred cattle owners in Seloo tehsil of Wardha district.

4.6.1.4 Low income

From Table 6A and Fig. 32 it was revealed that in Palghar district problem regarding low income was majorly faced by landless (100%) group, followed by marginal (98.59%), small (95.35%), medium (50%) and nobody (0%) from large cattle owners faced this problem. Overall 96 per cent of crossbred cattle owners faced problem regarding low income.

It was observed from Table 6B and depicted in Fig. 32 that in Thane district overall 90.4 per cent of cattle owners faced this problem of low income. Among different crossbred cattle owners this problem was faced by landless, marginal, small, medium and large group with 100 per cent, 95 per cent, 87.5 per cent, 50 per cent and 50 per cent, respectively.

Table 6C and Fig. 32 conclude that in Raigad district low income was majorly faced by landless (100%) cattle owners, followed by marginal (97.01%), small (93.75%) and medium (50%) group, whereas nobody (0%) from large category faced this problem. Average 94.4 per cent of crossbred cattle owners faced this problem.

It was recorded from Table 6D and illustrated in Fig. 32 that in Ratnagiri district low income was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 90.91 per cent, 86.44 per cent, 75 per cent and 66.67 per cent, respectively. Overall 88 per cent crossbred cattle owners faced this problem of low income.

From Table 6E and Fig. 32 it was observed that from total crossbred cattle owners landless (100%), marginal (89.80%), small (84.13%), medium (80%) and large (25%) group of crossbred cattle owners faced the problem of low income in Sindhudurg district. Average 84.8 per cent of crossbred cattle owners faced this problem.

Kavathalkar *et al.* (2007) examined the main limitations as bad economy and 54.07 per cent cattle owners faced this problem in Nagpur district.

4.6.1.5 Lack of loan facility

It was revealed from Table 6A and illustrated in Fig. 32 that in Palghar district lack of loan facility was majorly faced by landless, marginal and small group with 100 per cent, 83.10 per cent and 76.74 per cent, respectively. Nobody (0%) from medium and large cattle owners faced this problem. Overall 80 per cent of crossbred cattle owners faced lack of loan facility.

From Table 6B and Fig. 32, it was observed that in Thane district average 74.4 per cent of crossbred cattle owners faced lack of loan facility. Among total crossbred cattle owners landless (100%), marginal (78.33%) and small (73.21%) group faced the problem regarding lack of loan facility, whereas nobody (0%) from medium and large category faced this problem.

Table 6C and Fig. 32 conclude that in Raigad district lack of loan facility was majorly faced by landless (100%) cattle owners, followed by 86.57 per cent from marginal cattle owners and 68.75 per cent from small cattle owners, whereas nobody (0%) from medium and large group faced this problem. Overall 78.4 per cent of crossbred cattle owners faced lack of loan facility.

It was recorded from Table 6D and depicted in Fig. 32 that in Ratnagiri district lack on loan facility was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 80 per cent, 66.10 per cent, 50 per cent and 33.33 per cent, respectively. The overall 72 per cent of crossbred cattle owners faced this problem regarding loan facility.

From Table 6E and Fig. 32, it was revealed that in Sindhudurg district overall 70.4 per cent of cattle owners faced lack of loan facility. Among different groups of crossbred cattle owners this problem was maximum faced by landless (100%) group, followed by marginal (85.71%) and small (66.67%) group, whereas nobody (0%) from medium and large cattle owners faced lack of loan facility in Sindhudurg district.

Kavathalkar *et al.* (2007) observed that 43.70 per cent cattle owners in Nagpur district were faced by lack of loan facility. Patil *et al.* (2009) concluded that 63.11 per cent cattle owners faced the problem of insufficient money and lack of loan options. Kadam (2018) found that lack of loan facility was faced by 94.16 per cent crossbred cattle owners of Seloo tehsil.

4.6.2 Technical constraints

4.6.2.1 Lack of scientific knowledge

It was observed from Table 6A and depicted in Fig. 33 that in Palghar district lack of scientific knowledge was majorly faced by landless and medium (100%) group of cattle owners, followed by marginal (94.37%) and small (88.37%) group, whereas and nobody (0%) from large cattle owners faced this problem. Average 92 per cent of crossbred cattle owners faced the problem regarding lack of scientific knowledge.

From Table 6B and Fig. 33, it was concluded that in Thane district average 84.8 per cent of crossbred cattle owners faced lack of scientific knowledge. Among selected crossbred cattle owners landless, marginal, small, medium and large group faced this problem with 100 per cent, 86.67 per cent, 83.93 per cent, 50 per cent and 50 per cent, respectively.

Table 6C and Fig. 33 conclude that in Raigad district 100 per cent cattle owners from landless and large group faced the problem regarding lack of scientific knowledge which was followed by marginal (94.03%), small (89.58%) and medium (50%) group. Overall 92 per cent of crossbred cattle owners faced this problem.

It was recorded from Table 6D and illustrated in Fig. 33 that in Ratnagiri district the problem of lack of scientific knowledge was faced by landless, marginal, small, medium and large group of crossbred cattle owners with 100 per cent, 92.73 per cent, 84.75 per cent, 25 per cent and 100 per cent, respectively. Overall 87.2 per cent of cattle owners faced lack of scientific knowledge.

From Table 6E and Fig. 33, it was revealed that lack of scientific knowledge was majorly faced by landless (100%) group, followed by marginal (95.92%), small (88.89%), medium (60%) and large (50%) group cattle owners in Sindhudurg district. Average 89.6 per cent of crossbred cattle owners faced this problem.

Kavathalkar *et al.* (2007) reported that in Nagpur district lacks of scientific knowledge were faced by 81.48 per cent cattle owners. Lokhande *et al.* (2012) reported the inadequate knowledge of breeding practices is the major constraint faced by the respondents.

Raskar (2017) observed that overall 57.1 per cent of crossbred cattle owners in Chandur tehsil faced the problem of lack of scientific knowledge. Kadam (2018) reported that problem regarding lack of scientific knowledge was faced by 94.16 per cent crossbred cattle owners of Seloo tehsil. This result similarly matched with present study.

4.6.2.2 Lack of technical guidance

It was revealed from Table 6A and illustrated in Fig. 33 that in Palghar district lack of technical guidance was majorly faced by landless, medium and large (100%) group of cattle owners, followed by marginal (91.55%) and small (86.05%) group. Overall 90.4 per cent crossbred cattle owners faced this problem regarding lack of technical guidance.

From Table 6B and Fig. 33, it was observed that in Thane district overall 80 per cent of cattle owners faced lack of technical guidance. Among different cattle owners this problem was faced by landless, marginal, small, medium and large group with 100 per cent, 83.33 per cent, 75 per cent, 50 per cent and 100 per cent, respectively.

Table 6C and Fig. 33 conclude that in Raigad district all the (100%) selected cattle owners from landless and medium group, 92.54 per cent from marginal group and 91.67 per cent from small group faced

the problem regarding lack of technical guidance, whereas nobody (0%) from large cattle owners faced this problem. Overall 92 per cent of crossbred cattle owners faced this problem.

It was recorded from Table 6D and depicted in Fig. 33 that in Ratnagiri district lack of technical guidance was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 89.09 per cent, 77.97 per cent, 75 per cent and 33.33 per cent, respectively. Average 82.4 per cent of cattle owners faced lack of technical guidance.

From Table 6E and Fig. 33, it was observed that in Sindhudurg district average 85.6 per cent of crossbred cattle owners faced this problem regarding lack of technical guidance. Among total selected crossbred cattle owners landless (75%), marginal (93.88%), small (84.13%), medium (80%) and large (25%) group of cattle owners faced this problem.

Kavathalkar *et al.* (2007) reported that in Nagpur district 48.14 per cent cattle owners were faced by lack of technical guidance. Kadam (2018) found that lack of technical guidance was faced by 90.00 per cent crossbred cattle owners of Seloo tehsil.

4.6.3 Situational constraints

4.6.3.1 Inadequate land holding

It was revealed from Table 6A and depicted in Fig. 34 that in Palghar district problem of inadequate land holding was faced by landless, marginal and small group with 100 per cent, 98.59 per cent and 95.35 per cent, respectively. Nobody (0%) from medium and large crossbred cattle owners faced this problem. Overall 95.2 per cent crossbred cattle owners faced this problem.

From Table 6B and Fig. 34, it was revealed that in Thane district average 91.2 per cent crossbred cattle owners faced this problem regarding inadequate land holding. Among total selected crossbred cattle owners landless (100%), marginal (98.33%), small (89.29%) and nobody (0%) from medium and large group faced the problem of inadequate land holding.

Table 6C and Fig. 34 conclude that in Raigad district problem of inadequate land holding was majorly faced by landless (100%) group, followed by marginal (95.52%), small (91.67%) and medium (50%) group, whereas nobody (0%) from large cattle owners faced this problem. Overall 92.8 per cent of crossbred cattle owners faced this problem about inadequate land holding.

It was recorded from Table 6D and illustrated in Fig. 34 that in Ratnagiri district inadequate land holding was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 94.55 per cent, 88.14 per cent, 25 per cent respectively. Nobody (0%) from large crossbred cattle owners faced this problem. Average 87.2

per cent of crossbred cattle owners faced the problem of inadequate land holding.

Table 6E and Fig. 34 conclude that in Sindhudurg district problem of inadequate land holding was maximum faced by landless and marginal (100%) group, followed by small (82.54%) group, whereas nobody (0%) from medium and large crossbred cattle owners faced this problem. Overall 84 per cent crossbred cattle owners faced this problem regarding inadequate land holding.

Sinha (1982) reported that land availability was limiting factor for cultivation of green fodder for most of the cattle owners around NDRI, Karnal. Kavathalkar *et al.* (2007) reported that in Nagpur district 68.88 per cent cattle owners were faced by inadequate land holding. Kadam (2018) concluded that 79.16 per cent crossbred cattle owners of Seloo tehsil faced the problem of inadequate land holding.

4.6.3.2 Lack of irrigation facility

It was revealed from Table 6A and illustrated in Fig. 34 that in Palghar district average 87.2 per cent of crossbred cattle owners faced the problem regarding lack of irrigation facility. Among different groups of crossbred cattle owners this problem was majorly faced by landless (100%) group, followed by marginal (90.14%), small (83.72%) and medium (50%) group, whereas nobody (0%) from large cattle owners faced this problem.

From Table 6B and Fig. 34, it was observed that in Thane district from selected crossbred cattle owners landless (100%), marginal (86.67%), small (82.14%) and medium (50%) group faced lack of irrigation facility, whereas nobody (0%) from large group faced this problem about irrigation facility. Overall 83.2 per cent crossbred cattle owners faced this problem regarding irrigation facility.

Table 6C and Fig. 34 conclude that in Raigad district average 84.8 per cent of crossbred cattle owners faced this problem regarding lack of irrigation facility. Among selected crossbred cattle owners all the (100%) cattle owners from landless large group, 83.33 per cent from small group, 86.57 per cent from marginal group and 50 per cent from medium group faced lack of irrigation facility, whereas nobody (0%) from large group of cattle owners faced this problem.

It was recorded from Table 6D and Fig. 34 that in Ratnagiri district problem of lack of irrigation facility was faced by landless, marginal, small, medium and large group of cattle owners with 75 per cent, 80 per cent, 83.05 per cent, 50 per cent and 33.33 per cent, respectively. Overall 79.2 per cent of cattle owners faced this problem.

From Table 6E and Fig. 34, it was revealed that in Sindhudurg district from total selected crossbred cattle owners landless (100%), marginal (79.59%), small (76.19%), medium (60%) and large (25%) group faced lack of irrigation facility. Average 76 per cent crossbred cattle owners faced this problem regarding lack of irrigation facility.

Kokate and Tyagi (1994) reported that lack of the irrigation facility for the fodder production was perceived as very serious problem. Kavathalkar *et al.* (2007) reported that in Nagpur district 64.44 per cent cattle owners were faced by lack of irrigation facility. Kadam (2018) found that 63.33 per cent crossbred cattle owners of Seloo tehsil did not have irrigation facility.

4.6.3.3 Shortage of green fodder

From Table 6A and Fig. 35, it was concluded that in Palghar district problem regarding shortage of green fodder was faced by landless, marginal, small, medium and large group of crossbred cattle owners with 87.5 per cent, 88.73 per cent, 79.07 per cent, 100 per cent and 100 per cent, respectively. Overall 85.6 per cent crossbred cattle owners faced this problem.

It was observed from Table 6B and Fig. 35 that in Thane district problem about shortage of green fodder was majorly faced by landless (100%) group of crossbred cattle owners, followed by marginal (85%), small (73.21%), medium (50%) and large (50%) group. Average 79.2 per cent of crossbred cattle owners faced shortage of green fodder.

It was recorded from Table 6C and illustrated in Fig. 35 that in Raigad district overall 83.2 per cent of cattle owners faced this problem regarding shortage of green fodder. Among selected groups this problem was faced by landless, marginal, small and medium group with 71.43 per cent, 86.57 per cent, 83.33 per cent and 50 per cent, respectively. Nobody (0%) from large cattle owners faced this problem of shortage.

Table 6D and Fig. 35 conclude that problem about shortage of green fodder was maximum faced by marginal (80%) group, followed by small (76.27%), medium (75%) and landless (75%) group of cattle owners, whereas nobody (0%) from large category faced this problem in Ratnagiri district. The average 76 per cent crossbred cattle owners faced this problem.

From Table 6E and Fig. 35, it was revealed that in Sindhudurg district from total selected crossbred cattle owners landless, marginal, small, medium and large group faced this problem of green fodder shortage with 75 per cent, 73.47 per cent, 73.02 per cent, 60 per cent and 50 per cent, respectively. Overall 72 per cent crossbred cattle owners faced shortage of green fodder.

Kavathalkar *et al.* (2007) reported that 60.00 per cent cattle owners in Nagpur district were faced by shortage of green fodder. Patil *et al.* (2009) concluded that 45.33 per cent cattle owners had problem of lack of green fodder.

Kadam (2018) found that 57.50 per cent crossbred cattle owners of Seloo tehsil had shortage of green fodder.

4.6.3.4 Non availability of labour

It was observed from Table 6A and Fig. 35 that in Palghar district non- availability of labour was maximum faced by large (100%) group of

cattle owners, followed by small (65.12%), marginal (52.11%) and landless (50%) group, whereas nobody (0%) from medium group faced this problem. Overall 56 per cent crossbred cattle owners faced this problem about non availability of labour.

From Table 6B and Fig. 35, it was revealed that in Thane district the problem regarding non- availability of labour was faced by landless, marginal, small, medium and large group of crossbred cattle owners with 40 per cent, 58.33 per cent, 69.64 per cent, 100 per cent and 100 per cent, respectively. Average 64 per cent crossbred cattle owners faced this problem.

Table 6C and Fig. 35 conclude that in Raigad district average 54.4 per cent crossbred cattle owners faced non- availability of labour. From selected crossbred cattle owners this problem was faced by large (100%), landless (42.86%), small (58.33%) and marginal (53.73%) group, whereas nobody (0%) from medium group faced this problem of labour unavailability.

It was recorded from Table 6D and Fig. 35 that in Ratnagiri district non- availability of labour was faced by landless, marginal, small, medium and large group of cattle owners with 25 per cent, 63.64 per cent, 71.19 per cent, 75 per cent and 100 per cent, respectively. Overall 67.2 per cent crossbred cattle owners faced this problem about non availability of labour.

From Table 6E and Fig. 35, it was concluded that in Sindhudurg district overall 69.6 per cent of crossbred cattle owners faced this problem. Among selected crossbred cattle owners marginal (69.39%), small (71.43%), medium (80%) and large (100%) group faced non availability of labour, whereas nobody (0%) from landless category faced this problem.

Kavathalkar *et al.* (2007) examined that in Nagpur district the major limitations faced by cattle owners was high labor costs (72.59%). Lokhande *et al.* (2012) observed that non-availability of labour was perceived as very serious problem. Kadam (2018) found that 64.16 per cent crossbred cattle owners of Seloo tehsil had problem in labour availability.

4.6.3.5 Lack of awareness about use of mineral mixture / mineral block

From Table 6A and Fig. 36, it was observed that in Palghar district average 91.2 per cent crossbred cattle owners faced the problem regarding lack of awareness about mineral mixture or mineral blocks. From selected cattle owners this problem was majorly faced by landless (100%) group, followed by marginal (94.37%), small (88.37%) and medium (50%) group, whereas nobody (0%) from large group of cattle owners faced this problem

It was recorded from Table 6B and Fig. 36 that in Thane district lack of awareness about mineral mixture or mineral blocks was faced by

landless, marginal, small, medium and large group of cattle owners with 100 per cent, 83.33 per cent, 76.79 per cent, 50 per cent and 50 per cent, respectively. Overall 80 per cent crossbred cattle owners faced this problem regarding lack of awareness about mineral mixture or mineral blocks.

Table 6C and Fig. 36 conclude that In Raigad district this problem was majorly faced by landless (100%) group, followed by marginal (91.04%), small (87.5%) and medium (50%) group, whereas nobody (0%) from large group faced this problem. Average 88.8 per cent crossbred cattle owners faced this problem.

From Table 6D and Fig. 36, it was revealed that in Ratnagiri district overall 81.6 per cent crossbred cattle owners faced this problem regarding lack of awareness about mineral mixture or mineral blocks. From total selected crossbred cattle owners landless, marginal, small, medium and large group faced this problem with 100 per cent, 85.45 per cent, 79.66 per cent, 75 per cent and 33.33 per cent, respectively.

It was concluded from Table 6E and depicted in Fig. 36 that in Sindhudurg district lack of awareness about mineral mixture or mineral blocks was majorly faced by landless (100%) group, followed by marginal (91.84%), small (84.13%) and medium (80%) group, whereas nobody (0%) from large group faced this problem. Average 84.8 per cent cattle owners faced this problem in Sindhudurg district.

Kavathalkar *et al.* (2007) observed that in Nagpur district 54.81 per cent cattle owners were faced by high cost of mineral mixture. Kadam (2018) found that 87.50 per cent crossbred cattle owners of Seloo tehsil had problem about lack of awareness and high cost of mineral compounds.

4.6.3.6 Non availability of veterinary hospitals or veterinary services

From Table 6A and Fig. 36, it was observed that in Palghar district the problem related to non-availability of veterinary hospitals was faced by landless, marginal, small and medium crossbred cattle owners with 75 per cent, 70.42 per cent, 62.79 per cent and 50 per cent, respectively. Nobody (0%) from large cattle owners faced this problem. Overall 67.2 per cent crossbred cattle owners faced this problem about veterinary services.

It was revealed from Table 6B and illustrated in Fig. 36 that in Thane district problem regarding non-availability of veterinary hospitals and services was majorly faced by landless (80%) group of cattle owners, followed by marginal (63.33%), small (55.36%), medium (50%) and large (50%) group. Average 60 per cent crossbred cattle owners faced this problem.

From Table 6C and Fig. 36, it was concluded that in Raigad district overall 64.8 per cent crossbred cattle owners faced this problem about non-availability of veterinary hospitals and services. From total selected crossbred cattle owners landless, marginal, small and medium

group faced this problem with 100 per cent, 65.67 per cent, 60.42 per cent and 50 per cent, respectively. Nobody (0%) from large group of cattle owners faced this problem.

It was observed from Table 6D and depicted in Fig. 36 that in Ratnagiri district average 52.8 per cent crossbred cattle owners faced this problem about non-availability of veterinary hospitals and services. From selected groups this problem was majorly faced by landless (75%) group, followed by marginal (54.55%), small (50.85%), medium (50%) and large (33.33%) group of crossbred cattle owners.

It was recorded from Table 6E and illustrated in Fig. 36 that in Sindhudurg district non-availability of veterinary hospitals and veterinary services was faced by landless, marginal, small, medium and large group of cattle owners with 75 per cent, 61.22 per cent, 52.38 per cent, 40 per cent and 25 per cent, respectively. Average 55.2 per cent crossbred cattle owners faced this problem.

Patil *et al.* (2009) reported that 56.89 per cent cattle owners faced the problem regarding unavailability of veterinary services. Similar results reported by Raskar (2017) that overall 65.83 per cent crossbred cattle owners of Chandur tehsil of Amravati district faced the problem of non-availability of veterinary care hospitals. Kadam (2018) concluded that 67.50 per cent crossbred cattle owners of Seloo tehsil faced the problem of non-availability of veterinary care hospitals.

4.6.3.7 Breeding problems eg. Repeat breeding or abortions

From Table 6A and Fig. 37, it was observed that in Palghar district from total selected crossbred cattle owners landless (62.5%), marginal (18.31%) and small (13.95%) group faced these breeding problems, whereas nobody (0%) from medium and large group faced problem related to breeding. Overall 19.2 per cent crossbred cattle owners faced this problem.

Table 6B and Fig. 37 conclude that in Thane district breeding problems were faced by landless, marginal and small cattle owners with 40 per cent, 15 per cent and 12.5 per cent, respectively. Nobody (0%) from medium and large group of crossbred cattle owners faced this problem regarding breeding. Average 14.4 per cent crossbred cattle owners faced breeding problems like repeat breeding and abortions.

It was recorded from Table 6C and depicted in Fig. 37 that in Raigad district overall 16.8 per cent cattle owners faced breeding problems. Among crossbred cattle owners these breeding problems were faced by landless (71.43%), marginal (13.43%), small (12.5%) and medium (50%) group, whereas nobody (0%) from large group faced these problems.

From Table 6D and Fig. 37, it was concluded that in Ratnagiri district breeding problems were faced by landless, marginal and small group of cattle owners with 25 per cent, 12.73 per cent and 8.47 per

cent, respectively. Nobody (0%) from medium and large category faced this problem. Overall 10.4 per cent crossbred cattle owners faced this problem about breeding.

It was revealed from Table 6E and illustrated in Fig. 37 that in Sindhudurg district breeding problems were maximum faced by landless (50%) group of cattle owners, followed by medium (20%), marginal (14.29%) and small (7.94%) group, whereas nobody (0%) from large group faced this problem. Average 12 per cent crossbred cattle owners faced these breeding problems like repeat breeding and abortion.

Similar breeding problems were observed by Mircha *et al.* (2012) that rebreeding was the most commonly reported problem, with an incidence of 31.70 per cent and 22.70 per cent in dairy cows and buffalo, respectively. Lokhande *et al.* (2012) concluded that repeat breeding in crossbred cows/buffaloes was faced by 51.02 per cent of dairy farmers.

4.6.3.8 Faulty Pregnancy Diagnosis

It was recorded from Table 6A and depicted in Fig. 37 that in Palghar district problem related to faulty pregnancy diagnosis was faced by landless, marginal, small, medium and large group of crossbred cattle owners with 12.5 per cent, 14.08 per cent, 20.93 per cent, 50 per cent and 100 per cent, respectively. Overall 17.6 per cent cattle owners faced this problem.

Table 6B and Fig. 37 reveal that in Thane district faulty pregnancy diagnosis was majorly faced by medium and large (50%) group of cattle owners, followed by landless (40%), marginal (21.67%) and small (19.64%) group. Average 22.4 per cent of crossbred cattle owners faced this problem about faulty pregnancy diagnosis.

It was concluded from Table 6C and illustrated in Fig. 37 that in Raigad district overall 16.8 per cent cattle owners faced the problem of faulty pregnancy diagnosis. This problem was faced by marginal, small and medium group of cattle owners with 14.93 per cent, 20.83 per cent, 50 per cent, respectively. Nobody (0%) from landless and large group of cattle owners faced this problem.

From Table 6D and Fig. 37, it was observed that from total selected crossbred cattle owners landless (25%), marginal (20%), small (16.95%), medium (25%) and large (33.33%) group of cattle owners faced the problem of faulty pregnancy diagnosis in Ratnagiri district. Average 19.2 per cent crossbred cattle owners faced faulty pregnancy diagnosis.

It was revealed from Table 6E and illustrated in Fig. 37 that in Sindhudurg district overall 20.8 per cent crossbred cattle owners faced this problem of faulty pregnancy diagnosis. Among selected crossbred cattle owners this problem was majorly faced by landless and large (25%) group, followed by marginal (22.45%), medium (20%) and small (19.05%) group.

Lokhande *et al.* (2012) reported that 62.50 per cent of marginal farmers faced lack of knowledge about pregnancy diagnosis and overall 40 per cent respondents were facing incorrect pregnancy diagnosis.

4.6.4 Infrastructural constraints

4.6.4.1 Lack of chaff cutter

From Table 6A and Fig. 38, it was concluded that lack of chaff cutter was majorly faced by landless (100%) group, followed by marginal (95.77%), small (90.70%) and medium (50%) group, whereas nobody (0%) from large cattle owners faced this problem in Palghar district. Overall 92.8 per cent of crossbred cattle owners faced this problem regarding lack of chaff cutter.

It was revealed from Table 6B and depicted in Fig. 38 that In Thane district absence of chaff cutter was faced by landless, marginal, small and large group of crossbred cattle owners with 100 per cent, 83.33 per cent, 76.79 per cent and 50 per cent, respectively. Nobody (0%) from medium cattle owners faced this problem. Average 79.2 per cent of crossbred cattle owners faced this problem.

Table 6C and Fig. 38 conclude that In Raigad district lack of chaff cutter was majorly faced by landless (100%) group of crossbred cattle owners, followed by marginal (97.01%) and small (95.83%) group, whereas nobody (0%) from medium and large group faced this problem. Overall 94.4 per cent of crossbred cattle owners faced problem regarding lack of chaff cutter.

It was recorded from Table 6D and illustrated in Fig. 38 that in Ratnagiri district overall 84 per cent crossbred cattle owners faced the problem about lack of chaff cutter. Among selected crossbred cattle owners this problem was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 89.09 per cent, 83.05 per cent, 50 per cent and 33.33 per cent, respectively.

From Table 6E and Fig. 38, it was concluded that from total selected crossbred cattle owners landless (100%), marginal (91.83%), small (87.30%), medium (60%) and large (50%) group of cattle owners faced the problem regarding absence of chaff cutter in Sindhudurg district. Average 87.2 per cent crossbred cattle owners faced this problem in Sindhudurg district.

Kavathalkar *et al.* (2007) reported that in Nagpur district 77.03 per cent cattle owners were faced by Lack of chaff cutter. Kadam (2018) observed that 92.50 per cent crossbred cattle owners of Seloo tehsil do not have chaff cutter.

4.6.4.2 Lack of communication

It was observed from Table 6A and depicted in Fig. 38 that In Palghar district problem about lack of communication was majorly faced by landless (75%) group, followed by marginal (74.65%), small (69.77%) and medium (50%) group of cattle owners, whereas nobody (0%) from

large group faced this problem. Overall 72 per cent of crossbred cattle owners faced this problem.

From Table 6B and Fig. 38, it was concluded that in Thane district overall 64 per cent crossbred cattle owners faced this problem regarding lack of communication. Among selected crossbred cattle owners lack of communication was maximum faced by landless, marginal, small, medium and large cattle owners with 80 per cent, 68.33 per cent, 58.93 per cent, 50 per cent and 50 per cent, respectively.

Table 6C and Fig. 38 reveal that in Raigad district the problem about lack of communication was majorly faced by landless (85.71%) group of cattle owners, followed by marginal (79.10%), small (68.75%) and medium (50%) group, whereas nobody (0%) from large group faced this problem. Average 74.4 per cent of crossbred cattle owners faced this problem.

It was observed from Table 6D and depicted in Fig. 38 that in Ratnagiri district the problem of lack of communication was faced by landless, marginal, small, medium and large group of cattle owners with 75 per cent, 67.27 per cent, 64.41 per cent, 50 per cent and 33.33 per cent, respectively. Overall 64.8 per cent of crossbred cattle owners faced lack of communication.

From Table 6E and Fig. 38, it was observed that average 68 per cent crossbred cattle owners faced this problem regarding lack of communication in Sindhudurg district. From selected crossbred cattle owners landless (75%), marginal (73.47%), small (65.08%), medium (60%) and large (50%) group faced this problem of communication.

Kavathalkar *et al.* (2007) reported that 46.66 per cent cattle owners were in Nagpur district faced by lack of communication. Kadam (2018) concluded that 85.83 per cent crossbred cattle owners of Seloo tehsil had problem in lack of communication.

4.6.4.3 Lack of storage facility

It was observed from Table 6A and depicted in Fig. 38 that in Palghar district overall 82.4 per cent crossbred cattle owners faced this problem about lack of storage facility. Among selected groups this problem was maximum faced by landless (100%) group, followed by marginal (85.92%), small (76.74%) and medium (50%) group, whereas nobody from large cattle owners faced this problem.

Table 6B and Fig. 38 conclude that In Thane district lack of storage facility was faced by landless, marginal, small and medium group of crossbred cattle owners with 100 per cent, 85 per cent, 73.21 per cent and 50 per cent, respectively. Nobody (0%) from large group faced this problem. Average 78.4 per cent of crossbred cattle owners faced this problem about lack of storage facility.

From Table 6C and Fig. 38, it was revealed that in Raigad district from total selected crossbred cattle owners landless (100%), marginal (86.57%), small (83.33%) and large (100%) group faced the problem about

lack of storage facility, whereas nobody (0%) from medium cattle owners faced this problem. Overall 84.8 per cent crossbred cattle owners faced this problem in Raigad district.

Table 6D and Fig. 38 reveal that In Ratnagiri district average 70.4 per cent of crossbred cattle owners faced this problem regarding lack of storage facility. Lack of storage facility was majorly faced by landless (100%) group, followed by marginal (74.55%), small (67.80%), medium (50%) and large (33.33%) group of cattle owners.

It was recorded from Table 6E and illustrated in Fig. 38 that in Sindhudurg district lack of storage facility was faced by landless, marginal, small, medium and large group of cattle owners with 100 per cent, 77.55 per cent, 73.02 per cent, 60 per cent and 50 per cent, respectively. Overall 74.4 per cent crossbred cattle owners faced this problem.

Kavathalkar *et al.* (2007) reported that 44.44 per cent cattle owners in Nagpur district were faced by lack of storage facility. Similar results were found by Patil *et al.* (2009) that 25.33 per cent dairy farmers faced the problem regarding lack of storage facility. Kadam (2018) reported that 87.50 per cent crossbred cattle owners of Seloo tehsil faced the problem about lack of storage facility.

4.6.5 Personal interest

4.6.5.1 Lack of interest about adoption of standard management practices

It was concluded from Table 6A and depicted in Fig. 39 that in Palghar district problem regarding lack of interest about adoption of standard management practices was faced by landless, marginal, small, medium and large group of cattle owners with 87.5 per cent, 88.73 per cent, 83.72 per cent, 50 per cent and 100 per cent, respectively. Overall 86.4 per cent of crossbred cattle owners faced this problem.

From Table 6B and Fig. 39, it was observed that in Thane district problem of lack of interest was majorly faced by marginal (83.33%) group, followed by small (82.14%), landless (60%), medium (50%) and large (50%) group. Average 80.8 per cent of crossbred cattle owners faced this problem of lack of interest.

It was revealed from Table 6C and illustrated in Fig. 39 that in Raigad district lack of interest in adoption of standard management practices was faced by landless, marginal, small, medium and large group of crossbred cattle owners with 85.71 per cent, 88.06 per cent, 89.58 per cent, 100 per cent and 100 per cent, respectively. Overall 88.8 per cent crossbred cattle owners faced lack of interest about adoption of standard management practices.

Table 6D and Fig. 39 conclude that In Ratnagiri district average 75.2 per cent of crossbred cattle owners faced this problem about lack of interest in adoption of standard management practices. Problem regarding lack of interest was majorly faced by medium (100%) group,

followed by small (77.97%), landless (75%) and marginal (74.55%) group, whereas nobody (%) from large cattle owners faced this problem.

From Table 6E and Fig. 39, it was revealed that from total selected crossbred cattle owners landless, marginal, small, medium, and large group faced the problem regarding lack of interest in adoption of standard management practices with 50 per cent, 77.55 per cent, 82.54 per cent, 60 per cent and 50 per cent, respectively. Overall 77.6 per cent crossbred cattle owners faced this problem regarding lack of interest.

Lokhande *et al.* (2012) observed that in adoption of standard management practices, the biggest constraint is disinterest in keeping simple records (85.00%). Kadam (2018) found that 88.33 per cent crossbred cattle owners of Seloo tehsil had lack of interest in adopting standard management practices

4.7 Suggestions for improvement in crossbred cattle management practices

4.7.1 Suggestions regarding feeding practices

System of feeding:- It is necessary to feed crossbred animals with feed resources having both energy and nutrient supply in a sufficient manner. Grazing can provide good exercise for the animal but may not provide sufficient nutrients to the animal, Grasses in Konkan are not nutritious enough so animal cannot thrive entirely on Grazing. Rearing animal completely on stall feeding is quite expensive and do not provide sufficient physical exercise to the animal. It is suggested that stall feeding would be perfect for the animal along with a paddock area for exercise of animals. Combination of grazing and stall feeding may able to full-fill the nutritional requirement of animal as well as keep animal active with sufficient exercise.

Feeding of milch animal:- It is suggested to follow Individual feeding practice for milch animal which ensures equal distribution of feed for each animal. In Group feeding dominant animal may take over most of the feed.

Frequency of feeding:- Feeding in split doses in frequent intervals ensures maximum utilization of nutrient and so it is suggested to feed animal thrice or more in a day over twice and once a day.

Feeding of colostrum to new born calf:- It is suggested to feed colostrum to new borne calf. Colostrum provides protein and antibodies to the new born calf which boosts immunity.

Processing of Roughages and concentrates before feeding:- It is suggested to process (chaffing, crushing, soaking) roughages and concentrates before feeding, It improves palatability of feed and enhance nutrient uptake by improving digestibility.

Enrichment of poor quality straw by urea:- It is suggested to treat poor quality straw by using upto 4 per cent urea. it enhances the nutritional quality of straw in terms of increased nitrogen content, improve palatability and digestibility of straw.

Chaffing of green fodder and dry fodder:- It is suggested to chaff the fodder by machinery which ensures equal cutting and saves time and labour.

Feeding of Green fodder:- It is suggested to feed green fodder to animal, it provide good amount of nutrient to boost milk production and reduces feeding cost.

Feeding of Silage:- To meet the green fodder requirement in lean season it is suggested to feed silage which will provide green fodder nutrients throughout the year.

Feeing of Concentrates @ 2 to 2.5 kg/100kg body weight of animal:- It is recommended to feed animal Concentrates @ 2 to 2.5 kg/100kg body weight of animal which ensure proper growth and development of an animal.

Feeding of concentrates @ 40% of milk production and 1 kg as a maintenance ration:- It is recommended to feed milch animal @40 per

cent concentrates of total milk production and 1 kg as a maintenance ration, which helps to maintain good health, good milk production, suffeicient energy level and nutrient supply.

Type of concentrates:- It is suggested to provide concentrates to animal on basis of economic condition, nutrient supply and availability of concentrates.

Pregnancy allowance ration for pregnant animal:- It is suggested to give pregnancy allowance ration to pregnant animal it ensures healthy and proper embryo development and good milk production after parturition.

Use of mineral mixture or mineral brick:- It is recommended to feed 100 g mineral mixture daily to milch animals, 50 g daily to growing animals and 25 g daily to calves. It helps in better utilization of absorbed nutrients, increases milk production in animals and increases productive life of animals.

Feeding of Unconventional Roughages and concentrates during scaracity:- It is suggested to feed Unconventional Roughages and concentrates which will help to decrease the cost of production and will provide feed having sufficient nutrients even in lean season for growth, development and production.

Processing of Concentrates:- It is suggested to process the concentrates separately to avoid wastage.

4.7.2 Suggestions regarding breeding management

Method of breeding:- It is suggested to adopt AI for breeding over natural method for rapid development in breed. Use the semen of bulls having high yielding pedigree. It also ensures the complete avoidance of STD's.

Pregnancy Diagnosis:- Pregnancy diagnosis is suggested to reduce economic loss due to false alarms.

4.7.3 Suggestions regarding animal housing management

Type of Housing:- It is suggested to have pakka house to ensure animal comfort. It may also help to protect them from various natural disasters and predators also.

Type of flooring:- It is suggested to have pakka floor in animal shed which provide many benefits like good drainage and easy removal of animal waste. It also helps to decrease ectoparasites and udder infection.

Type of roofing material:- It is suggested avoid use grasses as a roofing material it doesn't provide complete protection in rainy season especially in Konkan region and use of grass as a roofing material increases the chances of catching fire.

System of Housing :- It is suggested to adopt close housing system especially in Konkan region because of heavy rainfall and wild animals.

4.7.4 Suggestions regarding health and sanitation of crossbred cattles

Washing of animals:- It is suggested to wash animal regularly for reducing ectoparacitic attack, maintenance of good hygiene and to have better animal comfort.

Washing of udder before milking:- To have clean and hygeneic milk production it is suggested to wash udder before milking.

Washing of floor:- To Avoid ectoparasite attack, to maintain a good hygiene of shed, and to provide comfort to the animal it is suggested to wash the floor regularly.

Vaccination:- To maintain good health of animal, enhancing their immunity, to avoid economic losses because of diseases it is suggested to vaccinate animal according to recommended vaccination schedule.

Deworming :- Deworming is recommended to reduce energy loss and maximum utilization of feed to get maximum economic returns.

Spraying against Ectoparsites:- To maintain comfort, to avid blood leaching from ectoparasites and for avoiding energy loss spraying against ectoparsites is suggested.

Grooming:- Grooming is suggested to increase comfort to animal and it also helps build social bond between animal and his owner.

CHAPTER V
SUMMARY AND CONCLUSIONS

5.1 Summary

Livestock is becoming an integral part of all interventions aimed to reduce rural poverty and enhancing food and nutritional security. If all management practices like feeding, housing, health and other management practices fit in proper manner, it is possible to meet desired level of milk production. Farmers are not fully aware of scientifically improved practices of livestock production and management. The feeding and management practices are directly concerned with milk production and it affect it largely. Hence, special attention should be given towards these practices is advisable and it is necessary to meet the requirement of the growing population of India. Therefore, it is essential to investigate the level of adoption in respect of recommended feeding and management practices, constraints in following the scientific adoption of these practices encountered by crossbred cattle owners.

The data for the study was collected by stratified random sampling technique from the Konkan region which includes seven districts *viz.,* Palghar, Mumbai, Navi Mumbai, Thane, Raigad, Ratnagiri and Sindhudurg. Out of which five districts was selected for survey *viz.,* Palghar, Thane, Raigad, Ratnagiri and Sindhudurg. From each district 5 tehsils were selected randomly and from each tehsil 5 villages were selected. Further from each village 5 cattle owners were randomly selected. Thus, sample size was 625.

The crossbred cattle owners were classified on the basis of land holdings i.e., landless (no land), marginal (up to 1 ha), small (1.01 to 2 ha), medium (2.01 to 8 ha) and large (above 8 ha). The majority crossbred cattle owners from Palghar (56.8%), Thane (48%) and Raigad (53.6%) district having marginal land holding. Whereas, majority crossbred cattle owners from Ratnagiri (47.2%) and Sindhudurg (50.4%) district having small land holding.

The crossbred cattle owners were also classified on the basis of herd size i.e., upto 2 animals, 3 to 5 animals, 6 to 10 animals and more than 10 animals. The most of the crossbred cattle owners from Palghar (51.2%), Thane (50.4%) and Raigad (47.2%) district having herd size of 3 to 5 animals. Whereas, most of the crossbred cattle owners from Ratnagiri (50.4%) and Sindhudurg (53.6%) district having herd size up to 2 animals.

Classification of crossbred cattle owners was done on the basis of their annual income i.e., Up to Rs. 25000, Rs. 25001 to 50000, Rs. 50001 to 100000 and above 100000. It was observed that maximum crossbred cattle owners from Palghar (56%), Thane (66.4%), Raigad (59.2%), Ratnagiri (64.8%) and Sindhudurg (62.4%) district having their

annual income Rs. 50000 to 100000. Overall 61.76 per cent farmers from a study area having anuual income between Rs. 50000 to 100000.

In feeding practices majority of crossbred cattle owners followed grazing + stall feeding system of feeding in Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 95.2 per cent, 82.4 per cent, 94.4 per cent, 90.4 per cent and 86.4 per cent, respectively. In the feeding of milch animal practice, individual feeding was prominently adopted by crossbred cattle owners of Palghar (76%), Thane (83.2%), Raigad (73.6%), Ratnagiri (87.2%) and Sindhudurg (85.6%) district. Among selected districts of Konkan region practice regarding feeding of animals twice in a day was majorly adopted by Raigad (67.2%) district, followed by Ratnagiri (64.8%), Palghar (64.8%), Sindhudurg (61.6%) and Thane (56%) district.

Feeding colostrum to new born calf was followed by all the (100%) crossbred cattle owners of Palghar, Raigad, Ratnagiri and Sindhudurg district except Thane district (96.8%). Processing of roughages and concentrates before feeding was followed by crossbred cattle owners of Palghar (26.4%), Thane (40%), Raigad (24%), Ratnagiri (37.6%) and Sindhudurg (35.2%) district. No farmers used urea for enrichment of poor quality straw in a study area except Thane (2.4%) and Ratnagiri (0.8%) district.

Majority of crossbred cattle owners followed manual chaffing of green fodder and dry fodder in Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 92.8 per cent, 79.2 per cent, 94.4 per cent, 84 per cent and 87.2 per cent, respectively. Feeding of green fodder was followed by crossbred cattle owners of Palghar (40%), Thane (55.2%), Raigad (41.6%), Ratnagiri (59.2%) and Sindhudurg (62.4%) district. No crossbred cattle owner adopted the practice of feeding silage except from Thane (6.4%) and Ratnagiri (0.8%) district. From total selected crossbred cattle owners 78.4 per cent from Palghar, 79.2 per cent from Thane, 75.2 per cent from Raigad, 84 per cent from Ratnagiri and 82.4 per cent from Sindhudurg district adopted the practice of conservation of feeds and fodder.

Feeding of dry matter @ 2 to 2.5 kg/100 kg body weight of animal was followed by crossbred cattle owners of Palghar (72%), Thane (75.2%), Raigad (69.6%), Ratnagiri (80.8%) and Sindhudurg (78.4%) district. Whereas, feeding of concentrate @ 40% of milk production and 1 kg as a maintenance ration was adopted by cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 30.4 per cent, 43.2 per cent, 28 per cent, 40 per cent and 36.8 per cent, respectively.

Readymade purchased concentrates were abundantly used by crossbred cattle owners than homemade concentrates in Palghar (50.4%), Thane (77.6%), Raigad (59.2%), Ratnagiri (74.4%) and Sindhudurg (71.2%) district. Pregnancy allowance ration for pregnant animals was given by different crossbred cattle owners such that 71.2 per cent from

Palghar, 80.8 per cent from Thane, 68.8 per cent from Raigad, 77.6 per cent from Ratnagiri and 75.2 per cent from Sindhudurg district.

Use of mineral mixture or mineral bricks was followed by crossbred cattle owners of Palghar (8.8%), Thane (27.2%), Raigad (7.2%), Ratnagiri (24%) and Sindhudurg (21.6%) district. Whereas, feeding of unconventional roughages and concentrates during scarcity was adopted by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 65.6 per cent, 68.8 per cent, 63.2 per cent, 72.8 per cent and 70.4 per cent, respectively. Separate processing of concentrates was prominently followed by crossbred cattle owners of Palghar (79.2%), Thane (68.8%), Raigad (81.6%), Ratnagiri (72%) and Sindhudurg (75.2%) district.

In management practices natural method of breeding was followed by Palghar (40.8%), Thane (28.8%), Raigad (44%), Ratnagiri (31.2%) and Sindhudurg (35.2%) district. Whereas, Artificial Insemination (AI) was prominently followed by crossbred cattle owners in Thane (71.2%) district, followed by Ratnagiri, Sindhudurg, Palghar and Raigad district with 68.8 per cent, 64.8 per cent, 59.2 per cent and 56 per cent, respectively. Pregnancy diagnosis was carried out by Palghar (27.2%), Thane (54.4%), Raigad (23.2%), Ratnagiri (44.8%) and Sindhudurg (40.8%) district.

Katcha type of housing was mainly adopted by selected crossbred cattle owners in Palghar (81.6%), Thane (66.4%), Raigad (80%), Ratnagiri (72%) and Sindhudurg (74.4%) district. Whereas, 18.4 per cent from Palghar, 33.6 per cent from Thane, 20 per cent from Raigad, 28 per cent from Ratnagiri and 25.6 per cent from Sindhudurg district adopted Pucca housing type.

Katcha type of flooring was mostly adopted than Pucca type of flooring in Palghar, Thane, Raigad, Ratnagiri, Sindhudurg district with 74.4 per cent, 60 per cent, 73.6 per cent, 63.2 per cent and 64.8 per cent, respectively. Roof tiles were prominently used as a roofing material than Grasses and Asbestos or Cement sheets in Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 45.6 per cent, 48.8 per cent, 51.2 per cent, 63.2 per cent and 71.2 per cent, respectively. Grasses as a roofing material was adopted by crossbred cattle owners of Palghar (36.8%), Thane (14.4%), Raigad (32.8%), Ratnagiri (12%) and Sindhudurg (8%) district. Whereas, Asbestos or Cement sheets were used by 17.6 per cent, 36.8 per cent, 16 per cent, 24.8 per cent and 20.8 per cent crossbred cattle owners from Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district, respectively.

Closed system of housing was majorly adopted by selected crossbred cattle owners than Open system of housing in Palghar (70.4 %), Thane (80%), Raigad (74.4%), Ratnagiri (83.2%) and Sindhudurg (84.8%) district. Whereas, from crossbred cattle owners 29.6 per cent from Palghar, 20 per cent from Thane, 25.6 per cent from Raigad, 16.8

per cent from Ratnagiri and 15.2 per cent from Sindhudurg district adopted Open system of housing.

In health and sanitation practices washing of cattle were carried out by crossbred cattle owners of Palghar (63.2%), Thane (77.6%), Raigad (60%), Ratnagiri (73.6%) and Sindhudurg (70.4%) district. Washing of udder before milking was practiced by all the (100%) crossbred cattle owners of Thane, Ratnagiri and Sindhudurg district except Palghar (99.2%) and Raigad (99.2%) district. Practice of regular cleaning of shed was adopted by 92.8 per cent from Palghar, 100 per cent from Thane, 97.6 per cent from Raigad, 100 per cent from Ratnagiri and 100 per cent crossbred cattle owners from Sindhudurg district.

Washing of floor was practiced by crossbred cattle owners of Palghar (24%), Thane (37.6%), Raigad (22.4%), Ratnagiri (30.4%) and Sindhudurg (28%) district. Practice of vaccination was majorly adopted by crossbred cattle owners of Thane (32%) district, followed by Ratnagiri (28%), Sindhudurg (24.8%), Palghar (16.8%) and Raigad (16%) district. Whereas, Deworming was followed by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri, Sindhudurg district with 14.4 per cent, 29.6 per cent, 12 per cent, 27.2 per cent and 23.2 per cent, respectively.

Spraying against ectoparasites was carried out by crossbred cattle owners of Palghar (21.6%), Thane (32.8%), Raigad (19.2%), Ratnagiri (30.4 %) and Sindhudurg (28%) district. Whereas, Grooming was followed by very less number of crossbred cattle owners from Palghar, Thane, Raigad, Ratnagiri, Sindhudurg district with 6.4 per cent, 20.8 per cent, 4 per cent, 18.4 per cent and 16 per cent, respectively.

Different Financial constraints were faced by crossbred cattle owners of selected districts in Konkan region. High cost of concentrates was faced by Palghar (82.4%), Thane (88%), Raigad (83.2%), Ratnagiri (88.8%) and Sindhudurg (92.8%) district. Whereas, constraint of high cost of green fodder was faced by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 90.4 per cent, 86.4 per cent, 88 per cent, 83.2 per cent and 80.8 per cent, respectively.

Constraint of non-availability of agro-industrial by products was faced by 96.8 per cent from Palghar, 94.4 per cent from Thane, 98.4 per cent from Raigad, 92.8 per cent from Ratnagiri and 91.2 per cent from crossbred cattle owners of Sindhudurg district. Problem regarding low income was majorly faced by crossbred cattle owners of Palghar (96%) district, followed by Raigad (94.4%), Thane (90.4%), Ratnagiri (88%) and Sindhudurg (84.8%) district. Whereas, problem of lack of loan facility was faced by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 80 per cent, 74.4 per cent, 78.4 per cent, 72 per cent and 70.4 per cent, respectively.

Technical constraints like lack of scientific knowledge were faced by crossbred cattle owners of Palghar (92%), Thane (84.8%), Raigad (92%), Ratnagiri (87.2%) and Sindhudurg (89.6%) district. Whereas, lack

of technical guidance was faced by 90.4 per cent from Palghar, 80 per cent from Thane, 92 per cent from Raigad, 82.4 per cent from Ratnagiri and 85.6 per cent of crossbred cattle owners from Sindhudurg district.

Situational constraints like inadequate land holding was faced by Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 95.2 per cent, 91.2 per cent, 92.8 per cent, 87.2 per cent and 84 per cent, respectively. Problem related to lack of irrigation facility was faced by crossbred cattle owners of Palghar (87.2%), Thane (83.2%), Raigad (84.8%), Ratnagiri (79.2%) and Sindhudurg (76%) district. Whereas, shortage of green fodder was faced by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 85.6 per cent, 79.2 per cent, 83.2 per cent, 76 per cent and 72 per cent, respectively.

Constraint of non-availability of labour was faced by 56 per cent from Palghar, 64 per cent from Thane, 54.4 per cent from Raigad, 67.2 per cent from Ratnagiri and 69.6 per cent crossbred cattle owners from Sindhudurg district. Whereas, lack of awareness about use of mineral mixture / mineral block was faced by crossbred cattle owners of Palghar (91.2%), Thane (80%), Raigad (88.8%), Ratnagiri (81.6%) and Sindhudurg (84.8%) district.

Problem related to non-availability of veterinary hospitals or veterinary services was majorly faced by crossbred cattle owners of Palghar (67.2%) district, followed by Raigad (64.8%), Thane (60%), Sindhudurg (55.2%) and Ratnagiri (52.8%) district. Whereas, problem regarding breeding practice was faced by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 19.2 per cent, 14.4 per cent, 16.8 per cent, 10.4 per cent and 12 per cent, respectively. Faulty pregnancy diagnosis was faced by 17.6 per cent from Palghar, 22.4 per cent from Thane, 16.8 per cent from Raigad, 19.2 per cent from Ratnagiri and 20.8 per cent crossbred cattle owners from Sindhudurg district.

Infrastructural constraints include lack of chaff cutter, lack of communication facility and lack of storage facility for feeds and fodders. Lack of chaff cutter was faced by crossbred cattle owners of Palghar (92.8%), Thane (79.2%), Raigad (94.4%), Ratnagiri (84%) and Sindhudurg (87.2%) district. Whereas, lack of communication was faced by crossbred cattle owners of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg district with 72 per cent, 64 per cent, 74.4 per cent, 64.8 per cent and 68 per cent, respectively.

Problem regarding lack of storage facility was very common in Palghar (82.4%), Thane (78.4%), Raigad (84.8%), Ratnagiri (70.4%) and Sindhudurg (74.4%) district and Lack of personal interest about adoption of standard management practices was majorly faced by crossbred cattle owners of Raigad (88.8%) district, followed by Palghar (86.4%), Thane (80.8%), Sindhudurg (77.6%) and Ratnagiri (75.2%) district.

5.2 Conclusions

1) Most of the respondents adopted the practice of feeding colostrum to new born calf and separate processing of concentrate mixture. More than half of the crossbred cattle owners provide pregnancy allowance ration to pregnant animals.
2) Major crossbred cattle owners adopted the practice of conservation of feeds and fodders. Similarly, feeding of dry matter @ 2 to 2.5 kg/100 kg body weight of animal was followed by most of the respondents in a study area.
3) Most of the respondents were not adopted enrichment of poor quality straw by urea and feeding of silage. Very few cattle owners used mineral mixture or mineral bricks. However, majority of the crossbred cattle owners adopted grazing + stall feeding type of feeding practices.
4) About half of the respondents were unable to provide green fodder to their animals. Majority of the crossbred cattle owners chaff green fodder and dry fodder manually.
5) More than half of the respondents in a study area adopted the A.I. method of breeding and very few crossbred cattle owners adopt the practice of pregnancy diagnosis.
6) With regards to health and sanitation, most of the crossbred cattle owners adopted the practice such as washing of cattle, washing of udder before milking and regular cleaning of shed. Whereas, very few crossbred cattle owners adopt the practice of vaccination, deworming, spraying against ectoparasites and grooming.
7) More than half of the respondents reared animals in Katcha housing with Katcha flooring. Majority of crossbred cattle owners were using Roof tiles as roofing material and majority of cattle owners were adopted close system of housing.
8) In financial constraints involved high cost of concentrates, green fodder, non-availability, low income and lack of loan facility. Technical constraints involved the lack of scientific knowledge and technical guidance.
9) In situational constraints involved inadequate land holding, lack of irrigation facility, shortage of green fodder, non-availability of labour, lack awareness about use of mineral mixture and non-availability of veterinary hospitals. Infrastructural constraints involved the lack of chaff cutter, communication and storage facility.

Hence, it is concluded that there is need to improve management of crossbred cattle on scientific line which includes, proper feeding, housing and health care. Therefore, regular training programs of dairy cattle owners in the area *viz.,* vaccination, deworming, fodder cultivation, AI etc. should be undertaken to make the dairy sector sustainable in Konkan region of Maharashtra to increase the production of crossbred cattle.

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APPENDIX-I

INTERVIEW SCHEDULE

Thesis Title

"STUDIES ON MANAGEMENT PRACTICES FOLLOWED BY CROSSBRED CATTLE OWNERS IN KONKAN REGION"

Name of Researcher :-Kadam Nikhil Prakash

1. Name of the cattle owner :-.....

2. Name of village :- .....

3. Tehsil :-.....

4. District :-.....

5. Information about land holding:-

6. Annual Income: -.....

7. Distribution of farmer according to herd size:-

Sr. No.	No. of animal	Crossbred cattle		Total	Percent
		Male	Female		
1	Upto 2				
2	3 to 5				
3	6 to 10				
4	More than 10				

8. Different Feeding practices adopted by Crossbred cattle owners:-

Sr. No.	Feeding practices	Yes	No
1	System of feeding		
	i. Grazing		
	ii. Stall feeding		
	iii. Grazing + Stall feeding		
2	Feeding of milch animal		
	i. Individual milch animal		
	ii. Group feeding of animals		
3	Frequency of feeding		
	i. Once in a day		
	ii. Twice in a day		
	iii. Thrice or more in a day		
4	Feeding colostrum to new born calf		

5	Processing of roughages & concentrate before feeding (chaffing, crushing, soaking. etc.)		
6	Enrichment of poor qualities straw by Urea		
7	Chaffing of green fodder and dry fodder		
	a. Manual chaffing		
	b. Machinery chaffing		
8	Feeding of green fodder		
9	Feeding of silage		
10	Conservation of feeds and fodder eg. Stacking, Hay making etc.		
11	Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal		
12	Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration		
13	Type of concentrates		
	i. Homemade concentrates		
	ii. Readymade purchased concentrates		
14	Pregnancy allowance ration for pregnant animal		
15	Use of mineral mixture or mineral block		
16	Feeding of unconventional roughages and concentrates during scarcity		
17	Processing of concentrate mixture		
	i. Separate processing of concentrates		
	ii. Processing of concentrates with roughages		

6. Adoption of recommend management practices:-

Sr. No.	Management practices	Yes	No
1	**Breeding Management**		
	a. Method of Breeding (Natural/A.I method)		
	b. Pregnancy Diagnosis		
2	**Animal housing management**		
	a. Type of housing (Katcha/Pucca)		
	b. Type of flooring (Katcha/Pucca)		
	c. Type of roofing material (grasses/ Asbestos or Cement sheets/ Roof tiles)		
	d. System of housing		

3	**Health and sanitation**		
	i. Washing of cattle		
	ii. Washing of udder before milking		
	iii. Regular cleaning of shed		
	iv. washing of floor		
	v. vaccination		
	vi. Deworming		
	vii. Spraying against ectoparasites		
	viii. Grooming		

7. Constraints in feeding and management practices:-

Sr. No	Constraints	Yes	No
1	**Feeding constraints**		
	i. High cost of concentrates		
	ii. High cost of green fodder		
	iii. Non availability of agro-industrial by products		
	iv. Low income		
	v. Lack of loan facility		
2	**Technical constraints:**		
	i. Lack of scientific knowledge		
	ii. Lack of technical guidance		
3	**Situational constrains:**		
	i. Inadequate land holding		
	ii. Lack of irrigation facility		
	iii. Shortage of green fodder		
	iv. Non availability of labour		
	v. Lack of awareness about use of mineral mixture or mineral block		
	vi. Non availability of veterinary hospitals		
	vii. Breeding problems eg. Repeat breeding or abortions		
	viii. Faulty pregnancy diagnosis		
4	**Infrastructural constraints:**		
	i. Lack of chaff cutter		
	ii. Lack of communication		
	iii. Lack of storage facility		
5	**Personal interest:**		
	i. Lack of interest about adoption of standard management practices		

APPENDIX-II

List of Abbreviations

%	-	per cent
eg.	-	For example
@	-	at the rate of
^{0}C	-	Degree Celsius
CP	-	crude protein
DM	-	dry matter
et al.	-	et alia (and others)
etc.	-	et cetera
GDP	-	Gross domestic product
Fig.	-	Figure
ha.	-	Hectare
i.e.	-	That is
Kg.	-	Kilogram
Lit.	-	Liter
LLF	-	Landless farmer
LF	-	Large farmer
Med F	-	Medium farmer
MF	-	Marginal farmer
m	-	Meter
mm	-	millimeter
No.	-	Number
NS	-	Non-significant
SM	-	Small farmer
S.E.$\pm$	-	Standard error of means
Sig.	-	Significant
Std.	-	Standard
TDN	-	Total digestible nutrients
Viz.	-	Namely

INDIA

MAHARSHTRA

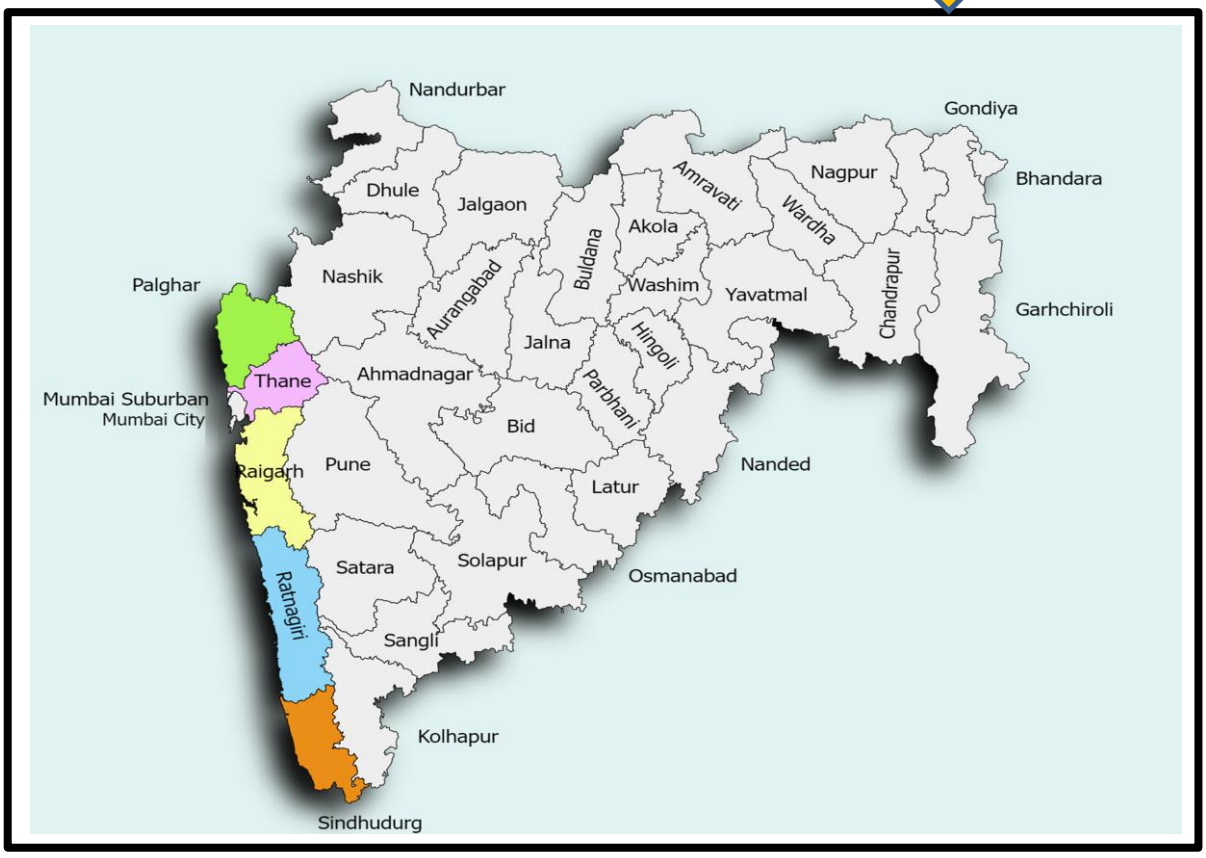


PLATE NO. 1: LOCATION MAP INDICATING STUDY AREA

PLATE NO. 2: COLLECTION OF INFORMATION FROM CROSSBRED CATTLE OWNERS BY PERSONAL INTERACTION

PLATE NO. 3: SYSTEM OF FEEDING FOR CROSSBRED CATTLE

PLATE NO. 4: MACHINARY CHAFFING OF FODDER

PLATE NO. 5: CONSERVATION OF FEEDS AND FODDER

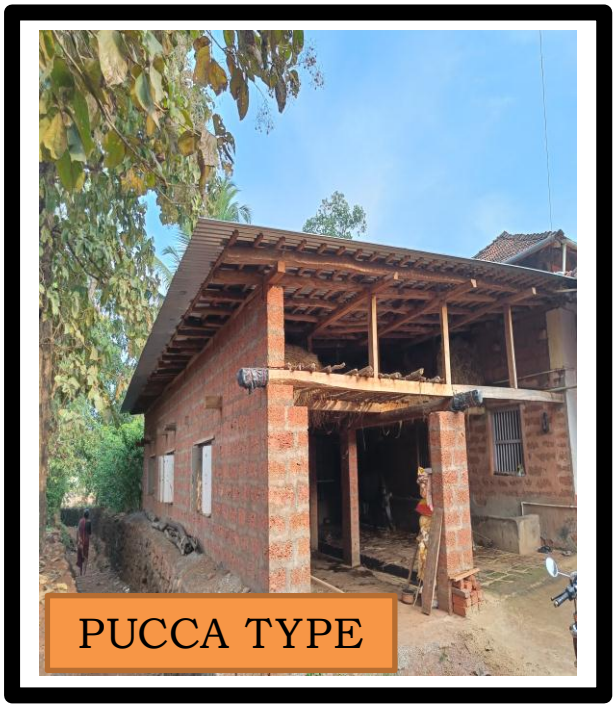
HOMEMADE CONCENTRATES

READYMADE PURCHASED CONCENTRATES

READYMADE PURCHASED CONCENTRATES

PLATE NO. 6: TYPE OF CONCENTRATES USED

PLATE NO. 7: USE OF MINERAL MIXTURE or MINERAL BLOCK



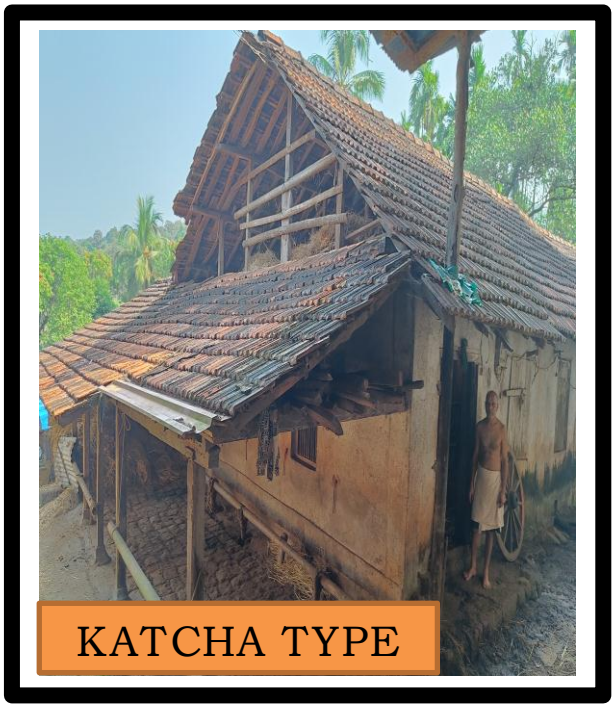
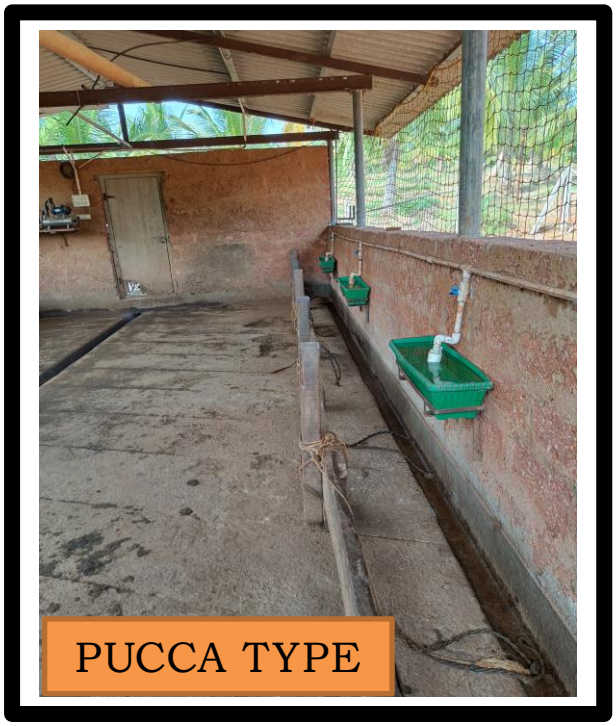


PLATE NO. 8: TYPE OF HOUSING



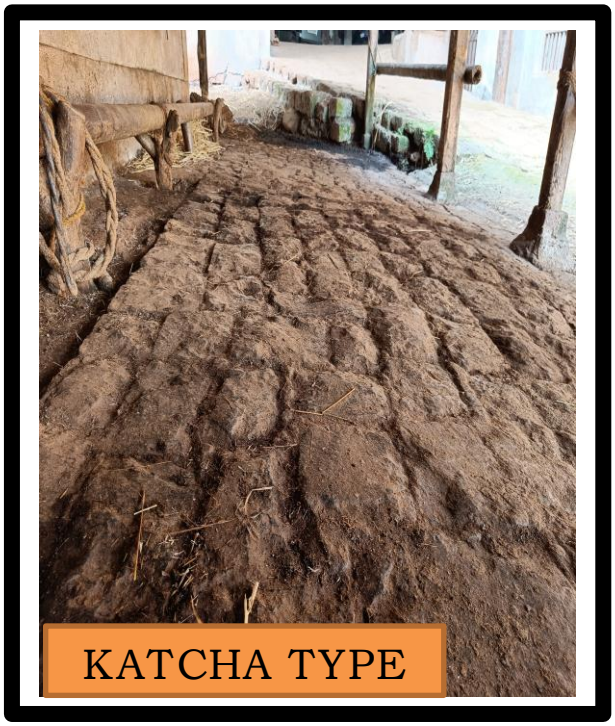
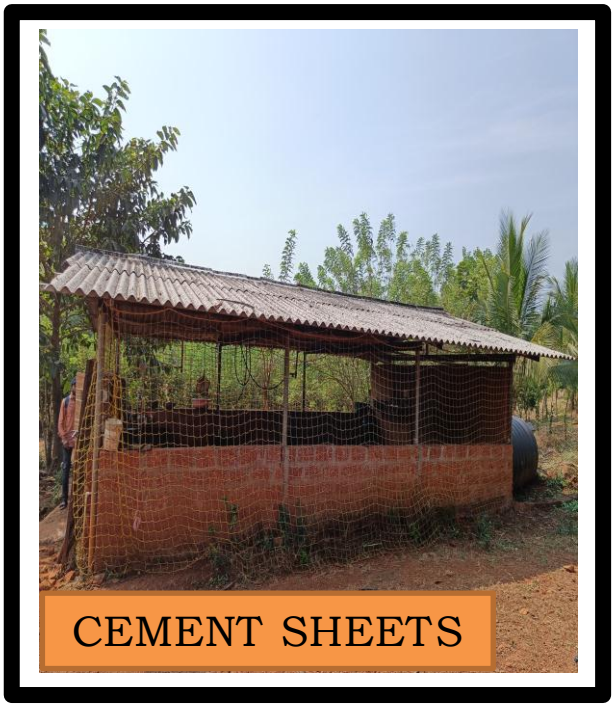


PLATE NO. 9: TYPE OF FLOORING



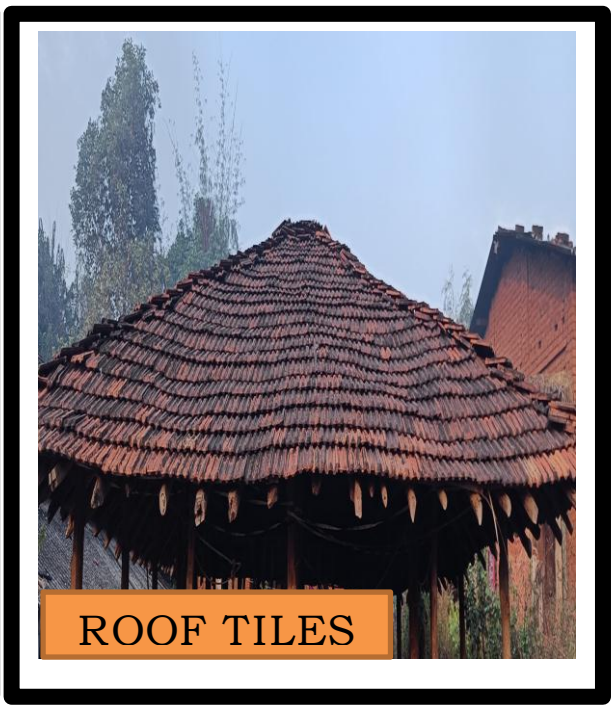
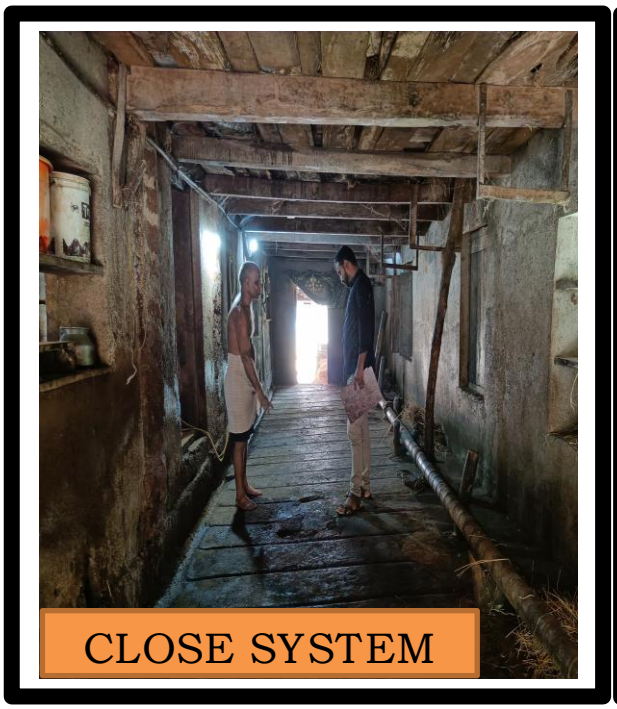


PLATE NO. 10: TYPES OF ROOFING



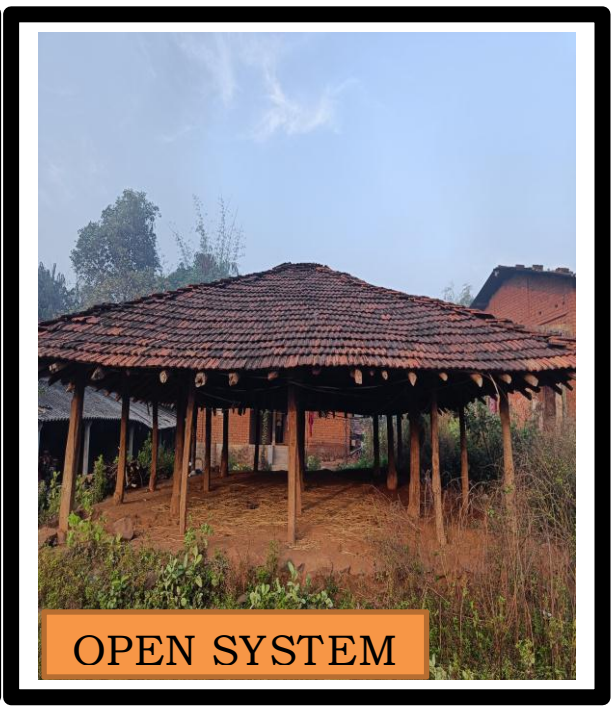


PLATE NO. 11: SYSTEM OF HOUSING

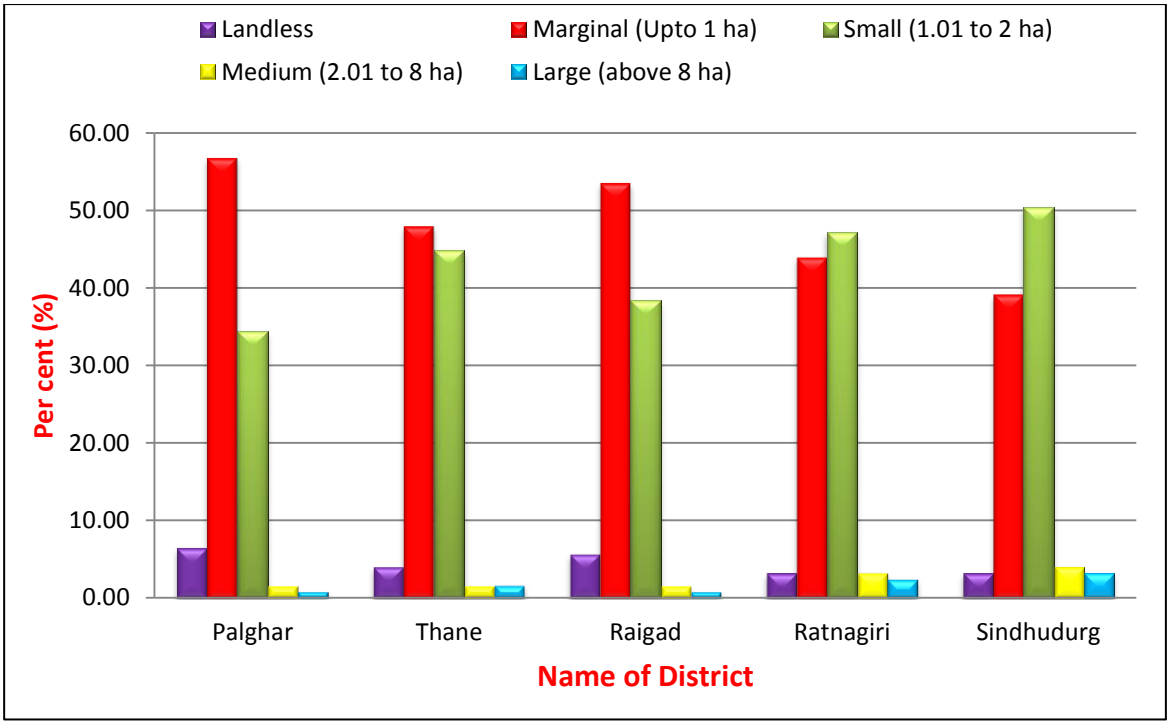


Fig. No. 1: Classification of farmers according to size of land holding

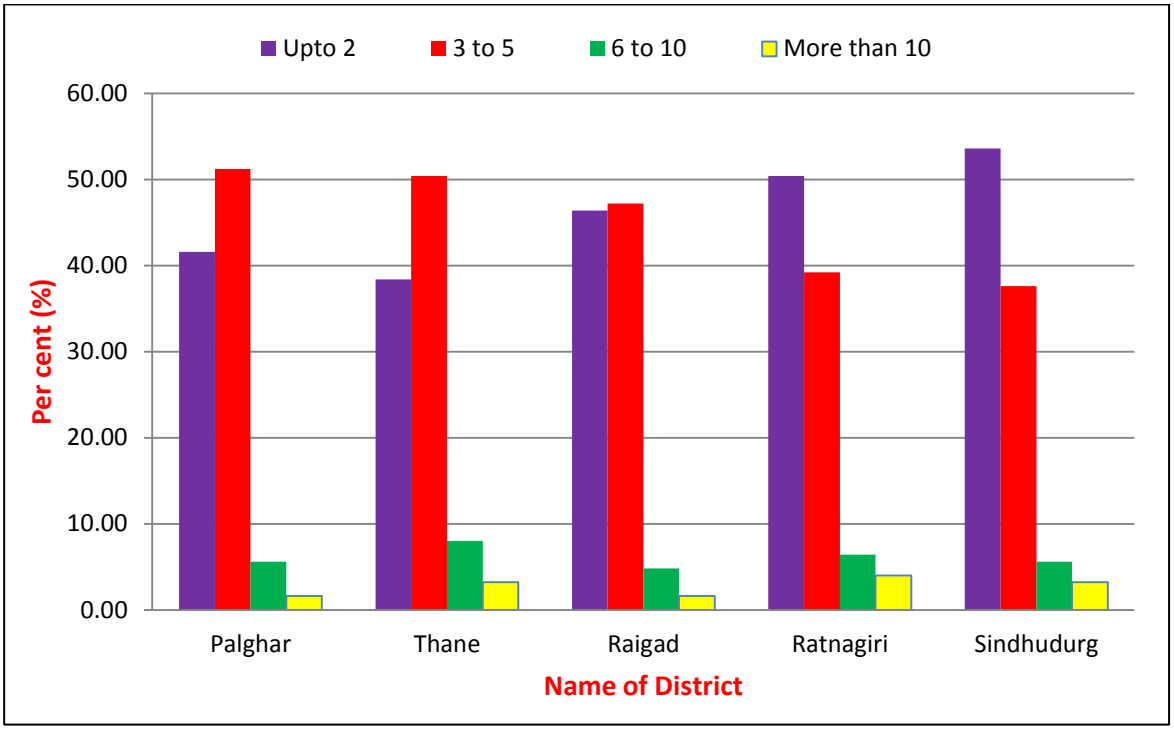


Fig. No. 2: Classification of farmers according to herd size

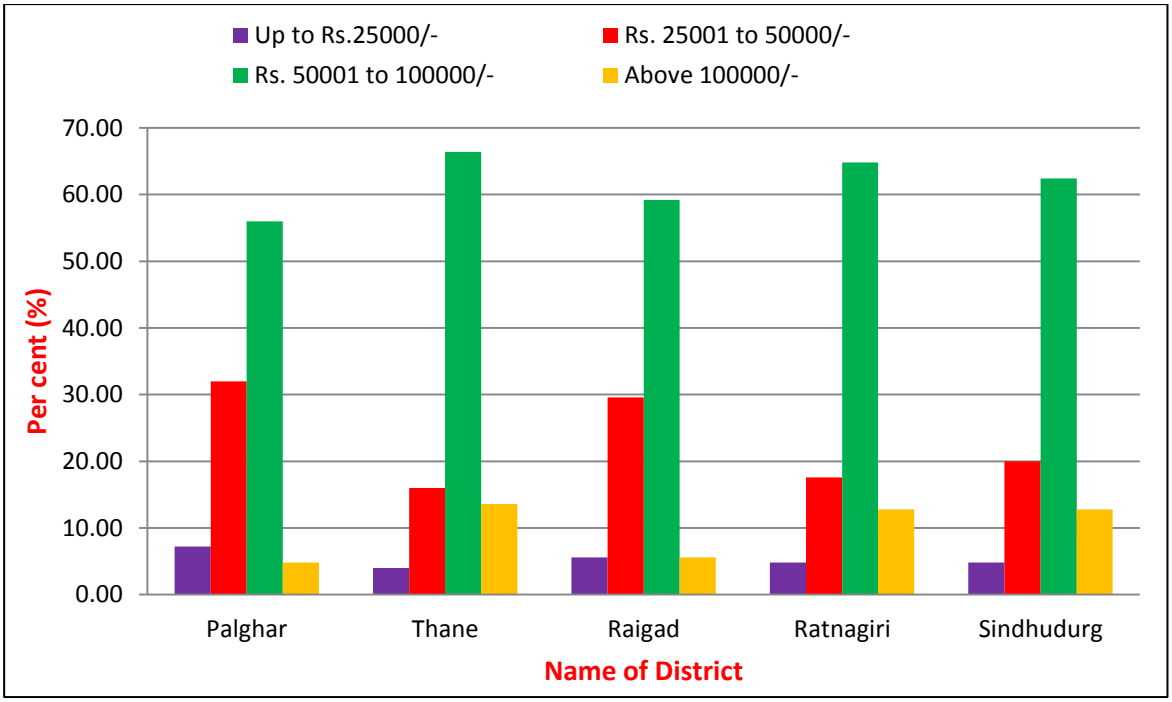


Fig. No. 3: Classification of farmers according to annual income

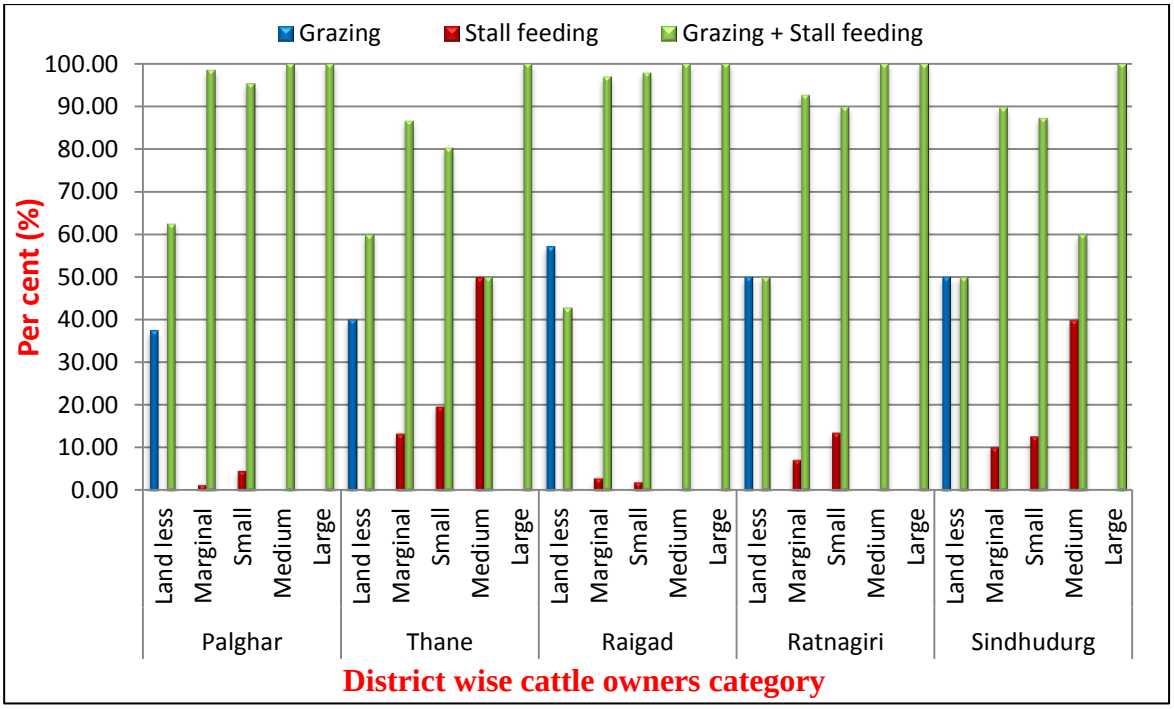


Fig. No. 4: System of feeding adopted by crossbred cattle owners

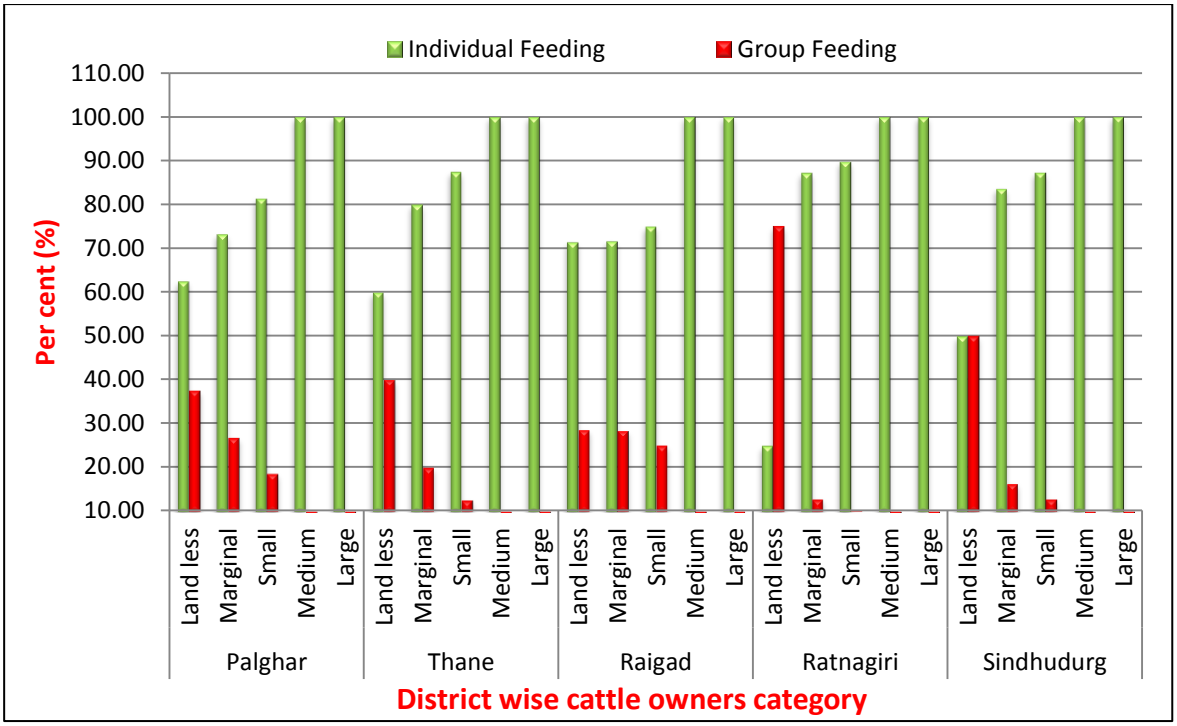


Fig. No. 5: Concentrates feeding to milch animal

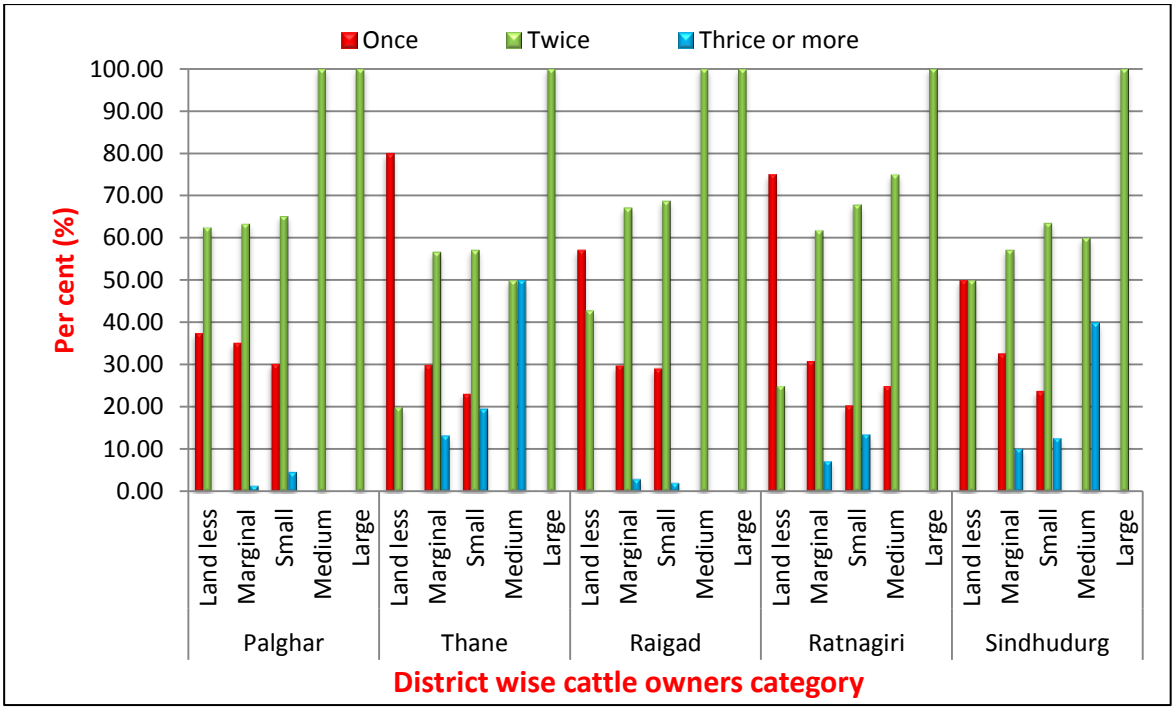


Fig. No. 6: Frequency of feeding

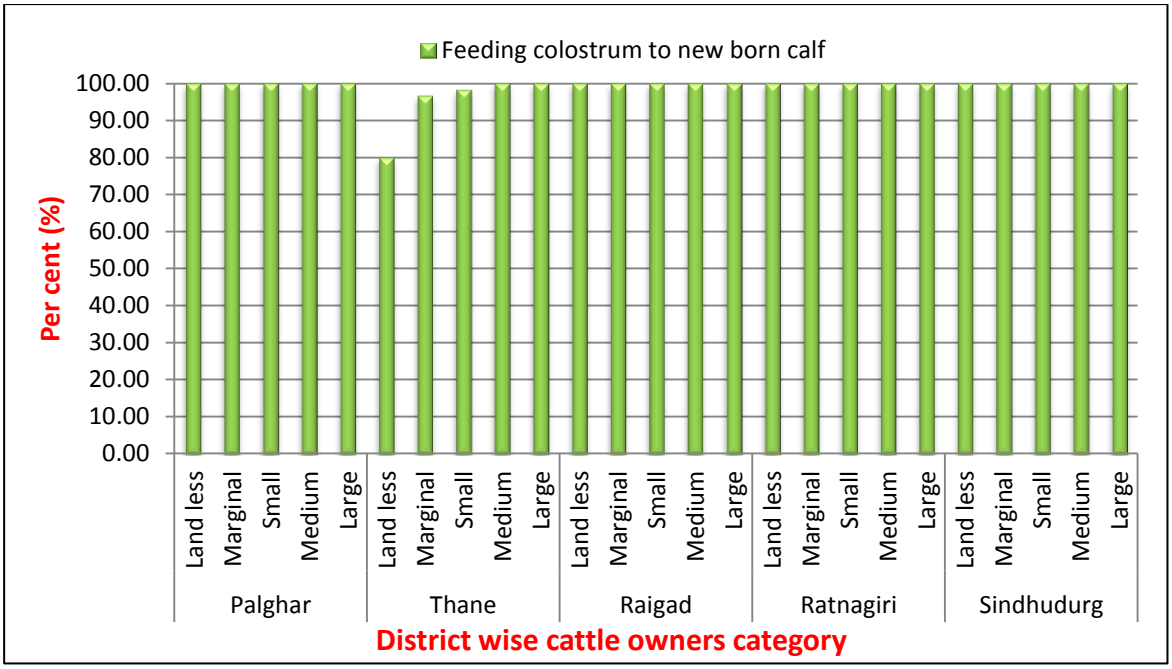


Fig. No. 7: Feeding colostrum to new born calf

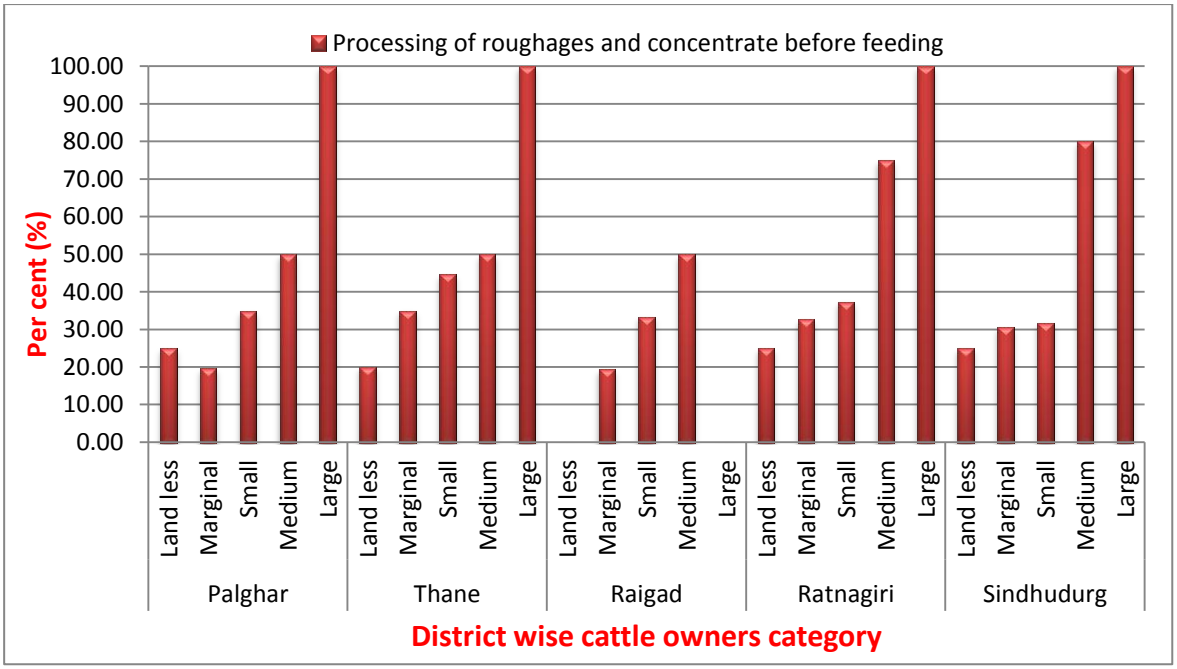


Fig. No. 8: Processing of roughages and concentrate before feeding

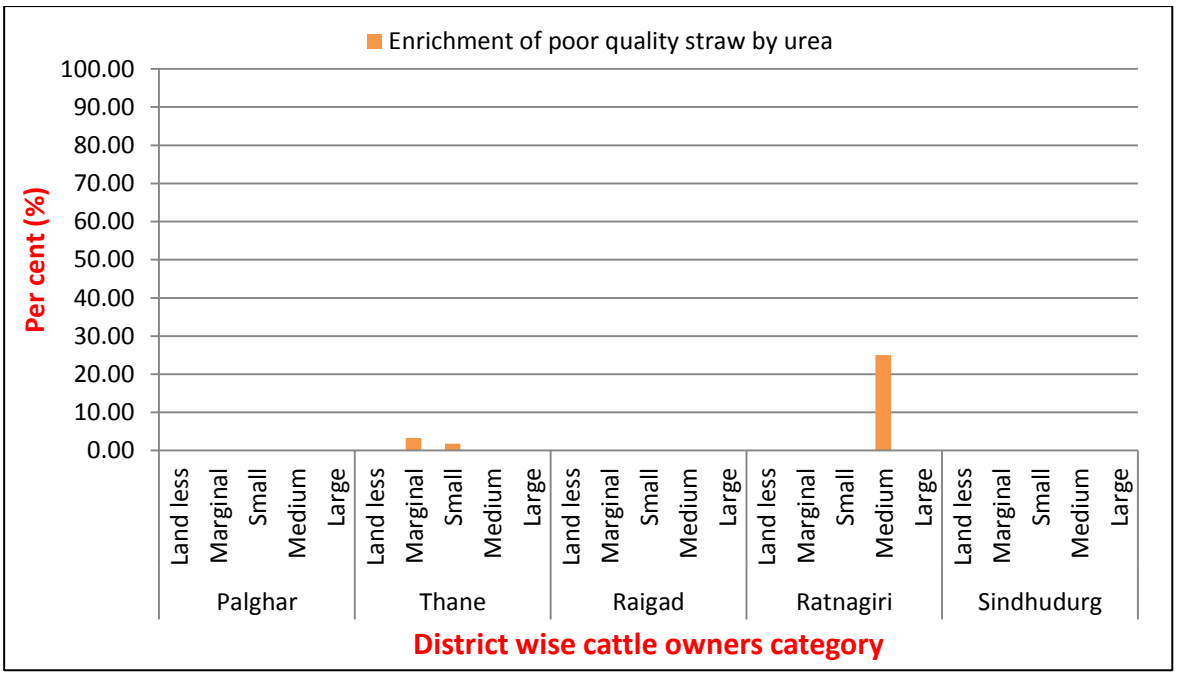


Fig. No. 9: Enrichment of poor quality straw by urea

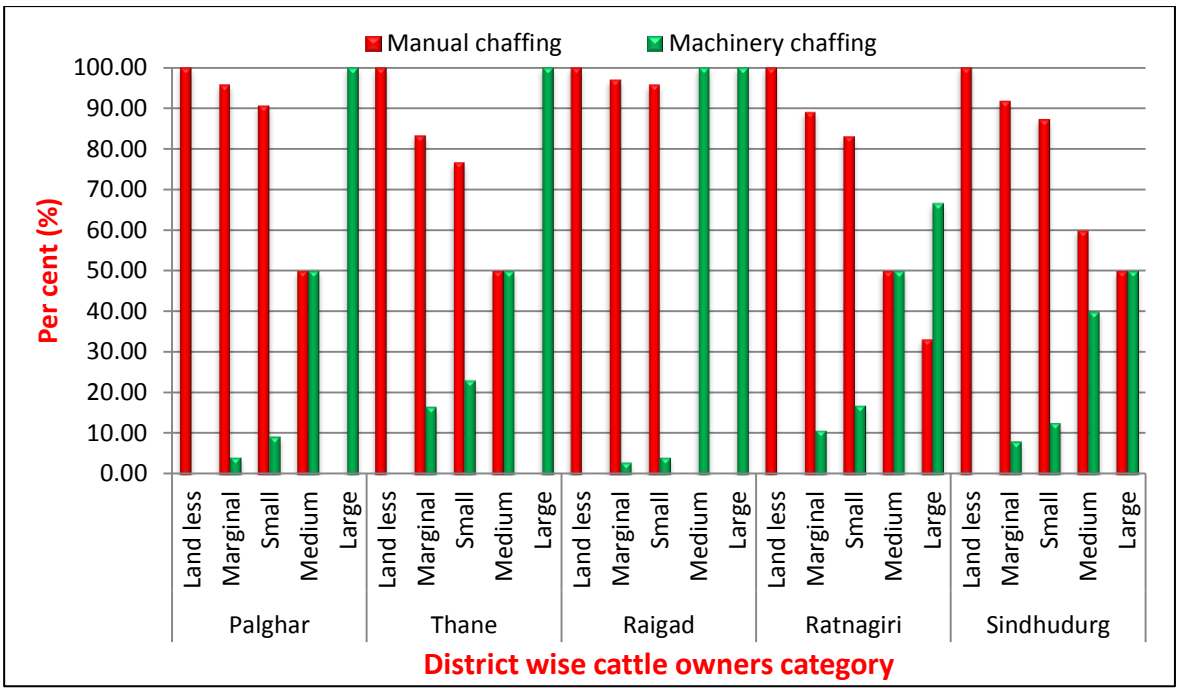


Fig. No. 10: Chaffing of green fodder and dry fodder

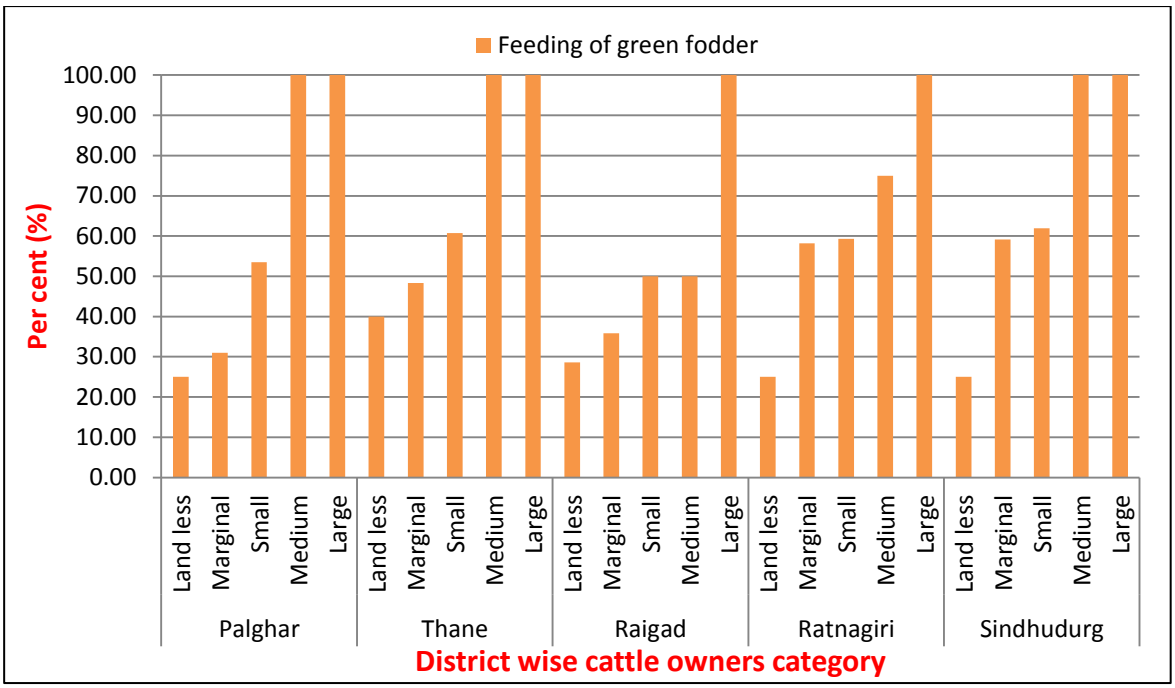


Fig. No. 11: Feeding of green fodder

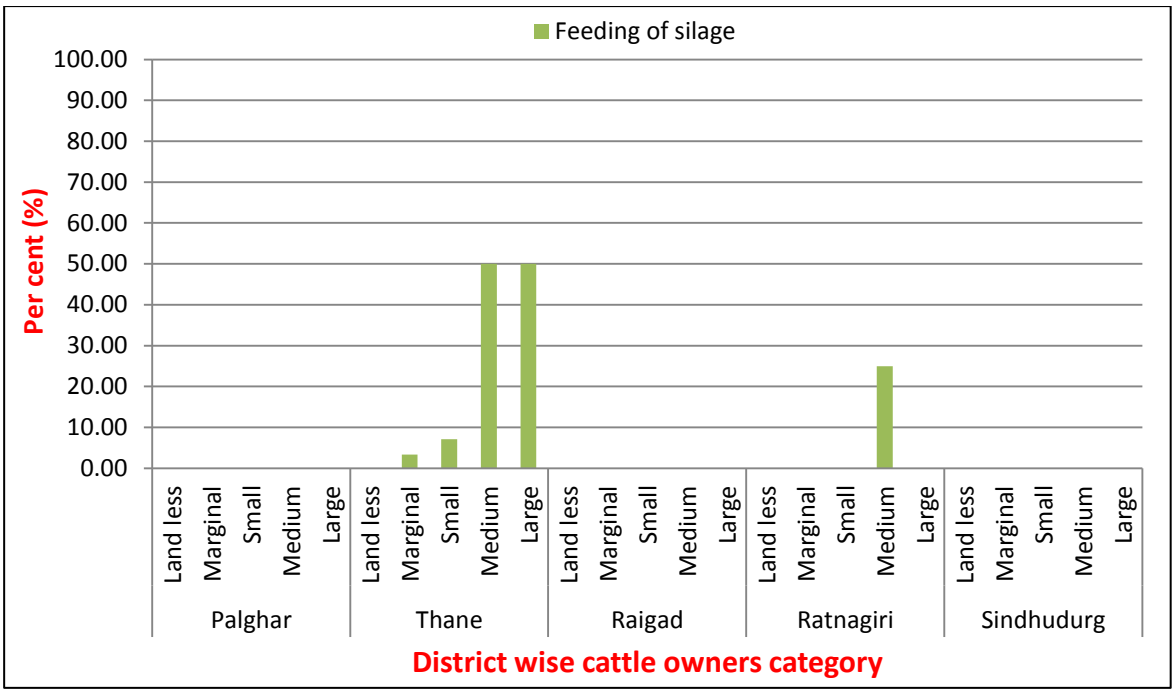


Fig. No. 12: Feeding of silage

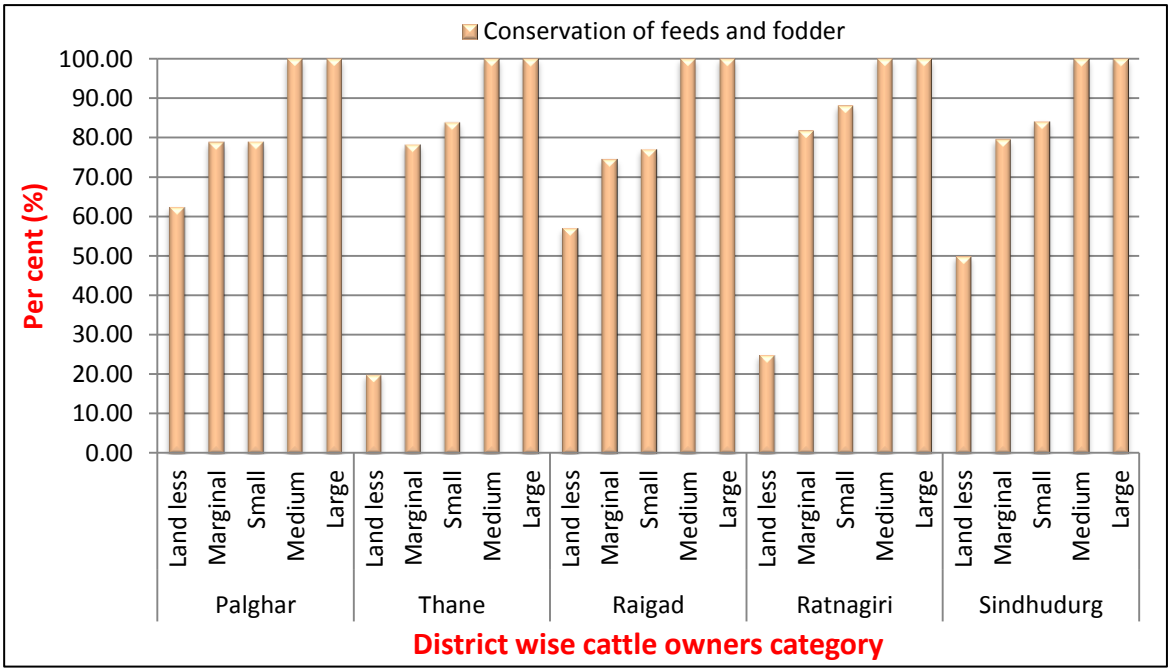


Fig. No. 13: Conservation of feeds and fodder

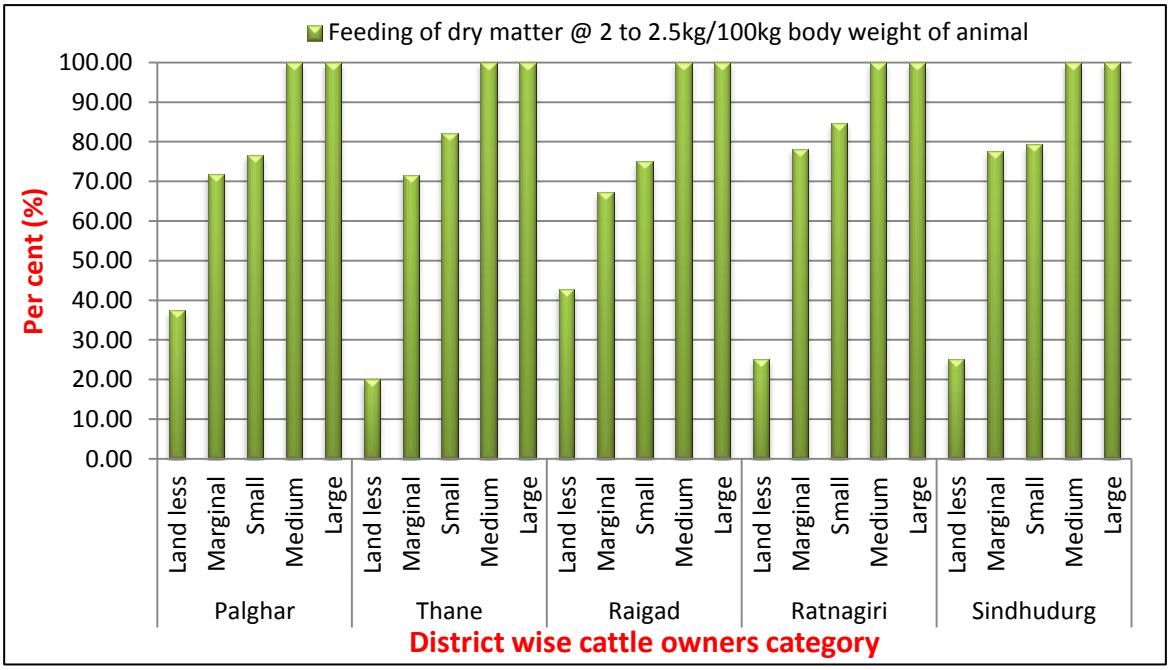


Fig. No. 14: Feeding of dry matter @ 2 to 2.5kg/100kg body weight of animal

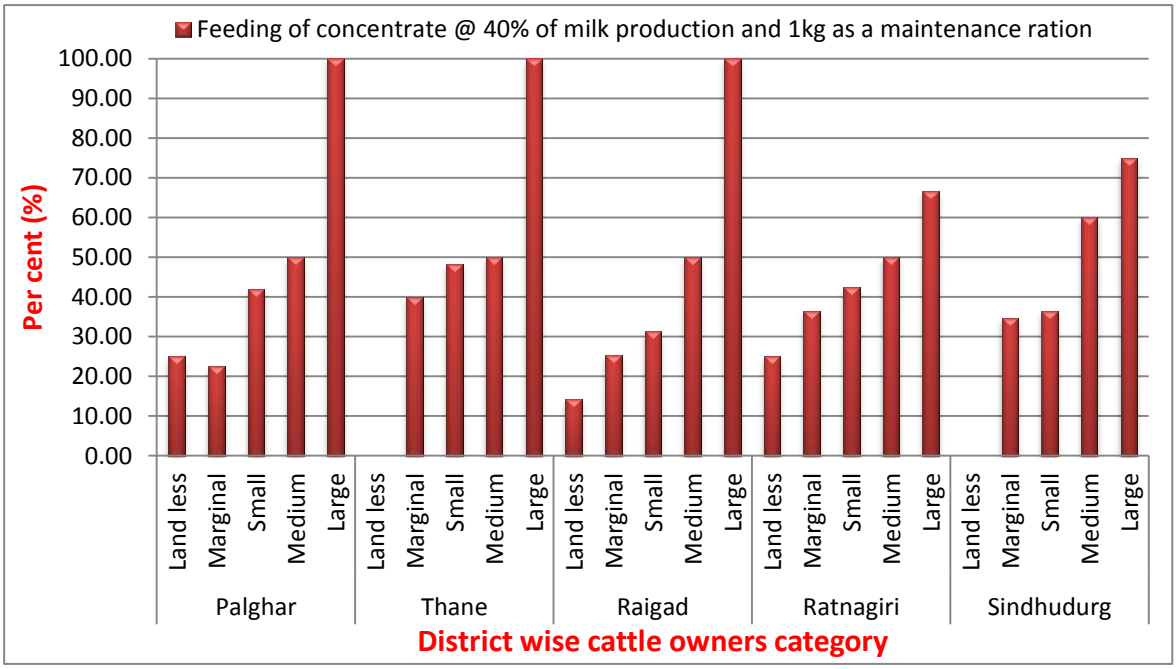


Fig. No. 15: Feeding of concentrate @ 40% of milk production and 1kg as a maintenance ration

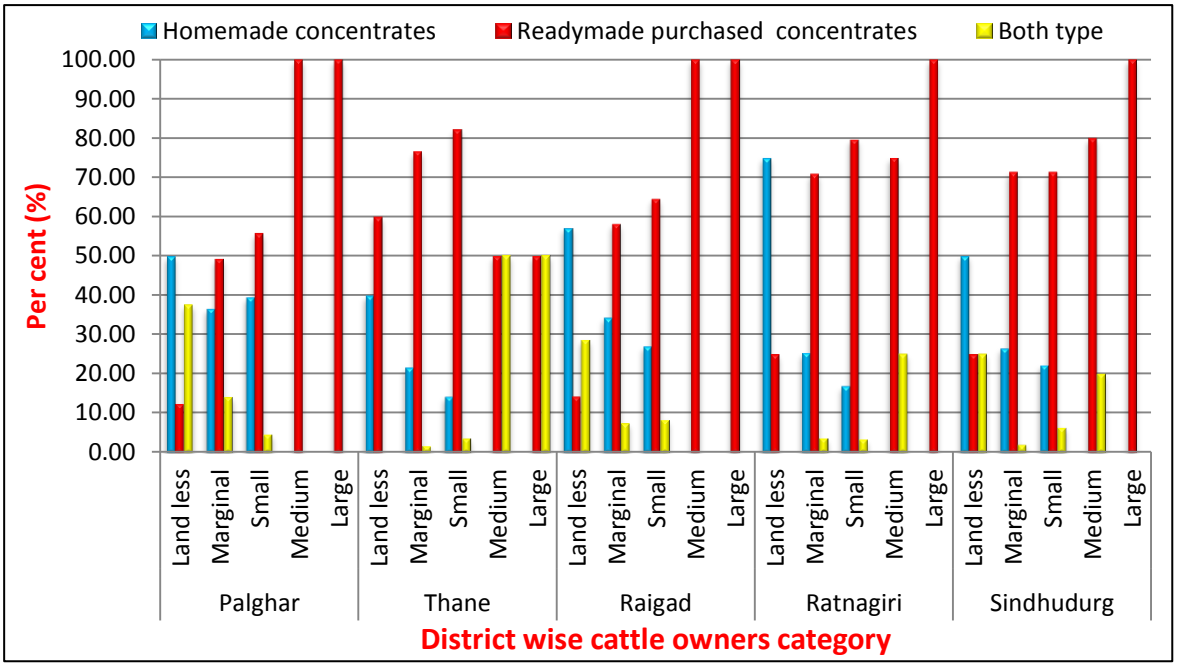


Fig. No. 16: Type of concentrates

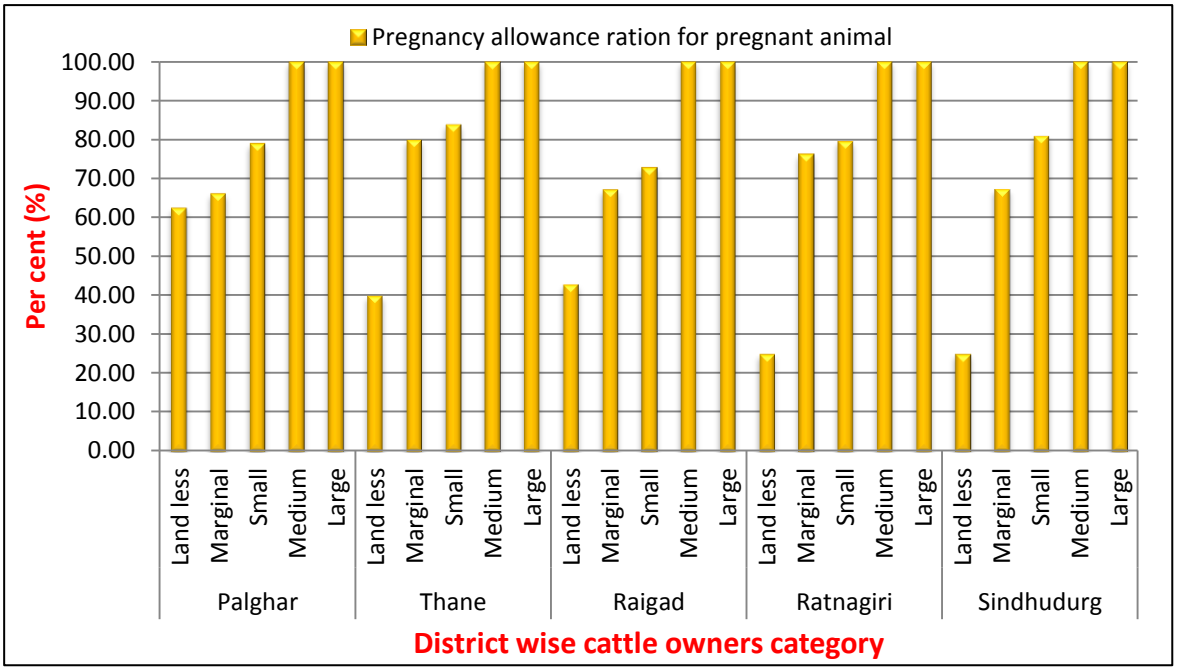


Fig. No. 17: Pregnancy allowance ration for pregnant animal

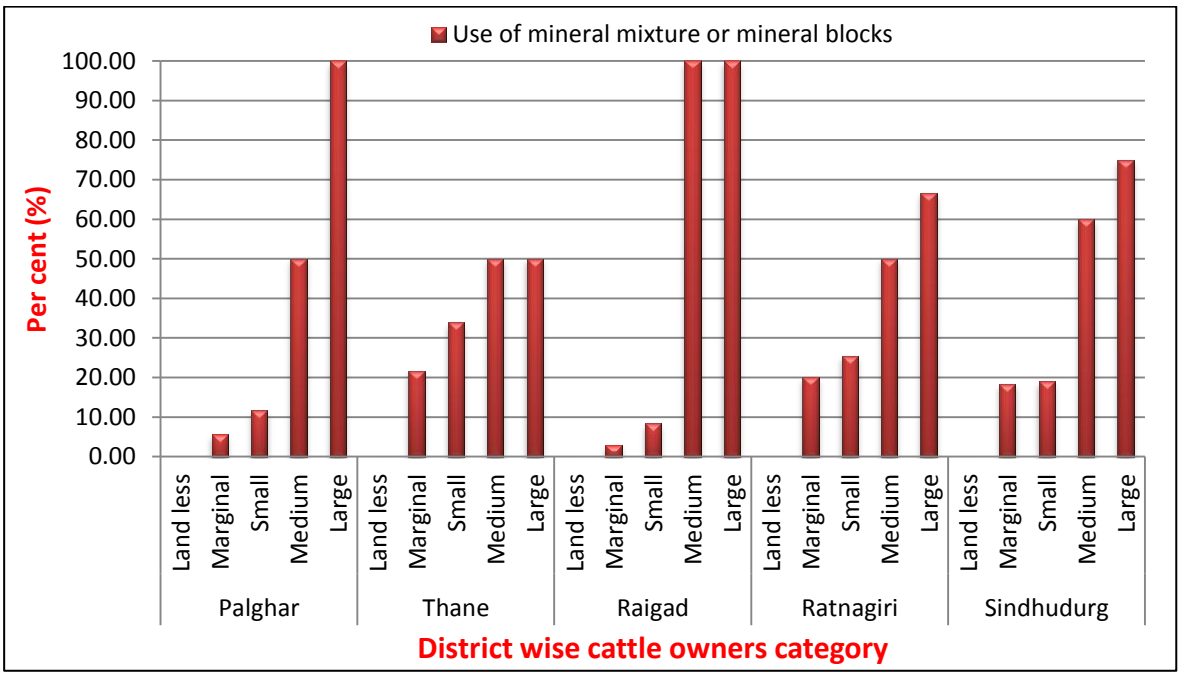


Fig. No. 18: Use of mineral mixture or mineral blocks

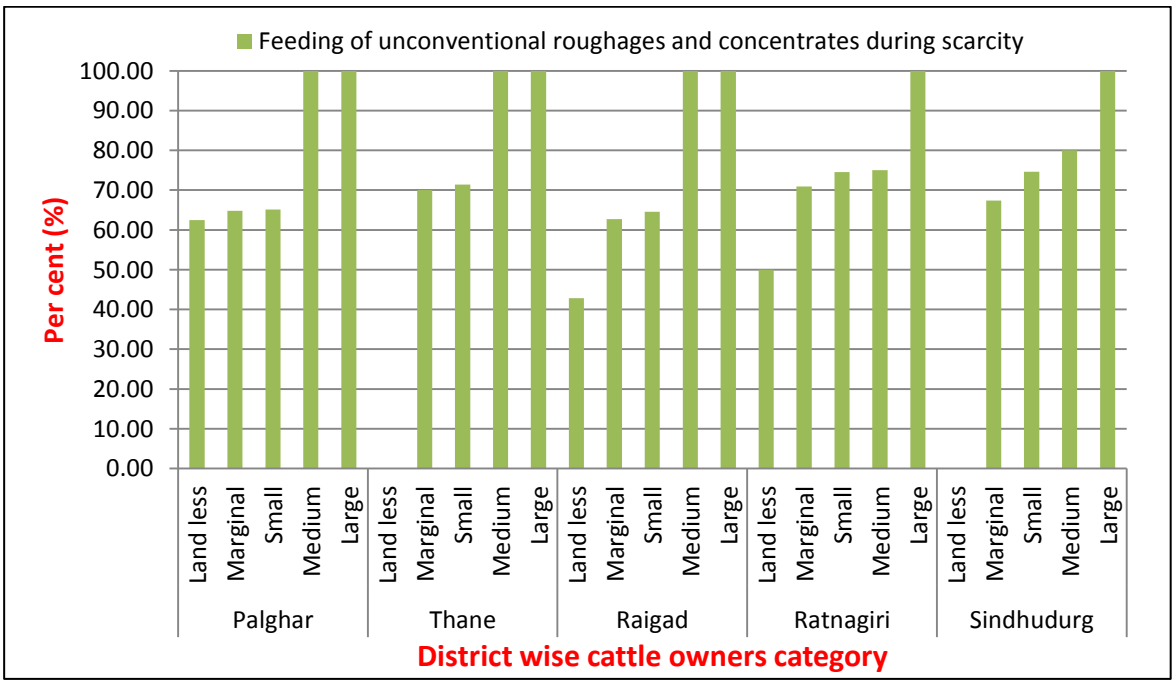


Fig. No. 19: Feeding of unconventional roughages and concentrates during scarcity

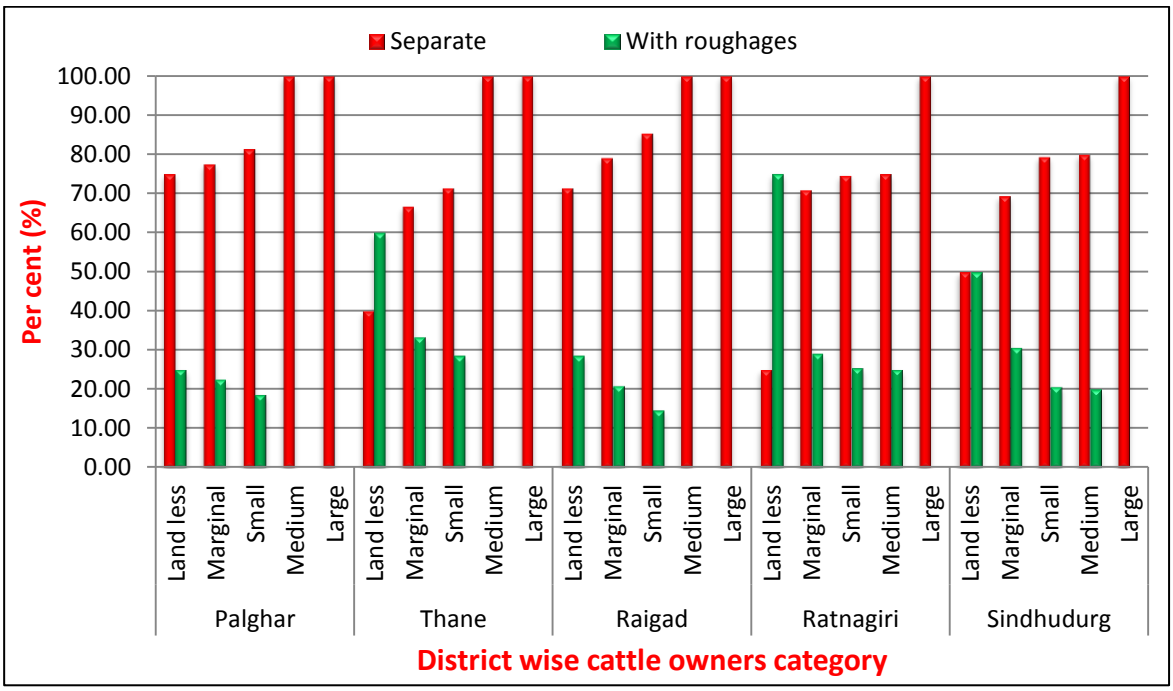


Fig. No. 20: Processing of concentrate mixture

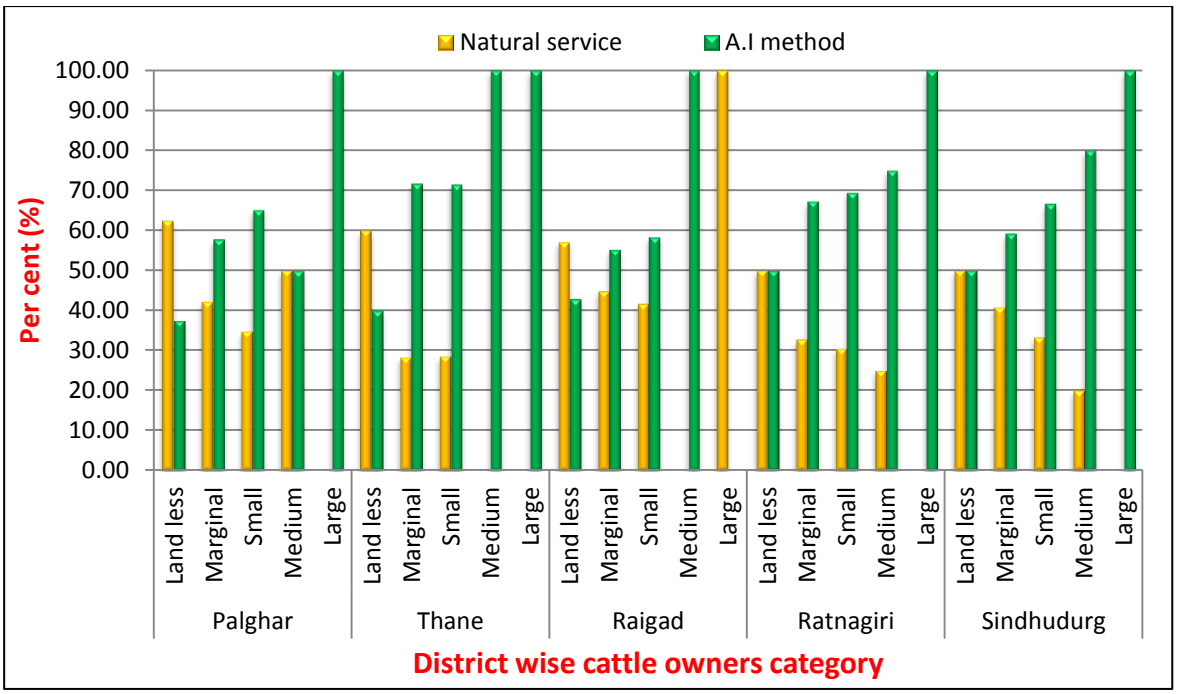


Fig. No. 21: Breeding method adopted by crossbred cattle owners in Konkan region

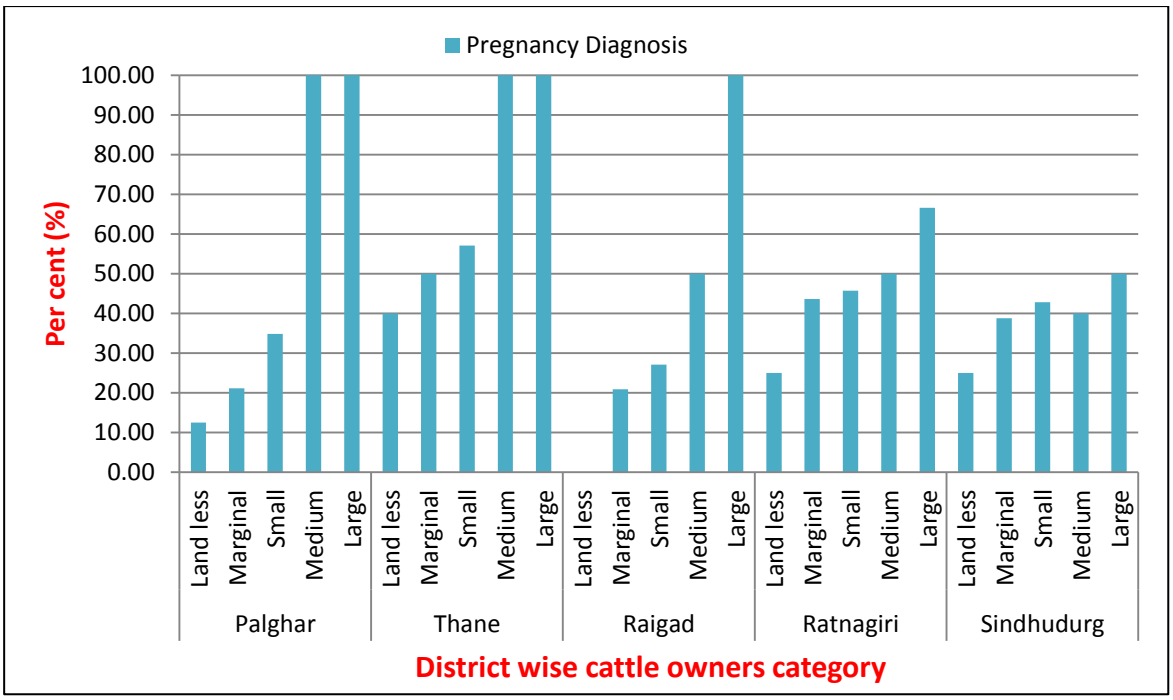


Fig. No. 22: Adoption of Pregnancy Diagnosis practice by crossbred cattle owners in Konkan region

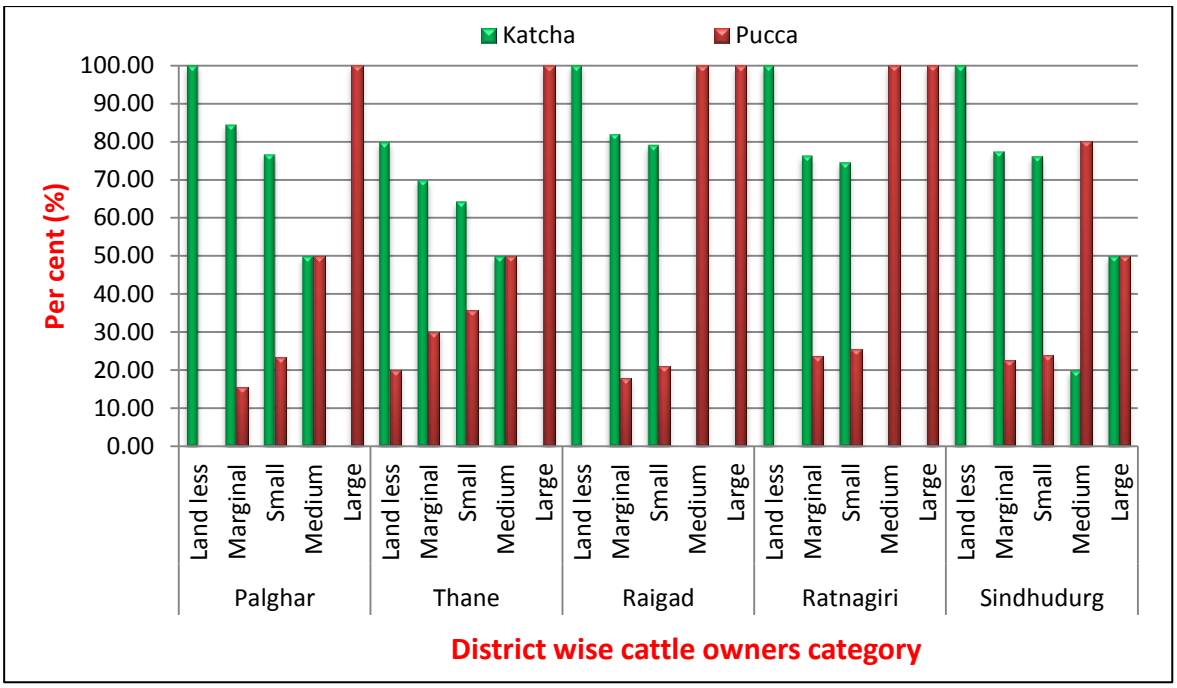


Fig. No. 23: Type of housing for crossbred cattle in Konkan region

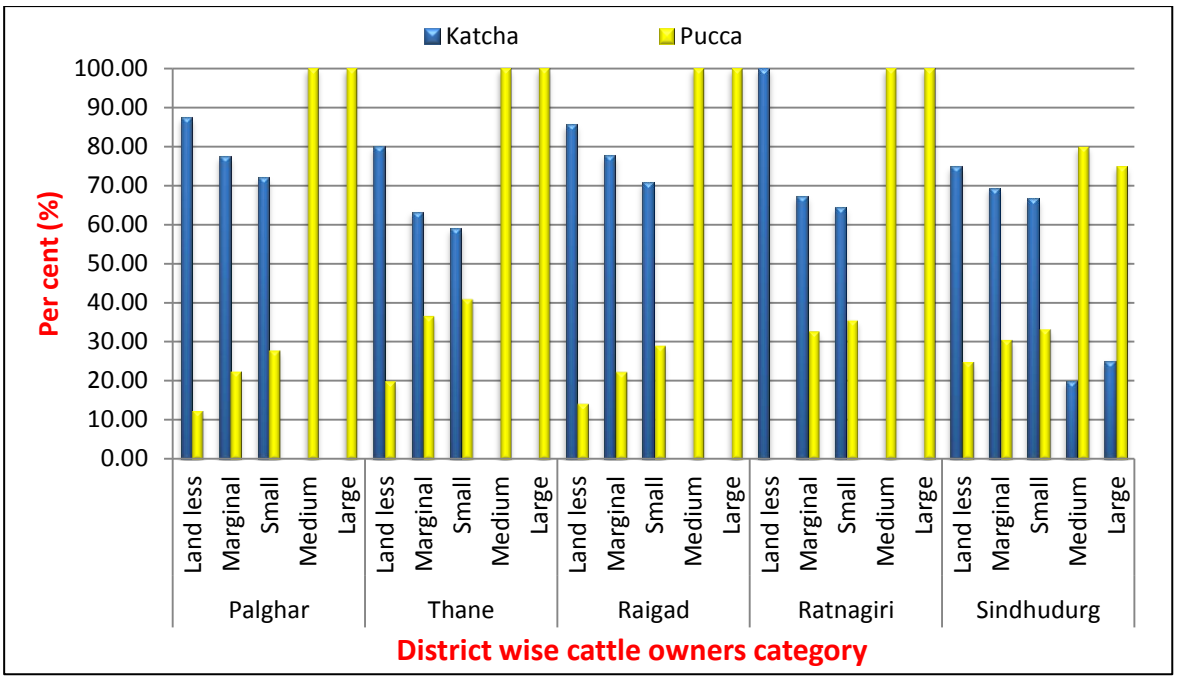


Fig. No. 24: Type of flooring of house for crossbred cattle in Konkan region

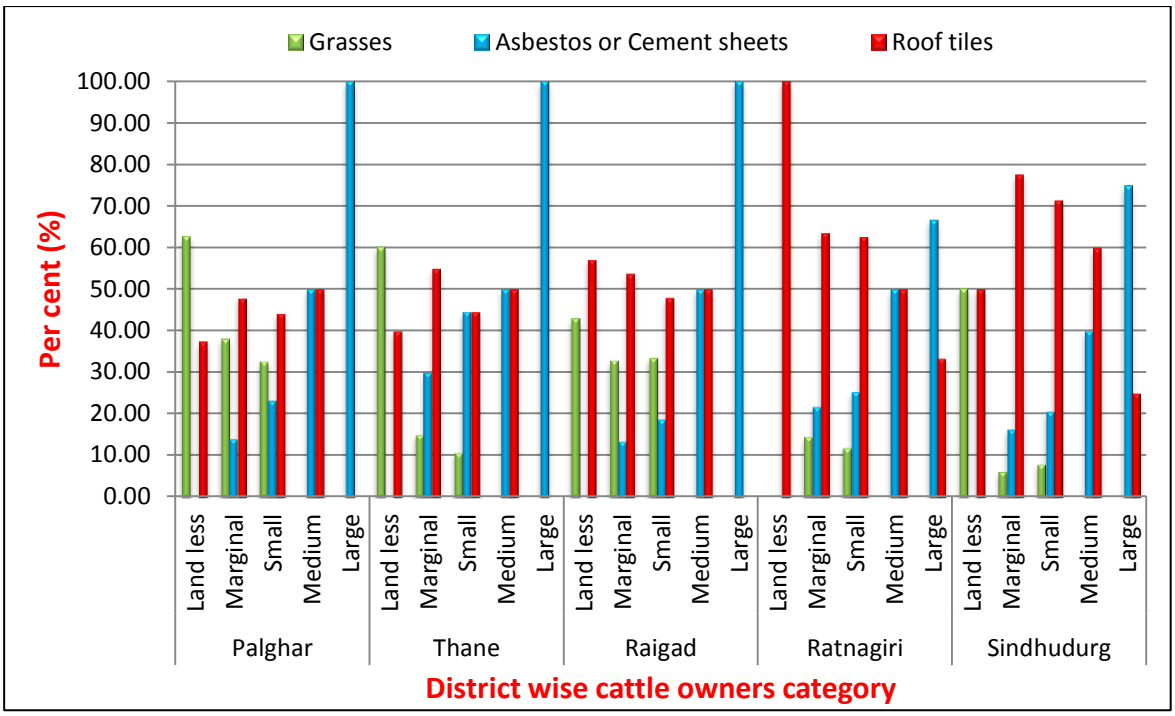


Fig. No. 25: Type of roofing material used for housing of crossbred cattle in Konkan region

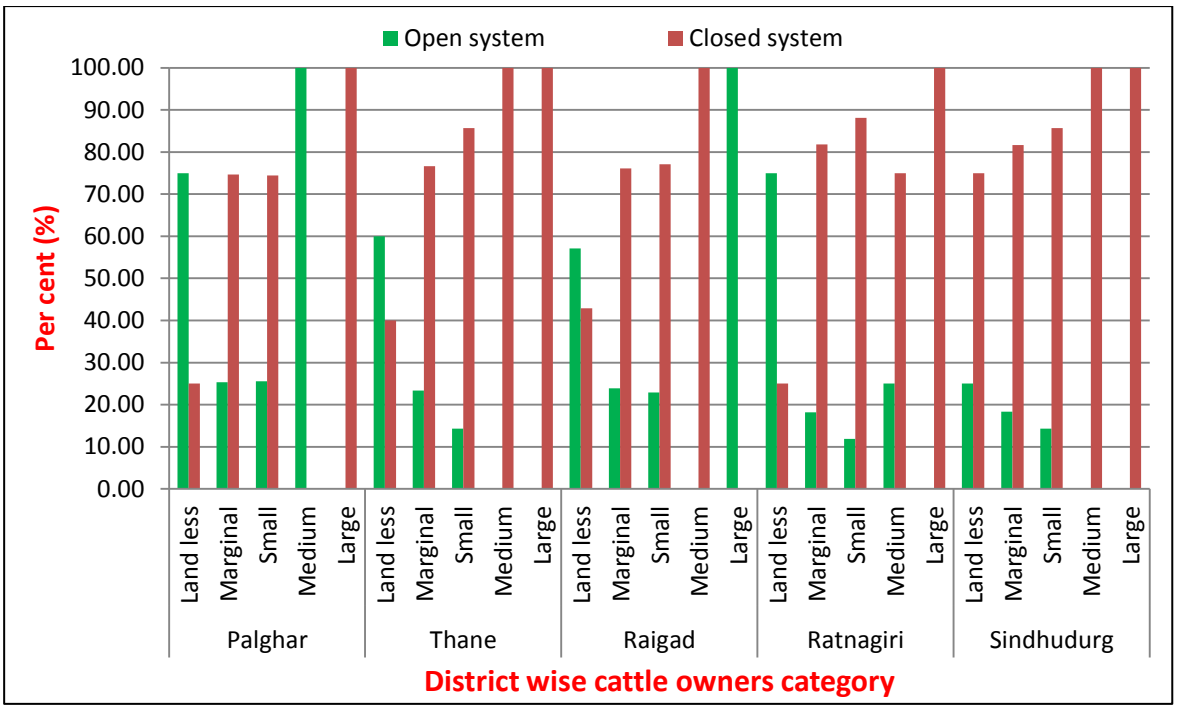


Fig. No. 26: System of housing for crossbred cattle in Konkan region

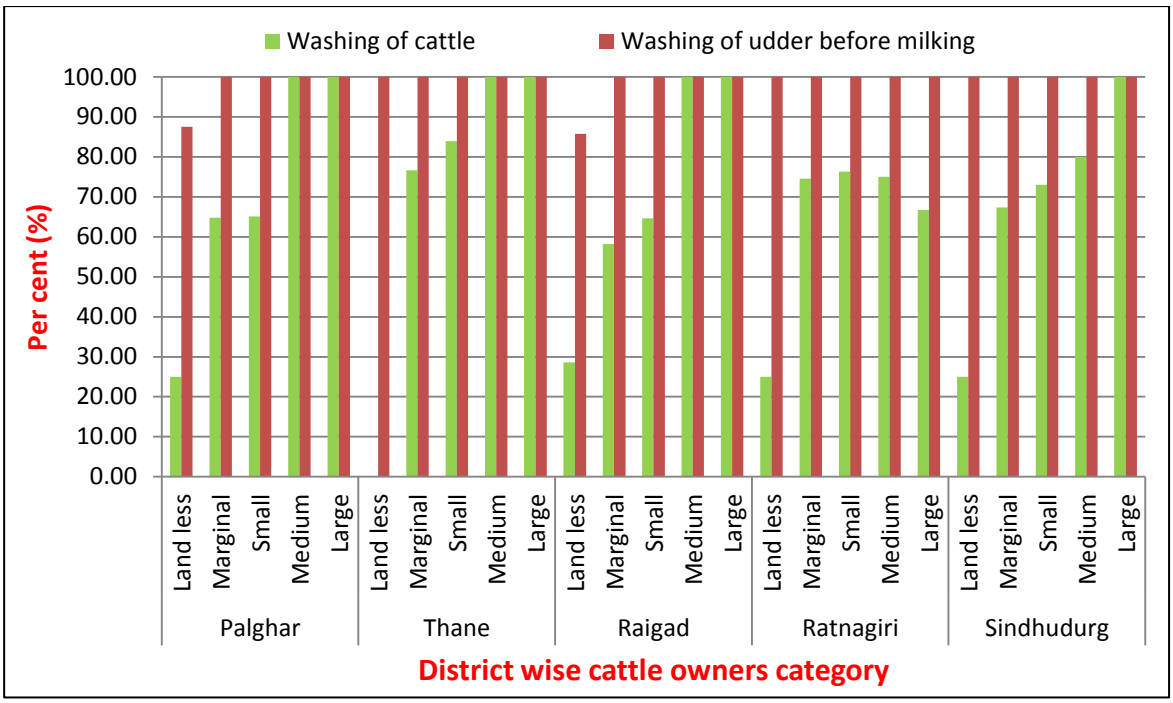


Fig. No. 27: Washing of crossbred cattle and Washing of udder before milking in Konkan region

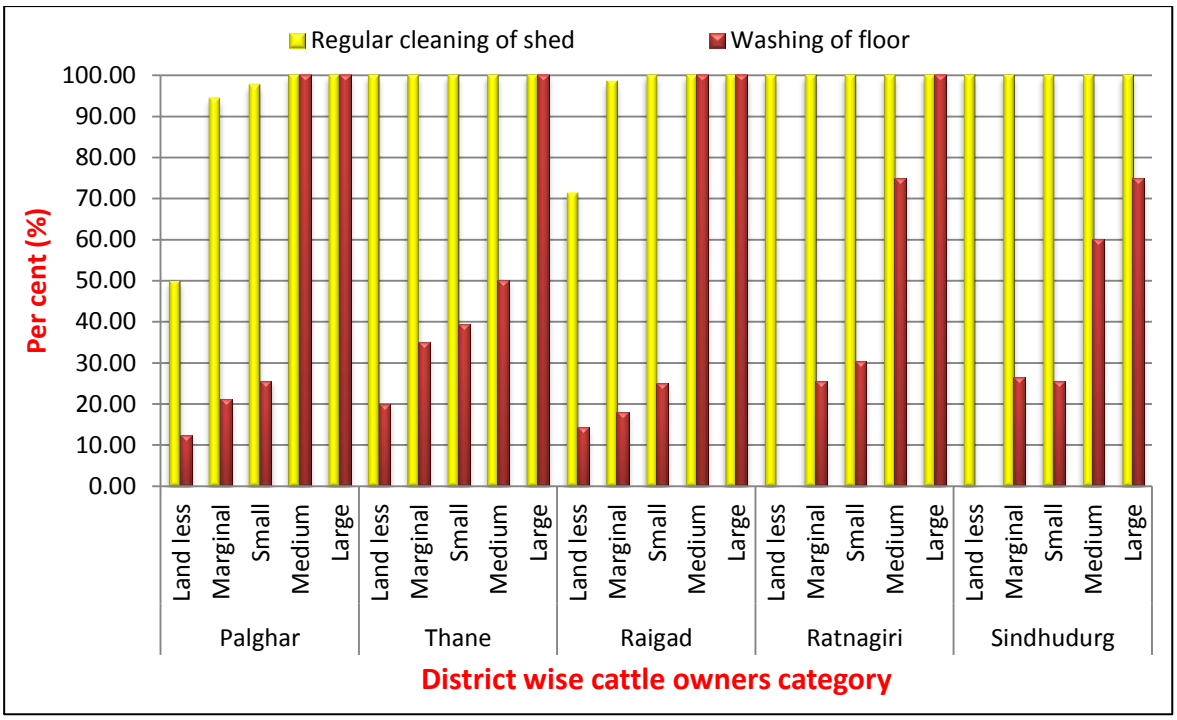


Fig. No. 28: Adoption of regular cleaning of shed and washing of floor in Konkan region

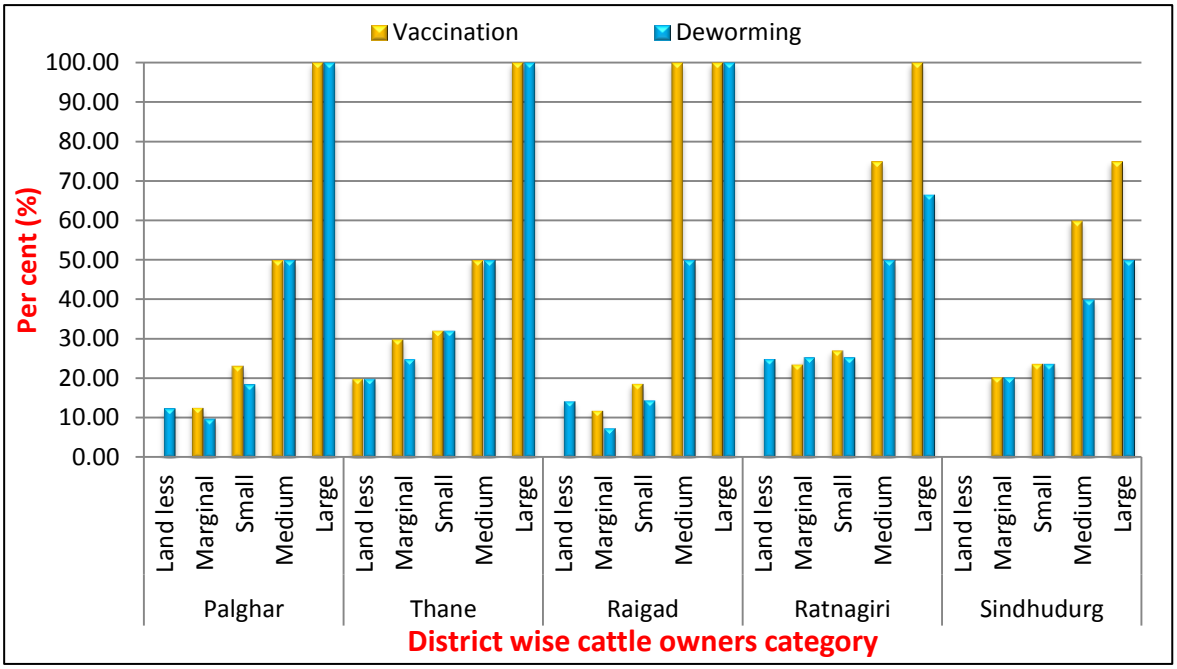


Fig. No. 29: Adoption of vaccination and deworming practice for crossbred cattle in Konkan region

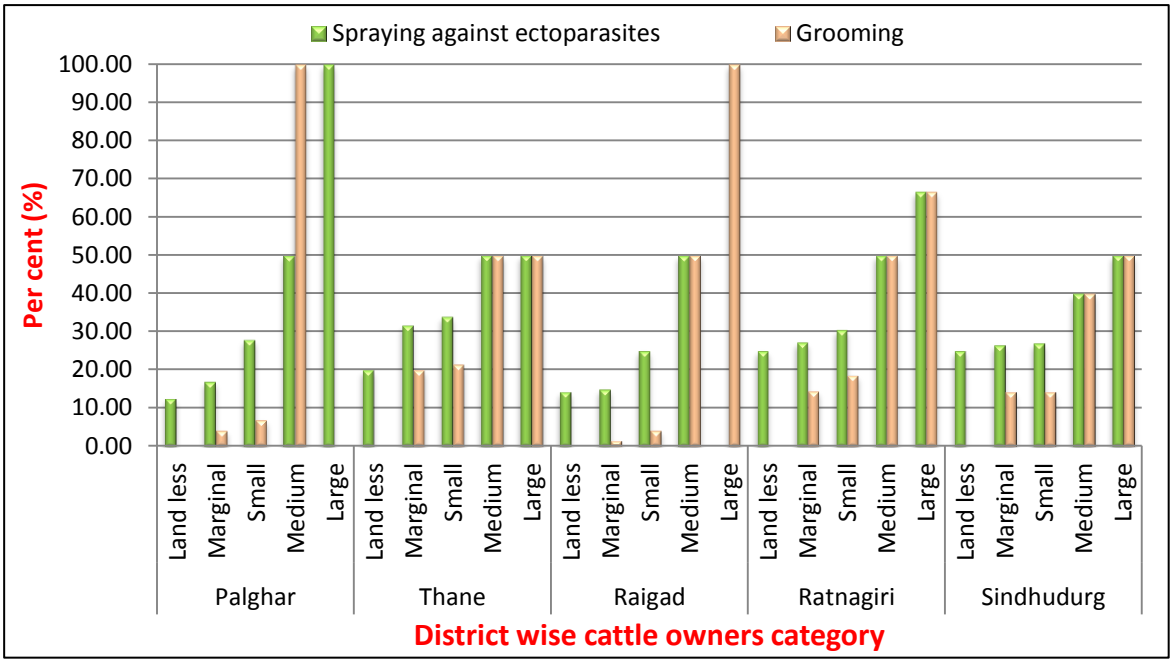


Fig. No. 30: Spraying against ectoparasites and adoption of grooming practice for crossbred cattle in Konkan region

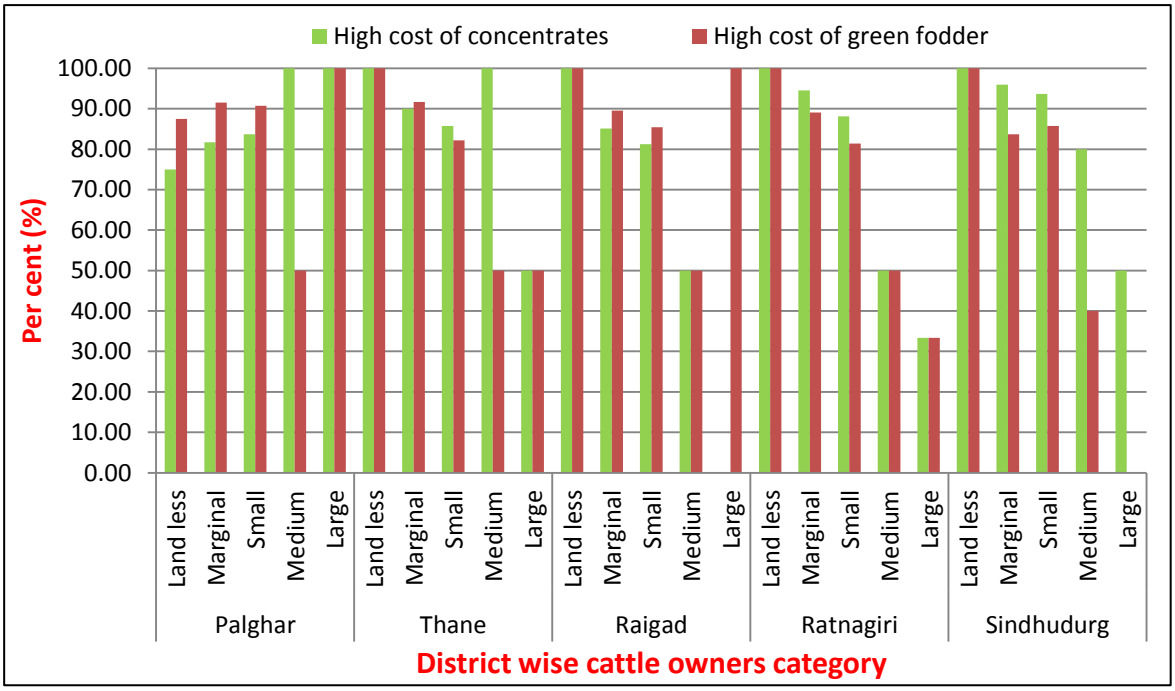


Fig. No. 31: Constraints of high cost of concentrates and high cost of green fodder observed in Konkan region

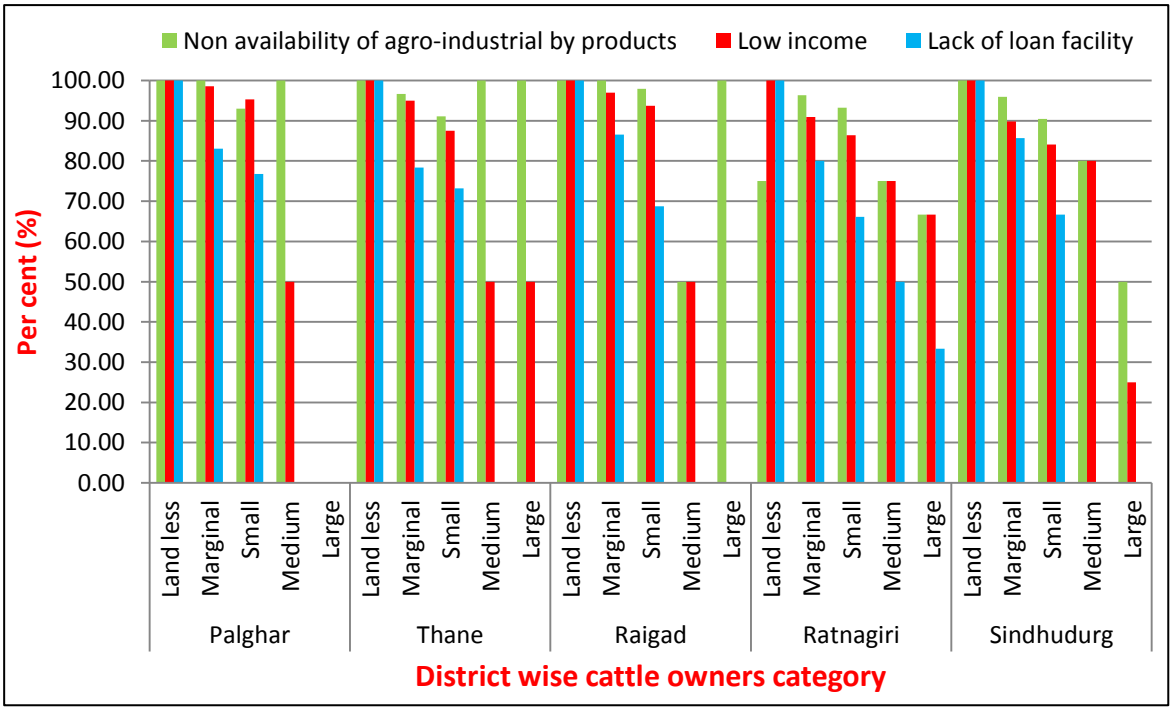


Fig. No. 32: Constraints of non-availability of agro-industrial by products, low income and lack of loan facility in Konkan region

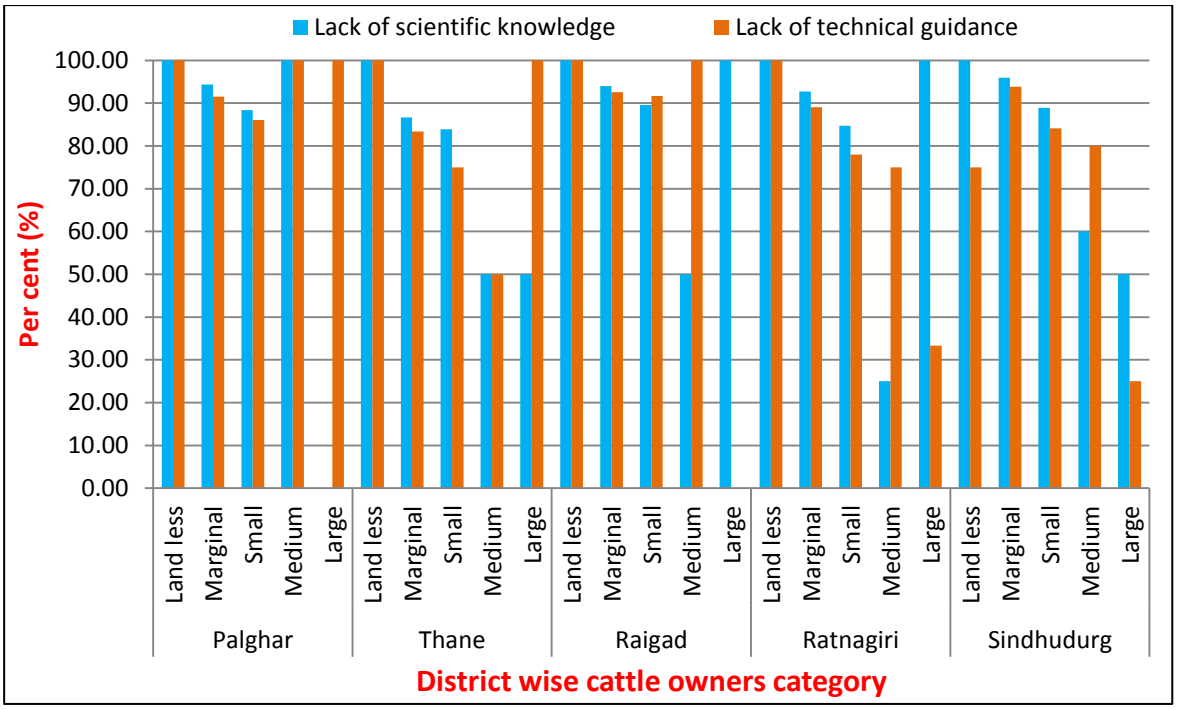


Fig. No. 33: Lack of technical knowledge and technical guidance observed in Konkan region

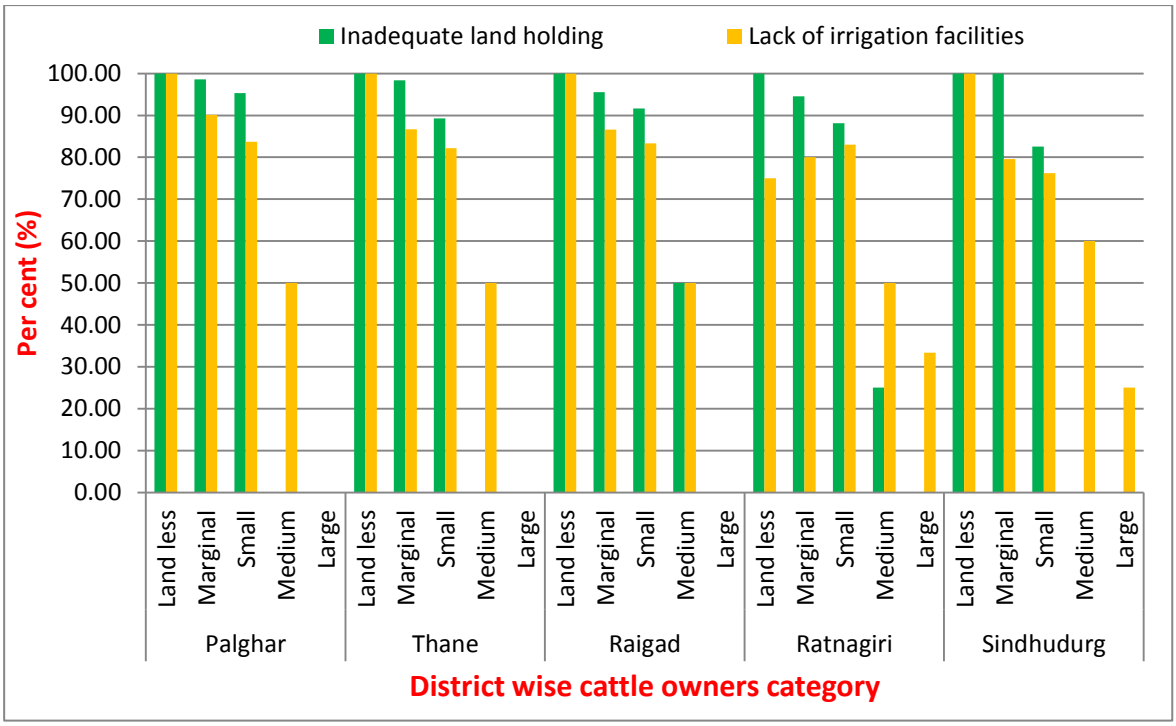


Fig. No. 34: Constraints of inadequate land holding and lack of irrigation facilities in Konkan region

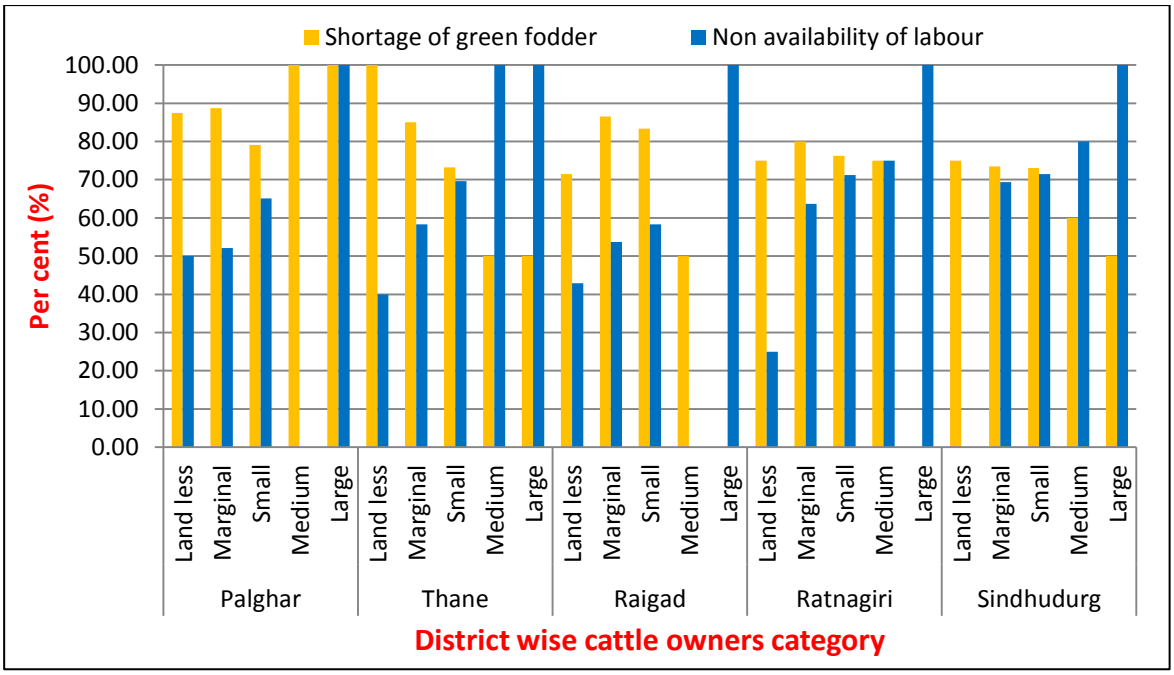


Fig. No. 35: Constraints of shortage of green fodder and non-availability of labour in Konkan region

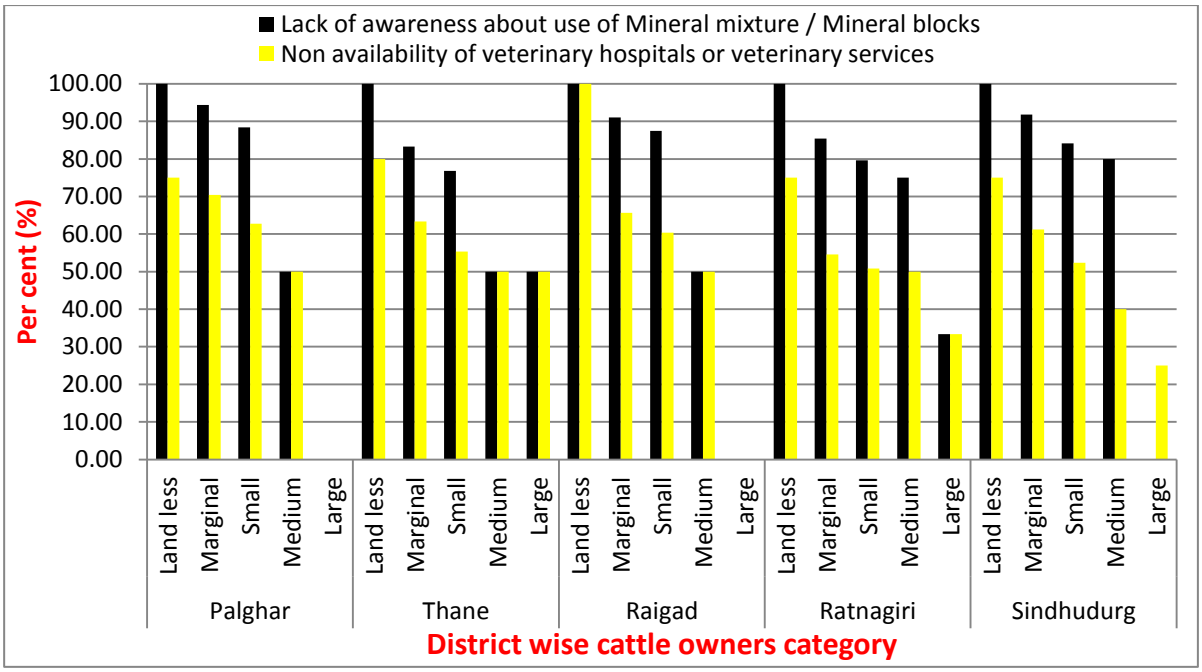


Fig. No. 36: Constraint of lack of awareness about use of Mineral mixture / Mineral blocks and non-availability of veterinary hospitals or veterinary services observed in Konkan region

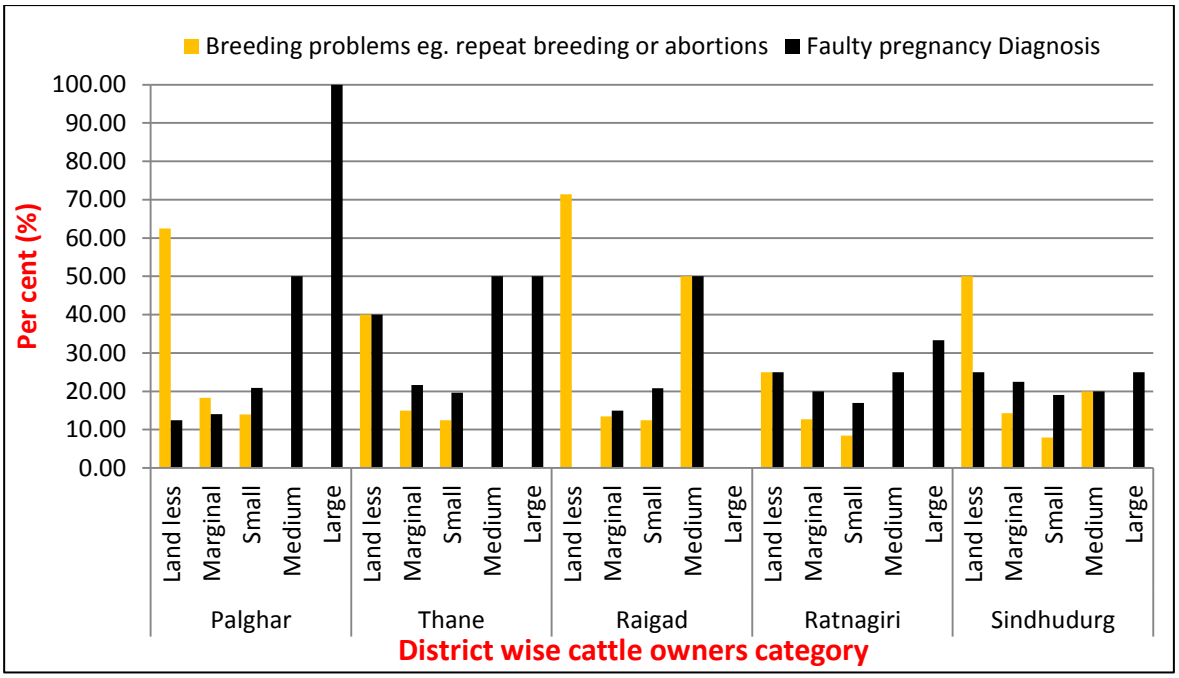


Fig. No. 37: Constraints of breeding problems eg. Repeat breeding or abortions and faulty pregnancy diagnosis observed in Konkan region

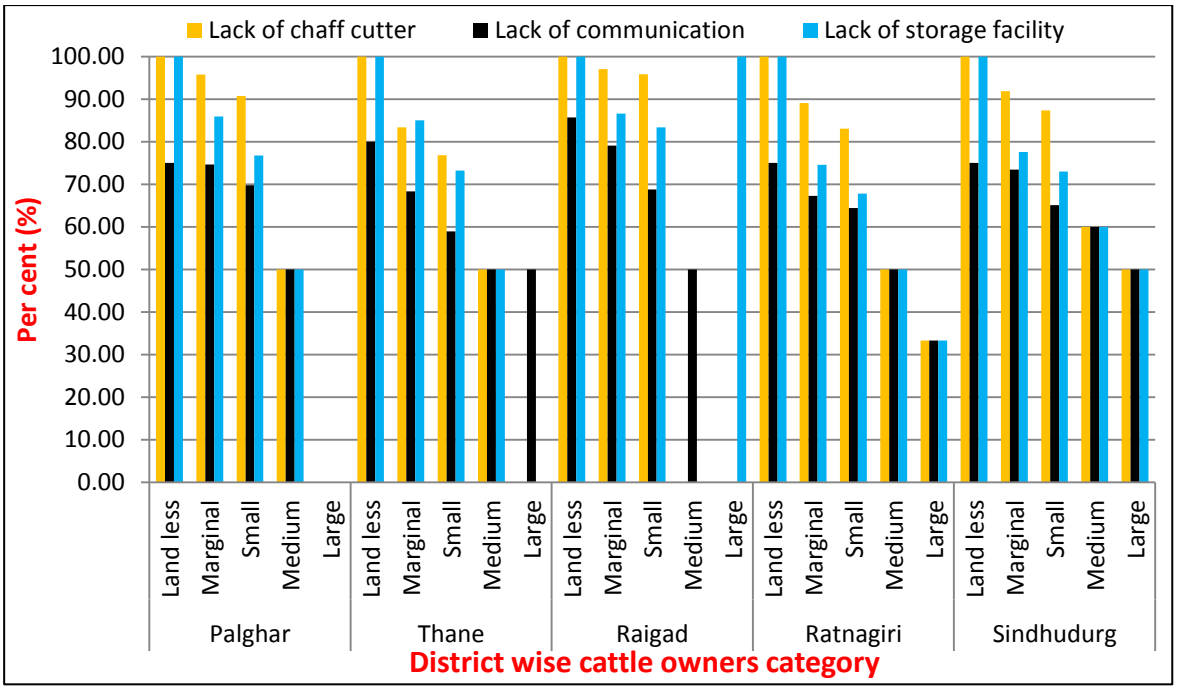


Fig. No. 38: Infrastructural constraints observed in Konkan region

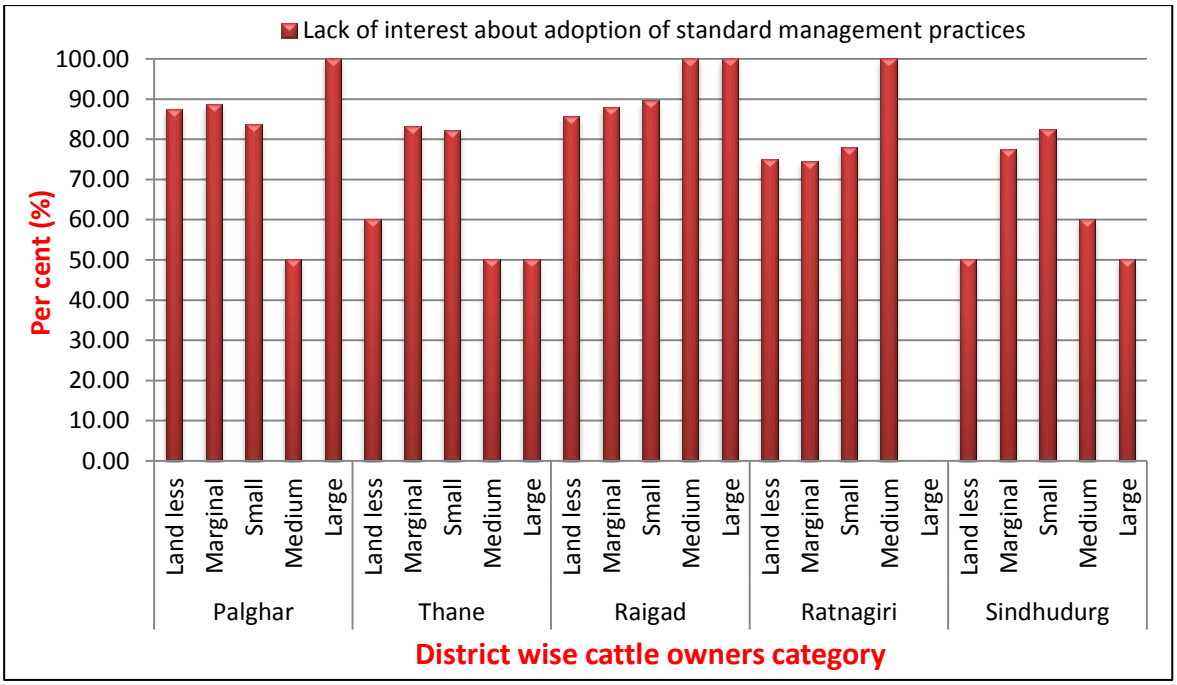


Fig. No. 39: Constraints of lack of interest about adoption of standard management practices observed in Konkan region